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3 – 6 SEPTEMBER 2024
ICC Sydney

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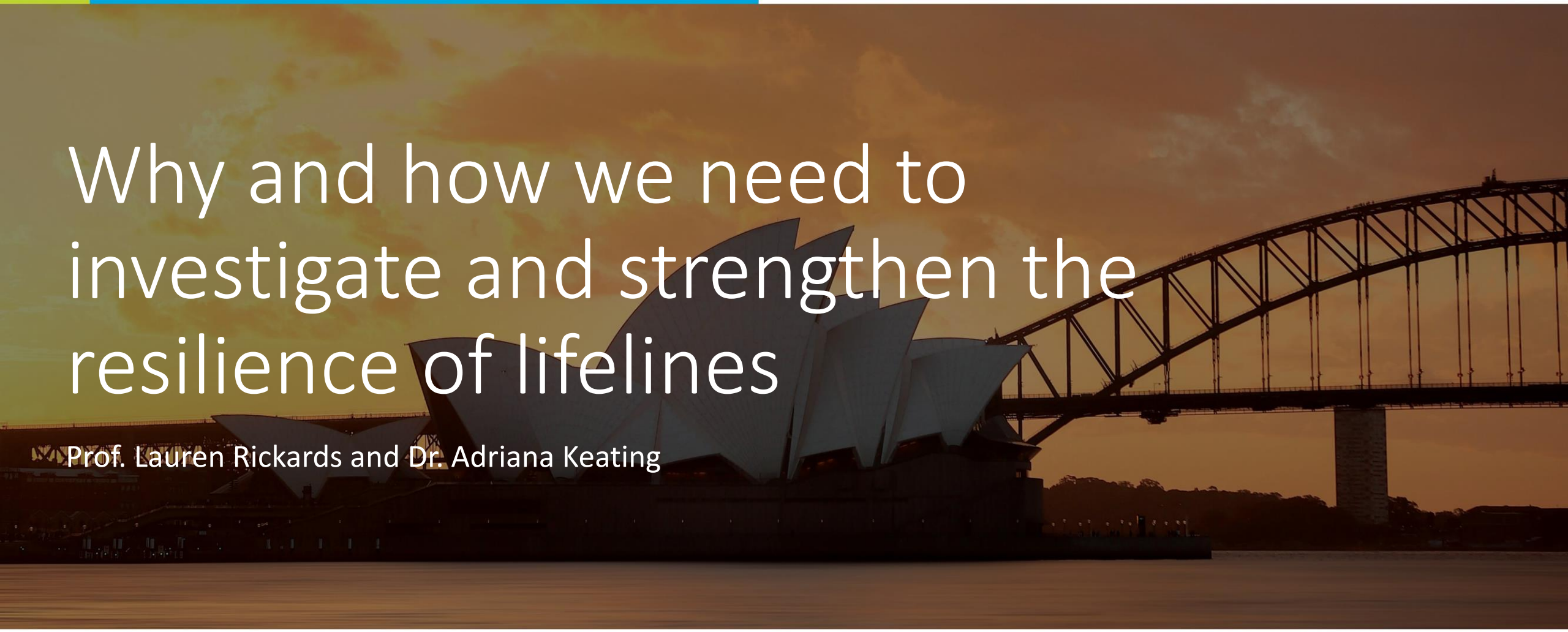

Why and how we need to investigate and strengthen the resilience of lifelines

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Australian Government
National Emergency Management Agency

Australian Institute for Disaster Resilience

iag

NRMA INSURANCE A Help Company

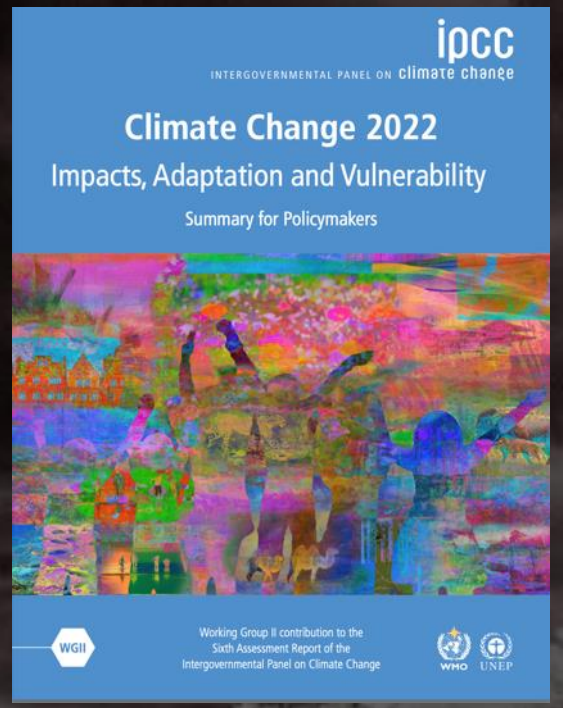
FIRE to FLOURISH Strength through community-led action

NSW GOVERNMENT

‘As climate change intensifies, we are now seeing **cascading and compounding impacts and risks**, including where extreme events coincide.

These are placing even greater pressure on our ability to respond.

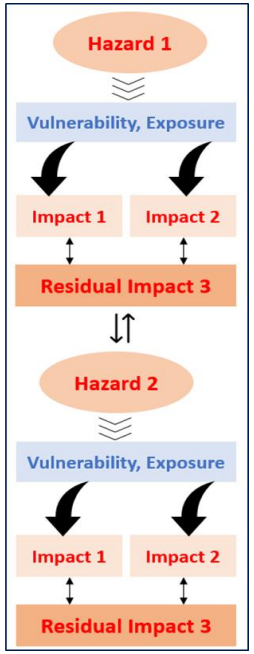
While the work of adaptation has begun, we have found the progress is uneven and insufficient, given the risks we face’

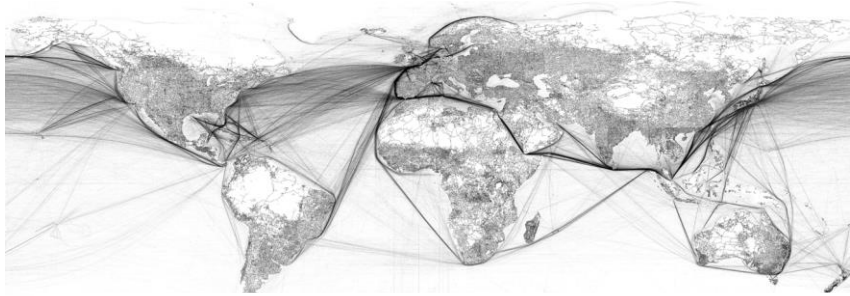


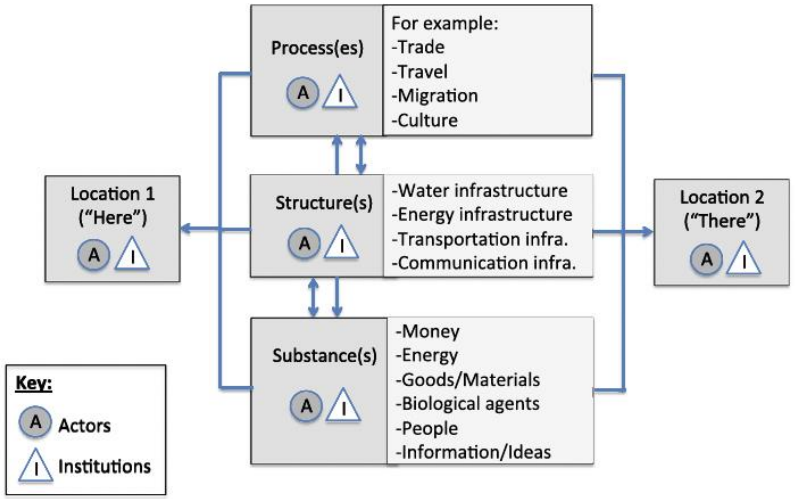
Mackey et al. (2022) New IPCC report shows Australia is at real risk from climate change, with impacts worsening, future risks high, and wide-ranging adaptation needed, *The Conversation*, Feb 28, 2022

Why are impacts *cascading*?

- The increasing severity of impacts means systems thresholds are being crossed, triggering and multiplying risks and impacts in the one system and other systems[1]
- Existing complex systems interconnections – including long-distance 'teleconnections' – propagate impacts
- One social teleconnection is our **interconnected infrastructural and service systems**[2]





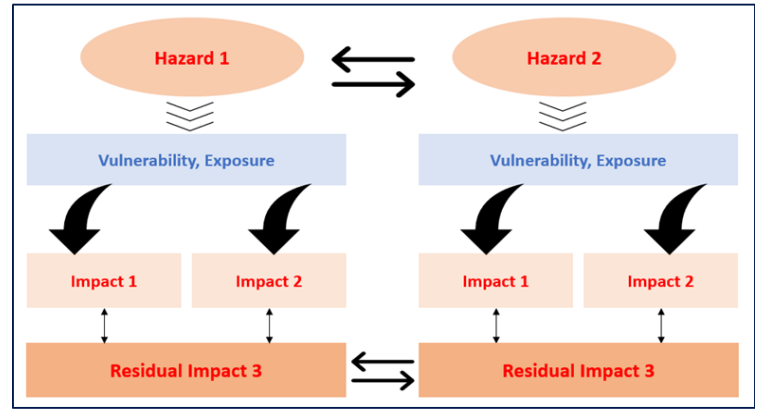


[1] Moser, S. C. & J. Hart (2018) The Adaptation Blindspot: Teleconnected and Cascading Impacts of Climate Change in the Electrical Grid and Lifelines of Los Angeles. *California Energy Commission. Publication number: CCCA4-CEC-2018-008*. See also https://www.unescap.org/blog/2022-year-when-disasters-compounded-and-cascaded

[2] Moser, S. C. & J. Hart (2015) The long arm of climate change: societal teleconnections and the future of climate change impacts studies. *Climatic Change,* 129**,** 13-26.

Why are impacts *compounding*?

- **Existing vulnerability** is a major determinant of impacts
- **Incomplete disaster recovery** = vulnerability to subsequent stressors. The increasingly long tail of recovery extends the disaster period, which means disasters are more likely to overlap from the perspective of those who have been impacted.
- At the same time, the return period of climate change-related extreme events is shrinking, and the background climate is becoming more challenging.



https://www.unescap.org/blog/2022-year-when-disasters-compounded-and-cascaded

Lifelines…

- Thinking about lifelines helps us understand why impacts are cascading and compounding and therefore how to intervene and improve resilience – of lifelines and more broadly.
- Lifelines are:

  'the systems or networks which provide for the circulation of people, goods, services and information, upon which health, safety, comfort and economic activity depend. Lifelines are the means whereby a community supports its day-to-day activities and include mechanisms used to respond to emergencies'.[1]
- Lifelines include but exceed what is needed to survive an acute disaster.

[1] Johnston, D., Becker, J., & Cousins, J. (2006). Lifelines and urban resilience. D. Paton & D. M. Johnston (Eds) *Disaster Resilience: An integrated approach*. Springfield: Charles Thomas Pub.

The idea of lifelines overlaps with that of 'critical infrastructure'

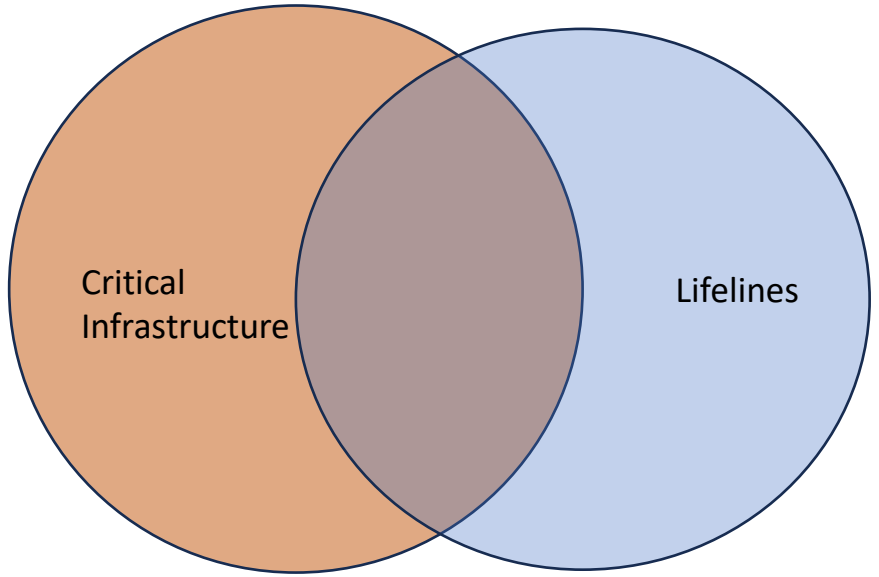
Critical Infrastructure:

'those physical facilities, systems, assets, supply chains, information technologies and communication networks which, if destroyed, degraded, compromised or rendered unavailable for an extended period, would significantly impact the social or economic wellbeing of Australia as a nation or its states or territories, **or** affect Australia's ability to conduct national defence and ensure national security.'

Australian Government (2023) *Critical Infrastructure Resilience Strategy.*

Critical infrastructure in Aus:

- energy
- food and grocery
- health care and medical
- transport
- water and sewerage
- communications
- higher education and research
- data storage or processing
- financial services and markets
- space technology
- defence industry



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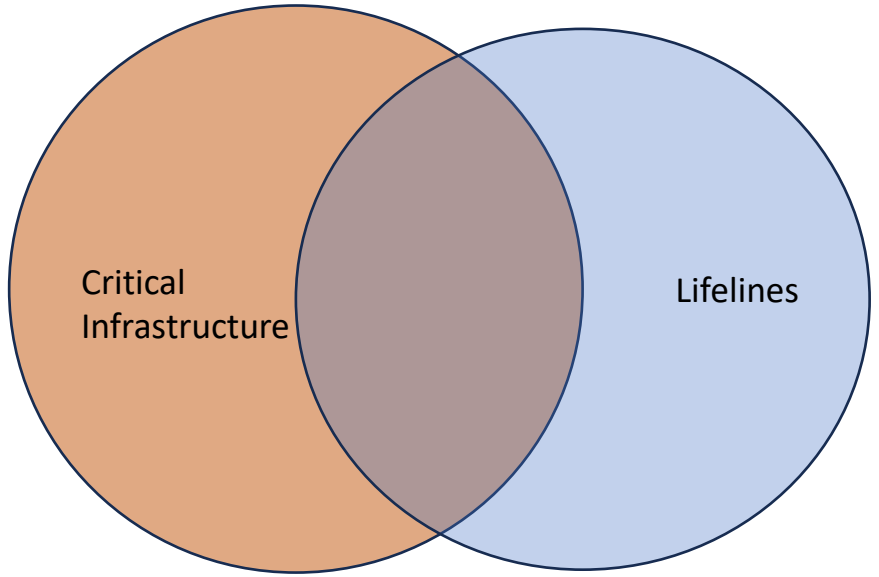

Some of these contribute to outcomes other than lifelines

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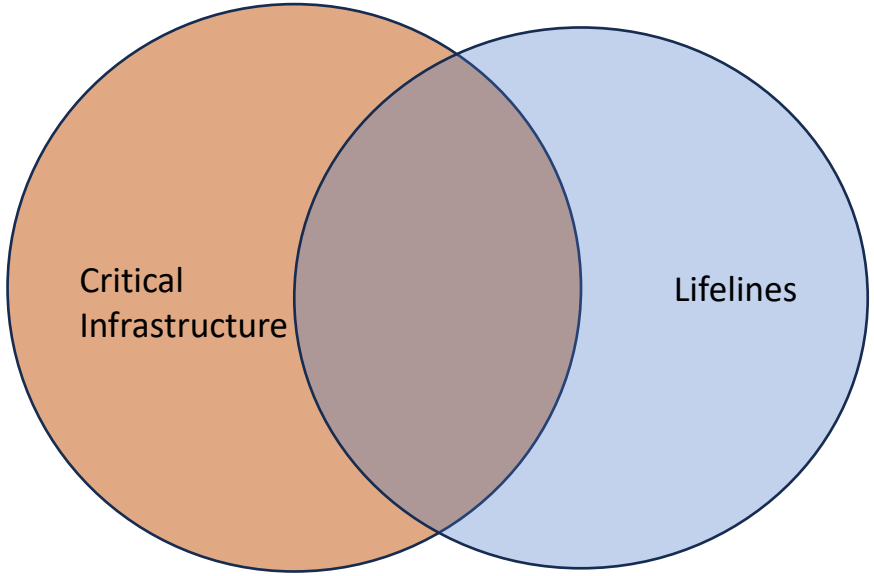
Other critical infrastructure

- Emergency services sites
- Schools
- Childcare
- Waste management
- Parks and gardens
- Sports infrastructure
- Rivers

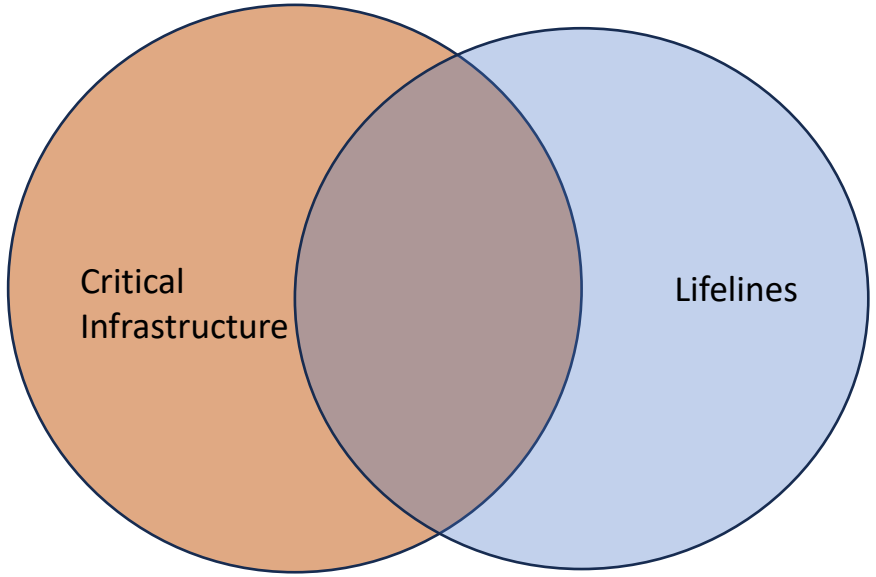
- i.e. Social and natural infrastructure

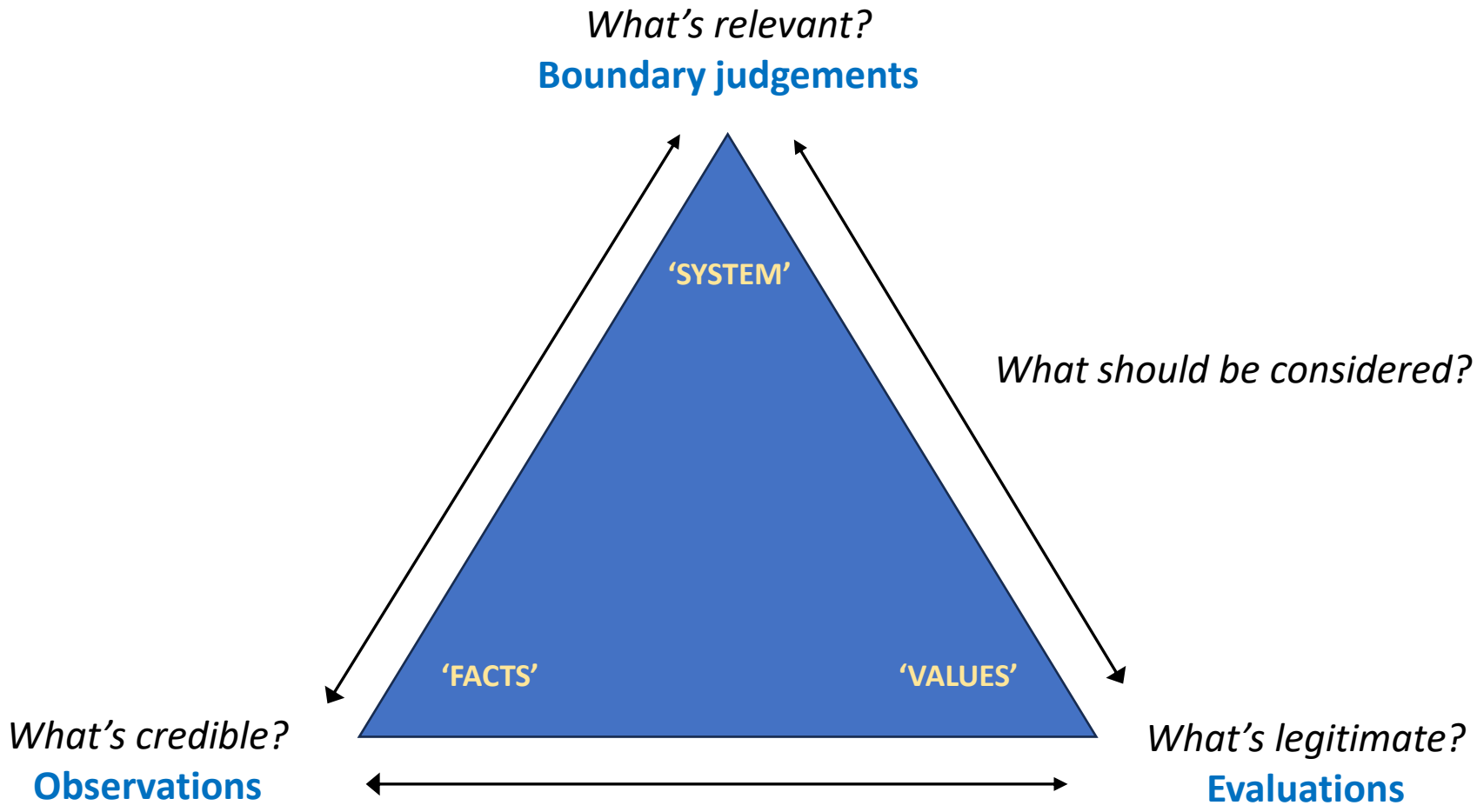


The idea of lifelines overlaps with that of 'critical infrastructure'

- Lifelines includes a selection of critical infrastructure, and brings into view other vital infrastructure, services and systems

- Why? They are focused on outcomes, notably *outcomes for society*

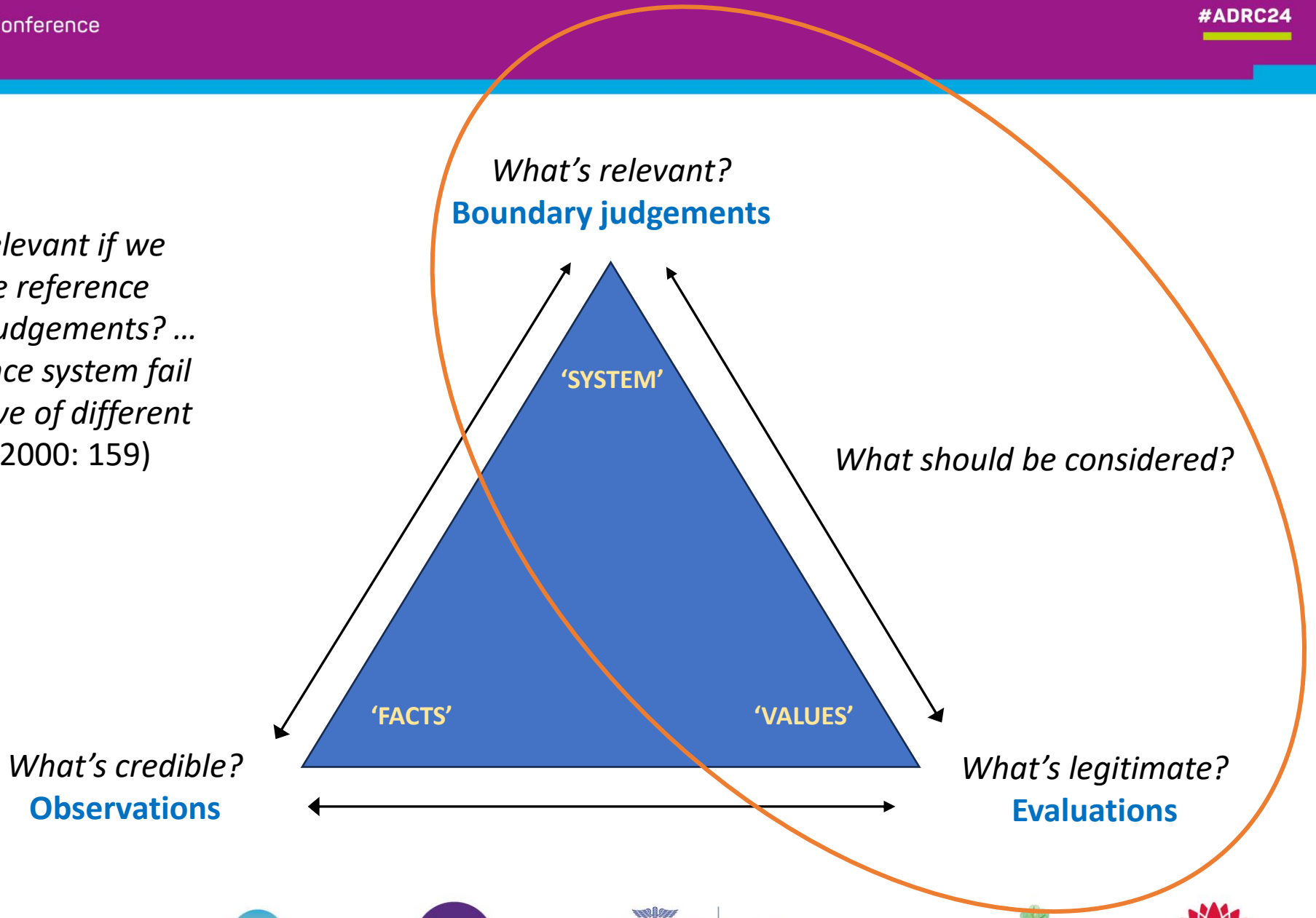




Ulrich, W. (2000) Reflective practice in the civil society: the contribution of critically systemic thinking. *Reflective Practice* 1, 247-268.

Cash, D.W. et al. (2003) Knowledge systems for sustainable development. *PNAS*, 100, 8086-8091.

'[W]hat new facts become relevant if we expand the boundaries of the reference system or modify our value judgements? … In what way may our reference system fail to do justice to the perspective of different stakeholder groups?' (Ulrich 2000: 159)



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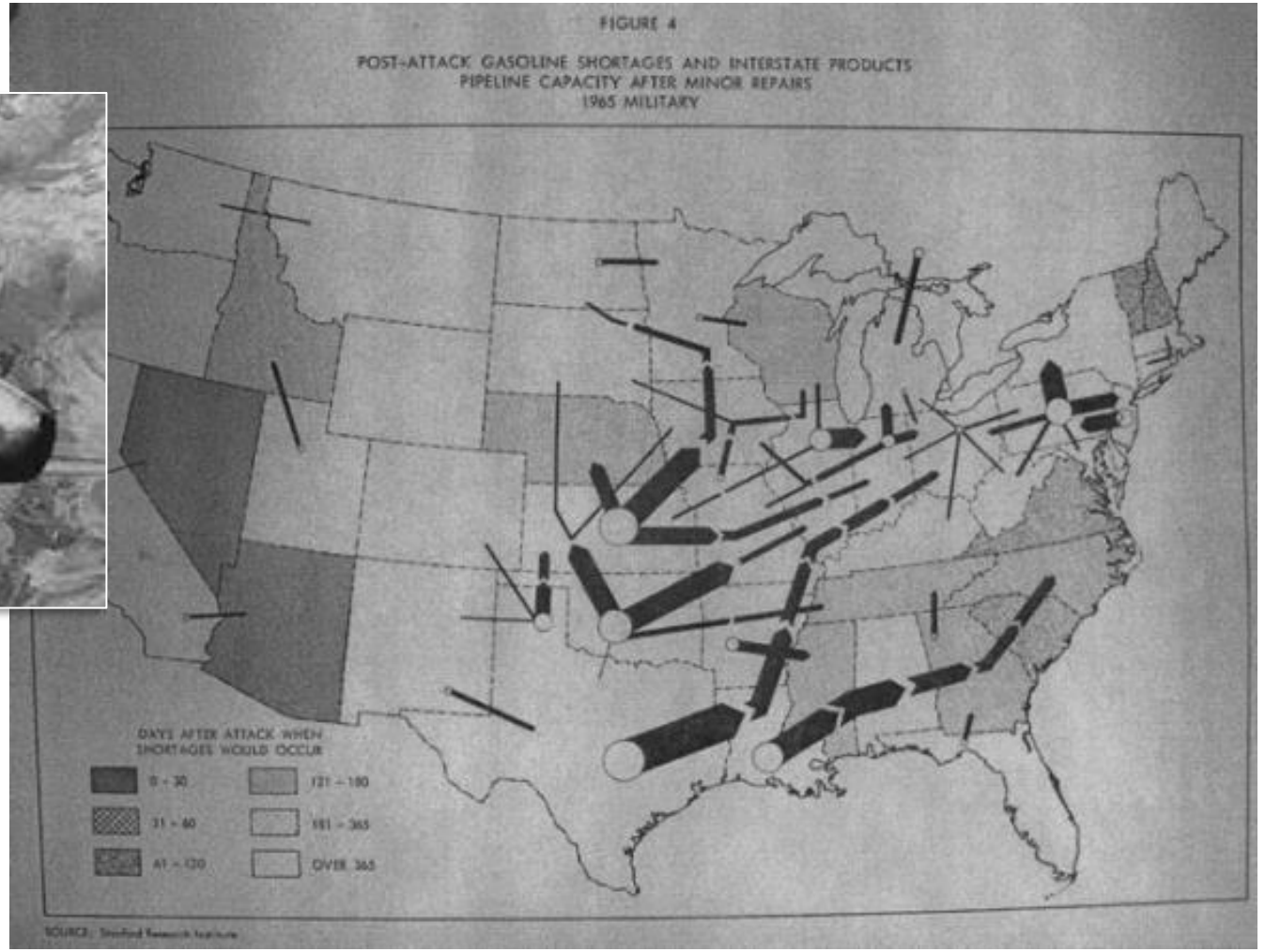


A shift in perspective from *the outside in*

To *the inside out…*

Lifelines especially take the perspective of community.

What do infrastructure and services look like from their experiential perspective? Before, during and after disasters?

So, what does this shift in focus reveal?

1. Existing lifelines are not fully or fairly distributed – so it is not enough to just make existing systems resilient
2. Successful infrastructure service outcomes require a lot more than physical assets.
3. How people engage with and experience generic lifelines depends as much on their situation as the services available
4. Depending on its type, siting and operation, infrastructure can have negative outcomes for some communities
5. In keeping with the way impacts can cascade through infrastructure and compound in particular contexts, 1-4 are often **amplified by disasters**

Infrastructure implications for community: examples

	Long-term		Disaster situation	
	Infrastructure status prior to disaster	**Risks and costs to communities**	**Infrastructure status during disaster**	**Risks and costs to communities**
Infrastructure absent	Rural and remote areas with little transport infrastructure	Socioeconomic disadvantage caused by lack of services and relative opportunities	Roads or bridges washed away during floods; mobile phone tower burnt out	Lack of access for evacuation or emergency services; lack of communications
Infrastructure physically deficient	Large, slow infrastructure building or maintenance projects	Socioeconomic disadvantage caused by lack of services and relative opportunities	Electricity transformers burn out during heatwave; Road repairs take years	Increased relative isolation and physical exposure to elements.
Infrastructure not operating as intended	Mobile phone or NBN towers present but signal weak and/or unreliable	Contextual vulnerabilities caused by unreliable services (e.g. difficulty WFH)	Debris from floods/fires causes malfunction in water sewage treatment plant; Mobile phone outage caused by computer glitch	Sudden loss of services and resources people normally rely on, causing confusion and stress. Severe health risks especially for vulnerable populations.

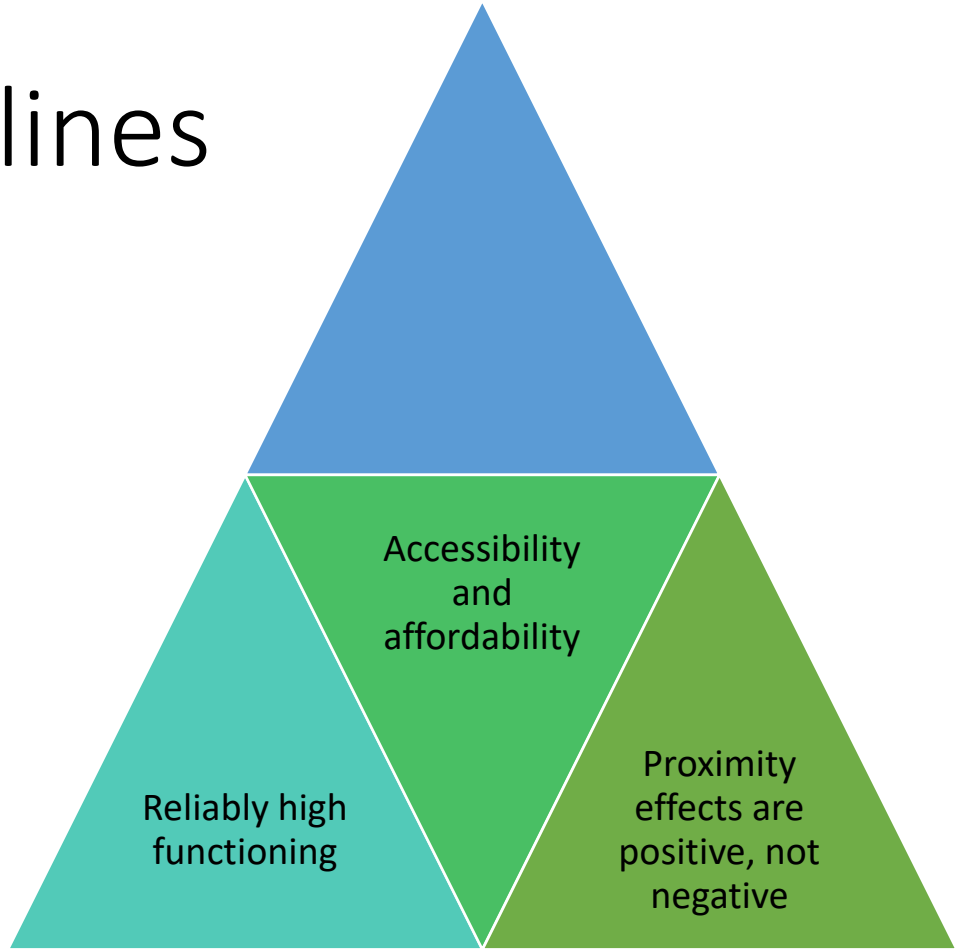
Road repairs, Northern Rivers, after 2022 floods. Taken 2/9/2024

Infrastructure implications for community: examples

	Long-term		Disaster situation	
	Infrastructure status prior to disaster	**Risks and costs to communities**	**Infrastructure status during disaster**	**Risks and costs to communities**
Infrastructure operating as intended but not accessible by community	Large dams, landfill sites and water treatment plants. Privately owned mines, railways, ports, power plants, plantations, roads.	Living with the infrastructure without the benefit, leading to reduced sense of community	Normal access to potable water, electricity or internet cut off due to damage on house block	Sudden loss of services and resources people normally rely on, causing confusion and stress. Increased risk for those who are socially and/or physically isolated.
Infrastructure not affordable for community	Satellite internet infrastructure run by StarLink (SpaceX)	Unaffordable internet access, exacerbated socioeconomic differences	Loss of household assets and income make normal costs too high	Lack of access to information, services, supports
Infrastructure displacing harms and risks onto community	Environmental pollutants, odour, noise, heavy traffic	Loss of amenity, reduced home values and sense of community. Health impacts. Impacts on livelihood.	Untreated sewage pumped into rivers during water treatment plant breakdown. Electricity lines or asphalt works ignite fire.	Loss of water quality and impacts on biodiversity. Life-threatening bushfires.

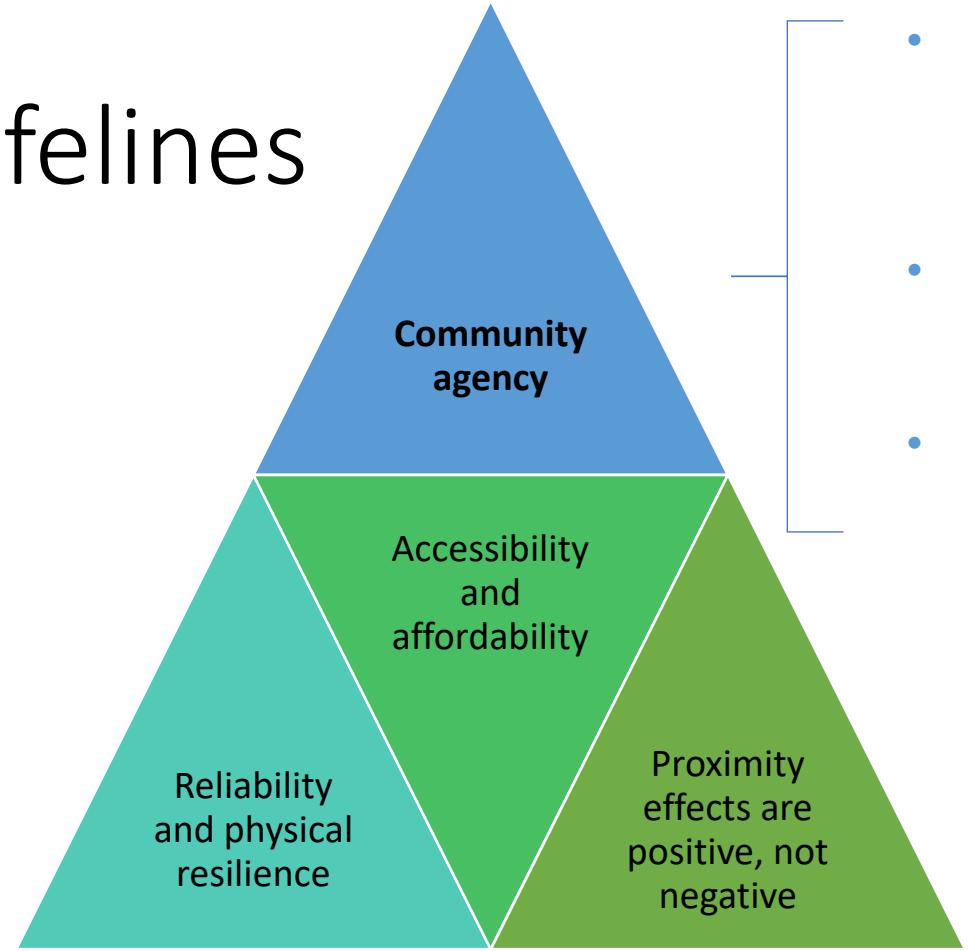
Sewage spill into Nambucca River, NSW, 2022

Lifelines



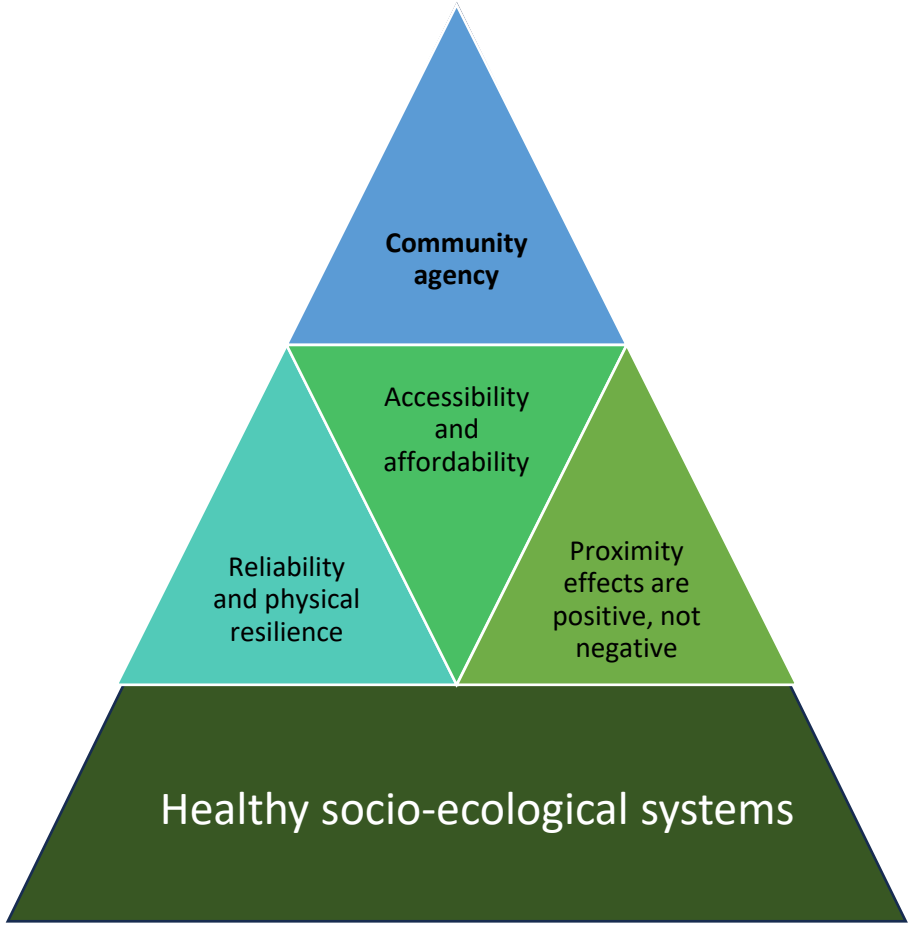
Infrastructure and service needs – before, during and after disasters

Lifelines



- Preparation for and resourcefulness during and after a disaster – negotiating around and with failed/absent infrastructure and services
- Increased self-reliance as appropriate to increase as many securities as possible (water, energy, food, comm's)
- Input to infrastructural governance and management to improve community outcomes

Lifelines


Community agency
Accessibility and affordability
Reliability and physical resilience
Proximity effects are positive, not negative
Healthy socio-ecological systems

Why and how do we need to investigate and strengthen the resilience of lifelines?

- Thinking about lifelines requires linking conversations about centralized infrastructure/services and community
- It points to a range of existing and possible links that are often overlooked, including drivers of disaster vulnerability above and beyond the resilience of existing assets
- These insights into systemic disaster risk and cascading and compounding impacts widen our options for improving resilience.