ENHANCING RESILIENCE OF CRITICAL ROAD INFRASTRUCTURE:

BRIDGES, CULVERTS AND FLOOD-WAYS UNDER NATURAL HAZARDS

Sujeeva Setunge[1], Weena Lokuge[2], Hessam Mohseni[3]

[1&3] School of Civil, Environmental & Chemical Engineering, RMIT University, Victoria [2] School of Civil Engineering and Surveying, University of Southern Queensland, Queensland

ROAD NETWORKS AND CRITICAL ROAD STRUCTURES SUCH AS BRIDGES, CULVERTS AND FLOOD WAYS HAVE A VITAL ROLE BEFORE, DURING AND AFTER EXTREME EVENTS TO REDUCE THE VULNERABILITY OF THE COMMUNITY BEING SERVED. THIS RESEARCH IS AIMED AT ADDRESSING THE CURRENT LACK OF ASSESSMENT TECHNIQUES AND TOOLS TO REDUCE THE VULNERABILITY OF ROAD STRUCTURES TO ENHANCE BOTH COMMUNITY AND STRUCTURAL RESILIENCE.

This project will develop innovative tools and techniques for implementing strategies to enhance resilience of road infrastructure to multi-hazards of flood, fire, earthquake and climate change. The outcomes of this project will include:

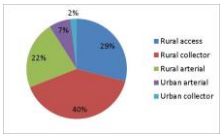
- Quantitative evaluation of vulnerability of road structures under multi hazards of fire, flood, earthquake and climate change: a web based tool for design and maintenance optimisation of bridges, culverts, flood-ways to flood, bushfire, climate change and earthquake.
- Quantifying social, Environmental and Economic consequences of failure: community, emergency services staff and road/local government authorities: Community adaptation options to enhance resilience as an alternative to hardening of structures when critical road structures are damaged.
- Input for decision support at local government and state road authorities: a new design guide for flood-ways, plus recommended changes to other standards.
- A generic research methodology that can be applied to other infrastructure such as transmission towers, and water infrastructure.

DATA COLLECTION AND ANALYSIS

Data has been collected from Lockyer Valley Regional Council on the damage due to 2013 flood in Queensland. The data has been categorised and analysed.

Flood – Bridges

Data clustering and correlation identification for bridges.

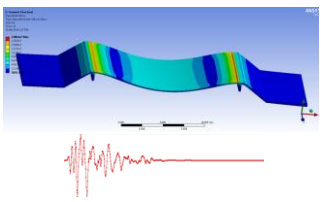


Flood – flood-ways

Statistical analysis and data categorisation for damaged flood-ways.

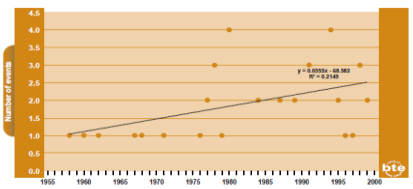
Earthquake – flood-ways

Preliminary finite element modeling for flood-ways due to earthquake.



Climate change

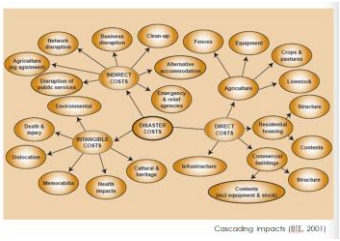
Climate change effect consideration as increasing number of events.



Natural disasters with a total cost btw. $75-150 mill. (BTE, 2001)

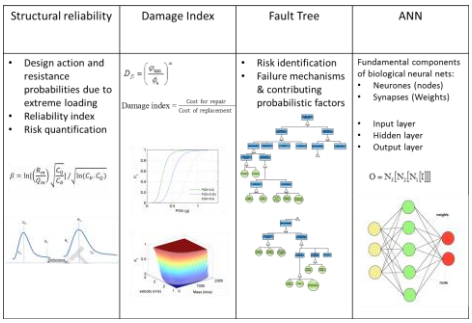
Community impact

Community impact, direct and indirect, tangible and intangible costs consideration.



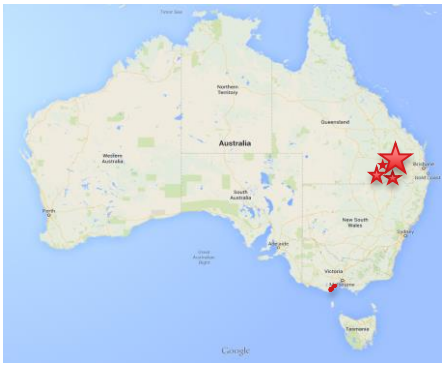
Cascading impacts (BTE, 2001)

REVIEW OF RESEARCH METHODOLOGY



WAY FORWARD

- Structural vulnerability / hazard assessment
- Risk identification
- Prioritisation



An Australian Government Initiative