

# Towards transformational change

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Rawpixel.com



Extreme weather events - greatest global risk.

# World Economic Forum Global Risks Perception Survey 2023-2024

This survey brings together the collective intelligence of nearly 1,500 global leaders across academia, business, government, the international community and civil society plus insights from over 200 thematic experts.

## Global risks ranked by severity

10 years



Source: World Economic Forum Global Risks Perception Survey 2023-2024.



# The scale and cost of disasters

| Cost (\$)  | Time frame                  | Assets                              | Cause   |
|--|-----------------------------|-------------------------------------|---|
| 1.35 trillion <sup>1</sup><br>(Deloitte 2021)                    | Now - 2060                  | Australian Economy                  | Natural disasters   |
| 94 billion<br>(Deloitte 2021)                                    | Average annual cost in 2060 | Australian Economy                  | Natural disasters   |
| 414.5 billion<br>(Climate Council 2022, Climate Valuation 2024)) | 2030                        | 1/25 properties                     | Riverine flooding high risk / uninsurable                             |
| 225 billion<br>(DCCEEW 2011)                                     | 2100 (or earlier)           | Up to 250,000 residential buildings | Coastal inundation and erosion (sea level rise of 1.1m) / uninsurable |
| 4.66 trillion<br>(Domain 2024)                                   |                             | 5.6 million homes                   | Bushfire risk   |

<sup>1</sup>Not including heatwaves, droughts, impact on the environment, most social impacts, tourism and network



# Who Bears the Costs?



Homeowners  
Local Governments  
State and Federal Governments  
Environment  
Taxpayers  
Businesses  
Insurance Companies  
Charities and NGOs  
Healthcare  
Farmers



# Limitations of Current Disaster Management



Not keeping up with climate change  
Insufficient \$ to finance recovery  
**and** mitigate risks

- Constrained government funding
- Growing insurance protection gap

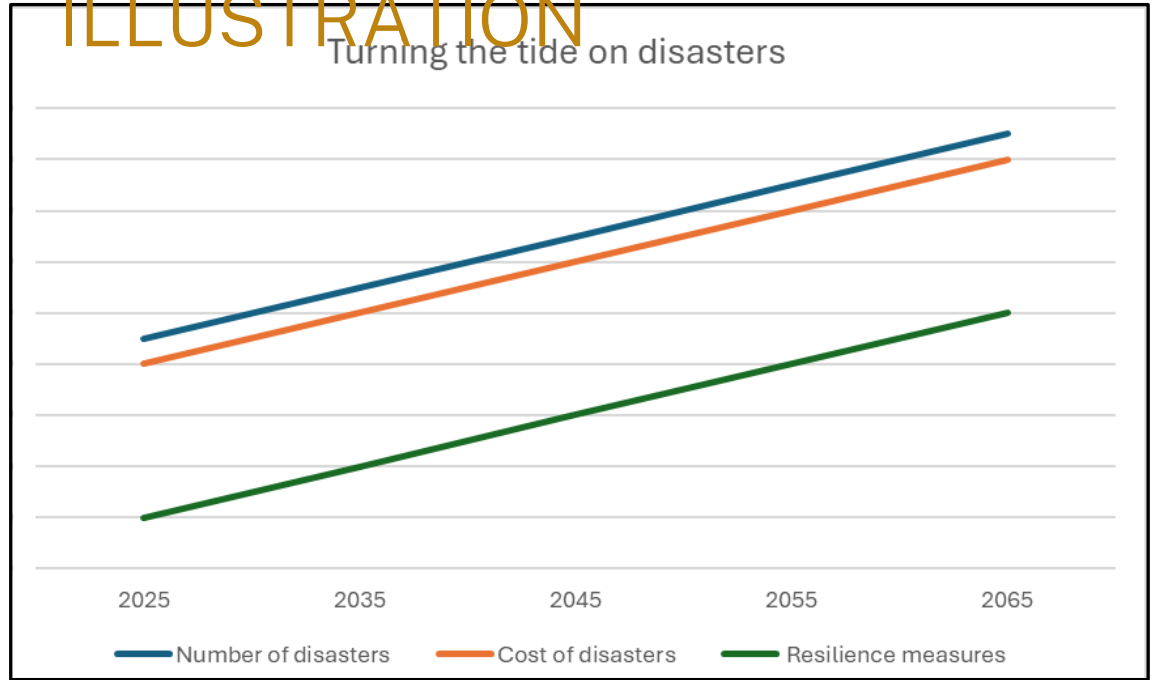
Incremental approaches often treat symptoms rather than causes.

Transformational solutions not available to address fundamental drivers of disaster risk.



# A CONCEPTUAL ILLUSTRATION

Turning the tide on disasters



How can we turn the tide?

What will be most effective?

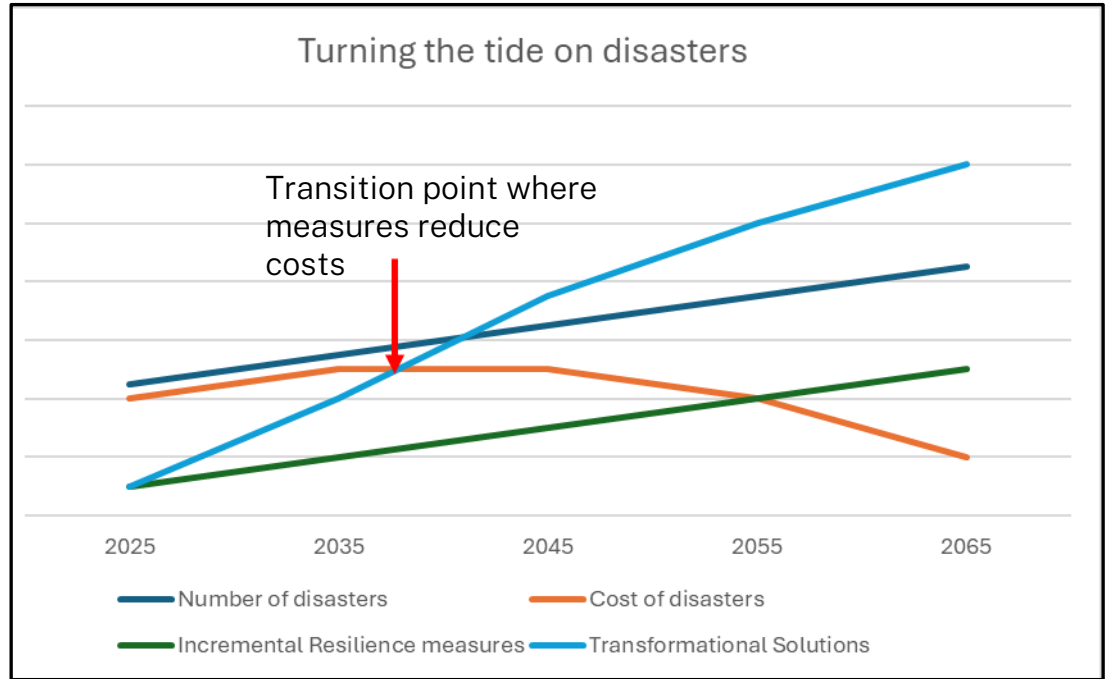
How much will it cost?



# Transformational solutions

A game changer.

## A CONCEPTUAL ILLUSTRATION





# Preparing to win a war on climate-change-fuelled disasters

Transformational Solutions are a must.

Catastrophic disasters are here.  
What we are doing is not working.



Pixabay free image





# Understand the Hazard

# Target the Intervention

Advanced science and technological leaps

Treat the root cause – not the symptom

Stop disasters in their tracks.

Stop the costs.



# Transformational Solutions

## STOP / REDUCE THE HAZARD

Transformational Solution 1: Stopping Catastrophic Bushfires

Transformational Solution 2: Research to Stop Cyclones

Transformational Solution 3: Nature-Based Solutions for Flood Mitigation

## REDUCE EXPOSURE

Transformational Solution 4: Relocating Communities at Risk

## REDUCE VULNERABILITY

Transformational Solution 5: Citizen scientists - Community Flood Intelligence Networks

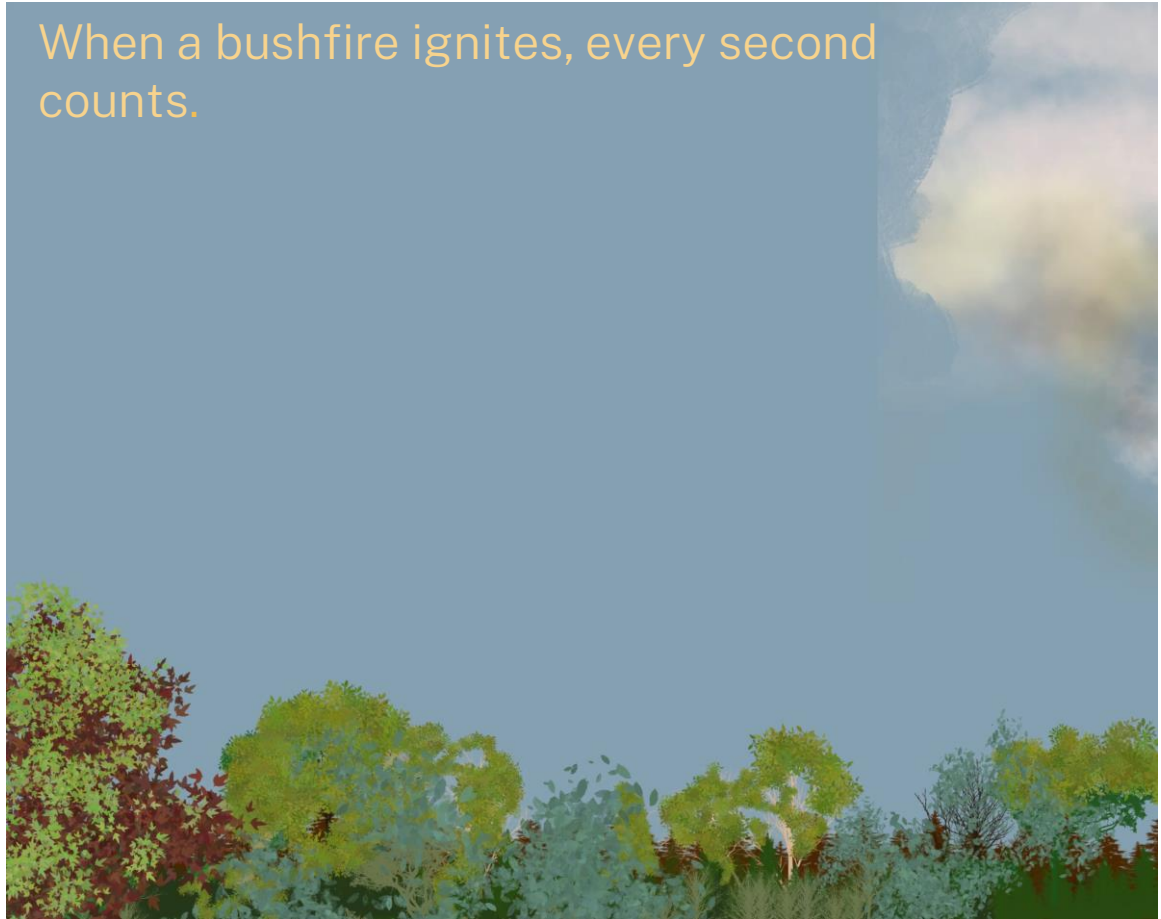


# TRANSFORMATIONAL SOLUTION 1 STOPPING CATASTROPHIC BUSHFIRES

## Vision |

Detect and extinguish a small bushfire before it can spread

When a bushfire ignites, every second counts.



ELENA MCNEE – An Artist's impression of our aspiration



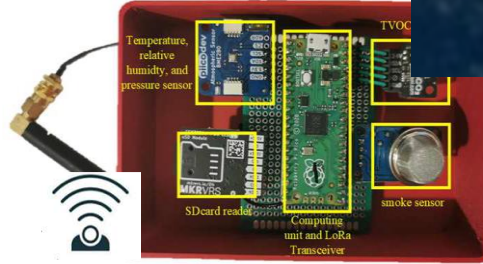
# ANU researchers from multiple disciplines and sectors collaborate with multiple end-users and industry partners



Astronomy and space science



Artificial Intelligence



Sensor technology / IOT



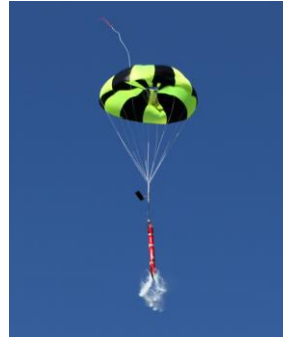
Computer simulation / mathematics



Autopilot software / Robotics / computer science



Bushfire and environmental scientists and practitioners



Autopilot software computer science Engineering



UAV manufacturer - Carbonix



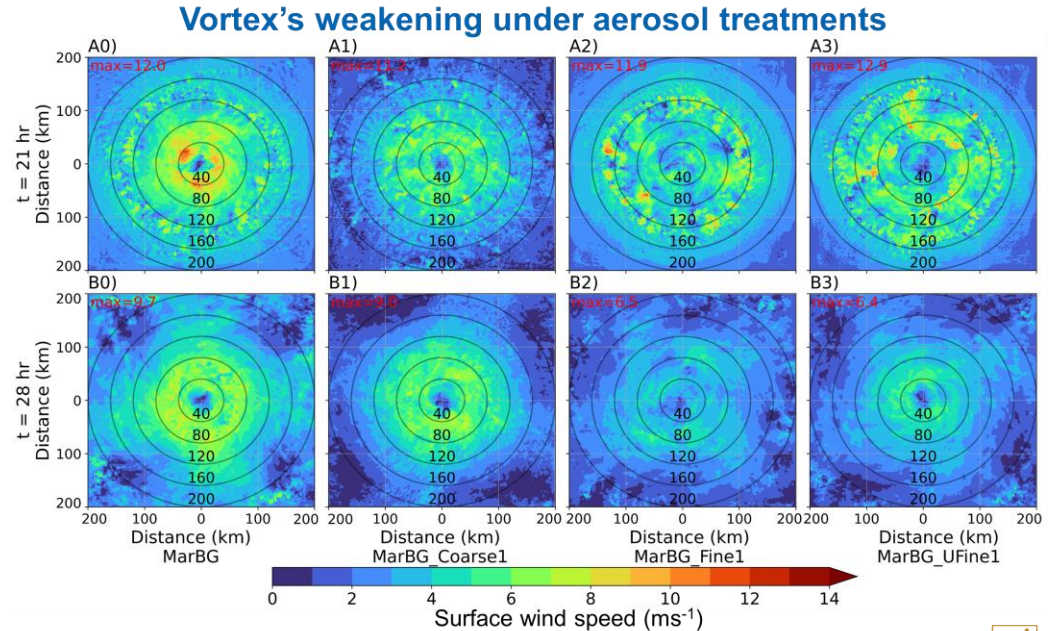
# TRANSFORMATIONAL SOLUTION 2

## ANU RESEARCH TO STOP CYCLONES

An international research team to better understand how we can use aerosols to intervene and stop cyclones or reduce their intensity through cutting edge physics and modelling.

Reference Miller et al (2023) The Feasibility and Governance of Cyclone Interventions

Cyclone sensitive to changes in environment and structure – a tiny difference changes intensity. Identify a highly sensitive point in the cyclone and modify it.





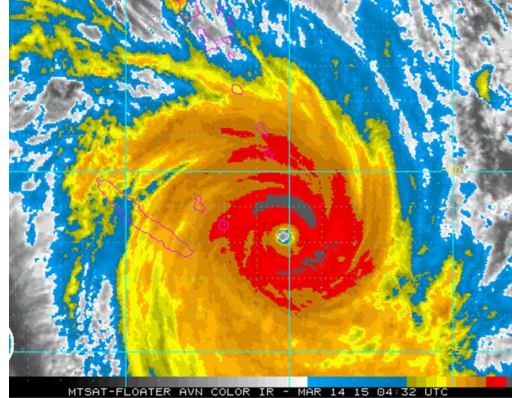
## Japan's Moonshot

Free the world from the fear of climate-induced disasters (typhoons and storms).

AUD177m

## UK – Advanced Research & Invention Agency

Managing our weather through responsible engineering.



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## China's Meteorological Masterplan: Controlling the Clouds

Supports disaster preparedness.

Large-scale scientific experiments

Employs 37,000 people nationwide



# TRANSFORMATIONAL SOLUTION 3

## ANU Nature-Based Solutions for Riverine Flood Mitigation



Nature Based Solutions are interventions that:

1. are inspired and powered by nature;
2. address (societal) challenges like floods;
3. provide multiple services/benefits, including biodiversity gain;
4. are of high effectiveness and economic efficiency.

ANU interdisciplinary team partnering with regional communities.

Funded by NEMA and CSIRO





# Has large scale ecosystem-based riparian management since the 1980s reduced flood risk?



## Natural flood management: Lessons and opportunities from the catastrophic 2021–2022 floods in eastern Australia

[Kirstie Fryirs](#), [Nuosha Zhang](#), [Timothy J. Ralph](#), [Amir Mohammad Arash](#) (2023)

<https://doi.org/10.1002/esp.5647>

# Protection by Nature-based Solutions in 100% AEP flood (simulation)

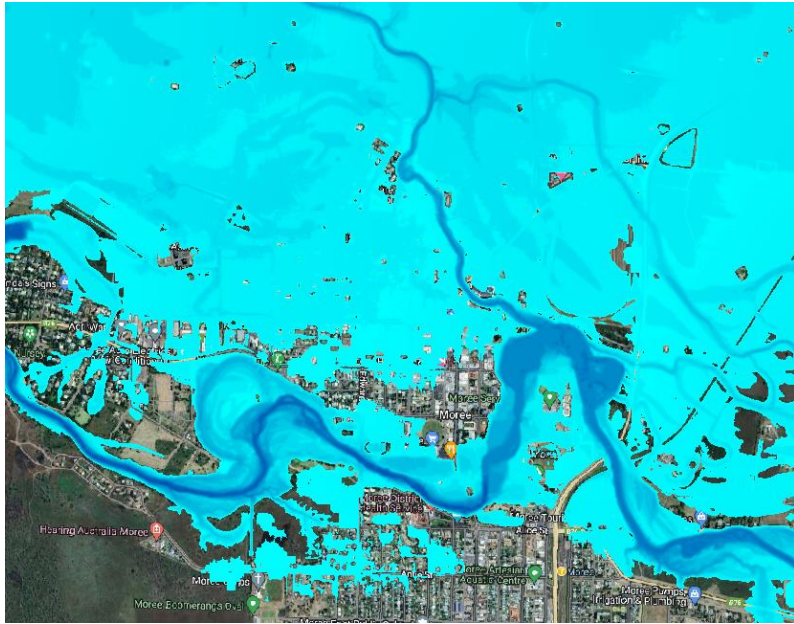
No Nature Based Solutions

Upstream interventions - Riparian  
revegetation plus leaky weirs

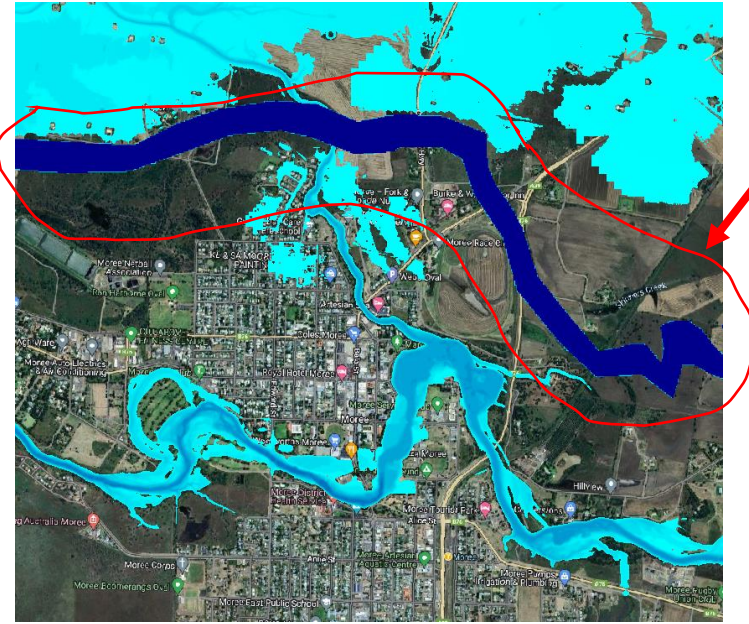




# Impact on 2012 flood (20% AEP) of palaeochannel in Moree



A simulated real flood event with significant damage experienced in Moree city  
(Most parts of the town inundated)



Modified palaeochannel for flood diversion

A simulated Nature based Solution for the same real flood event  
(Most parts of the town protected by the palaeochannel-based solution)

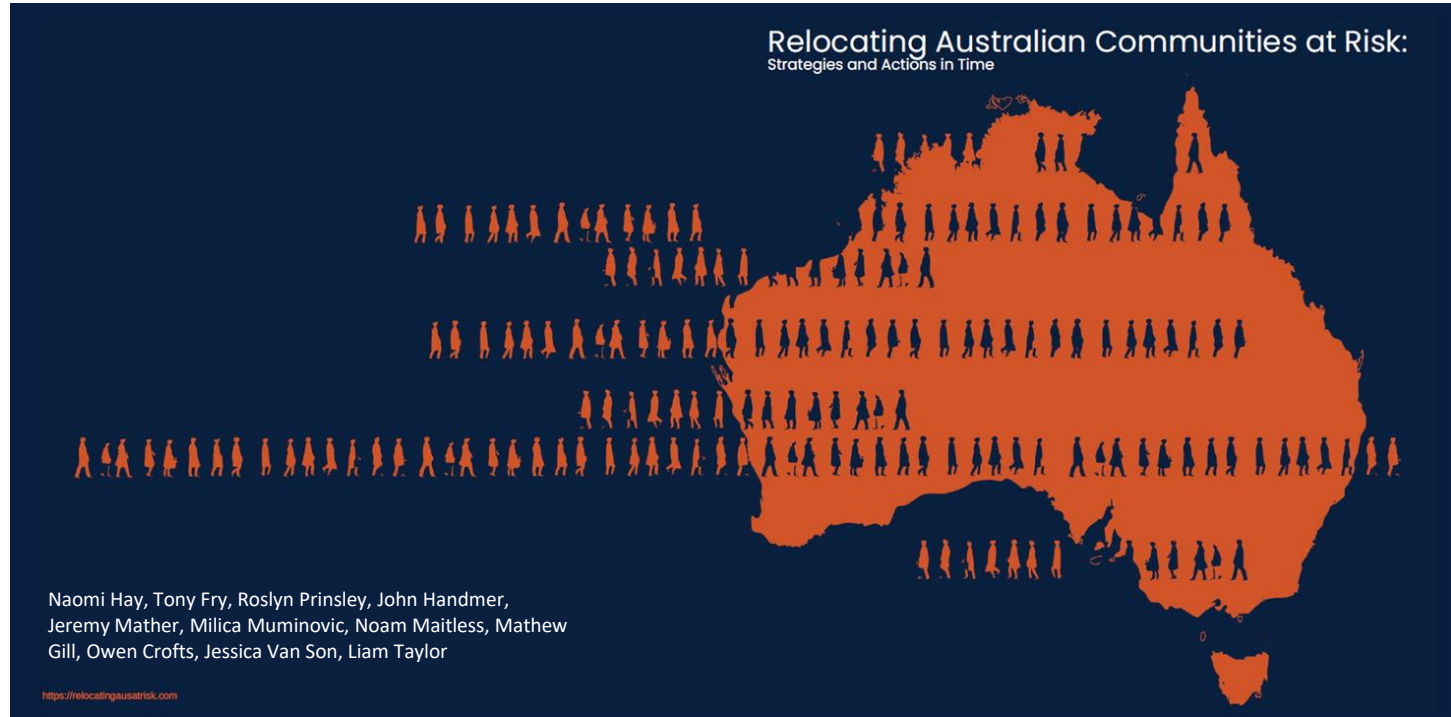


# TRANSFORMATIONAL SOLUTION 4

## Relocating Australian Communities at Risk

Reduce Exposure to Disasters

- A National Strategy
- A National Relocation Authority to lead it.



<https://relocatingausatrisk.com>



# TRANSFORMATIONAL SOLUTION

## 5

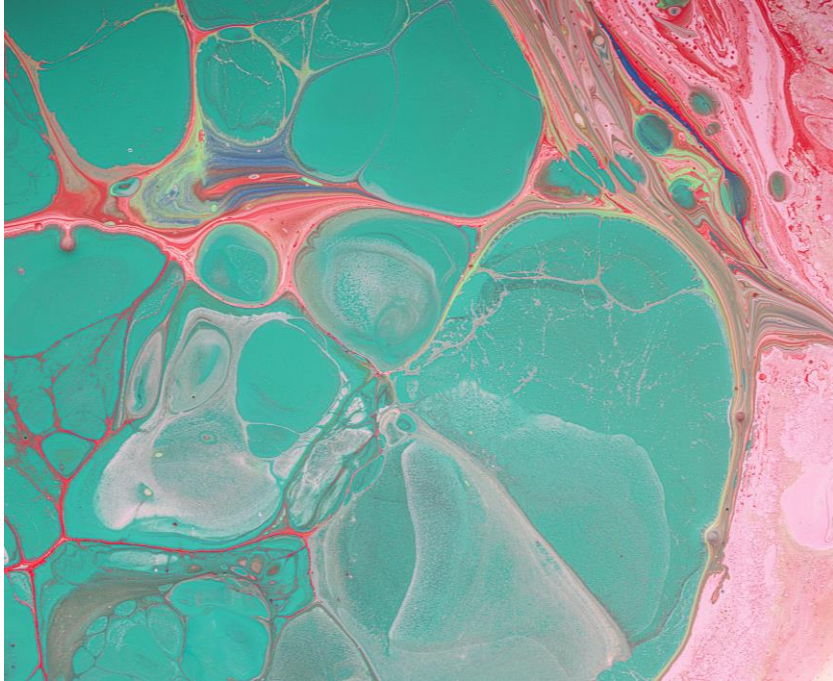
### Citizen Scientists – Community Flood Intelligence Networks

- Community-led partnership
- Citizen scientists collect and communicate data for timely response to floods
- Build resilience and protection
- Build community capability.





# Spectrum of Disaster Management Solutions



Continue to invest in disaster readiness and recovery while investing in future transformational solutions

Allocate resources across the spectrum.

Break the cycle of spending more on recovery than prevention.



Urgent, coordinated action needed to develop, fund, and implement transformational disaster solutions.



National Innovation Fund for Transformational Disaster Solutions



National Climate Disaster Fund



Ecosystem restoration / Nature-based Solutions



Implementation Strategies



Public-private partnerships to accelerate innovation and implementation





# Conclusion

Multi-faceted approach needed that includes the development of transformational solutions.

Current sources available for financing recovery and mitigating risks are insufficient.

Who pays for these initiatives and how?



Creazilla

