A PRE-DISASTER MULTI-HAZARD DAMAGE AND ECONOMIC LOSS ESTIMATION MODEL FOR AUSTRALIA

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AUSTRALIA HAS EXPERIENCED A NUMBER OF NATURAL DISASTERS THROUGHOUT HISTORY THAT HAVE SIGNIFICANTLY IMPACTED UPON THE ECONOMY. TO DATE, DISASTER RISK REDUCTION STRATEGIES HAVE HAD LITTLE SUCCESS IN AVOIDING ADVERSE ECONOMIC IMPACTS OF THESE EVENTS. THIS PROJECT INVESTIGATES THIS SHORTCOMING AND IDENTIFIES THE STEPS REQUIRED FOR DEVELOPING A MODEL TO CALCULATE THE ECONOMIC LOSS.

History portrays numerous natural disasters that not only reshaped topographical settings but also have bearings on the economic structures of many countries, including Australia. The economic impacts are often overlooked in management planning as they are not immediately felt and focus is put onto emergency response systems. In Australia, the disaster management arrangements across all stages (mitigation, preparedness, response and recovery) have proven to be very successful at saving lives and property. However, in terms of the adverse economic impacts of the natural disasters, less attention and resources have been allocated.

In Australia, natural disasters are estimated to cost an average of AU$1.14 billion annually. This statistic, which includes the costs carried by individuals, governments, businesses etc., along with the rapid economic growth in Australia, makes natural disasters a significant issue for policy makers. One of the substantial issues identified in this connection is the inability to estimate the full economic impact of natural hazards, considering all the affected sections of the economy. This effort should take into account not only the primary effects of the natural disasters, but also its lingering, all-important secondary effects due to the pervasive losses throughout the economy emanating from various sectors within the economy.

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CURRENT APPROACHES AND METHODS AVAILABLE

A number of different approaches and methods exist for modelling and estimating damage and economic loss as a result of disasters. Some include:

- HAZUS (Hazard in the US) – developed by FEMA and contains extensive databases and default values for methodology parameters, making it possible to estimate potential damage and losses;
- Advanced Component Method (ACM) – more advanced than HAZUS in some ways, it assesses both physical and monetary damage at the component level;
- CAPRA – a disaster risk information platform that consolidates hazard and risk assessment methodologies providing potential loss estimation with regard to different natural hazards

However, none of these approaches are comprehensive when applied to the country of Australia.

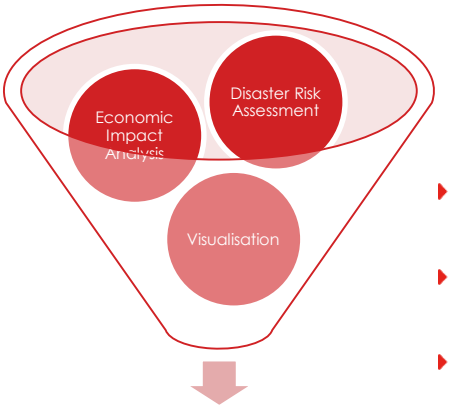

Fig 1: The research approach & outcomes

THE STEPS TO DEVELOP THE MODEL

There are 3 primary steps:

- Initially, a GIS is used to develop a multi-hazard risk assessment map. Empirical economic techniques are used to estimate the overall effects of natural disasters. The method involves: compiling available multi-hazard maps; integrating these to create a geographic database of exposed elements; and verification of data. A vulnerability assessment is conducted and the information is fed through an intelligent visualisation platform to create a comprehensive multi-hazard risk map. The map shows the risk in term of physical and direct monetary damage.
- The second step focuses on integrating different scenarios of disaster risks in a macroeconomic model to not only quantify the potential economic losses but also prescribe an optimal policy mix for ensuring effective reallocation of available resources in the economy.
- The final step is to visualise the results which using an existing geospatial which can store, update, analyse, and visualise data to provide estimates on potential physical damage against a set of possible disaster scenarios. The platform is also capable of displaying the indirect economic losses that would be derived from a macroeconomic model.

OUTCOMES

Outcomes of the project are fourfold:

- The causal impact of natural disasters on sector specific economic growth in Australia is uncovered
- A spatially enabled multi-hazard risk assessment maps for Victoria to quantify potential damage is developed
- Scenarios of forecasting potential economic losses will be made possible
- A set of economic policies will be identified and proposed to reduce the estimated effects of disaster risks