

STORM EVENT

— 26th-27th February 1990 —

The Towyn flood event, Wales: a catastrophic combination of high tides, extreme weather and defence failure...thousands evacuated from homes and businesses



Severity Ranking



Social	<u>Loss of life</u>	No direct fatalities, although around 50 persons were reported to have died prematurely due to this flood
	<u>Residential property</u>	3,076 people were affected by flooding in north Wales, mostly in the town of Towyn
	<u>Evacuation & rescue</u>	Over 5,000 persons were evacuated
Economic	<u>Cost</u>	Damages (possibly limited to direct material impact only) estimated at £110 m
	<u>Ports</u>	*
	<u>Transport</u>	Severe disruption to rail services between London Euston and Holyhead when the track was badly damaged
	<u>Energy</u>	*
	<u>Public services</u>	*
	<u>Water & wastewater</u>	*
	<u>Livestock</u>	*
Environmental	<u>Agricultural land</u>	Around 10 km ² of agricultural land was flooded
	<u>Coastal erosion</u>	*
	<u>Natural environment</u>	*
	<u>Cultural heritage</u>	*
	<u>Coastal defences</u>	Catastrophic overtopping of defences at Towyn, Wales

*No known sources of information available

Source

The storm developed along the US east coast on 24th February 1990. By 26th February the storm was large and tracking east to northeast over the north of Scotland and onwards across Scandinavia. On 27th February, the depression formed strong north to north-westerly winds at the northern tip of the British Isles, whilst an intense smaller storm crossed England and Wales from the west. The west coast of Scotland experienced strong westerly winds, which were amplified by the interaction with the anti-cyclone located to the south. Winds were gusting up to 87 knots [45 m/s] at Leeds and St Abb's Head (Scottish Borders) (Met Office, 1990a). Gusts of 86 knots [44 m/s] and 79 knots [41 m/s] were recorded at Norfolk and Sheerness, respectively.

The storm generated skew surges of 0.25 – 0.5 m along much of the west, north and east coasts of the UK. Larger skew surges were generated at several sites, including Avonmouth in the Bristol Channel (0.87 m). Water levels exceeded the 1 in 5 year return level at 7 sites on the west coast, north coast and east coast. The highest return period water level was at Lerwick and was 15 years. The next largest return period was at Aberdeen and was 10 years. It is notable, particularly in north Wales and the west coast of Scotland, that several gauges were not operational at the time of this event.

Wave heights along northwest Wales impacting Towyn reportedly reached 4.5 m (Bates et al. 2005). We are unaware of any further sources describing the wave conditions during this event.

Pathway

The most notable flood pathway to report for this event is the catastrophic overtopping and breach of defences followed by widespread inundation at Towyn, Wales.

Receptor & Consequence

This event was one of the most severe coastal floods in the UK. The towns of Towyn and Clwyd in Wales experienced a 'major disaster' which began on 26th February 1990 when defences were overwhelmed (Met Office, 1990b) and more than 5,000 people were evacuated from their homes and businesses (Bates et al., 2005; BBC, 2010). Over 3,000 properties were inundated during this event, mostly in the Towyn (Gledwyn-Jones, 1990). Nobody drowned (despite a lack of warnings, high vulnerability of people impacted, and deep fast-flowing floodwaters). However, the anxiety and disruption of the evacuation and loss of belongings are believed to have contributed to the premature death of about fifty persons (WAO, 2009). Around 10 km² of agricultural land was inundated (Wadey, 2013). According to HR Wallingford (2008), this event generated £110 m in damages. The worst affected area was the coast from Pensarn to Kinmel Bay with its hundreds of houses and bungalows on low-lying land and many caravan holiday parks (Met Office, 1990a). Parts of Rhyl and Prestatyn experienced flooding when sea defences were overtopped; the Nova leisure centre at Prestatyn suffered extensive damage with 6 ft. [1.83 m] of flood water in some areas; 50 people were evacuated from their homes and the railway line was flooded at Ffynnongroyw near Prestatyn; whilst 15 people were evacuated when the sea wall was overtopped at Dinas Dinlle near Caernarfon (Hansard, 1990). According to Met Office (1990a), there was severe disruption of the rail service between London Euston and Holyhead. Repairs to damaged housing were estimated as between £22.4 million and £100.8 million (Zong and Tooley, 2003), whilst 15% did not have building insurance, 40% were without contents insurance and 50% were uninsured (Fordham and Ketteridge, 1995).

Table 1: High water levels (m CD) recorded at the UK National Tide Gauge sites that reached or exceeded a 1 in 5 year return level during the event.

Tide gauge Site	Date and time (GMT)	Return period (years)	Water level (m CD)	Astronomical tide (m CD)	Skew surge (m)
Newlyn	27/02/90 06:00	<1	5.98	5.85	0.13
Avonmouth	26/02/90 08:00	9	15	14.12	0.87
Milford Haven	26/02/90 07:00	<1	7.78	7.35	0.43
Fishguard	26/02/90 08:00	<1	5.45	5.14	0.31
Holyhead	26/02/90 11:00	4	6.53	6.04	0.49
Heysham	26/02/90 12:00	5	11.04	10.31	0.73
Tobermory	26/02/90 06:00	3	5.5	4.97	0.53
Stornoway	27/02/90 08:00	4	5.72	5.41	0.31
Ullapool	27/02/90 08:00	3	6.07	5.75	0.32
Lerwick	27/02/90 12:00	15	2.93	2.54	0.39
Wick	26/02/90 12:00	3	4.18	3.92	0.26
Aberdeen	26/02/90 14:00	3	5.01	4.68	0.33
Leith	26/02/90 15:00	2	6.3	5.9	0.4
North Shields	26/02/90 16:00	4	5.9	5.5	0.4
Whitby	26/02/90 17:00	<1	6.27	5.83	0.44
Immingham	26/02/90 19:00	<1	7.96	7.6	0.36
Lowestoft	26/02/90 22:00	3	3.64	2.69	0.95
Sheerness	27/02/90 01:00	<1	6.3	5.84	0.46
Dover	27/02/90 00:00	8	7.73	7.16	0.56

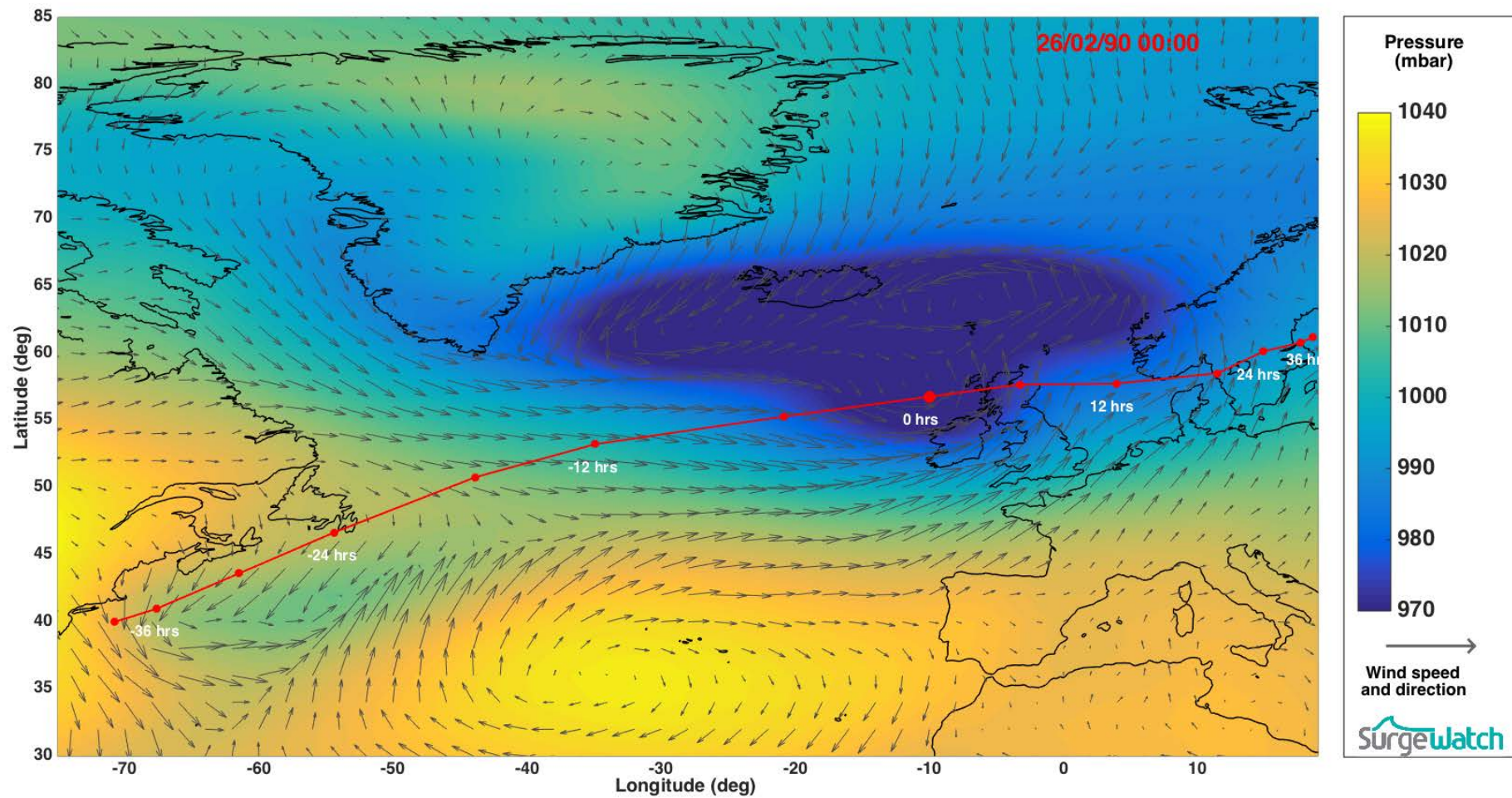


Figure 1: Meteorological conditions at time of maximum water level overlaid by the storm track

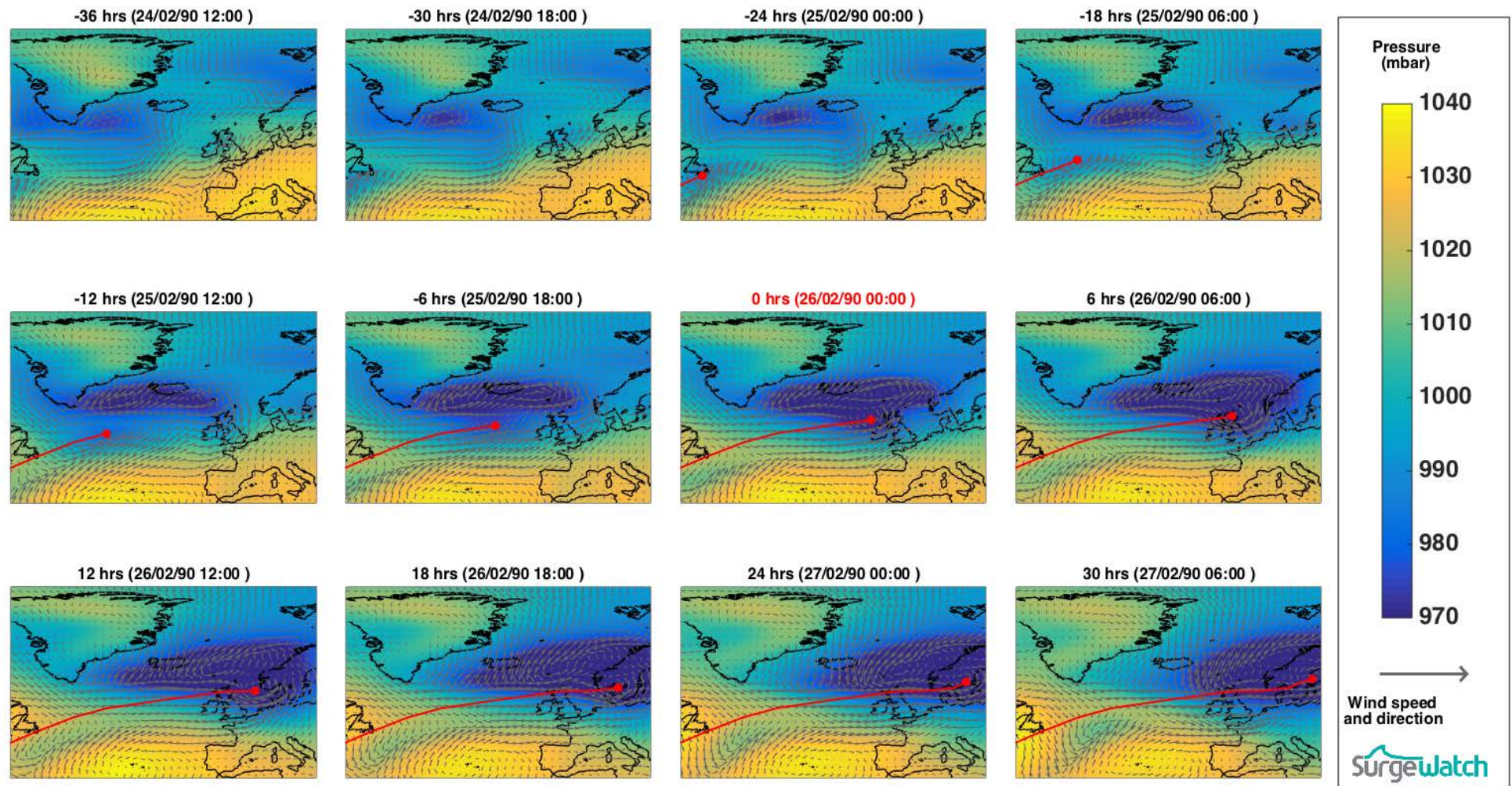


Figure 2: Meteorological conditions during event

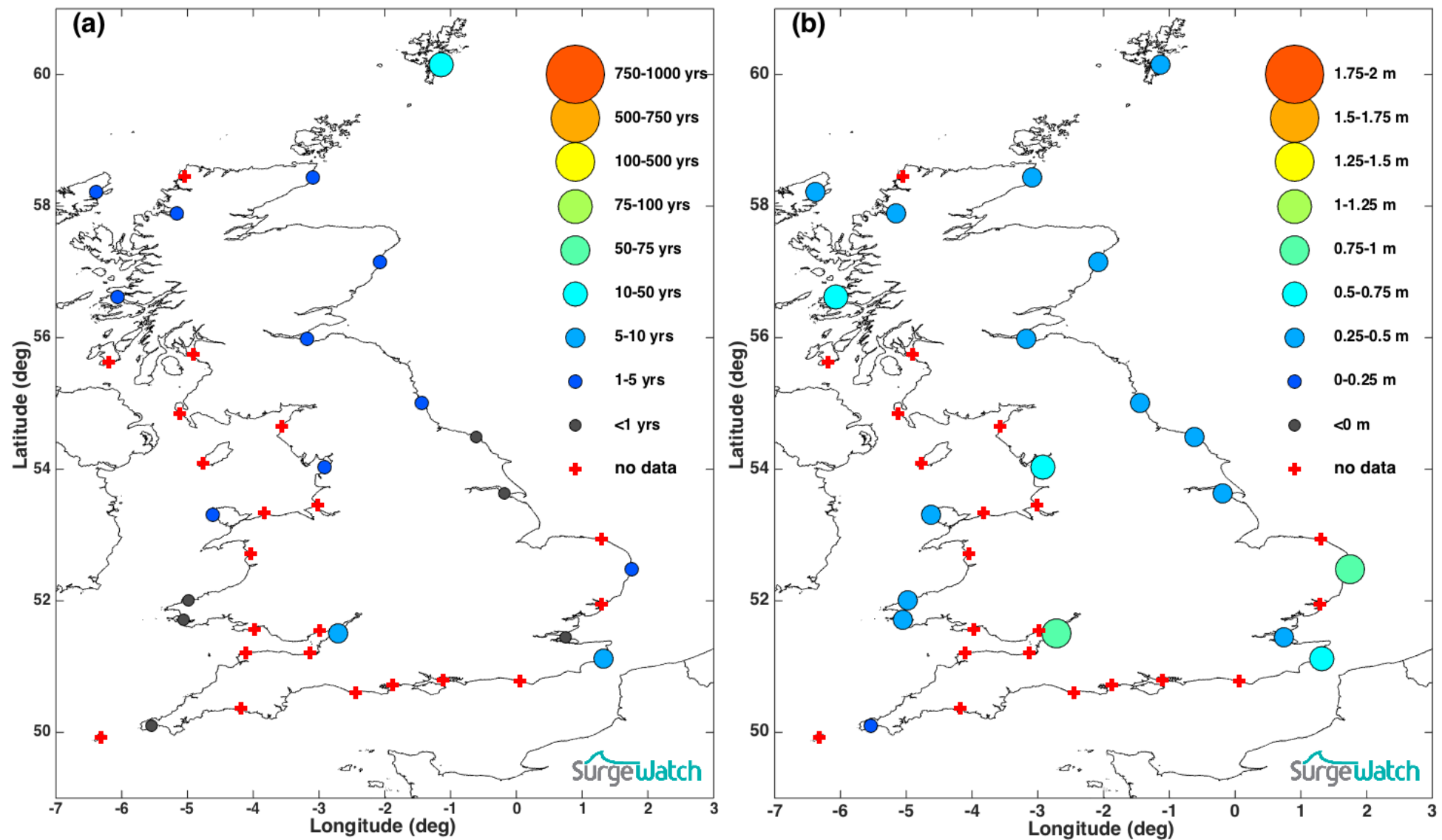


Figure 3: (a) Water level return period; (b) Skew surge levels

References

- Bates, P.D. et al., 2005. Simplified two-dimensional numerical modelling of coastal flooding and example applications. *Coastal Engineering*, 52(9), pp.793–810.
- BBC, 2010. Looking back at the Towyn floods of February 1990. *BBC Northwest Wales*. Available at: http://news.bbc.co.uk/local/northwestwales/hi/people_and_places/history/newsid_8516000/8516287.stm [Accessed August 23, 2015].
- Fordham, M., Ketteridge, A., 1995. *Flood Disasters – Dividing the Community*, Lancaster.
- Gledwyn Jones, D., 1990. County Councils: Co-ordination and Concern The Towyn Experience. In *New Directions in Public Services: The County Council Experience*. London: Policy Studies Institute.
- Hansard, 1990. *Flooding (North Wales)*, Available at: <http://hansard.millbanksystems.com/commons/1990/feb/27/flooding-north-wales>.
- HR Wallingford, 2008. *Conwy Tidal Flood Risk Assessment, Stage 1 — Final Report. Report EX 4667 (release 3.0)*, Wallingford.
- Met Office, 1990. Monthly Weather Report of the Meteorological Office. *Monthly Weather Report*, 107(2). Available at: <http://www.metoffice.gov.uk/learning/library/archive-hidden-treasures/monthly-weather-report-1990s>.
- Met Office, 1990. *Monday 26 February 1990 (Towyn Floods)*, Exeter. Available at: http://www.metoffice.gov.uk/media/pdf/5/s/Towyn_Floods_-_26_February_1990.pdf.
- Wadey, M.P., 2013. *Understanding Defence Failures and Coastal Flood Events: a Case Study Approach*. University of Southampton.
- WAO, 2009. *Coastal Erosion and Tidal Flooding Risks in Wales. Report prepared by Jeremy Colman and team for the National Assembly under the Government of Wales Act 2006, 29 October 2009*, Available at: [http://www.assembly.wales/Laid Documents/AGR-LD7767 - Coastal Erosion and Tidal Flooding Risks in Wales-29102009-149678/AGR-LD7767-e-English.pdf](http://www.assembly.wales/Laid%20Documents/AGR-LD7767%20-%20Coastal%20Erosion%20and%20Tidal%20Flooding%20Risks%20in%20Wales-29102009-149678/AGR-LD7767-e-English.pdf).
- Zong, Y. & Tooley, M.J., 2003. A Historical Record of Coastal Floods in Britain: Frequencies and Associated Storm Tracks. *Natural Hazards*, 29(1), pp.13–36. Available at: <http://link.springer.com/article/10.1023/A%3A1022942801531> [Accessed March 5, 2015].

Additional sources of information

- BBC, 2010. Prestatyn floods remembered from 1990. *BBC Northeast Wales*. Available at: http://news.bbc.co.uk/local/northeastwales/hi/people_and_places/newsid_8522000/8522544.stm [Accessed August 28, 2015].
- Anon, Coastal Flooding in Towyn 1990. *UK Floods-Case studies of causes and effects and flooding policies*. Available at: <https://sites.google.com/site/ukfloods/home/coastal-flooding-in-towyn-1990> [Accessed August 11, 2015].

Powell, D., 2013. Moments that shocked North Wales; Towyn Floods. *The Daily Post*.
Available at: <http://www.dailypost.co.uk/news/nostalgia/moments-shocked-north-wales-towyn-3181218>.