A CRITICAL ASSESSMENT OF THE COASTAL FLOOD WARNING SYSTEM IN ORKNEY, SCOTLAND

Edward Walker (Supervisor: Dr Bayes Ahmed)
UCL Institute for Risk and Disaster Reduction

BACKGROUND AND PURPOSE OF STUDY

The Orkney Islands, situated off the North East coast of Scotland, consist of 70 islands, 20 of which are inhabited. With a coastline approximately 860km in length and numerous settlements in proximity to the sea, there is a high risk of coastal flooding in Orkney. This was most recently evidenced in 2005, figure 1. This can be compared to usual conditions, figure 2.

With this initial risk and the increased threat of coastal flooding due to rising sea levels posed by climate change, the Scottish Environment Protection Agency (SEPA) launched the Orkney Coastal Flood Warning System (known as Floodline) in September 2018 as part of a wider flood risk management plan. Floodline provides flood forecasting and warning dissemination for residents in eleven areas on the islands, figure 3.

The purpose of this project is to critically assess the effectiveness of Floodline. This will be undertaken in recognition of the paradigm shift from early warning systems (EWS) as technically driven, top-down systems to people-centric systems (Villagran de Leon, 2012). With this in mind, effectiveness will be evaluated with regards to the four key stages to the early warning process (PPEW-ISDR, 2006):

1. Risk knowledge and interpretation
2. Monitoring and warning service
3. Dissemination and communication
4. Response capability

AIM & OBJECTIVES

With the recent introduction of Floodline, the aim of the project is to take a pre-emptive rather than, as is often the case, a retrospective approach to assessing its effectiveness. The specific objectives are:

1. To understand the overall effectiveness of Floodline in Orkney
2. To identify geographic (i.e. settlement of residency) and demographic factors that influence Floodline's effectiveness
3. To understand the reasons why these geographic and demographic factors influence Floodline's effectiveness.

Figure 1 (top): St. Margaret's Hope in Jan 2005 (Mike Gray, 2005)
Figure 2 (bottom): St Margaret's Hope in 2018 (Google, 2018)

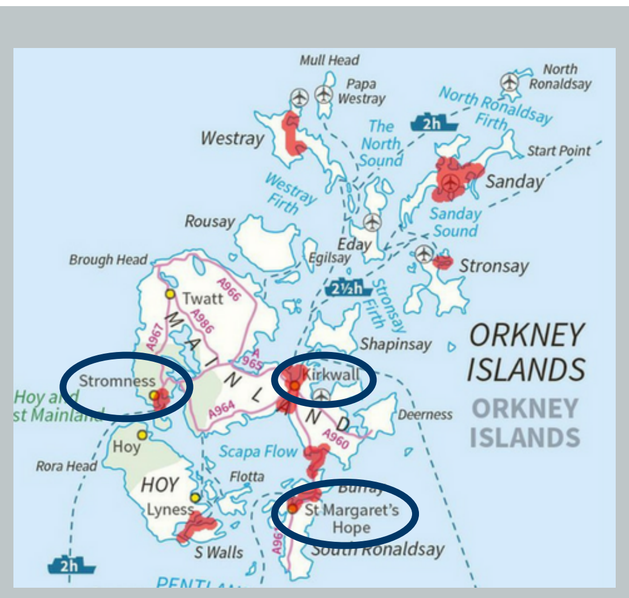

Figure 3: Map of Orkney with Floodline warning areas in red. Study areas circled in blue (SEPA, 2018)

METHODOLOGY

Completed · In progress · Not started

1. SEPA/Council Representative Interviews	2. Resident Questionnaires	3. Creation of Composite Effectiveness Score	4. Quantitative Analysis	5. Qualitative Analysis
• Interviews of 4 SEPA/ Council representatives involved in Floodline's implementation. • To understand its implementation from the perspective of those responsible for it. • May-June 2019	• 50 semi-structured door-to-door questionnaires were carried out (23 in Kirkwall, 15 in Stromness and 12 in St Margaret's Hope). • A mix of open and closed questions. • Random sampling of at risk residents.	• A Floodline effectiveness score will be generated for each participant. • This will be a composite measure of individual indicators for the four key stages to EWSs as outlined in the purpose of study.	• R will be used to undertake regression analysis and other statistical analyses. • To establish if geographic or demographic factors influence where or for whom Floodline is most effective.	• Questionnaire responses will be coded and content analysis undertaken. • To comprehend why certain predictors for Floodline's effectiveness emerge from the regression analysis.

PRELIMINARY RESULTS

Initial indications suggest that residents in Kirkwall are less aware and less willing to proactively sign up for Floodline whereas residents in St Margaret's Hope are most engaged with the service, figure 4.

However this will form only one aspect of Floodline's composite effectiveness score. Also, one observation from the field suggests a prioritisation of local knowledge over Floodline in St Margaret's Hope despite the sign-ups. This will be more rigorously analysed in the coming weeks.

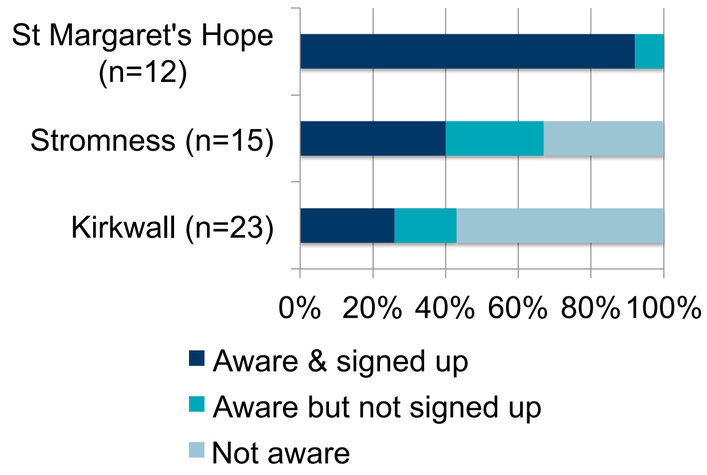

Figure 4: Percentage of respondents who were aware of and had signed up, aware of and had not signed up and unaware of Floodline by settlement

LIMITATIONS

Due to time and resource constraints, 50 interviews is not a sufficient sample size to represent the whole of Orkney covered by Floodline. This project should therefore be viewed as a pilot study.

Kirkwall, Stromness and St Margaret's Hope were selected for the study due to contrasting population sizes, flooding histories and risk profiles.

The technical performance of Floodline is not within the scope of this project.

MSc Risk, Disaster & Resilience
Edward.Walker.18@ucl.ac.uk
Submission Date: 24th June 2019

REFERENCES:
PPEW-ISDR (2006). *Global survey of Early Warning Systems: An assessment of capacities, gaps, and opportunities towards building a comprehensive global early warning system for all natural hazards*, Bonn: PPEW-ISDR.
Villagran de Leon, J.C. (2012). Early Warning Principles and Systems. In: Wisner, B., Gaillard, J. C. & Kelman, I. (ed.) *The Routledge Handbook of Hazards and Disaster Risk Reduction*. 1st ed. New York: Routledge.