

5. CLIMATIC HAZARDS

Reference:

West Coast Regional Council: Natural Hazards Review 2002, DTec Consulting Christchurch (the DTec Report)

Climatic Hazards are caused by one or a combination of:

- A. heavy rainfall
- B. hail
- C. thunder & lightning
- D. strong winds – tornadoes
- E. snow & ice
- F. droughts
- G. wildfires

Past examples of these are:

- a. Heaviest rain recorded on WC found at WCRC rain gauge upper Cropp River. Less heavy rain recorded at Niwa rain gauge at Taipo River by highway
- b. Hail effects on White Heron colony near Whataroa, Press 2001
- c. Thunder & Lightning constant January 1995 in Greymouth area: Snowflake Factory struck/burnt down
- d. Strong winds: Katabatic winds Waiho – Whataroa areas, Nov.1975.
Tornadoes: Small ones occur regularly along coast in vicinity of Hokitika and Greymouth.
- e. Snow & Ice: are a problem in winter at times in Rahu, Lewis, Otira Pass Areas. Problem is usually for road / communication links to West Coast
- f. Drought: Degree of this on WC can be ascertained by scanning rainfall records any year. Example seen in effect on Greymouth water supply over summers of 1998 to 2001
- g. Wildfires: Limited sporadic newspaper data but more in records at Greymouth Fire Station: *(Note also fires due to spontaneous combustion, e.g. of coal)*

NB There is less organized data on Climatic Hazards overall but plenty anecdotally, particularly in Newspaper records. Studies of these hazards lend themselves well to research.

The excerpts on following pages are from DTec Report pp 110 - 119

CLIMATIC HAZARDS

Introduction

The previous chapters have dealt with the more obvious natural hazards in the region. However, there are several other hazards recognised by the WCRC that need consideration at some stage in the future. Most of these relate to climatic hazards. Scattered references are made to some of these in reports on main hazards. There are relatively few published works that deal with climatic hazards in the West Coast Region, either relating to the region alone (e.g. Hessel 1982), or as part of broader surveys of specific hazard agents (e.g. Tomlinson and Nicol 1976). There are numerous newspaper reports of atmospheric and related hazards that could be analysed in a manner similar to that employed by Benn (1990) for flooding, though this would be a large undertaking. However, as an indication of what could be done, searches were carried out for these types of reports relating to the West Coast region in an electronic database of INL newspapers over the last five years (DTec Report, Appendix 5).

In the following sections of this chapter, the information on causes, effects, magnitude, frequency and past research for each type of hazard is presented together in one section on that hazard.

Heavy Rainfall

The existence of very heavy orographic rainfall in the West Coast area has been known for some time but the details of the distribution were not clearly elucidated until Ministry of Works scientists established profiles of rain gauges perpendicular to the main divide in the 1970s. The major finding of these studies was the identification of a zone of very high precipitation just to the west of the main divide (Chinn 1979, Griffiths & McSaveney 1983). At the same time, the earlier work of Robertson (1969) on extreme value analysis of high intensity rainfalls for the country, was extended by Tomlinson (1980). As an example his maps show that for the high precipitation zone just to the west of the central Southern Alps, the 24-hour, 5-year return period rainfall is over 640 mm, far greater than any other part of the country. Whitehouse *et al.* (1985) provided more detail for the central Southern Alps and provided graphs for estimating short period extreme rainfalls from M.A.P. data.

More recently, the processes involved in these very high rainfalls have been the focus of the SALPEX study (Wratt *et al.* 1996) and papers are still being published using the measurements made during the experiment (Ibbitt *et al.* 2000, Revell *et al.* 2002). Because the effects of heavy rainfalls are considered elsewhere in this review under floods and landslides, no further discussion is included here, except to note that in view of the difficulty of obtaining precipitation measurements at suitable resolution, either numerical modelling should be used (Stainer & Auer 1997) or run-off itself be used as the best measure of precipitation amounts (Ibbitt *et al.* 2000). However, there is little doubt that the West Coast Region is afflicted by a higher frequency of severe storm phenomena than most other parts of New Zealand, and the effects of these are discussed in the following sections.

Hailstorms

As indicated by Sturman & Tapper (1996), hailstorms along with thunder, lightning, violent updraughts and downdraughts, and in extreme cases, tornadoes, are typical of an unstable atmosphere in which temperature decreases rapidly with height. Consequently, they are often found in convective cloud cells following the passage of a cold front (Brenstrum 1998). On the West Coast, their formation is enhanced by orographic uplift.

Using newspaper reports, Neale (1977) documented 444 hailstorms throughout New Zealand from 1924 to 1973. Steiner (1989) extended this study to include 118 storms up to 1986 and also examined hail reports from 38 climate stations. The climate station reports revealed that Hokitika Airport had a similar frequency of hail occurrence to Dunedin and Waiouru and that only Invercargill exceeded this frequency. However, the West Coast Region featured less frequently in the newspaper reports with only 17 of the total of 662 considered. This is a complicated function of low population density, lack of susceptible agricultural and horticultural activities and the fact that the climate station data are probably dominated by occurrences of small sized hail. Both Neale and Steiner showed that the western hail region was characterised by low frequencies of hail in autumn and high frequencies in winter and spring.

Three references to hail were found in the INL database over the last five years (Appendix 5); one to the effect of hail on loss of white heron chicks near Whataroa (The Press 27/02/2001), one to hail associated with a tornado at Hokitika (The Press 08/09/2000) and one to a possible hailstorm influence on the loss of a light plane near Haast (The Dominion 11/11/1997).

Thunderstorms and Lightning Strike

Tomlinson (1976) and Revell (1984) analysed the occurrence of thunderstorms throughout New Zealand. Tomlinson noted that by world standards, the frequency of thunderstorms in New Zealand is low. However, the frequency of thunder days is larger on the West Coast than elsewhere in the country. Most of the region can expect 20 thunder-days/year whereas almost all the remainder of the country has less than 15. The average number of thunder days at Hokitika and Westport is 20.5 and 17.0 respectively: This is more than any of the other 23 stations analysed by Tomlinson (1976). There is no clear seasonal trend in thunder occurrence.

Tomlinson (1976) recorded 11 fatalities from lightning strike throughout New Zealand between 1919 and 1975, one of which occurred in Hokitika on 22 February 1937. Cooper (2000) outlined the cause of lightning (tri-polar storm clouds), and noted that such storm clouds often occur off the West Coast, and lightning strikes are seen out to sea, although they were uncommon on land. However, although no detailed analysis has been made, historical records indicate that lightning strikes are common on land, and cause a considerable amount of damage in the region (Cowie 1957, Benn 1990, Appendix 1). From Appendix 1 it can be seen that direct lightning strikes caused considerable damage on at least five occasions between February 1990 and March

1995. Most of this damage was to power supplies (the Dillmanstown Power Station being directly hit on two occasions), although the most serious damage was at the Snowflake Ice cream factory at Coal Creek, which burnt down as a result of a lightning strike.

Rob Daniel (WDC, pers. comm.) noted that lightning strikes were relatively common at the new Hokitika water supply plant, and at telecommunication masts. He said that Telecom did not bother with lightning conductors or other protection methods, due to the frequency of strikes at their masts (i.e. it was cheaper to take the risk and repair damage, than to pay for lightning protection). An example of these types of effects, from the INL database, indicated that in a storm in September 2000 (The Press 12/09/2000, Appendix 5), there had been 200 telephone outages and over 900 customers between Arahura and Franz Josef had been without power for up to six hours on occasions.

The district councils considered lightning strike hazards as low priority (as per Ch. 7 DTec Report).

Strong Winds and Tornadoes

Gale force winds and tornadoes have caused considerable damage in the region and are reasonably frequent occurrences. Numerous cases of damage caused by strong winds are referred to in Cowie (1957), Benn (1990) and Appendices 1 & 5, inferring that strong winds are commonly associated with storms that cause flood events. However there are numerous cases reported where strong winds occur by themselves. Examples of wind damage that can occur are presented in Appendix 1, for 8-12 January 1994, 1-2 October 1996, 29 March 1998, where power and telephone lines were cut by falling trees and poles, roofs were blown off, windows smashed, and small buildings were demolished. Although not as marked as the north west foehn effect to the east of the main divide of the Southern Alps, some synoptic situations may give rise to very strong south east winds. For example, Coulter (1965) reported the uprooting of mature trees in the Waiho Valley by such a wind. Doran (1979) recorded similar effects from a strong south-easterly wind in November 1975 which *killed young stock, brought down trees, unroofed a house and several sheds, and blew the NZR¹ bus off the road*. Ryan (1984) and Russell (1987, 1989) identified turbulence and downdrafts in the region as a hazard to aircraft.

Tornadoes are also a relatively common occurrence in the region, and can cause considerable damage (Rob Daniel, pers. comm., Appendices 1& 5). Seelye (1945) and Tomlinson & Nicol (1976) compiled information on tornadoes reports throughout New Zealand. Seelye (1945) recorded 162 reports from 1919 to 1944, and Tomlinson & Nicol (1976) recorded 236 reports from 1961 to 1975. Tomlinson & Nicol (1976) noted that although the greatest number of reports came from the northern and western parts of the North Island, this probably reflected high population density there.

Consequently, their identification of Buller and north Westland as areas of common occurrence suggested significant numbers in the region. Twenty-seven West Coast region tornadoes were included in the list given by Tomlinson and Nicol (1976), and it is clear that the seasonal and diurnal distribution of tornadoes in the West Coast Region is different to that of the country as a whole. Table 9 shows that whereas the seasonal distribution for the country is relatively even, the West Coast Region frequencies are greatest in winter.

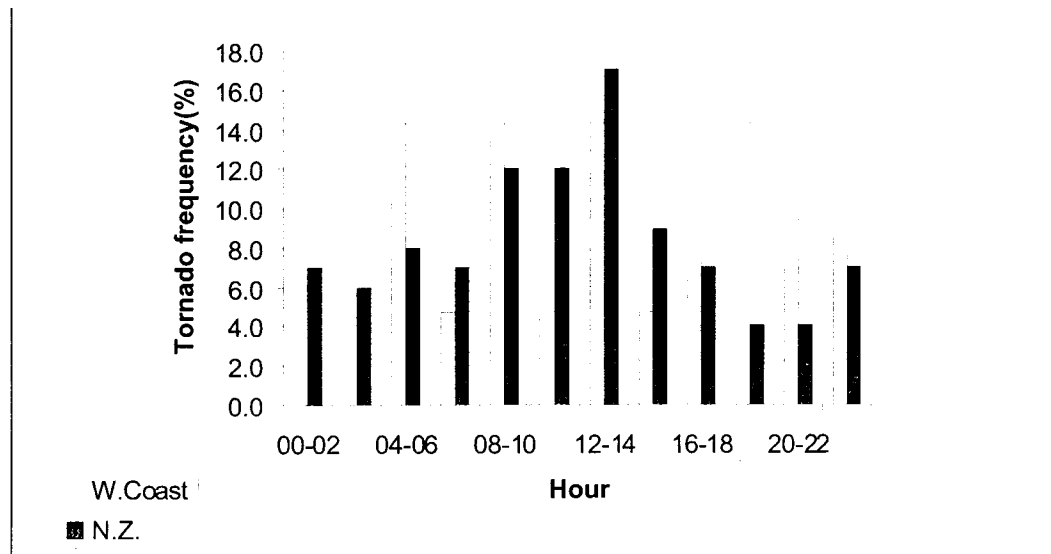
	Summer	Autumn	Winter	Springg
All New Zealand (%) 1961-75	24	25	28	24
West Coast (%) 1961-75	13	25	46	17

The diurnal frequency for the whole country shows a pronounced maximum in the early afternoon whereas the West Coast Region tornadoes are more evenly spread throughout the day except for the very early morning when none have been recorded (Figure 3). As there has been no specific search for historical records, determining the frequency or return periods for such events is impossible until such information is gathered. It was previously mentioned in Chapter 4, that with global warming, an increase in the occurrence and frequency of strong westerly winds associated with El Nino weather patterns could be expected for the West Coast Region.

District Council staff general felt high winds and tornados fell into the mid-lower range of priority for research (as per Ch. 7). INL reports included reference to tornado occurrence in March 2001, January 2000 (water spouts) and March 1998 (The Press 28/03/2001, 26/01/2000, 16/03/1998, Appendix 5).



Figure 3. Diurnal Distribution for New Zealand (n=236) and West Coast (n=24) Tornadoes for 1961-75.



Note: Three West Coast tornadoes are not included in the above diagram as the times of occurrence were not presented by Tomlinson & Nicol (1976).

Snow and Ice

Very little information about snow and ice hazards has been unearthed. Hessell (1982) commented on snowline elevations and observed that snowfalls at sea level are extremely rare north of Haast. There have undoubtedly been some snow avalanche fatalities associated with climbing and tramping at high elevation, for example, a fatality in County Stream in the headwaters of the Waitaha River, reported by Irwin *et al.* (2002). Newspaper reports over the last five years were mainly confined to road accidents and articles relating to the safety on the Otira viaduct during snow and ice conditions.

Drought

Despite the extremely high average annual rainfall in the region, droughts are relatively common (in terms of hazards and inconvenience caused). This is partly a result of the fact that drought is not directly a function of average amounts of rainfall because systems making use of the water become adjusted to the amount available. Thus drought is best defined by some measure of the negative departure from the average conditions — or water that is not available when it is expected to be. One of the earliest droughts in New Zealand's European history was recorded from the West Coast, when in 1867, water supplies to gold mines ran dry, due to a lack of rain (May 1962). Based on meteorological records, Hessell (1982) indicated that dry spells are rare in Westland, especially in the south. Table 10 compares the average number of dry spells (defined as periods of 15 days or more without rain) of West Coast locations to other sites from New Zealand

Table 10. Frequencies of Dry Spells at Selected Stations (Hessell 1982). (A) = No Rain for at Least 15 Days. (B) = Not More Than Imm/dav for at Least 15 Days				
	A,B.	No. of Years	Longest Period (Days)	No. Per Year
Rotorua	A	30	29	0.8
	B	30	33	1.3
Westport	A	17	19	0.2
	B	17	23	0.6
Hokitika	A	103	29	0.4
	B	103	29	0.6
Haast	A	25	20	0.2
	B	25	25	0.3
Milford	A	45	20	0.3
	B	45	20	0.4
Puyseger Point	A	60	15	0.0
	B	60	16	0.1
Christchurch	A	29	25	0.9
	B	29	45	3.0
Auckland	A	107	39	0.6
	B	107	40	1.2

Hessell (1982) also noted that synoptic conditions with a blocking (and relatively stationary) anticyclone to the east of the South Island produced dry spells such as the one which resulted in no rain at Hokitika between 5th and 25th January 1971. Doran (1979) noted a similar occurrence at Whataroa in December 1974 — January 1975, with 21 days of no rain.

Some of the effects of drought in the region are:

- Residents in parts of Greymouth (and other locations) not on reticulated water supplies, often have to get water trucked in, as home water tanks run dry. In extreme cases, such as in March to July 2001, drought conditions caused the contamination of the whole Greymouth town water supply: Low rainfall led to very low flows in the Grey River. This in turn led to a salt-water wedge entering the river and contaminating the town water supply intake area.
- Low river flows can lead to river mouth blockages and subsequent backwater flooding as described in Chapters 2 and 4.
- Long dry periods increase the risk of natural forest and bush fires. Cooper (2000) noted that *Within the Buller District, naturally triggered fires commonly occur in areas where forest undergrowth becomes dry and humidity is low, or where the brush covering becomes tinder dry in the summer months*.
- As river and stream flows reduce, increased pressure on water resource allocation occurs. This is particularly true for the dairy and mining industries that use large quantities of water.

No specific information search or analysis has been undertaken, so the magnitude and frequency of drought occurrence are unknown at this stage.

Five drought references are made in the INL database (The Press 19/02/2002, 21/08/2001, 26/03/2001, 13/03/2001, The Dominion 09/03/2001, Appendix 5).

Staff at both the BDC and WDC considered drought hazard a low priority, whilst Mel Sutherland (GDC) thought that salt water contamination (resulting from dry periods and low river and ground water levels), was of current concern (see Chapter 7).



There ARE dry spells on the West Coast. These two pictures were taken in South Westland in August 2003 when there was a long period without rain. The top one is a small unnamed creek on the Wanganui River Flats and the lower one is Matainui Creek at Whataroa.

Wildfires

Most studies of regional fire hazard in New Zealand place the West Coast Region in a low hazard class because of ample rainfall, high humidity and a relative lack of strong winds during dry periods (Kerr & Hunter 1986, Pearce 1996). However, as shown in the drought section, some synoptic situations can give rise to long dry spells that may lead to significant fire danger. Consequently scrub and bush fires may pose significant problems in some years. For example, Arnold (1994) noted that in 1886:

At Greymouth the Grey River Argus of 11 January told of fires on that coast where none had been seen before, far from any settlement. The masters of coasters reported the smoke of bush fires all along the coast between Nelson and Greymouth.

Cooper (2000) noted that in the Buller District during 1998, 57 fires were notified, with most of these occurring in the Charleston and Whitehorse areas. Cooper stated:

Historic documentation of fires has not been included in the WCRC Hazards Register due to the sheer volume of data (held by Alan Flux at the Greymouth Fire Station). This data needs to be included at a later date, as it may be possible to predict areas that are most at risk.

Attempts were made during this project to obtain the information but it was not readily available at the time of writing. Mel Sutherland of the GDC (pers.comm.) thought that there was an increasing risk of rural fire hazards (maybe accidentally started), due to an increased development of rural lifestyle blocks. That is because development is encroaching into natural bush-clad areas.

INL reports referred to bush and scrub fires in March 2002, February 2002, January 2000, December 1998 and January 1997 (The Press 28/03/2002, 19/02/2002, 21/01/2000, 01/12/1998, 07/01/1997, see Appendix 5).

The main effects of natural fires are probably to the rural landscape (forests, scrub etc), although in some locations, houses, power and telephone pole/lines may be at risk (for example, the lower bush-clad slopes in Greymouth).

Fire information is obtainable from various sources (NZ Fire Service, District Councils, Dept. of Conservation), and efforts should be made to obtain it, to help identify areas prone to fire hazards and to assist in emergency management.

Resource Example 1.

Excerpts from flood data material held for 1940 –50's at West Coast Regional Council (EIG/John Benn) reporting strong winds. The same material could be researched for heavy rainfall, thunderstorm, snow and ice, drought, wildfire events etc.

Strong Winds

10 JUNE 1941

An exceptionally heavy rain, accompanied by a violent northerly gale, caused floods in the Hokitika area. Backed up by spring tides, an extremely heavy flood occurred in the Hokitika River, which flooded the low-lying parts of the town. No serious damage occurred, however. At Greymouth 29mm was recorded in twenty-four hours. Though there was only a slight rise in the Grey River, the smaller streams in the district rose rapidly and low-lying parts of Greymouth were flooded. Damage was mainly from the gale-force winds which accompanied the storm.

2 - 13 AUGUST 1946

The whole of the West Coast was swept by a north-west gale accompanied by a severe electrical storm and heavy rain. The area experiencing the most severe storm was Otira, where 190mm of rain was recorded in twenty-four hours. The torrential rain was associated with a wind of cyclonic force, which ripped the roof off the Otira school, overturned a transformer house and railway huts, and tangled overhead wiring systems. In Greymouth the rainfall was much lighter, only 47mm being recorded in the twenty-four hours, and only minor damage was done by the wind. The Grey River was in moderate flood, although at Kaimata, where 58mm of rain fell in twenty-four hours, the Arnold River was in high flood. The most serious damage was the washing away of two complete spans of the combined road and rail bridge at Larrys Creek, north of Reefton. Numerous slips occurred on the Reefton-Westport line, and one occurred on the Midland line at Nellies Creek, near Jacksons. Both the Otira Gorge and the Lewis Pass highways were blocked by slips, but the interruptions were of only a short duration.

17 - 18 JULY 1951

Gale force winds and heavy rain brought all rivers in the Grey district into flood. For twenty-four hours 211mm of rain fell at Otira, and at Karoro 107mm fell in the same period. The Grey River rose to within 1.5m of the wharf at full tide, but it caused no damage. The Otira Gorge was blocked by slips, and surface flooding also blocked other roads, but no serious damage was reported from any district.

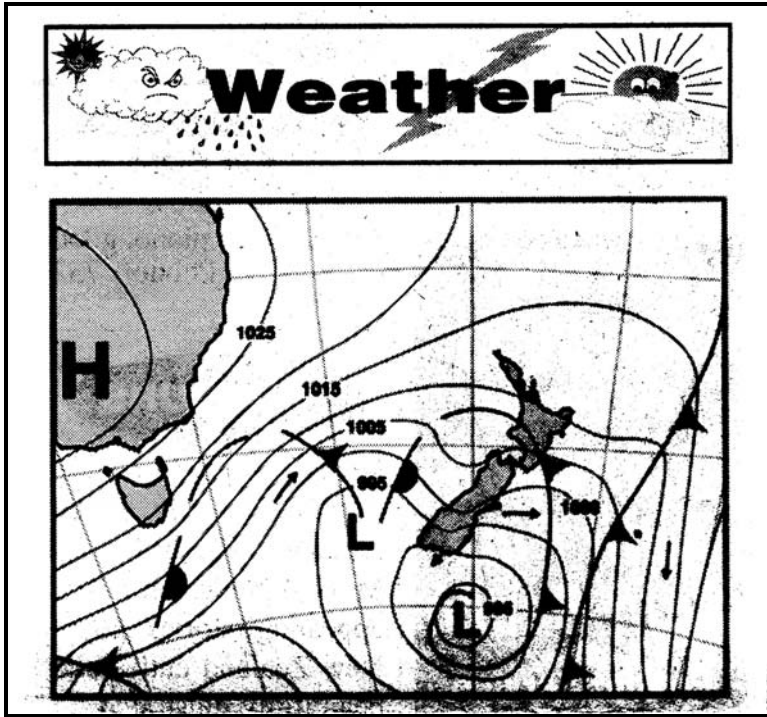
28 MAY 1958

A storm of cyclonic force struck the West Coast. The Midland Railway line was cut by washouts and slips at Rocky Creek and Coomb's culvert was also washed out. At the Reefton Saddle, a slip blocked the entrance to the Tawhai Rail Tunnel. Strong winds cut power and telephone lines and de-roofed many houses over a wide area (G.E.S. 28/05/1958).

Resource Example 2.

Newspaper items about the same "twister" event.

a) **Weather Map** Services for June 6th 2003 issued by Blue Skies Weather & Climate Ltd



Situation: A trough of low pressure is moving over New Zealand today with a strong cool westerly airflow. Further fronts will move over the country in the next few days, with the airflow tending southwesterly and becoming colder. A strong westerly flow is expected to re-develop by Thursday then ease on Saturday. Forecast for the West Coast: Showers easing tonight, but still mostly cloudy tomorrow with further showers at times during the day. Cold, with fresh westerly or southwesterly winds. Showers clearing and fine periods increasing tomorrow night. Fine with sunny periods at first on Wednesday, but cloud increasing again during the day and showers developing by evening. Westerlies freshening. Cloudy with showers again on Thursday and Friday. Some heavy showers with thunderstorms and hail possible in south Westland on Thursday, and elsewhere on Friday. However, fine periods increasing later on Friday and showers clearing by Friday night. Becoming colder, with strong gusty westerlies tending southwesterly. Fine on Saturday with light westerly winds. Northerlies freshening on Sunday with cloud increasing and rain by Sunday night. (*Greymouth Evening Star*)

b) News Report, THE PRESS, Christchurch, Friday February 21, 2003

Mini-twister sucks up pet, twists iron fence

A dog was plucked off the ground and whipped 100m through the air by a mini tornado that struck Hokitika on the West Coast.

Britz, a large Rhodesian ridgeback, was in his owners' garden when the twister hit just after 7 pm on Wednesday.

After a harrowing 30 seconds, his owners Sherry and John Spark went outside to find the yard wrecked and Britz missing.

A neighbour saw the tornado jump something in the bush, but a search of the area failed to find him.

"we were all out looking for him. It was awful. He came home at five (yesterday) morning pretty shaken up," Mrs

Spark said. "If only he could talk. I was absolutely terrified," Mrs Spark said. It sounded like freight train coming."

The tornado ran along the back of the Sparks' property. It twisted corrugated iron and the left fence buckled in waves.

"I never want to experience anything like that again," she said.

It lifter a garden shed off it's foundations, and smashed windows on properties. The bulk of the garden shed was dumped two streets away.

■ NZPA

■



The Greymouth Evening Star

TUESDAY JUNE 17, 2003

Tornado started as two waterspouts

Yesterday's tornado started out as two small waterspouts in the Blaketown Lagoon, leaving eyewitnesses shocked at the damage it went on to do.

Talley's worker Aldous Kelly was standing by the chiller when he saw two waterspouts forming straight off the wharf. They soon joined up and "took off," heading inland.

Even then, Mr. Kelly said it looked more like a "little wave" than anything else, and was only a few metres high.

"It didn't look spectacular, although the roar of the wind sounded it (spectacular)."

Mr Kelly said he was definitely surprised when he saw the damage the "little wave" had done as it cut a path through the lower end of town.

Colleague Jonathan Rodden confirmed there were two small spouts which formed into one. Only when he looked behind him did he realise how powerful it was.

"I went out the back and there was tine in the air, like it was cardboard."

Yesterday's tornado was the latest of several high profile ones to hit the West Coast. Earlier this year a dog was carried away from its Hokitika home, and shortly after Marlborough Street homes were hit.

Prior to that residents of Rapahoe, Barrytown and Serpentine experienced a twister first hand.

However both the MetService and National Institute of Water Atmospheric Research (Niwa) deny they are becoming more frequent.

Niwa meteorological hazard researcher Warren Gray said he was not aware of any data to suggest the occurrence in urban Coast areas was increasing

"They are relatively rare events, but they do turn up in bunches quite often which surprises people."

MetService chief forecaster Rob Stainer agreed there was no data to suggest they were more frequent.

"Short term memory is lot more powerful than long term memory," he mused.

Mr. Stainer said tornadoes occur when you get strong thunderstorms. Cold air moved over the warmer ocean, hail and rain dragged the cold air down, accelerating as it went.

The result was either what's called down burst or a tornado.

Although the big ones have wind speeds of up to 800 kilometres an hour, Mr Stainer said you never that magnitude of tornado here.

Twisters are more common on the Coast simply because there are more thunder storms – more than 500 lightning strikes were recorded here and out to sea during yesterday's storm.

d) Digital photographs by Greymouth Evening Star reporter *Doug Sail* about the twister damage. These pictures were used to illustrate articles in the Greymouth Evening Star, the West Coast Times and the Christchurch Press.



Greymouth Evening Star part article Friday February 21st 2003: “It (the twister) departed as quickly as it came but blew out a big portion of our fence (pictured) – snapping concrete posts at the base -, lifted tiles off a neighbour’s roof, carted off another neighbour’s trampoline and either picked up Jazz (their black Labrador dog) or sent her scurrying for cover.”



Christchurch Press caption Thursday February 20th 2003: “ Windblown: John Spark surveys his barbecue and materials normally found inside his garden shed. The shed and his dog were carried away in a tornado

Resource Example 4.

Newspaper article proof of drought occurrence on the West Coast.

a) Excerpts from the Grey River Argus in the summer of 1871 when mining ground to a halt, particularly on sluicing claims, due to a long spell of weather

Thursday January 26th

The Ahaura township is now suffering from the general depression, but scarcely to the same extent as some of the mining townships. It would be almost an impossibility to make the Ahaura any duller than it usually is, but this scorching weather effectually keeps the streets clear. The thermometer has been ranging 83degrees to 96degrees [Fahrenheit] in the shade for the last ten days, and there is not at present any sign of a change in the weather. The representatives of the several Banks are doing are still doing a “freeze out” or rather a “melt down” in this hot weather.....

The farmers on Totara Flat are busy with the harvest and if the miners have reason to complain of the want of rain the farmers on the contrary, ought to be thankful for the glorious spell of fine weather they have had. As a ruel the crops are later, and not aso heavy as they were last year The Napoleon district has utterly collapsed and the township has a most miserable appearance. More than one hald the business places, or what were such, arew shut up, or turned into stables, and the grass might be said to be growing in the streets, except that it won’t grow, the place is so poor.....

.....The want of water is very much felt here, although not to the same extent as it is in other localities. All the paddocks are filled to bursting with wash-dirt, and some of the claimholders have been compelled to enlarge their receptacle for wash-dirt. The water-races are nearly all dry, and consequently some of the [water] wheels are lying idle for want of motive power.

Thursday February 23rd

The long drought that has occurred on the West Coast Gold Fields has resulted in very disastrous consequences. For the last two months a great proportion of the mining population has been compulsorily idle through failure of the available natural water supply, and the losses thus sustained will be over-estimated if we put their amount down at the enormous sum of 100,000 pounds. It may be fairly estimated that between four and five thousand miners on the whole of the West Coast have been either altogether idle or working without any remuneration for fully eight weeks.....

.....The situation is full of grave fears for the progress and prosperity of the Gold Fields of the West Coast, and should impress upon minds of all concerned the necessity of endeavouring to meet the difficulty. Pre-eminent amongst the means for placing the mining interest on a more secure footing is the provision of abundant water supply, by means of large races, dams, and reservoirs.

b) The Christchurch Press reporting on 13/3/2001 on Greymouth's "water woes" of the summer of 2000 – 01. The town had already had two dry summers prior to and together with a measurable rise in sea-level of 10cm at the local wharf, this latest dry period proved the nail in the coffin for the town's water supply. For six months townspeople had to collect drinking water from a tanker in the council's car-park, with water being brought from outlying districts. Many townspeople were singularly unimpressed with the district council's management of the whole saga, local industry battled to keep appliances and machinery up and running and the local plumbers had a field day.

Faulty, salty water for Greymouth taps

by Paul Madgwick

in Greymouth

A decent rainfall is needed to beat water-quality problems with the Greymouth town supply as the West Coast endures its driest summer since 1891.

The Grey District Council yesterday apologised for deteriorating water quality at the weekend, that left tap water salty and undrinkable. A different problem existed in country areas, where household tanks were running dry, keeping truck tankers busy replenishing supplies.

Council chief executive Paul Pretorius blamed Greymouth's weekend water –woes on an abnormal demand for water, because of the large number of visitors in town, and a breakdown in the pumping system. Urgent steps had been partially successful, and the taste had improved. The town supply is taken from the Grey River's tidal area, just above the Cobden Bridge, and increasingly has been subject to inundation from salty tidal waters, especially with the low river levels and high tides.

As a short-term move, the council has been withdrawing water only at low tide to try to avoid the tidal waters. However, the pumps failed at the weekend.

"At least one withdrawal took place outside of low tide, introducing high chloride content water into the system," Mr Pretorius said. "The situation is regrettable and I offer my apology for the contribution that the failure in the pump-management protocol has made to the problem."

He acknowledged the salt water intrusion affected the taste and had health implications. Results were awaited from water tests taken in the weekend.

Last year, the council appointed engineering consultants to find a permanent solution after a continually salty water content caused a rash of blown hot water cylinders across Greymouth, and caused concern for the brewery and hospital.

Mayor Kevin Brown said the only feasible long-term solution was a new source, which would take time and money. Meanwhile, a temporary new intake, using different technology was due to be trialled this week.

"In the meantime it is suggested that we should; recognise water as a scarce commodity 'and should all use it sparingly," Mr Brown said.

Resource Example 5.

Wildfires on West Coast: Burning coal seams

Human development such as mining and farming can expose natural resources such as coal and grass hay or silage to spontaneous combustion given the right combination of warmth, air and water. Lightning can also play a part here although most coal fires are not a result of this. As of 2004 there are three burning coal seams on the West Coast.



Coal seams on fire have burnt quite a large area in the hills behind Nine Mile near Rapahoe. Mining in the Strongman No 2 Mine exposed coal seams near the surface which caught fire spontaneously. Putting such fires out is very difficult and they often burn for many years. *WCRC Collection*

Climatic Hazard References

General Information

The NZ Weather Book: by E. Brenstrum, 1998, Craig Potton Publishing, Nelson

Natural Hazards in New Zealand: compiled by I. Speden and MJ Crozier for NZUNESCO 1984. Part A: Scientific Topics – Weather Related Hazards. Good overall resource.

Climate Change Hazards & Meteorological Hazards (cards): produced by Greater Wellington (Regional Council) for Emergency Management Education. Concise and user friendly.

Tephra Magazine, June 1997, Vol.16: All articles on Storms. Excellent technical information but limited West Coast Information.

Avalanche Accidents in Aotearoa: D Irwin, W McQueen & IF Owens, 2002, NZ Mountain Safety Council publication

A Climatology of Severe Hailstorms in New Zealand: AA Neale, 1977. NZ Meteorological Service Technical Note. Miscellaneous publication 115. 44pp

Mountain Safety Council of New Zealand re Avalanches & Snow Records

Regional Information

WCRC Natural Hazards Review, 2002: relevant section of report prepared by Dtec for WCRC. Available through EI Officer.

A Chronology of Flooding on the West Coast, 1846 – 1990: WCRC Report by JL Benn, 1990. Access report through WCRC EE Officer.

The Frequency of High-Intensity Rainfalls in the Central Southern Alps, NZ. IE Whitehouse, 1985, Journal of the Royal Society of NZ, Vol. 15, pp 231 – 226

Records of West Coast Fires: compiled by Alan Flux, held at Greymouth Fire Station.

Grey River Argus: back copies for research on microfilm at Greymouth District Library

Greymouth Evening Star: back copies for research held at the Star Office, Greymouth

West Coast Times, (Hokitika): back copies for research held at Star Office, Greymouth

WCRC: assorted news clipping folders on climatic/ other hazards. Apply to EI Officer

Westport News: back copies held at the News Office, Westport

Climatic Hazard Websites

General Information Sites

- www.naturalhazards.co.nz Expert consultants, engineers re disaster prevention, mitigation, recovery
- www.gns.cri.search/index.asp All forms of Climatic Hazard can be searched with the Institute of Geological & Nuclear Resources archives.
Enter key words at SEARCH and then download as pertinent. Quick way of finding information.
- <http://archive.greenpeace.org/~climate/database/recordszgppz0715.html> Short note regarding potential effects of climate change on NZ weather, esp. re heavy rainfall.
Has two other excellent references to papers on same issue.

Regional Information Sites

- www.wcrc.govt.nz Search website or apply to EI Officer for relevant online information.
- www.alliedpress.co.nz/greymouth Greymouth Evening Star Office: this holds back - copies of this paper, the Westland Times and Messenger For research into chosen hazard on West Coast.
- www.natlib.govt.nz Access NZ Microfilmed Newspapers Index for research into chosen hazard on West Coast
- www.library.christchurch.org.nz Has a large database of information in the Aotearoa Centre which could be useful for research into chosen hazard on the West Coast
- www.bullerdc.govt.nz/libraries.html Buller District Library services: useful for local research.
- www.westlanddc.govt.nz/index.cfm/libraries Westland District Library services: useful for local Research