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Influence of Decision Making during disasters and the impact on Community

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Outline

**Research
Methodology**

**What do we
know about
Disasters**

**Why the
impact on
Society is High**

**Decision
Making**

**Risk &
Resilience**

**Case
Study**

**Case Study
findings**

Summary

Research Methodology

PhD Research Title: **Protection of Transport Infrastructure and forward planning processes**

Gap
Identification

Identification of Strategic Planning
Areas related to Transport

Risk Matrix
Formulation

Strategic Planning Framework
with Integrated Risk Evaluation

Case
Study

Identifying
gaps in
Transport
planning
using Gap
Analysis

Identifying
strategic land
use planning
areas to
overcome
gaps using
existing
national and
international
codes of practice

Transport
Corridor
Planning

Road Design

Land Use
Development
Approvals

Risk Matrix
formulation
using
identified
factors and
associated
risks

Decision
Making
Frame
work
using
Triple
Bottom
Line

Integrated
Decision
Making
Framework

What do we know about Disasters ?

Source: EM-DAT/CRED.

Why is the impact on Society so high?

- What influences the Impact ?
- Population growth rate is High
- Cities expand to Mega Cities Metro?
- Cities in Vulnerable locations
- Urbanisation is High

Reason 1 - World Population

- World Population gone past 6 billion in 2000
- Expected to be 9 billion in 2050
- Urban population to increase by 3.1 billion between 2007 and 2025
- Between 2000 & 2030, expected population growth is 1.8%

Reason 2 – Urbanisation Issues

- Urbanised population increased from 270 million in 1990 to 3.3 billion in 2007
- In 1900, 13% or 220 million people lived in urban areas
- In 1950, 29% or 732 million people lived in urban areas
- Demand for housing / services / health / employment / education / land increase
- Creation of slum dwellings
- In 2020, slum population to reach 1.4 billion people

Reason 3 – Global Risks

Socio-economic Resilience Index 2013

Reason 4 - Critical Infrastructure (CI)

How can we reduce these impacts

- What are the Key Main Areas that needs improving
- Decision Making is **ONE** Key Item

Decision Making - Under Ideal Conditions

- Decision Making Styles

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- **knowledge about the situation**
be able to carry out a situational analysis
analyse available resources to carry out the whole

- **Decisiveness and flexibility**
Problem Solving and decision making skills
Be able to motivate stakeholders and team building
Information Management skills
Planning and organising
Strategic Planning

- **access to experienced staff**

- **opportunity to input their views into decision making process.**

Decision Making GOAL

- What is the **GOAL** in Decision Making
- What are the **Challenges**
- What needs to be **improved**
- How important is this to YOU and YOUR COUNTRY
- What is **MORE IMPORTANT** under this banner of I3R2?

Reality Check

- What is the reality of achieving this GOAL?
- What is the situation NOW
- What are the **BARRIERS**

• Time available to make decisions	Quality of information	Experience of decision maker
• Political influence	Environmental factors	Theoretical & Practical Knowledge
• Community resilience status	Community resources	Financial factors
Affected areas	Situational awareness	Organisational Culture
Ethical factors	Available resources	Available Resources

Risk / Vulnerability

- **Emergency Management in Australia is built on the four principles: prevention, preparedness, response and recovery (PPRR).**
- **ESCAP & UNISDR report (2010) states that overall disaster risk depends on three factors such as**
 - **Hazard** - The type and intensity of a hazard event
 - **Exposure** - The number of people and the scale of assets exposed to the event
 - **Vulnerability** - The capacity to cope with and recover from hazard events

For example if the risk event is residential fatalities during an emergency, the vulnerabilities may be identified as:

- **Lack of alternative routes,**
- **High congestion – inadequacy of the road design for the particular land use**
- **Lack of provisions for emergency vehicle access**
- **Design errors of construction of dwellings**
- **Residential development in areas of high likelihood of threat**

Resilience

Resilience can be quantified by Area A

Source: Kimmance (2010)

- U.S. Department of Homeland Security (2008), stated that “**resilience is the ability of systems, infrastructure, government, business, and citizens to resist, absorb, and recover from or adapt to an adverse occurrence that may cause harm, destruction, or loss of national significance**”.

- Pitt (2010) stated that “**the ability of a system or organisation to withstand and recover from adversity**” as resilience”.

- Resilience of a system is related to the definition of risk as follows:

Risk = Threat x Vulnerability x Consequences

- Figure illustrates the definition of resilience (Kimmance, 2010) as area under the functional capacity versus time curve. **Improving resilience can be achieved by a reduction in probability of the event, reduction of consequences due to the event and/or reducing the time required for system restoration.**

- Henstra et al (2004) stated that **hazard environment is dynamic and because decisions are made regularly that affect vulnerability, disaster resilience must be seen as an ongoing process and not just an ideal condition that can be achieved and forgotten.**

Resilience of a system is related to the definition of risk:

$$\text{Risk} = \text{Threat} \times \text{Vulnerability} \times \text{Consequences}$$

Model: Dr. Mary Ellen Hynes, DHS (2001); Blair Roes, ORNL; CARRI 2008 ©

ORNL 2011-G00804/jcn

How to Improve Community Resilience

Be able to understand:

the immediate threat and hazards that are threatening their community.

the community structure, ages of people, where they live, what type of needs they require to avoid the hazard

the available capabilities of each community member

the available resources

the geographical area, built environment and transport infrastructure

the solutions to enhance the community resilience

Community processes in place for action

Community's ability to communicate required information to the community members

Leadership

Identify vulnerabilities

Available Resources

National / State / Private / Public & International contributions - \$ / Material / Workforce

Case Study 1.Land Use Planning Permit Process

Case Study 1 : Land Use Development and Planning Framework

Issues identified in a Land Use Planning Process

Figure 10. Hurricane paths and intensities

(Source: <http://blog.cleanenergy.org/2011/09/05/how-wind-farms-weather-hurricanes/>)

Case Study 2. Hurricane Katrina August 2005

Wind speeds	> 232km/h
Storm Surge	8.2 m
Affected Area	240,000 sq.km
Debris	118 million cubic yards

Impact

Fatalities > 1300

Critical Infrastructure Failures

Dangerous chemical sites	466
Hazardous waste sites	31
Superfund toxic waste sites	16
Dinking water facilities	170
Power / Phone customers	2.5 / 3 million

Economic losses

Estimated construction costs \$ 96 billion

Case Study 2. Katrina Transport Issues

- Lack of alternative routes
- High congestion
- Inadequacy of the road design for the particular land use
- Lack of provisions for emergency vehicle access
- Transport Planning Failures
- Emergency Management Planning Failures

Source : Bob Wolshot, Evacuation Planning and Engineering for Hurricane Katrina ,The Bridge,SPRING 2006.

Source : A FAILURE OF INITIATIVE

Case Study 2. Social Impact

Fatalities > 1300

- Elderly
- Children
- Sick
- Animals

CI System failures

Electricity, Water,
Telecommunication,
Phone and
Technology

Planning

Leadership,
High Risk Area
Developments,
Emergency
Management Strategies
and Policies,
Engineering Standards

Summary of Case Study 2

Hurricane Katrina Critical Challenges

1	National Preparedness
2	Integrated Use of Military Capabilities
3	Communications
4	Logistics and Evacuations
5	Search and Rescue
6	Public Safety and Security
7	Public Health and Medical Support
8	Human Services
9	Mass Care and Housing
10	Public Communications
11	Critical Infrastructure and Impact Assessment
12	Environmental Hazards and Debris Removal
13	Foreign Assistance
14	Non-Governmental Aid
15	Training, Exercises, and Lessons Learned
16	Homeland Security Professional Development and Education
17	Citizen and Community Preparedness

How a hazard impact on the Society, Environment , Economy and Critical infrastructure

DISASTER DECISION MAKING PROCESS

INPUT

Understand the types of hazards / understand the risk/ Understand the threat /
Knowledge Management / Decision making Characteristics / Decision making Styles
Responsibilities / Transport Planning / Logistics / Road Management / Information Analysis
Communication / Shelter / Available Resources / Situational Awareness /
Identify impact on Community / Identify impact on Economy / Identify impact on Environment /
Community Preparedness / Services / Training

Decision Maker

OUTPUT

Impact on Community / Impact on Economy / Impact on Environment
Situational Awareness / Transport Network / Critical Infrastructure
Road Safety / Resource Allocation / Search & Rescue
Supply of Food, water and medicine / Communication

Gaps in Decision Making

- **Leadership and Accountability**
- **Strategic Transport Planning**
- **Failure to understand the full scope of catastrophe**
- **Communication Gaps**
- **Land Use Development Approvals in high risk areas**
- **Evacuation Planning and Action Timing**
- **Disaster and Emergency Management Policies**
- **Disaster and Emergency Management Action Plans**
- **Protection of CI systems**
- **Traffic Management**

What are the barriers to providing Safety for all?

Decision Making
Leadership
Political
Economic
Strategic Planning
Environmental Constraints
Social Constraints
Population increases and migration

Improving Community Resilience through Strategic decision making

Leadership,

Accountability

Action by Responsible Authorities

Strategic Planning

Understand the full scope of Risk to the Community

Gaps in Community Resilience

Communication and Community Information

Technology Use

Disaster and Emergency Management Policies and Action Plans

Critical Infrastructure Protection Strategies

Summary

**Case studies showed the importance of
DECISION MAKING and how it impacts
on Society, Economy and Environment.**

**Good Informed Decision Making can save
lives / improve the status of a country**

Leadership and Accountability

Strategic Planning

Thank You

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