GIS Derived Real-Time Impact Analytics to support Flood Emergency Managers

Juliette Murphy (Australia) and Henry Walshaw

Key words: Hydrography; Risk management

SUMMARY

The magnitude and frequency of flood disasters is increasing, which poses a major challenge for emergency managers (EMs). Real-time flood intelligence is of the highest importance to provide situational awareness so that faster and more accurate decisions can be made, to minimise the negative consequences of floods.☐☐For it to be useful, flood intelligence should cover the full area of importance of EMs, while keeping the granularity required to make decisions at a property or street level, and it should be easily ingested within their Geospatial Information Systems (GIS) dashboards and infrastructure. ☐☐This intelligence should be updated as frequently as possible (ideally hourly or more) to cope with the dynamic changes throughout each event, and very importantly, it should help EMs understanding flood impacts before, during and after events. ☐☐Live impact maps describing future, current and recent flood conditions, such as extent and depth, are a very useful tool to allow EMs to understand how a flood emergency is unfolding so that they can better prepare, respond and recover. Integrating these maps with existing GIS data and infrastructure allows EMs and decision makers to build workflows and answer the important questions about a flood event, such as: ☐•How many properties are at risk and need to be evacuated?☐•How many km of roads and bridges are currently impacted and need to be closed? And when water levels will recede so that teams can be sent to inspect the roads' condition before reopening them?☐•How many power substations and how many customers have been impacted as a result?☐•How many insurance policy holders have been impacted?☐•What is the reconstruction value or damage across a portfolio?☐•What LGAs and electorates have been affected?☐☐Answering these questions and others, and providing them in real time to EMs through an API, to complement live maps, can considerably improve how flood emergencies are managed. ☐☐The most important resource in an emergency is time, and by automatically receiving these metrics, many hours of manual postprocessing work are saved. This allows decision makers to focus on the key actions required to address a flood disaster, including closing roads to avoid

GIS Derived Real-Time Impact Analytics to support Flood Emergency Managers (13240)
Juliette Murphy (Australia) and Henry Walshaw

FIG Working Week 2025
Collaboration, Innovation and Resilience: Championing a Digital Generation
Brisbane, Australia, 6–10 April 2025

residents driving through flooded roads, undertaking accurate and timely evacuations, de-energising the power grid in affected areas in a proactive manner, and pre-deploying rescue teams for timely and efficient responses in affected communities. This paper describes a system that automatically takes live flood maps, overlays them with GIS datasets and estimates these impact analytics through case studies in Australia and the United States. This system is updated hourly and provides real time situational awareness to decision makers. Figure 1 and Figure 2 show sample dashboards with impact analytics, to describe the impact of events, while they happen, in both NSW and Florida (US). The feedback from organisations currently getting these analytics highlight the value of these metrics, as a complement to live maps, to support EMs taking fast and accurate decisions that minimise the negative consequences of floods.