A Flash Flood in the Caves of Northwest Clare, Ireland

By
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In March 1968, a small party went to Clare to carry out some underground water tracing. Whilst doing this work information was volunteered by local inhabitants about the record flood of Aug. 9th, 1967. This was the occasion when a party from the R.M.A. Sandhurst was trapped in Pollomega. Gradually the pattern of the flood emerged and the accounts of the eyewitnesses were checked against one another and found to agree. The evidence in the field and in the caves was checked by at least two members of the U.B.S.S. party. Some levelling was done by Messrs. Dunnington, Leaman and Tiffin of the University of Bristol Geography Department field class and I am grateful for their assistance.

This was a true flash flood. The rainfall figures (appendix 1), have been supplied by the Meteorological Service, Dublin, for which I am very grateful. Three stations associated with the area have been included. Of these, the station at Corkscrew Hill is nearest and most typical of the rainfall of the caving areas. Ballyvaughan is on the coast north of the areas and Kilfenora inland southeast.

The weather, as the figures show had been fairly wet, and the soil must have been moderately waterlogged and the streams relatively high. The rainfall on August 9th was concentrated around Knockauns, Slieve Elva and Doolin areas. The record for Corkscrew Hill for that day was 52.8 mm. while Ballyvaughan had only 11.5 mm. and Kilfenora 0.9 mm. This heavy rainfall and the subsequent flood all took place within 2½ hrs. though it took longer for the flood to subside. The R.M.A. party went down Pollomega in sunshine at 1430 hrs. (Lucas, 1967). Reliable eyewitnesses state that the rain was over by 1630–1700 hrs. and that water was seen to burst up through the roof of the Coolagh River Cave near Pollclabber at about 1700 hrs.

It will also be noted from appendix 1 that there was another major downpour on Aug. 17th and this, according to local information, produced considerable flooding. Coleman (1966) has recorded another flood in the Lisdoonvarna area in Sept. 1966, and this flooded the main Galway –Lisdoonvarna road, downstream of Killeany–Owenterbolea.

It was only possible to visit some of the swallets and caves in March

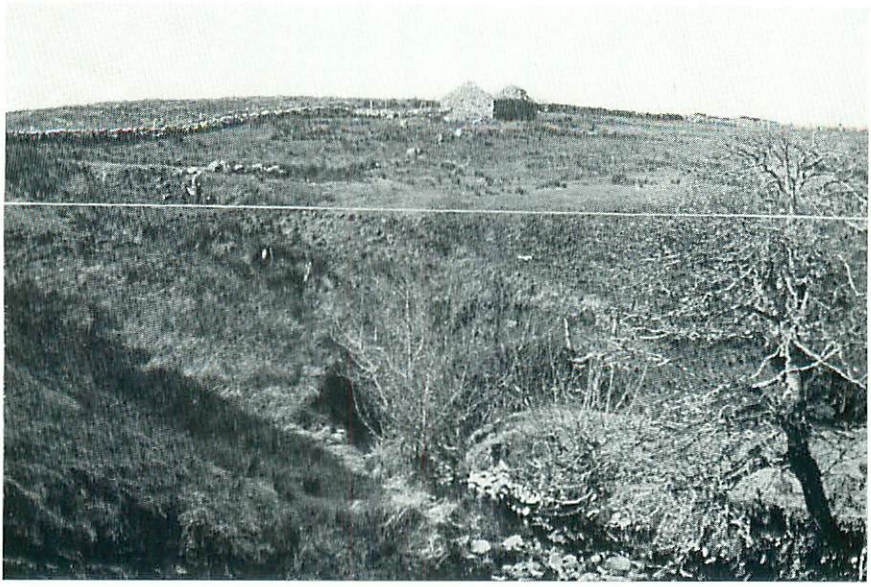

PLATE 39A

A. Polldonough.

(Photograph: E. K. Tratman

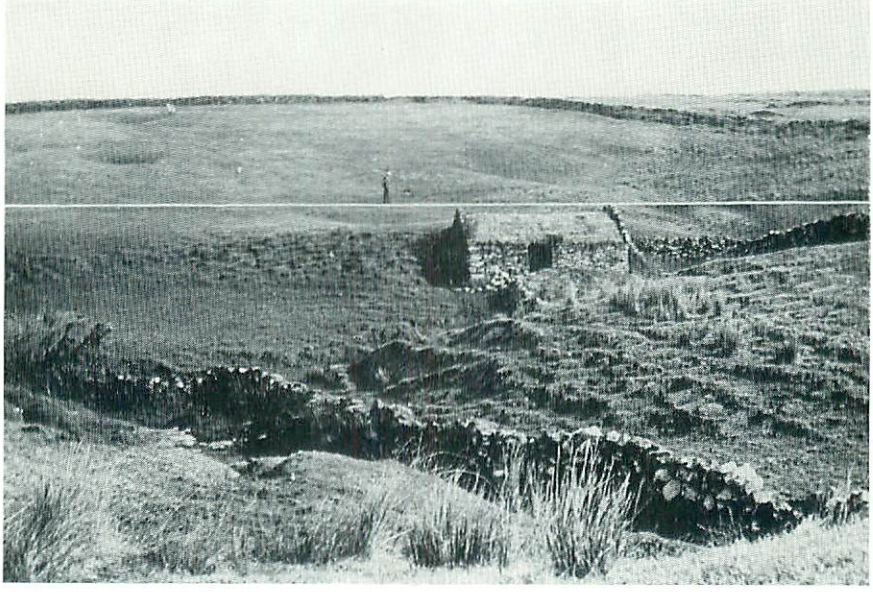

PLATE 39B

B. Polldonough South.

The white line indicates the flood level, Aug. 9th 1967.

Photograph: E. K. Tratman

1968 and what follows is based on the observations made and on local accounts. For later specific levelling local people have pointed out the position of the top of the flood at various places and these sites have been recorded on the society's maps and thus can be used, subsequently, for levelling.

COOLAGH RIVER CAVE SYSTEM AND VALLEY

In this is included the valley down to Cregg Lodge Swallet (A6) (Ollier and Tratman, 1956, *Plate* 6), and beyond to the next swallet A7.

Polldonough North swallet had been submerged by about 15 ft. At Polldonough itself there was a lake extending up the valley to lap round the ruined cottage 400 yd. away. At the swallet the cave roof was submerged to a depth of 23.5 ft. (levelled). This put the top of the flood at 22 ft. above the top of the limestone (*Plate* 39A). Polldonough South was submerged so deeply that the flood stood at least 2 ft. above the level of the roof of the bothy above the swallet (*Plate* 39B). The estimated submergence was 25 ft. On the route from Polldonough to Polldonough South a new opening appeared. It is reported that daylight can be seen here from inside the cave. This opening was not investigated. It was occupied by a very dead badger. Further down another fresh opening seemed to communicate with the Polldonough South passage, probably along the Canal.

Pollclabber had been submerged and water had flowed from it down the valley on the surface, passing through the cart shed at the farm. Just south of this the two shakeholes, which are known to connect with the Lower Main Drain (Bendall and Pitts, 1953, p. 236), were observed to spout water to a height of several feet and piles of shale and gritstone debris thrown out by the force of the water confirm this observation. Many other details of the flow down the valley were recorded. It will suffice to describe a few. At the road bridge below Ballynalackan School there had been less than a foot clearance at the crown of the arch. Further down the flood had been over 120 ft. wide with an average depth of over 1 ft. Swallets A6 (Cregg Lodge) and the adjacent A7 filled right up. The lake formed behind them extended almost up to the road bridge beneath Ballynalackan Castle. Its level was 7–9 ft. above the coping stone of the bridge at A6. The height would thus be 253–255 O.D. (roughly levelled). This level is about 4 ft. lower than the top of the col (258.7 ft. levelled) across into Poll-an-Ionain.

POLLNAGOLLUM (SLIEVE ELVA)

Only limited observations were made on this system. The Gunman's Cave end of the Muddy Link to Branch Passage Gallery was quite clean and had a scoured look as if it had taken water from B.P.G. No flood

debris was actually seen in Gunman's Cave itself. It was not really looked for. It should be remembered that the water in B.P.G. is supplied only in a small part from an open swallet, E2, and would not be likely to contain much debris such as grass. The source of the stream in Gunman's is not known but does not seem to come from an open swallet.

From the First Waterfall onwards in the Main Streamway the whole of the lower canyon had been full and a considerable amount of water had also flowed along the wider middle level. Further down the cave, where the lower canyon is not so deep, the flood had filled the whole of the middle level and extended upwards into the Upper Canyon. In the small enlargment just downstream of Main Junction the flood had been at least 30 ft. deep.

No debris was seen in Branch Passage to a height of 10 ft. but there may well have been debris at a higher level. Again the main source of water here is B.P.G. and so very little debris might be expected.

KILLEANY RISING

The rock sill above the usual rising (c.f. Collingridge *et al.* 1962, *Plate* 19A) had been submerged to a depth of at least 2 ft., and more probably 3 ft., by water rising further up the valley. Just upstream the flood had been about 180 ft. wide and 2 ft. deep. Shale debris had been swept out of openings that had formerly not been known to exist. A fine mud "volcano" had been formed in the valley floor 200 yd. up from Killeany.

DOOLIN CAVE SYSTEM

St. Catherine's 1 swallet had been submerged to a depth of about 12 ft. Some water must have gone into the nearby shakehole but there was no definite evidence that water had overflowed down the valley towards St. Catherine's 2. The small stream that normally sinks close to the latter had run direct into the roof opening and had scoured the limestone clean. The other suppliers to St. Catherine's 2 were not examined.

The Doolin Road Sink had been totally submerged to a depth of about 12 ft. The lake so formed must very nearly have overflowed westwards.

Aran View Swallet was not examined.

Inside the cave there was eivdence of flooding to the roof all the way down the stream route from St. Catherine's 1 entrance to Fisherstreet pothole, but the Great Oxbow Roof was not examined, nor was the Doolin Dry tributary.

DISCUSSION

It was a pity that the small U.B.S.S. party (Messrs. D. P. Drew, M. Newson and E. K. Tratman), could not examine all the caves but sufficient

has been seen to emphasize the magnitude of the flood and to demand further observations when the caves are next visited.

The flood has carried through the caves very considerable quantities of debris derived from the shales and gritstone series in the stream banks above the swallets. Again, within the caves, existing fills were partially re-distributed either to sites further down the caves or right through to the resurgences. This debris must have had an appreciable corrasive power and similar floods in the future as in the past must have contributed to enlargement of the caves by corrasion. Equally floods might have increased solutional effects because of the very large volume of water involved even though the amount of limestone in solution per unit volume of water is ordinarily lower than that in water under normal flow conditions. But this does not invalidate the conception that the caves have been formed mainly by solution (corrosion). Much more quantitative work is needed in Clare on this aspect of cave formation.

The transport of debris through the caves is generally minimal as far as coarser grades are concerned. On this occasion debris up to 2 in. diam. was thrown out through the roof of the Lower Main Drain of the Coolagh River Cave. Yet this is very much, in relative terms, a fine grade when set against the large, 6 in. or more, debris seen all the way along many cave passages. The existence of this material is evidence of even faster flowing and larger streams than this flood having been present during the formation of the caves.

In several places in Poulnagollum Main Streamway below the First Waterfall the cross-sectional area of the flood was estimated, by three observers, as being 25 ft. across in the middle level and 3–4 ft. in average depth. The rate of flow in March in the stream was 10 ft. in 7 sec. All the observations were made in areas where it was deemed that the depth of the flood was not the result of water backing up. If allowance is made for a higher rate of flow under flood conditions then a figure of 100 cu. ft./sec. as the rate of flow can be regarded as a very conservative estimate and 150 cu. ft./sec. might well be a more accurate estimate. The flow may have been still larger.

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APPENDIX 1

RAINFALL FOR AUGUST 1967

(Figures supplied by Department of Transport and Power Meteorological Service, Government of Ireland).

	Stations		
	Ballyvaughan	Corkscrew Hill	Kilfenora
August 1967	mm.	mm.	mm.
1	2.2	2.9	0.6
2	2.3	1.8	5.3
3	1.9	1.6	0.4
4	0.1	0.7	—
5	11.5	17.7	16.9
6	3.2	5.2	5.2
7	0.8	0.5	1.5
8	8.4	9.1	13.1
9	11.5	52.8	0.9
10	14.3	19.9	7.9
11	1.7	3.4	—
12	—	1.1	0.2
13	8.6	7.9	3.9
14	—	1.2	0.8
15	10.5	11.6	2.4
16	5.2	10.5	1.9
17	35.0	43.3	13.4
18	—	10.3	2.1
19	—	—	—
Totals for whole month:—	142.4	235.9	88.2