Risk Reduction for Extreme Natural Disasters

Paul Grundy
paul.grundy@eng.monash.edu.au

Obstacles to risk reduction for major disasters

1. Lack of awareness of community risk, where the impact of a disaster is greatly magnified compared with an individual risk
2. Lack of knowledge on how to retrofit existing buildings using local community resources
3. Lack of research to provide the knowledge on how to retrofit
4. Lack of community and government commitment to effect change
5. Lack of resources and funding

In this presentation: the first issue

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DRC Disaster Reduction on Coasts

Two key concepts

1. For the average citizen there is little perceived difference in loss for a disaster impacting the citizen's household and one impacting the entire community.
2. There is a large difference in the level of acceptance of risk depending upon whether it is voluntary or involuntary.

Individual loss versus Community wide loss - 1

Individual loss:

A householder will accept a high risk of asset loss where there is insurance and/or community assistance in recovery

Example: house fire

Acceptable risk 1 in 50 per annum,
Acceptable risk of loss of life 1 in 500 p.a.,
Community rallies around,
Recovery is complete in a short time.

Individual loss versus Community wide loss - 2

Community wide loss extends to:

key infrastructure which cannot be quickly replaced even if insured,

uninsurable social capital.

Example: major earthquake

Acceptable risk 1 in 500 per annum?

Acceptable risk of loss of life 1 in 500 p.a.?

Community needs external support,

Recovery is never complete.

Individual loss versus Community wide loss - 3

However

The individual still accepts the same level of risk (e.g., 1 in 50 per annum) for a major community disaster, assuming the same level of loss applies as for a local disaster.

The individual has not included the loss of key infrastructure or social capital.

The individuals comprising a community need to **Know Risk**.

Levels of acceptable risk for structures - 1

Events with annual probability 1 in 50:

Structures and facilities remain serviceable, functional and intact.

Events with annual probability 1 in 500:

Structures and facilities remain standing but may sustain damage. No lives are lost.

These standards are inadequate for major disasters where satisfaction cannot be achieved solely through engineering.

Levels of acceptable risk for structures - 2

Events with annual probability 1 in 5000:

Disaster risk reduction measures – spatial planning, retrofitting, education and training – implemented.

(This standard of disaster risk reduction is already being achieved in some places, e.g., Japan.)

Voluntary risk versus Involuntary risk - 1

- People accept a higher level of risk for activities which they actively choose than for activities where they are bystanders.
- People accept a higher level of risk from natural hazards than from hazards generated by human activity.
- There are standards of acceptable risk for infrastructure and buildings designed and built to specifications

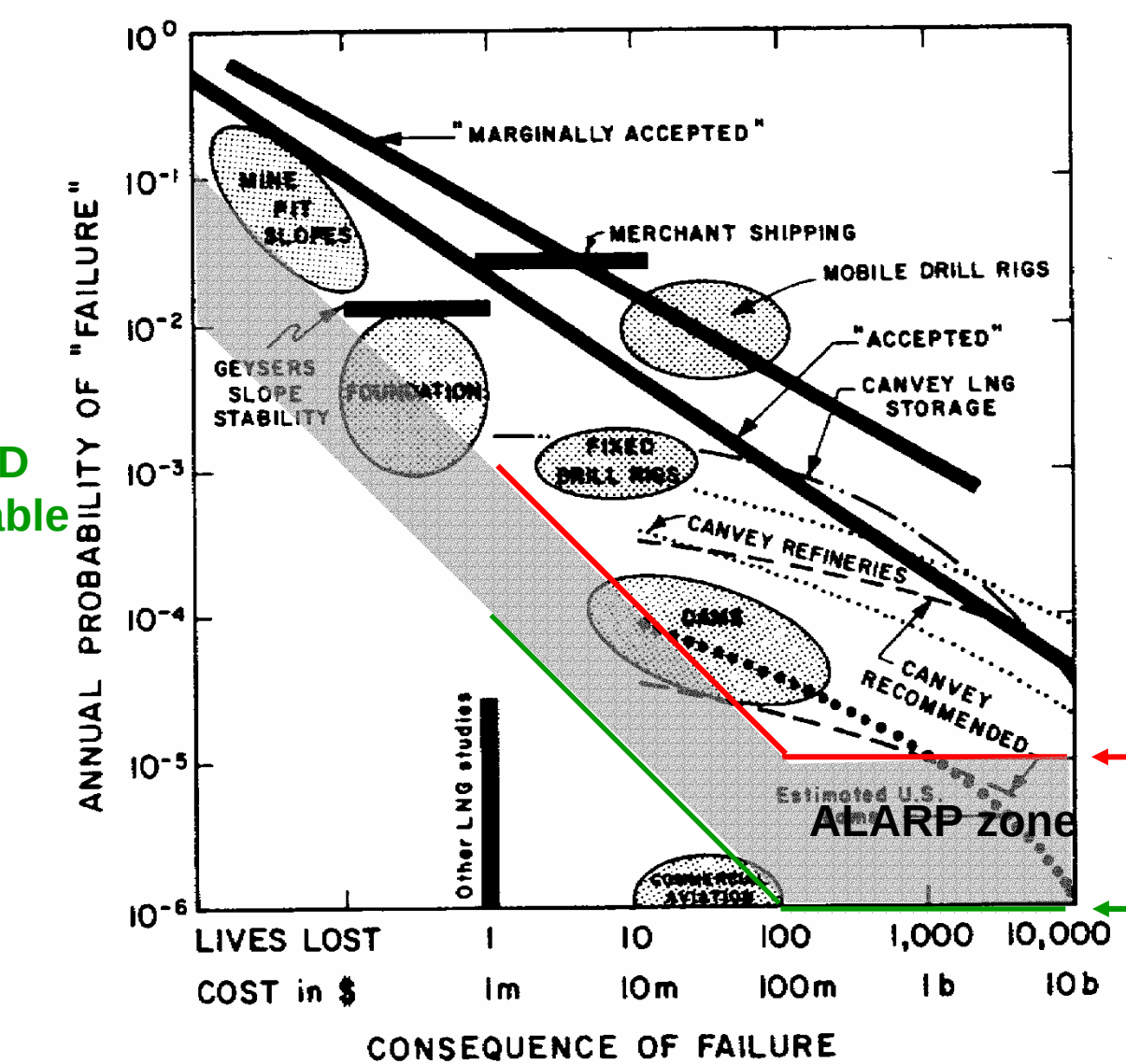
Voluntary risk versus Involuntary risk - 2

Voluntary	Involuntary
Driving a car	Riding a train
Living on a flood plain	Living downstream from a dam
Any risky occupation	Air pollution
Sport	Exposure to asbestos

Quantifying acceptable risk

Review historical acceptance of risk and industry standards

Risk of failure vs. Loss (after Whitman)



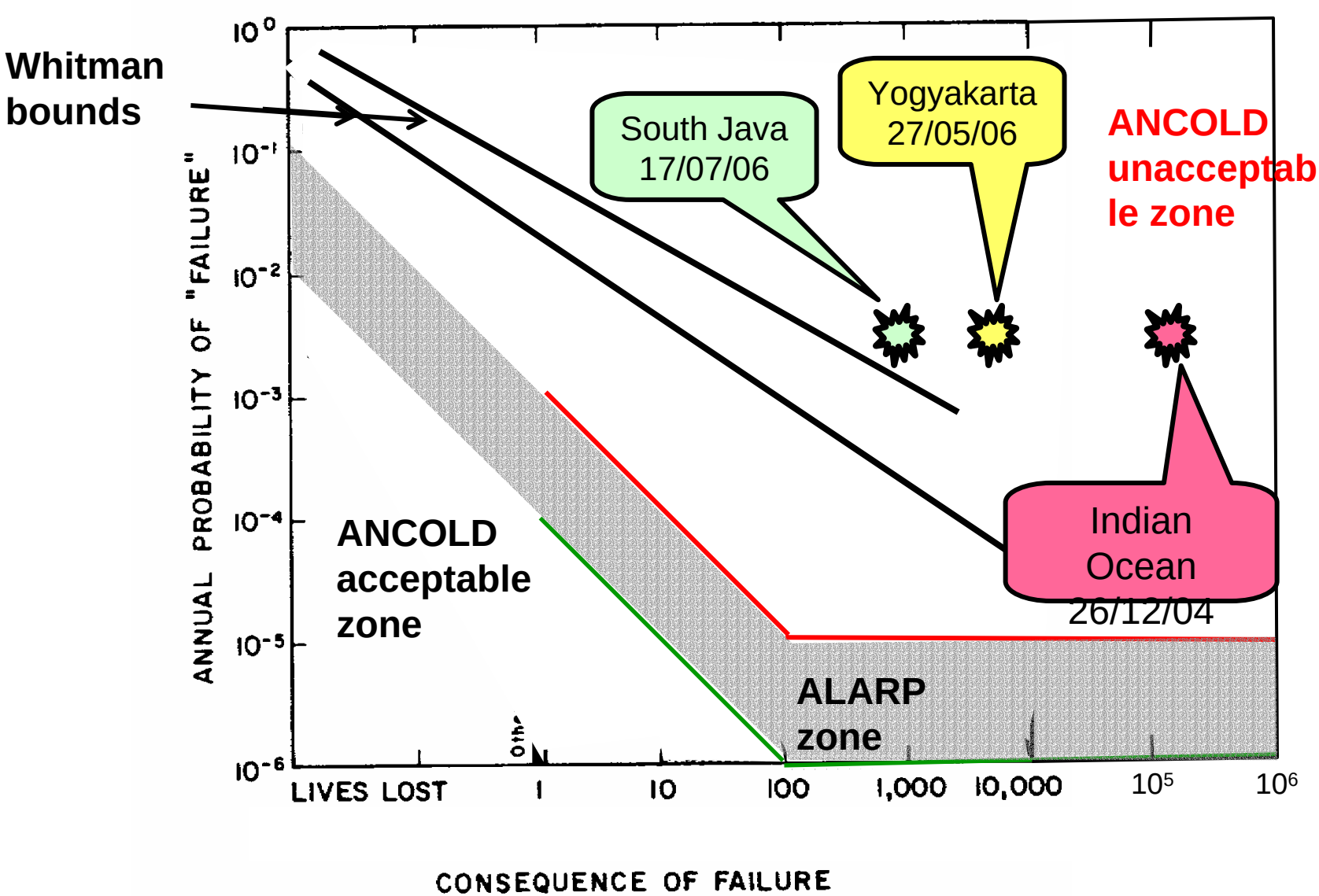
ANCOLD acceptable zone

ANCOLD unacceptable zone

ANCOLD existing design limit

ANCOLD new design limit

Some recent natural disasters



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The challenge is finding ways to raise community awareness of, and therefore demand for, disaster risk reduction.

Stages in risk reduction for major disasters

1. Identification and quantification of risks of disasters
2. Communication of the risk to the stakeholders
3. Development with stakeholders of the risk reduction options
4. Implementation of the disaster risk reduction plan

If we don't fall at the first hurdle we fall at the second.

OR

Conclusions

- Risks from major natural disasters can be far higher than those acceptable for human developments.
- There are major challenges at every stage of major disaster risk reduction.
- There is a serious shortfall in the appropriate research and development for retrofitting buildings and infrastructure.

Thank you

Engineers Australia

The Institution of Structural Engineers

International Association for Bridge and Structural Engineering

MONASH University

International Strategy for Disaster Reduction

The Joint Working Commission for Disaster Reduction on Coasts

Aims:

- to produce a *Guide to Disaster Reduction on Coasts* for use by local, regional and national groups
- To work with government and NGOs in implementation of the *Guide*

DRC Disaster Reduction on Coasts

Guide for disaster reduction on coasts

- Launched at IABSE conference, New Delhi, 20-22/2/05
- Three tiers of application
  - Local, regional and professional groups
- Based on risk assessment
- Community chooses on risk acceptance and/or reduction options
- A challenge to implement