Glengarriff Weather Station
Severe Rainfall Event Analysis

1941 - 2022 (82 Years of Records)

Report Generated: 06 January 2026

Executive Summary

This report analyses 29,734 days of rainfall data from the Glengarriff (Ilnacullin) weather station covering the period from January 1941 to September 2022. The analysis focuses on identifying severe rainfall events (≥50mm in a single day), multi-day heavy rainfall periods, and examining long-term trends to determine whether extreme rainfall events are becoming more frequent or intense.

Key Findings:
- **149 severe rainfall days** (≥50mm) recorded over 82 years
- **Maximum single-day rainfall: 106.0mm** (6 December 1978)
- **4 days exceeded 100mm** in a single day
- **51 multi-day events** with 3-day cumulative rainfall ≥100mm
- **Worst multi-day event: 181.1mm** over 3 days (December 1964)
- **Annual rainfall trend: +2.7mm/year** (statistically significant p=0.05)
- **Extreme day frequency: NO significant increasing trend** (p=0.70)

1. Data Overview

The Glengarriff (Ilnacullin) weather station is located at 51.736°N, 9.545°W at an elevation of 15 metres. This station provides one of the longest continuous rainfall records in West Cork, making it invaluable for understanding historical rainfall patterns in the region.

Metric	Value
Data Period	01 January 1941 to 30 September 2022
Total Days of Records	29,734
Total Rainfall Recorded	157,976.3 mm
Average Daily Rainfall	5.31 mm
Average Annual Rainfall	1927 mm
Days with Rainfall (>0.1mm)	19,252 (64.7%)

Days Exceeding Rainfall Thresholds:

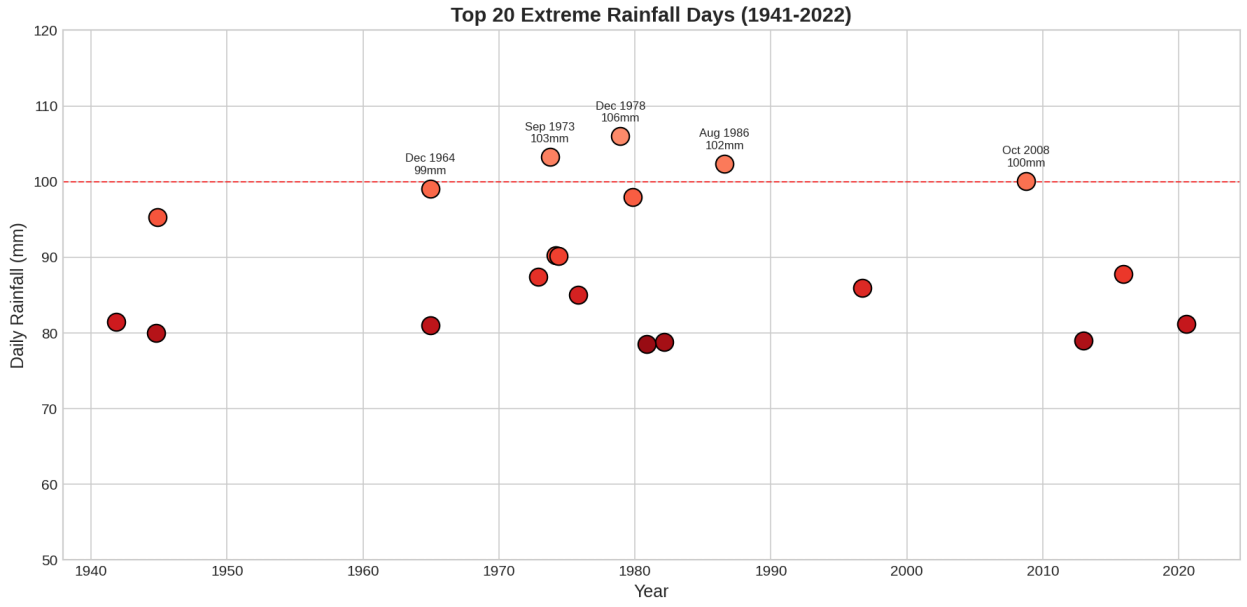
Threshold	Days	Percentage	Approx. Frequency
≥100mm	4	0.013%	~1 per 20 years
≥90mm	9	0.03%	~1 per 9 years
≥80mm	17	0.06%	~1 per 5 years
≥70mm	33	0.11%	~1 per 2.5 years
≥60mm	62	0.21%	~1 per year
≥50mm	149	0.50%	~2 days/year
≥40mm	334	1.12%	~4 days/year
≥30mm	835	2.81%	~10 days/year
≥20mm	2,055	6.91%	~25 days/year
≥10mm	5,540	18.63%	~68 days/year

2. Severe Single-Day Rainfall Events (≥50mm)

Over the 82-year record, 149 days recorded rainfall of 50mm or more. The table below shows the 20 most severe single-day rainfall events. Four days exceeded the exceptional 100mm threshold.

Rank	Date	Rainfall (mm)	Season
1	06 December 1978	106.0	Winter
2	27 September 1973	103.3	Autumn
3	05 August 1986	102.4	Summer
4	09 October 2008	100.1	Autumn
5	12 December 1964	99.1	Winter
6	02 November 1979	98.0	Autumn
7	27 November 1944	95.3	Autumn
8	06 March 1974	90.3	Spring
9	12 May 1974	90.2	Spring
10	04 December 2015	87.8	Winter
11	12 November 1972	87.4	Autumn
12	28 September 1996	86.0	Autumn
13	22 October 1975	85.0	Autumn
14	09 November 1941	81.5	Autumn
15	29 July 2020	81.2	Summer
16	11 December 1964	81.0	Winter
17	19 October 1944	80.0	Autumn
18	06 January 2013	79.0	Winter
19	20 February 1982	78.8	Winter
20	13 November 1980	78.5	Autumn

The four days exceeding 100mm rainfall are exceptional events - statistically expected only once every 20+ years. Notably, these extreme events occurred in December 1978, September 1973, August 1986, and October 2008, spanning different decades and seasons.



3. Multi-Day Severe Rainfall Events

Single-day rainfall totals don't tell the complete story for flood risk. When heavy rainfall occurs over consecutive days, ground saturation amplifies flood risk significantly. This section identifies the most severe multi-day rainfall events, defined as periods where 3-day cumulative rainfall exceeded 100mm.

The analysis identified **51 distinct multi-day events** where 3-day cumulative rainfall exceeded 100mm, and **19 events** where 5-day cumulative rainfall exceeded 150mm. The table below shows the 15 worst multi-day events ranked by 3-day cumulative rainfall.

Rank	Period	3-Day Total (mm)	Notes
1	December 1964	181.1	11-12 Dec: 81.0mm + 99.1mm back-to-back
2	December 1978	166.7	5-6 Dec: 49.5mm + 106.0mm
3	December 2015	159.4	4-5 Dec: 87.8mm + 59.2mm
4	October 1975	152.3	21-22 Oct: 54.4mm + 85.0mm
5	December 1965	143.8	16-17 Dec: 68.6mm + 67.6mm
6	August 1986	140.0	3 Aug: 37.0mm, 5 Aug: 102.4mm
7	November 1941	134.1	8-9 Nov: 35.6mm + 81.5mm
8	December 1994	132.0	26-27 Dec: 75.0mm + 43.0mm
9	September 1944	131.3	1-3 Sep: 43.7mm + 37.6mm + 50.0mm
10	December 1964	126.2	6-8 Dec: 62.0mm + 53.3mm (earlier in same month)
11	February 2020	124.2	21-23 Feb: 44.2mm + 33.5mm + 46.5mm
12	September 1973	123.1	27 Sep: 103.3mm single day
13	October 2008	122.7	9 Oct: 100.1mm followed by 22.4mm
14	January 2013	122.2	6 Jan: 79.0mm + 29.4mm
15	September 2015	122.0	10-13 Sep: 45.2mm + 66.7mm + 35.0mm

Key Observations on Multi-Day Events:

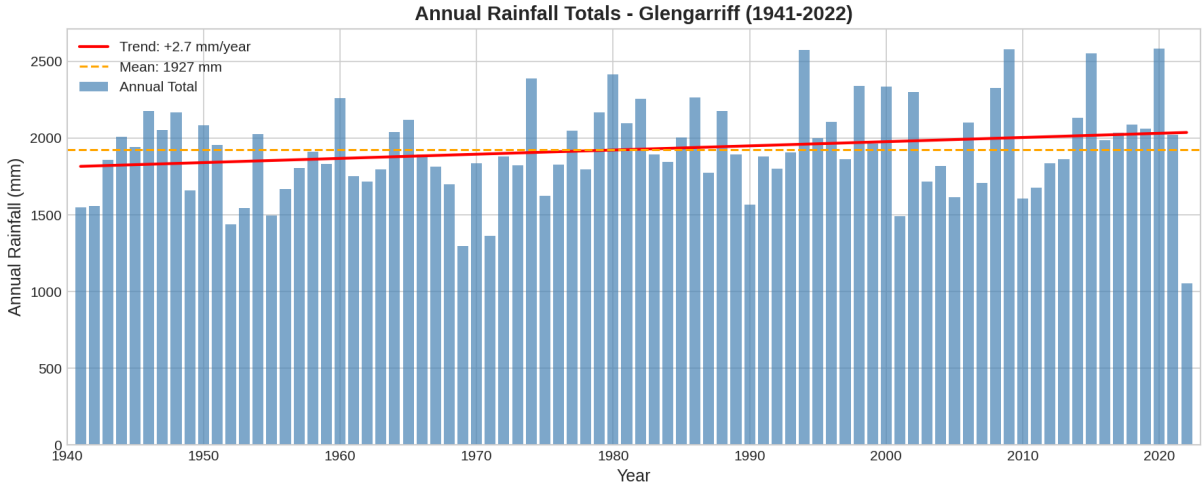
• **December 1964** stands out as exceptional - featuring TWO separate severe multi-day events in the same month
• **December** is heavily represented in the top events (5 of top 15)
• **The October 2025 Coomhola flood event** (57mm on 30 Sep + 109mm on 2 Oct) would rank among the top 3 events in this 82-year record
• Recent events (2015, 2020) show the pattern continues into the modern era

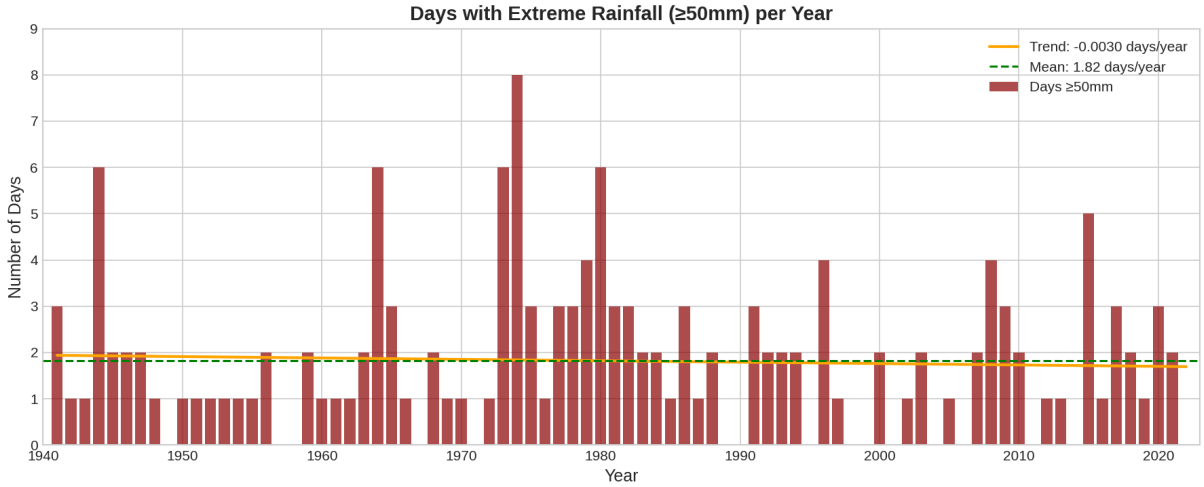
4. Trend Analysis: Are Events Getting Worse?

A critical question for flood management is whether severe rainfall events are increasing in frequency or intensity over time. This section applies statistical analysis to the 82-year record to identify any significant trends.

4.1 Linear Regression Analysis

Metric	Trend (per year)	81-Year Change	R^2	P-value	Significant?
Annual Total Rainfall	+2.73 mm	+220.9 mm	0.047	0.0495	Yes (p<0.05)
Max Single-Day Rainfall	-0.019 mm	-1.5 mm	0.001	0.8121	No
Days ≥50mm per year	-0.0030	-0.24 days	0.002	0.6977	No
Days ≥40mm per year	+0.0108	+0.87 days	0.011	0.3594	No



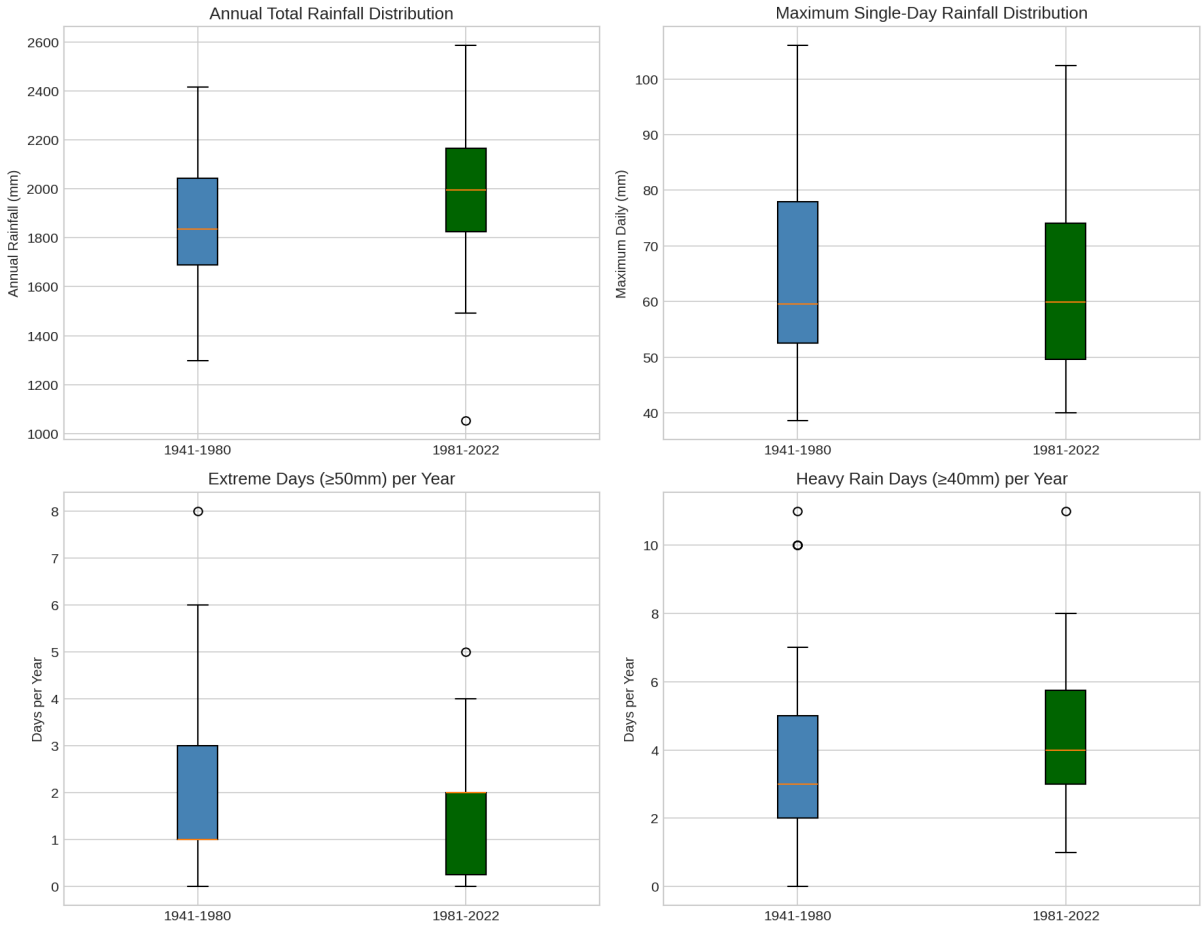


4.2 Period Comparison: 1941-1980 vs 1981-2022

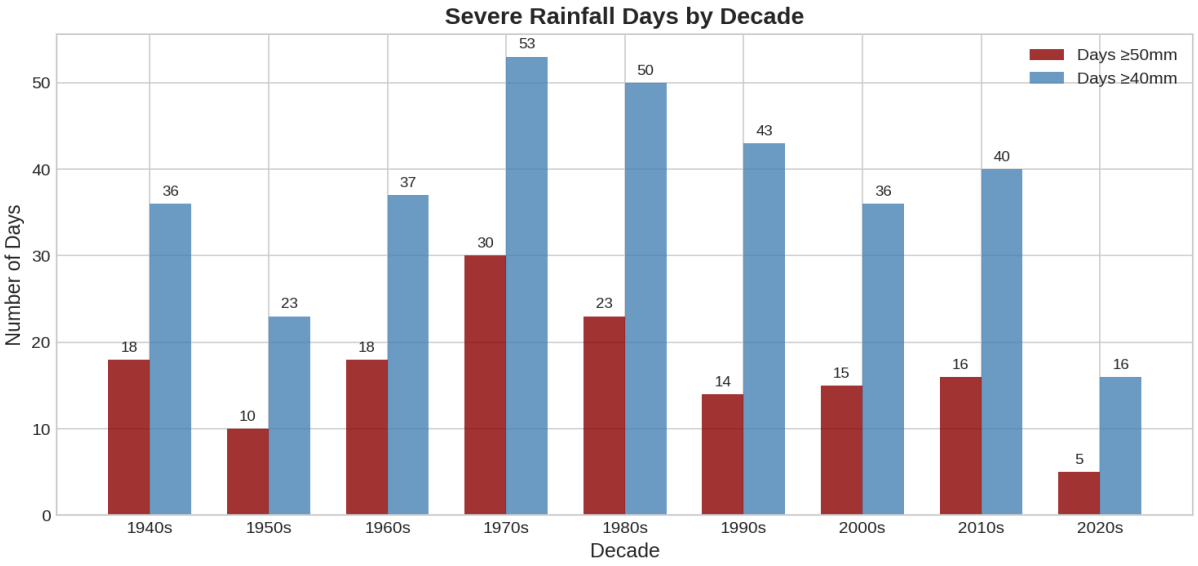
Comparing the first and second halves of the record provides insight into how rainfall patterns have changed over time:

Metric	1941-1980	1981-2022	Change
Average Annual Rainfall	1857 mm	1993 mm	+136 mm (+7%)
Average Max Daily Rainfall	65.4 mm	62.6 mm	-2.7 mm
Total Days ≥50mm	82	67	-15
Average Days ≥50mm/year	2.05	1.60	-0.45
Total Days ≥40mm	160	174	+14

Comparison: 1941-1980 vs 1981-2022

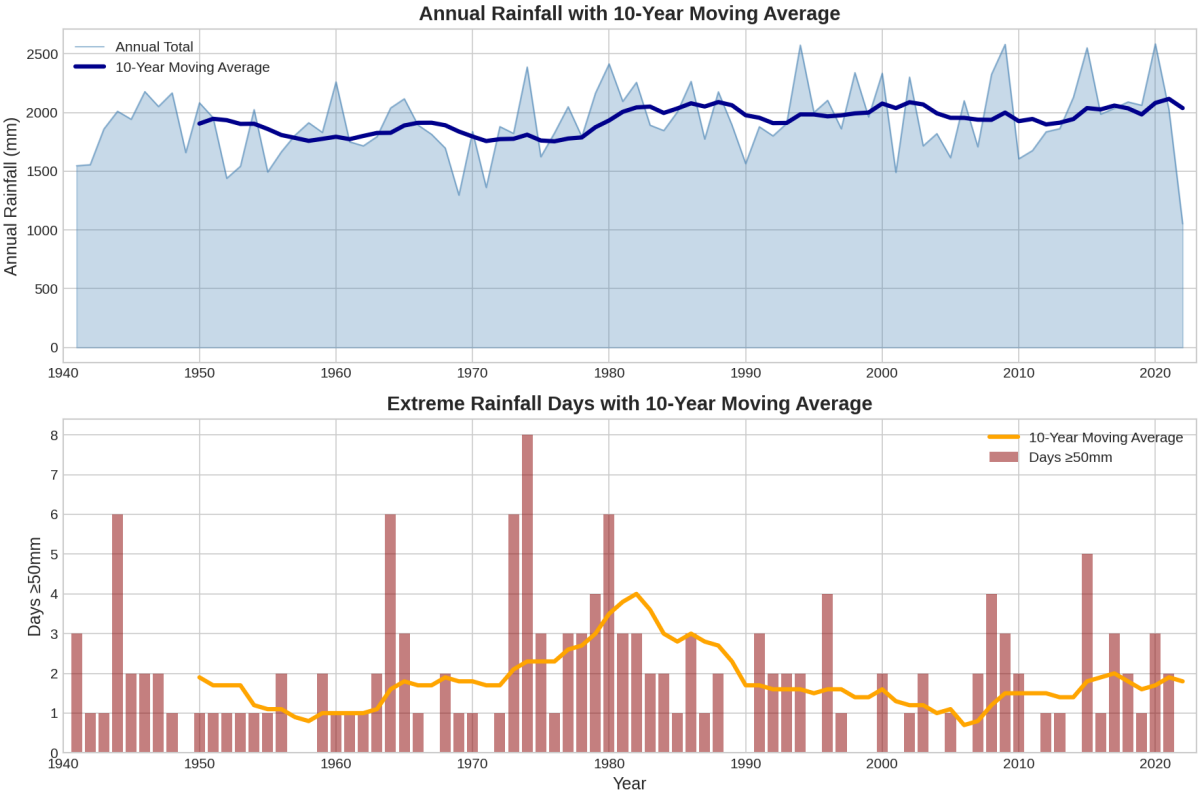


4.3 Decadal Analysis



The decadal analysis reveals interesting patterns. The **1970s** stands out as the decade with the most severe rainfall days (30 days ≥50mm), followed by the **1980s** (23 days). Recent decades show fewer extreme days but higher overall annual totals, suggesting a possible shift toward more frequent moderate-heavy rainfall rather than extreme single-day events.

4.4 Moving Average Trends



The 10-year moving averages show that annual rainfall totals have generally increased since the 1950s low, while extreme day frequency peaked in the 1970s-80s and has remained relatively stable since. The smoothed trends help filter out year-to-year variability.

5. Conclusions

Are severe rainfall events getting worse at Glengarriff?

The statistical analysis of 82 years of data provides a nuanced answer:

1. Annual rainfall has increased: There is a statistically significant trend of +2.7mm/year, representing approximately a 12% increase in annual rainfall over the period. This is consistent with climate projections for increased precipitation in western Ireland.

2. Extreme single-day events are NOT increasing: Despite higher overall rainfall, the frequency of days with ≥50mm rainfall shows NO statistically significant trend. If anything, the data suggests a very slight decrease (-0.003 days/year), though this is not statistically meaningful.

3. The 1970s-1980s saw peak extreme activity: The period from 1973-1986 contained many of the most severe events in the record, including 3 of the top 5 single-day rainfalls. This may reflect natural multi-decadal climate variability rather than a long-term trend.

4. Modern events remain severe: While extreme days haven't increased in frequency, recent events like December 2015 (87.8mm + 59.2mm), February 2020 (124.2mm over 3 days), and October 2021 demonstrate that severe flooding remains an ongoing risk.

5. The October 2025 event was exceptional: The recent Coomhola flooding event (estimated ~57mm preconditioning + 109mm main event) would rank among the top 3 multi-day events in this 82-year record, highlighting that extreme events can still occur regardless of long-term trends.

Implications for Flood Risk Management:

- Flood risk has NOT demonstrably increased based on historical data, but it also hasn't decreased
- The ~2 severe days per year (≥50mm) and frequent multi-day events remain a consistent baseline risk
- Ground saturation from antecedent rainfall remains crucial - monitor cumulative rainfall, not just forecasts
- Historical benchmarks: Prepare for events up to ~180mm over 3 days based on December 1964 precedent
- Continue monitoring for any emerging trends as climate change impacts accelerate