CLIMATE ADAPTATION

FutureMed General Assembly
Chania, September 29, 2025

CLIMATE CHANGE WORSENS THE CRISES WE FACE

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CLIMATE CHANGE DEEPENS VULNERABILITY

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THE NEED FOR CLIMATE ADAPTATION

“There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all.”

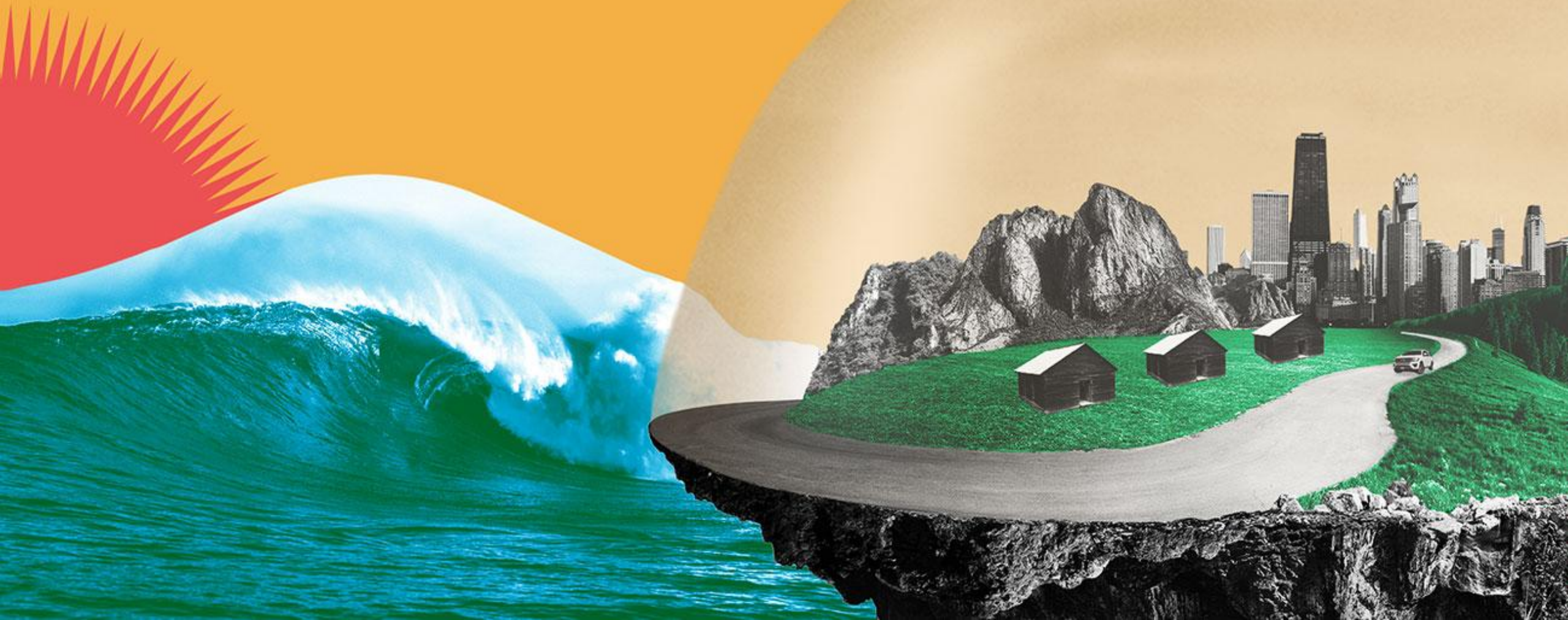
Adaptation is advancing in all regions, yet gaps persist and will grow at current rates of implementation; some ecosystems/regions have already hit hard or soft limits; maladaptation is occurring.

Global adaptation finance is insufficient and constrains implementation, especially in developing countries.

IPCC, 2023

CLIMATE ADAPTATION

A socioenvironmental process allowing organisms, ecosystems and human societies to adjust to the climate-related changes that have started to occur and, in the case of human societies, to anticipate future risks



IN PRACTICE, WHAT DO WE DO WHEN WE ADAPT?

HOW COMMUNITIES ADAPT

- Protect homes: retrofit/flood-proof (raise electrics, backflow valves, vents).
- Secure water: install rainwater tanks; store/treat water at home.
- Use less resources: fix leaks; low-flow fixtures; daily water-saving habits.
- Diversify their livelihoods;
- Relocate (voluntary): moves from high-risk to safer areas.
- Safety nets & risk transfer: use social protection; shock-responsive cash; micro/parametric insurance.

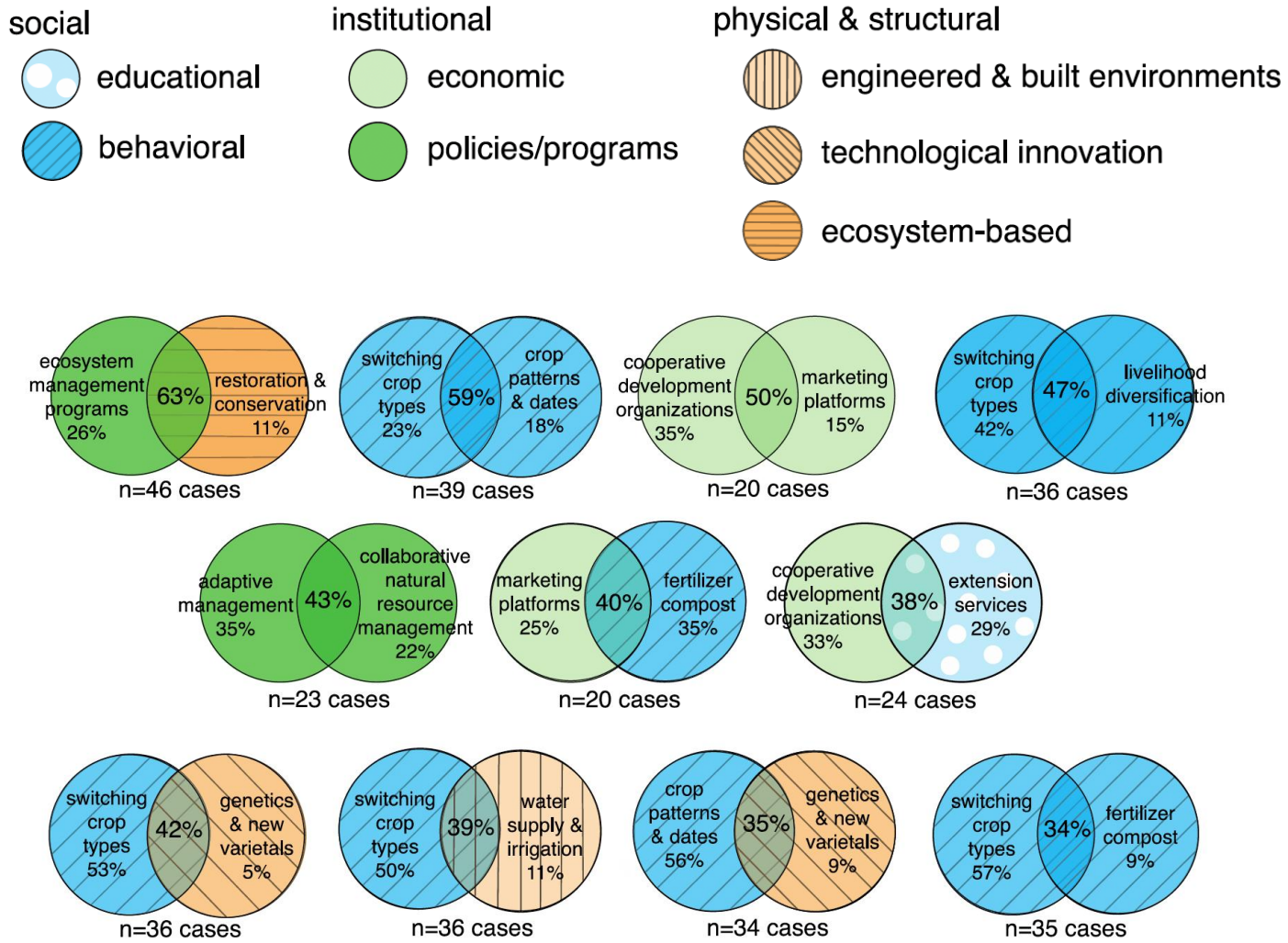
HOW ECOSYSTEMS ADAPT

- Restore & protect habitats: native reforestation, mangroves, seagrass & coral reefs, wetlands, riparian buffers, urban trees.
- Replenish & conserve water: managed aquifer recharge, wetland re-wetting/creation, watershed protection, soil-moisture conservation.
- Reclaim urban spaces for risk reduction: rain gardens, bioswales, permeable landscapes, pocket parks & street trees for cooling and stormwater retention.

HOW INSTITUTIONS ADAPT

- Design and implement policies, laws, regulations
- Plan & coordinate: NAPs/LAPs, sector plans, clear mandates across national–local levels.
- Ensure budget lines, contingency funds, grants/loans, unlock external finance.
- Invest & maintain: resilient infrastructure and nature-based assets, O&M.
- Provide services & data: early warnings, climate services.
- Protect equity: social protection, lifeline tariffs/subsidies, safeguards

CLASSIFICATION OF CLIMATE ADAPTATION PRACTICES



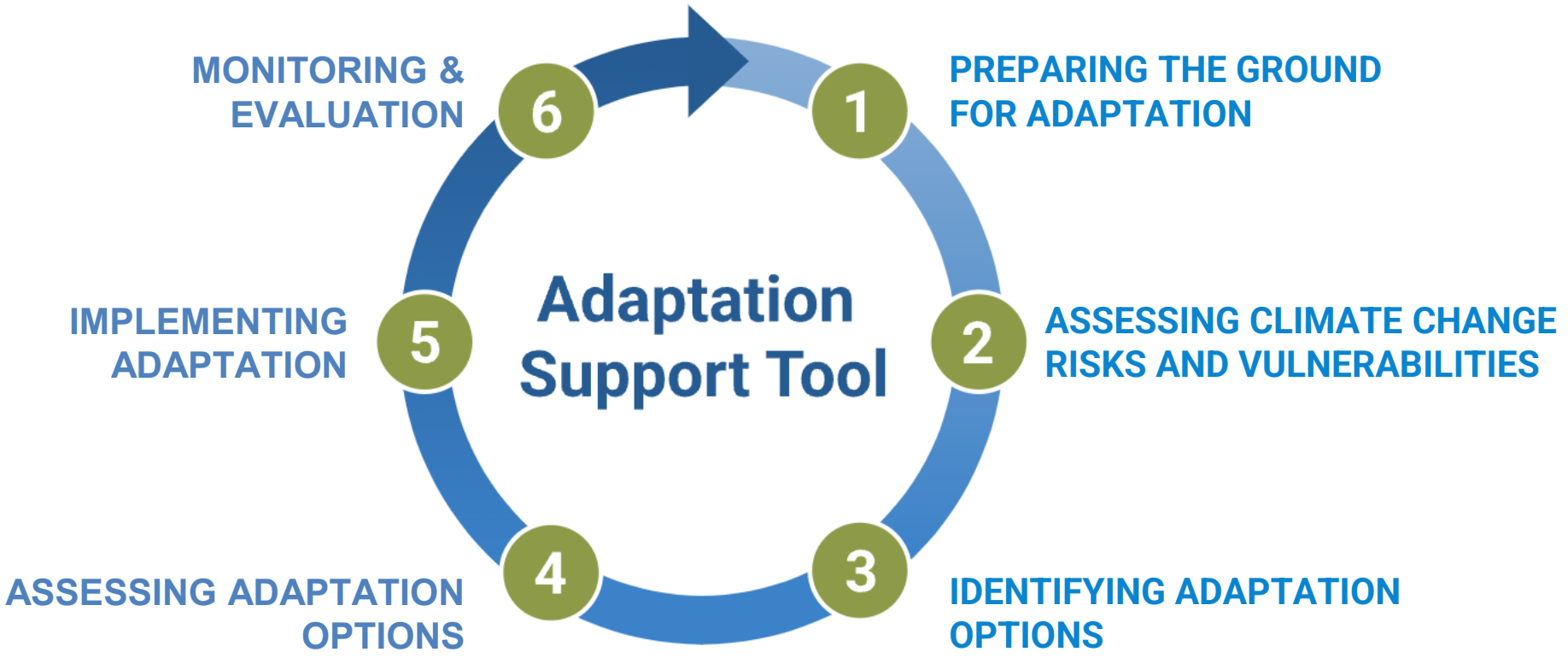
Owen, 202o

HOW DO WE IMPLEMENT ADAPTATION?

- What type of adaptation responses are the most effective?
- Which locations are priorities for implementation?
- And which timescales should be considered when planning for their implementation?

Schipper, 2020

THE CLIMATE ADAPTATION CYCLE



https://climate-adapt.eea.europa.eu/en

CLIMATE CHANGE ADAPTATION TOOLS

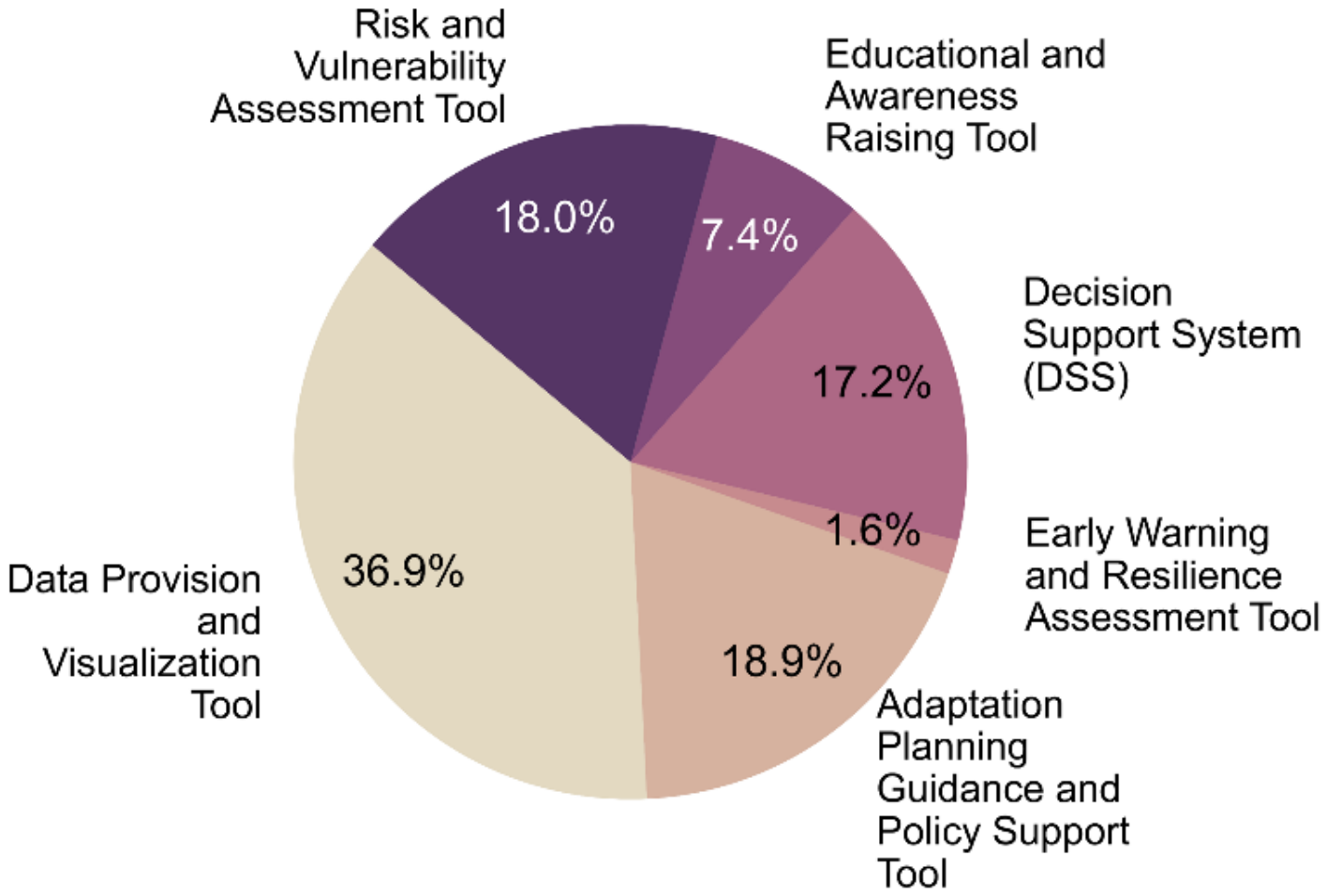
context-specific combination of information and methods developed to support climate change adaptation planning, implementation, and monitoring.

publicly documented, operational and digitally accessible resources.

designed to support all the different stages of the adaptation process.

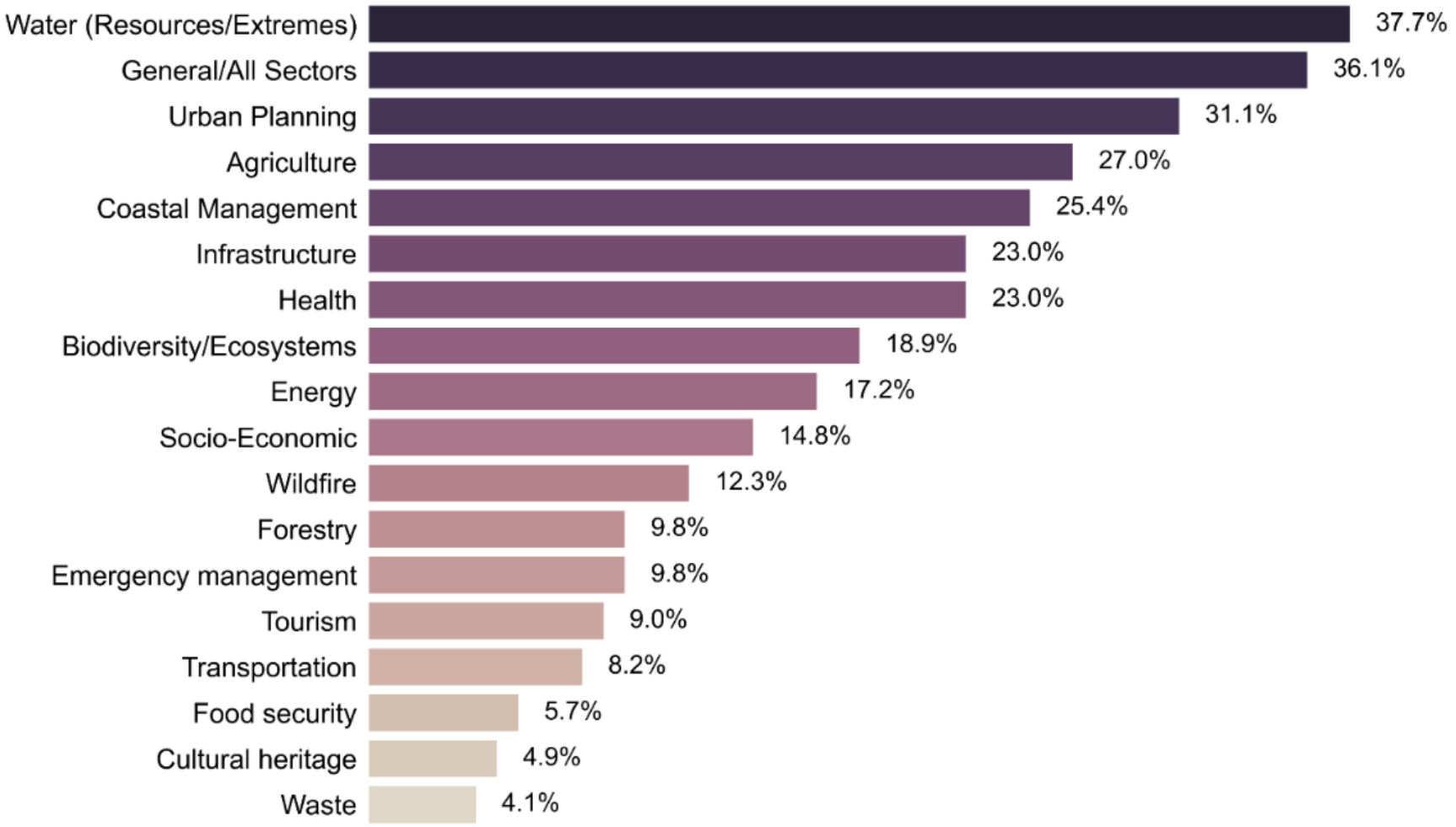
Koutroulis, et al, forthcoming

TYPES OF CLIMATE ADAPTATION TOOLS



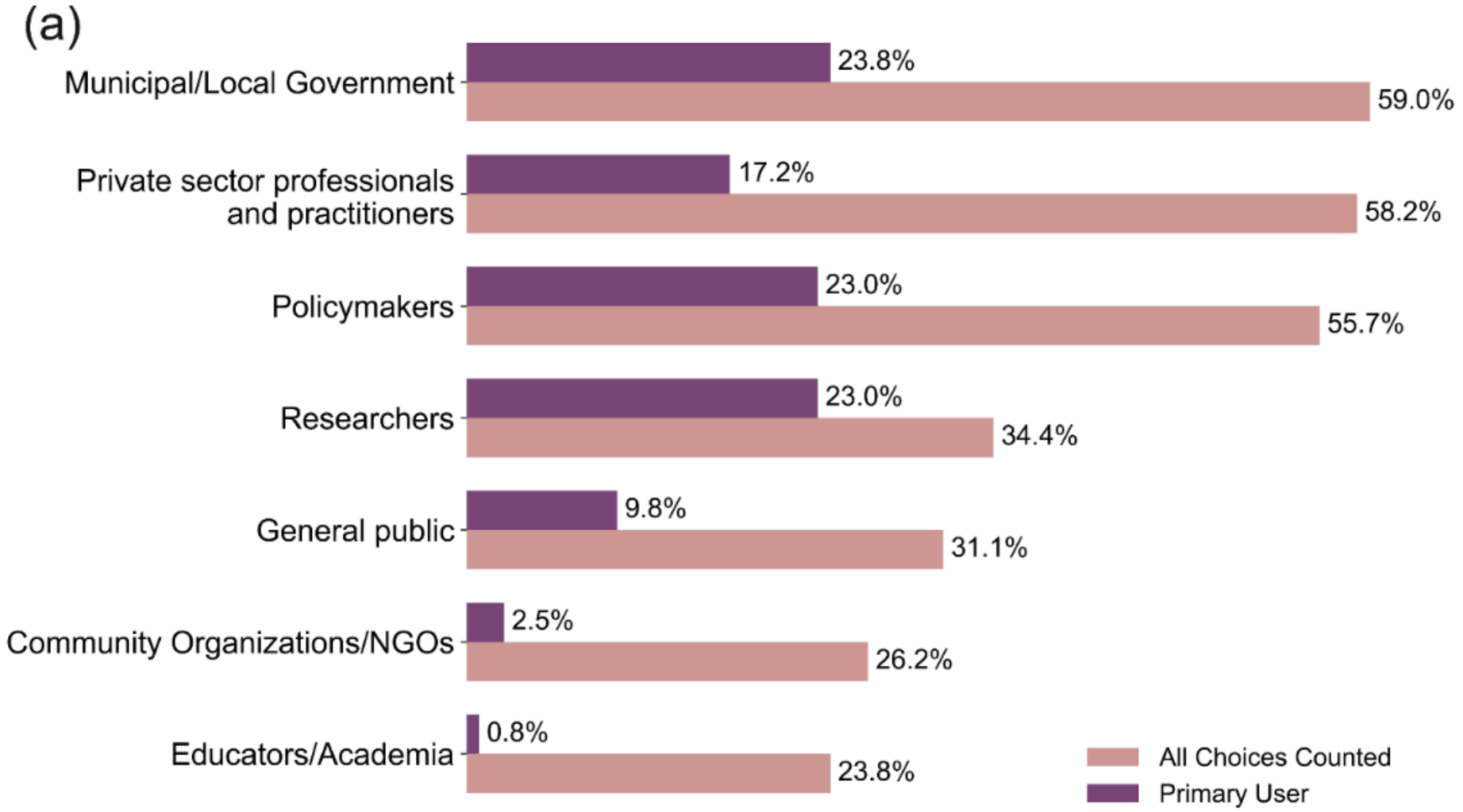
Koutroulis, et al, forthcoming

APPLICATIONS OF CLIMATE CHANGE ADAPTATION TOOLS



Koutroulis, et al, forthcoming

WHO ARE CLIMATE CHANGE ADAPTATION TOOLS FOR?

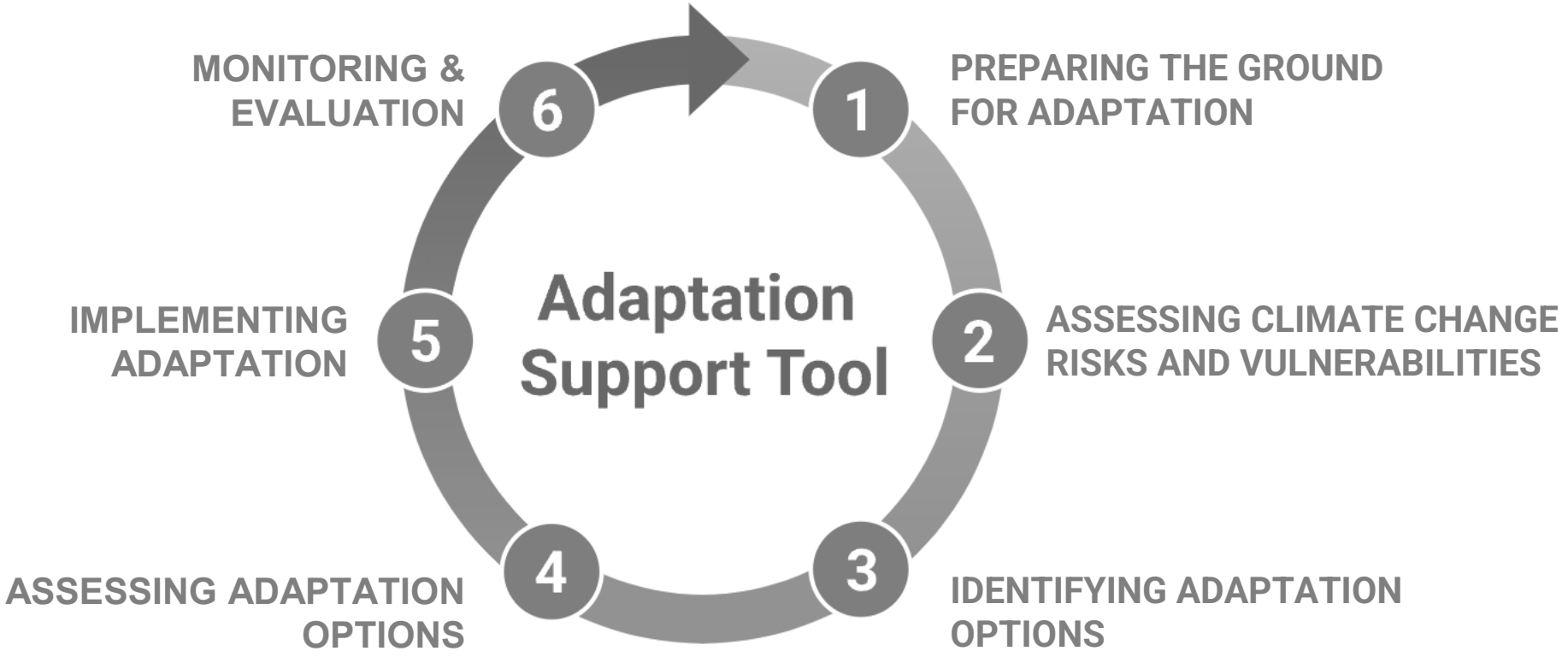


CAN WE REALLY USE CLIMATE ADAPTATION TOOLS?

Type of Data			
Data modality	Source/granularity	Use (%)	Use (nº of tools)
Quantitative	Primary (detailed)	5.7	7
	Secondary (aggregated)	46.7	57
Qualitative	Primary (detailed)	3.3	4
	Secondary (aggregated)	7.4	9
Quantitative & qualitative (both)	-	36.9	45
Approach and analysis			
Type of approach & analysis	Description	Use (%)	Use (nº of tools)
Scenario, predictive & quantitative	Models/data to project futures and compare options	57.4	70
Spatial & geographic	Mapping and spatial pattern analysis	50.8	62
Frameworks & structured processes	Stepwise guidance that structures decisions	28.7	35
Participatory, stakeholder-engagement & community-led	Co-production with stakeholders/communities	17.2	21
Policy & economic	Policy/economic appraisal and trade-off analysis	14.8	18

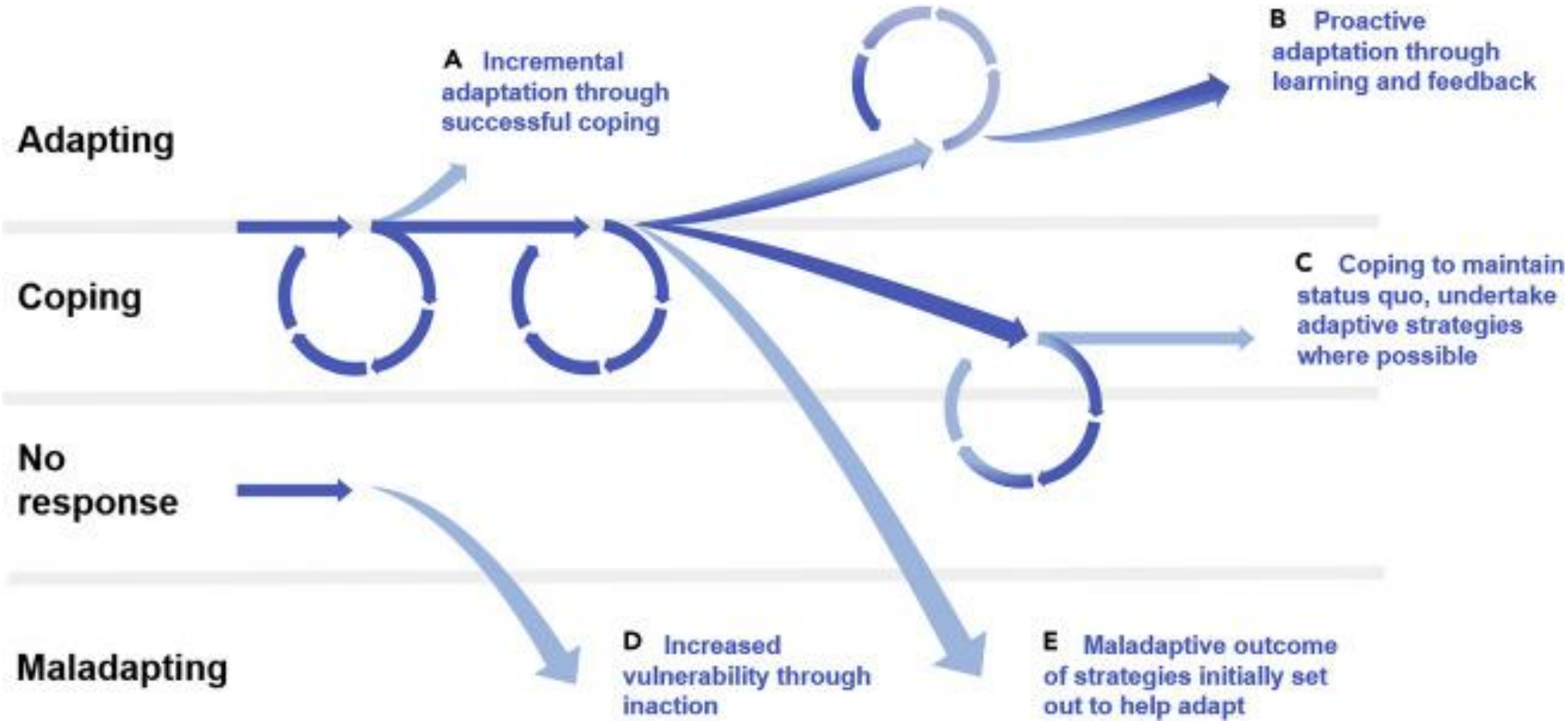
WHERE CLIMATE ADAPTATION TOOLS GO TO DIE

THE CLIMATE ADAPTATION CYCLE



https://climate-adapt.eea.europa.eu/en

CLIMATE ADAPTATION AS A PROCESS



Schipper, 2020

WHEN ADAPTATION GOES WRONG

Form groups of 3.

In group “Give one example of adaptation that goes wrong (maladaptation). Explain why it went wrong?”

Keep it to one or two sentences.

Choose one rapporteur to share your example.

CAPE TOWN AS EXAMPLE OF MALADAPTATION

Aerial view of Hout Bay and Imizamo Yethu in Cape Town.
Photo credit: Johnny Miller.

WHEN IN 2015/17 CAPE TOWN EXPERIENCED A METEOROLOGICAL DROUGHT...

…CAPE TOWN WATER SUPPLY SYSTEM ALMOST RUN DRY

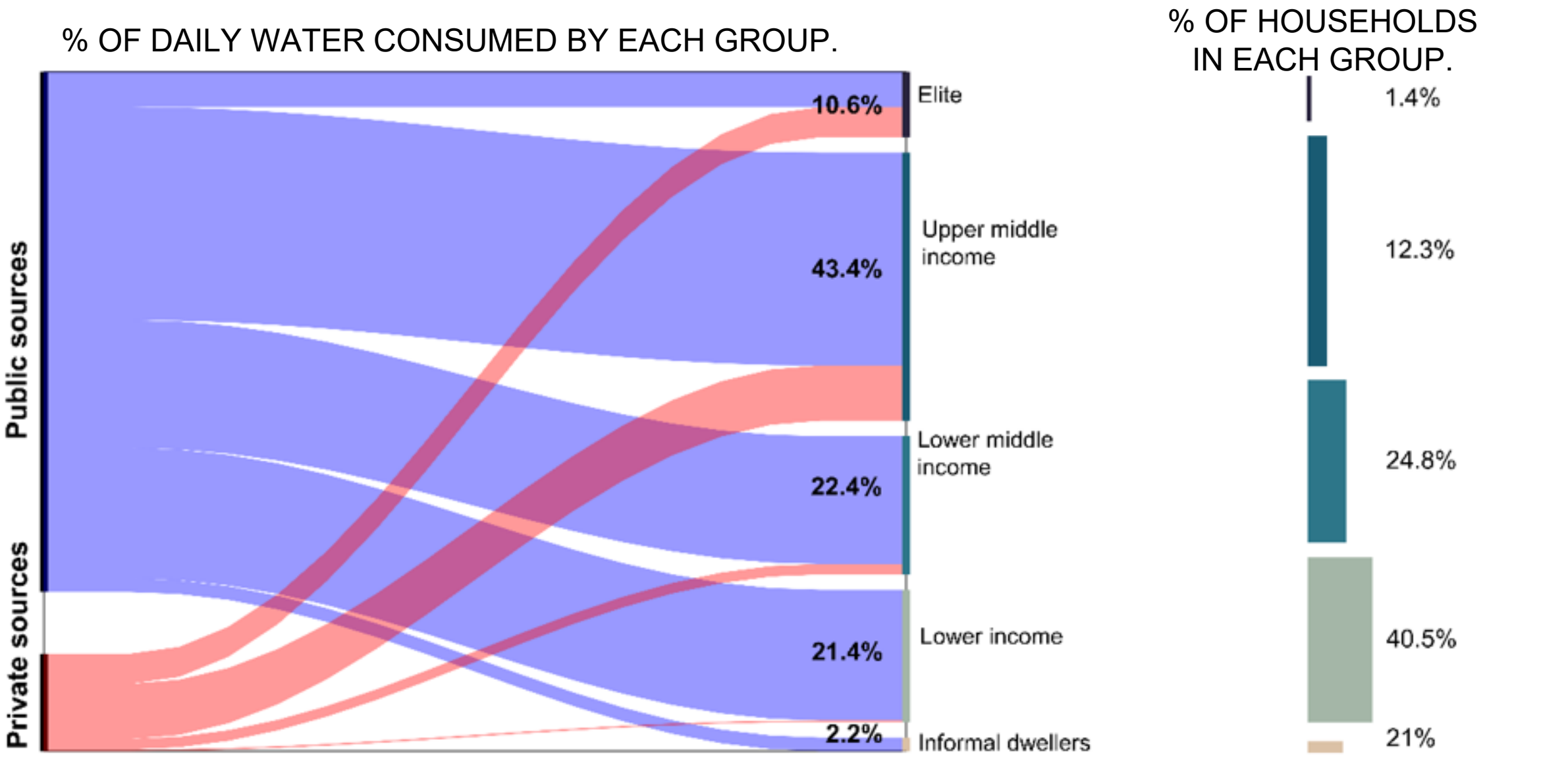
The water level
of Cape Town's major dams,
reached the 22.8%,
which translated to 12.3% of
usable water in early 2018.


DAY
ZERO

ADAPTATION MEASURES TO AVOID DAY ZERO

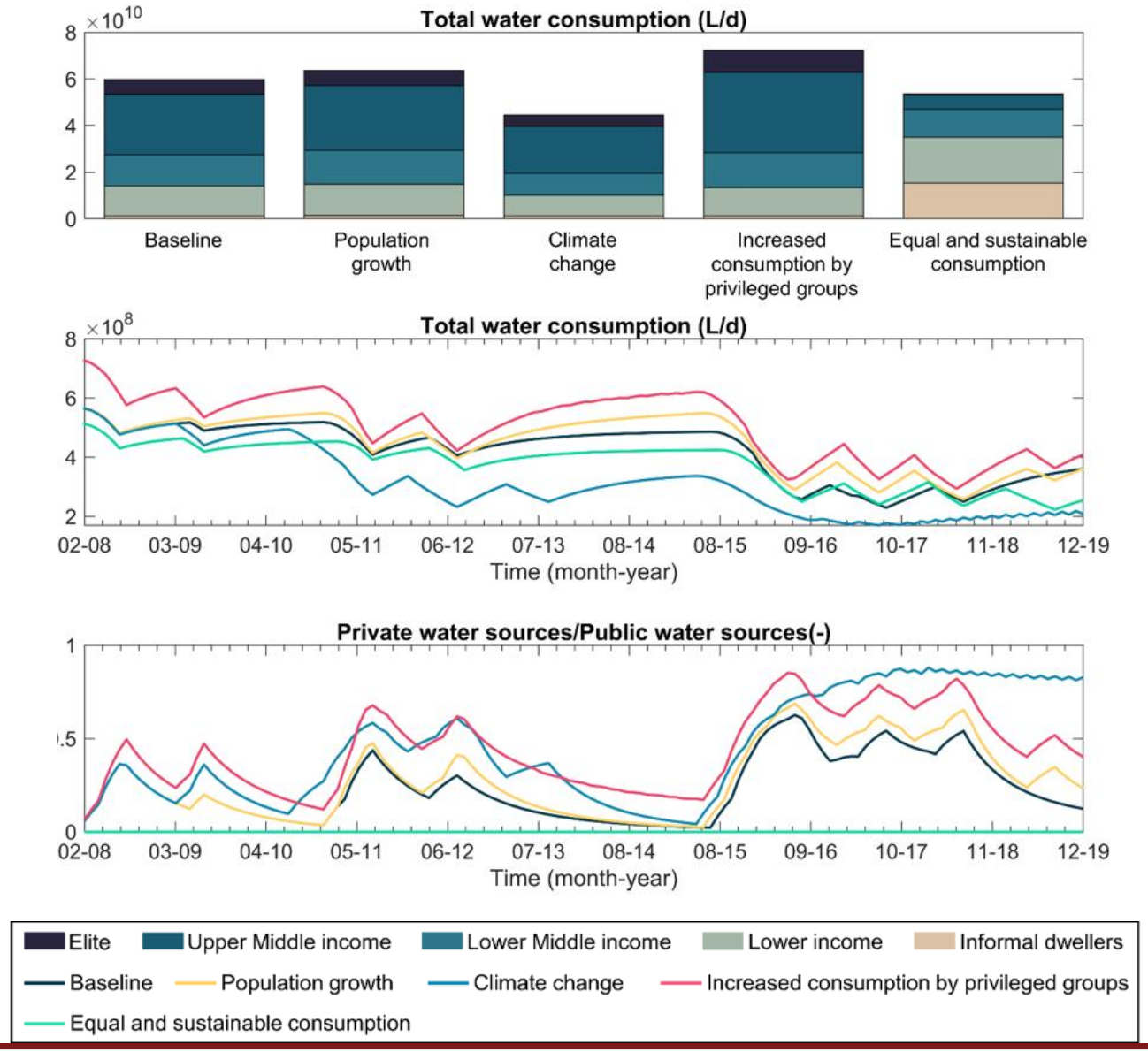
Savelli et al, 2019

DISPROPORTIONATE CONSUMPTION BY ELITES



Savelli et al, 2022

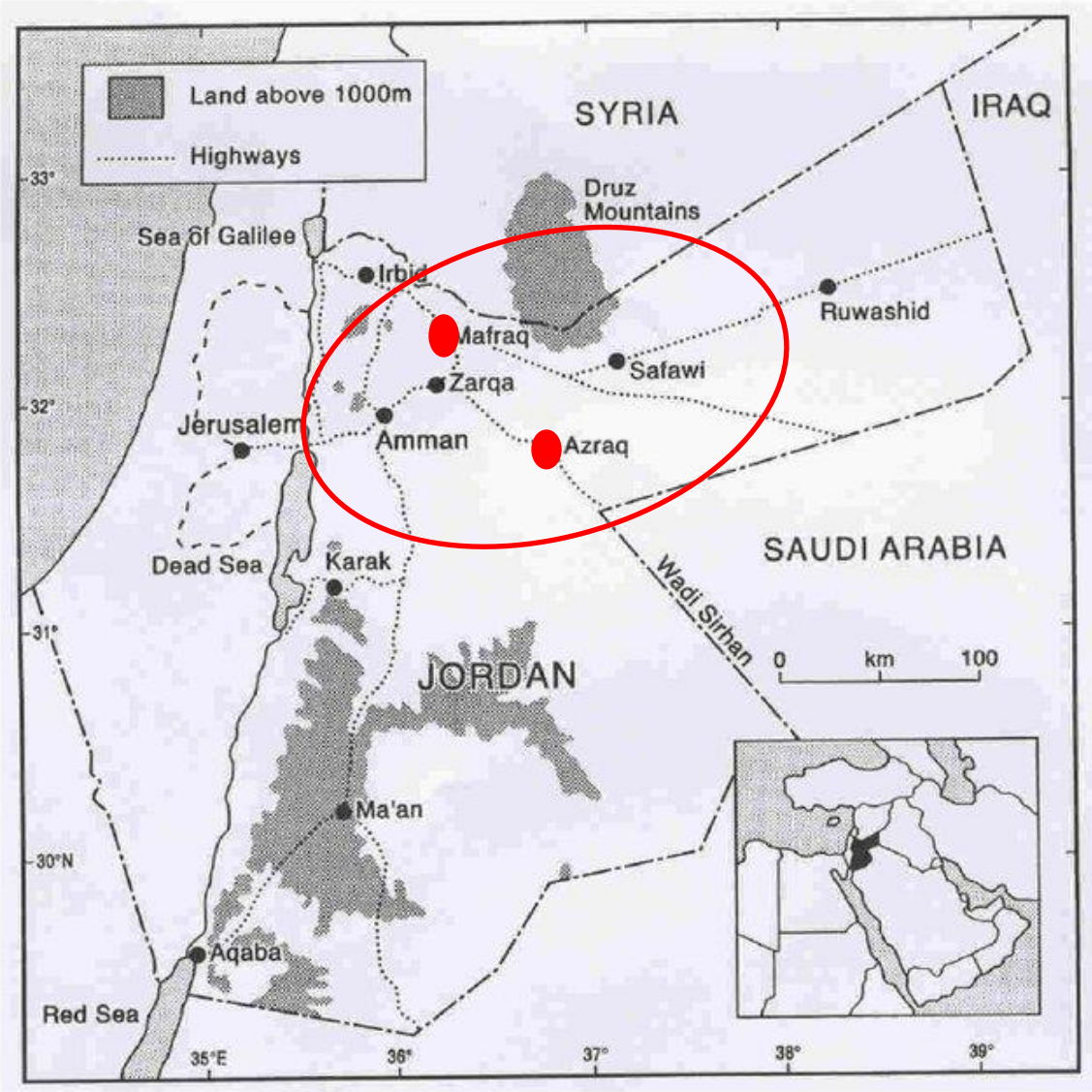
WATER CRISIS DRIVEN BY INEQUITABLE CONSUMPTION



Savelli et al, 2022

WILL THERE BE ANOTHER WATER CRISIS IN CAPE TOWN?

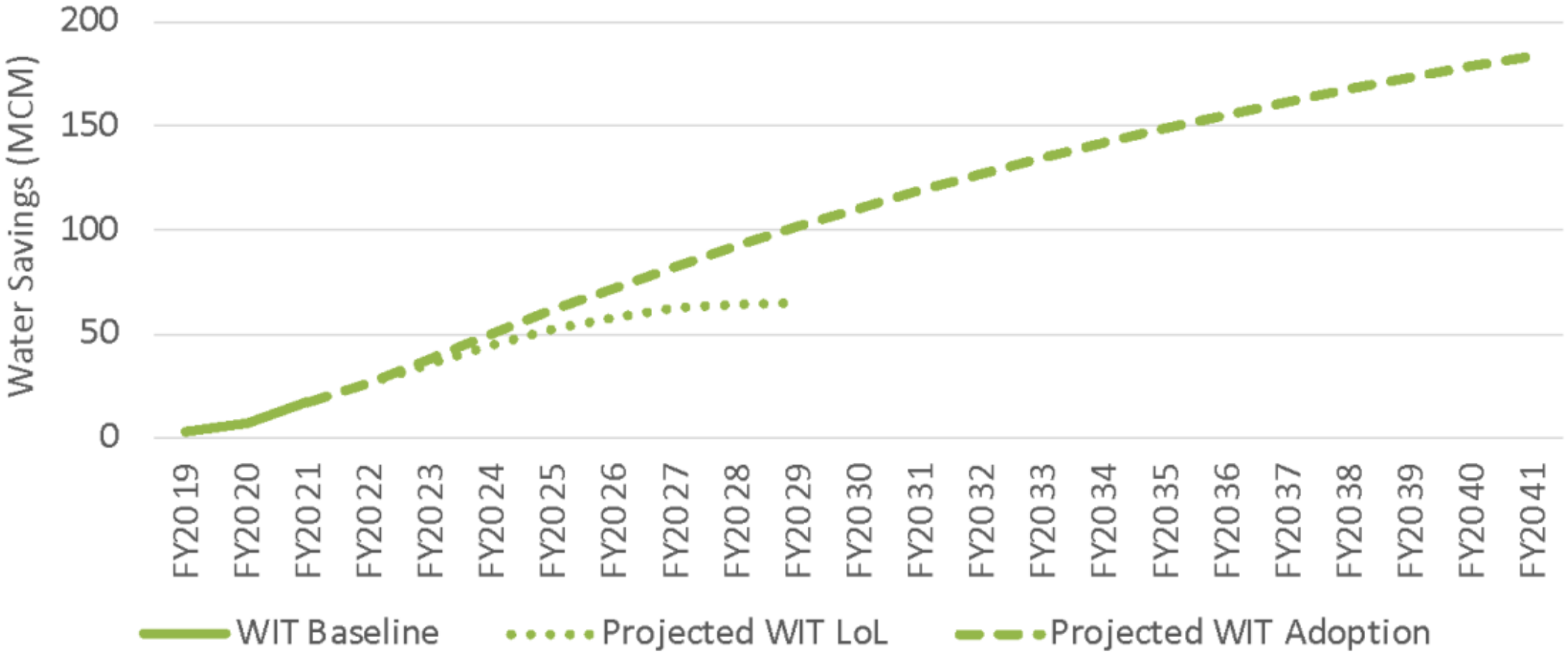
A JORDANIAN EXAMPLE OF MALADAPTATION



The programme worked with market actors and financial services to facilitate supply and demand of water savings technologies and services by building the capacity to sell and use water savings technologies.

Savelli et al, 2025

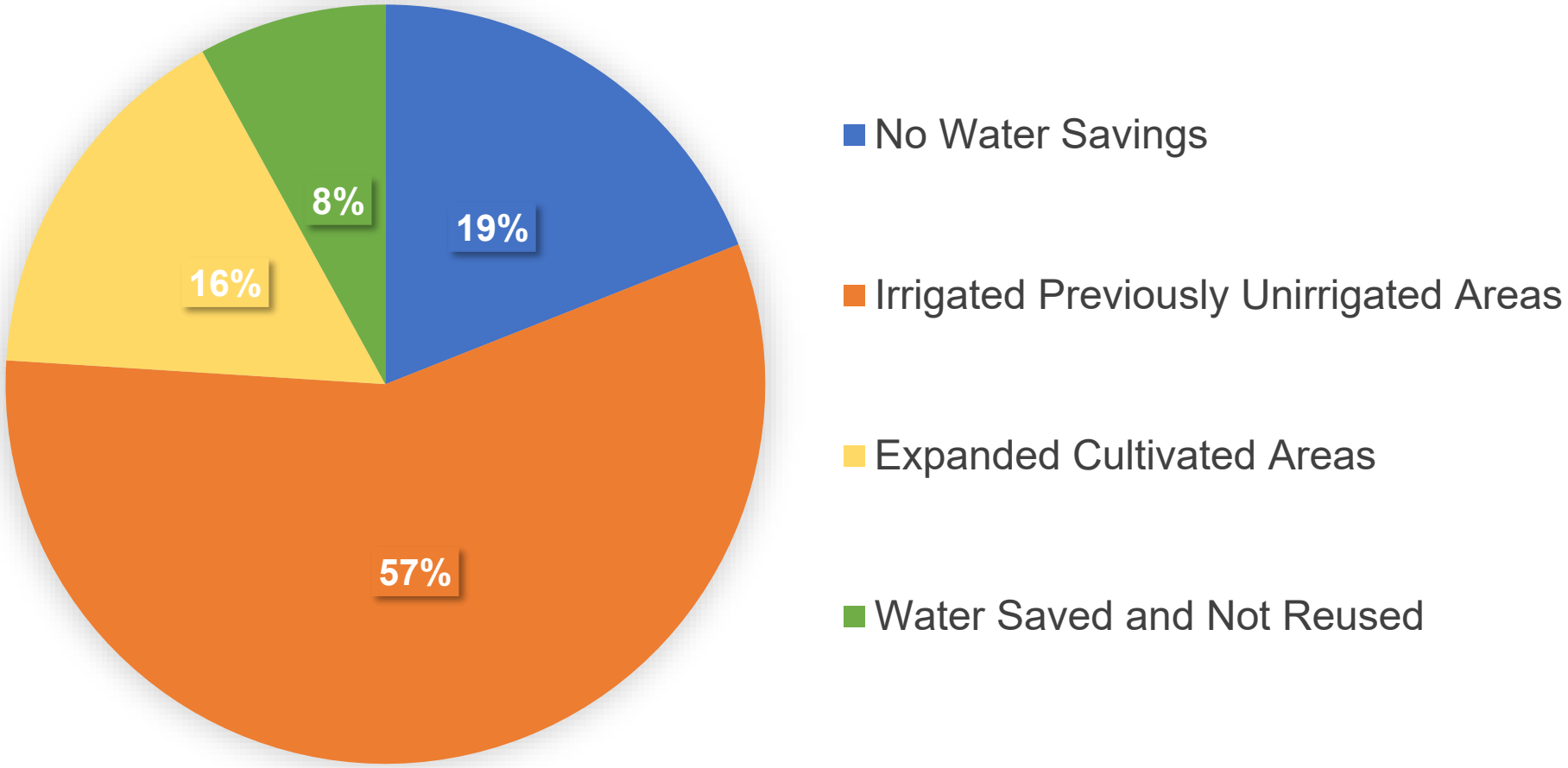
ADAPATION MEASURES OPTIMIZED IRRIGATION ON 2.024 HECTARES OF FARMLAND



ADAPTATION MEASURES RESULTED IN IMPRESSIVE WATER SAVINGS

- Saved 24 million cubic meters of water (9600 Olympic-sized swimming pools).
- Demonstrated the effectiveness of the market-based approach in water conservation
- Improved farmers' irrigation practices.

ADAPTATION MEASURES RESHAPED FARMERS' BEHAVIOUR



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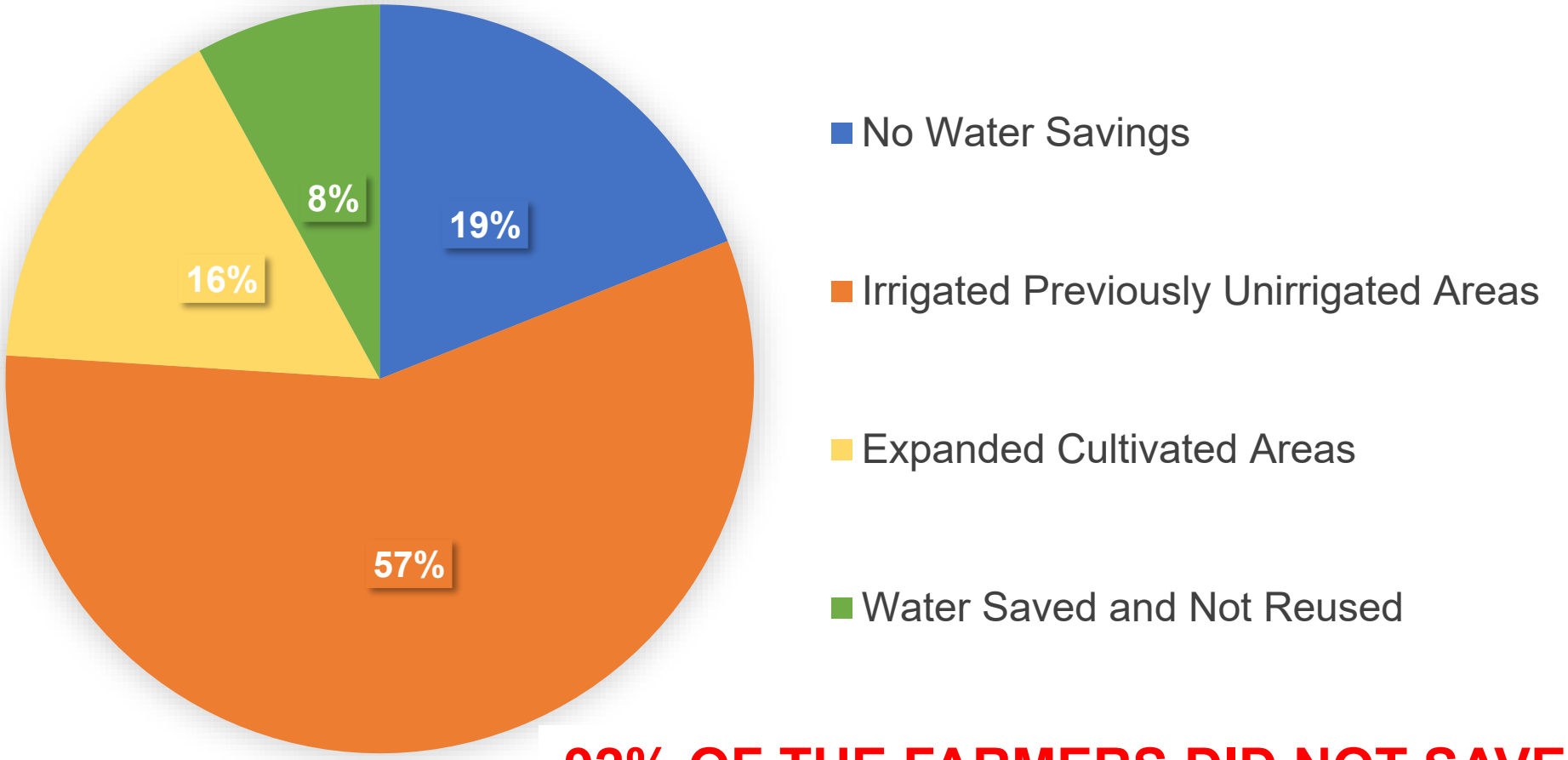
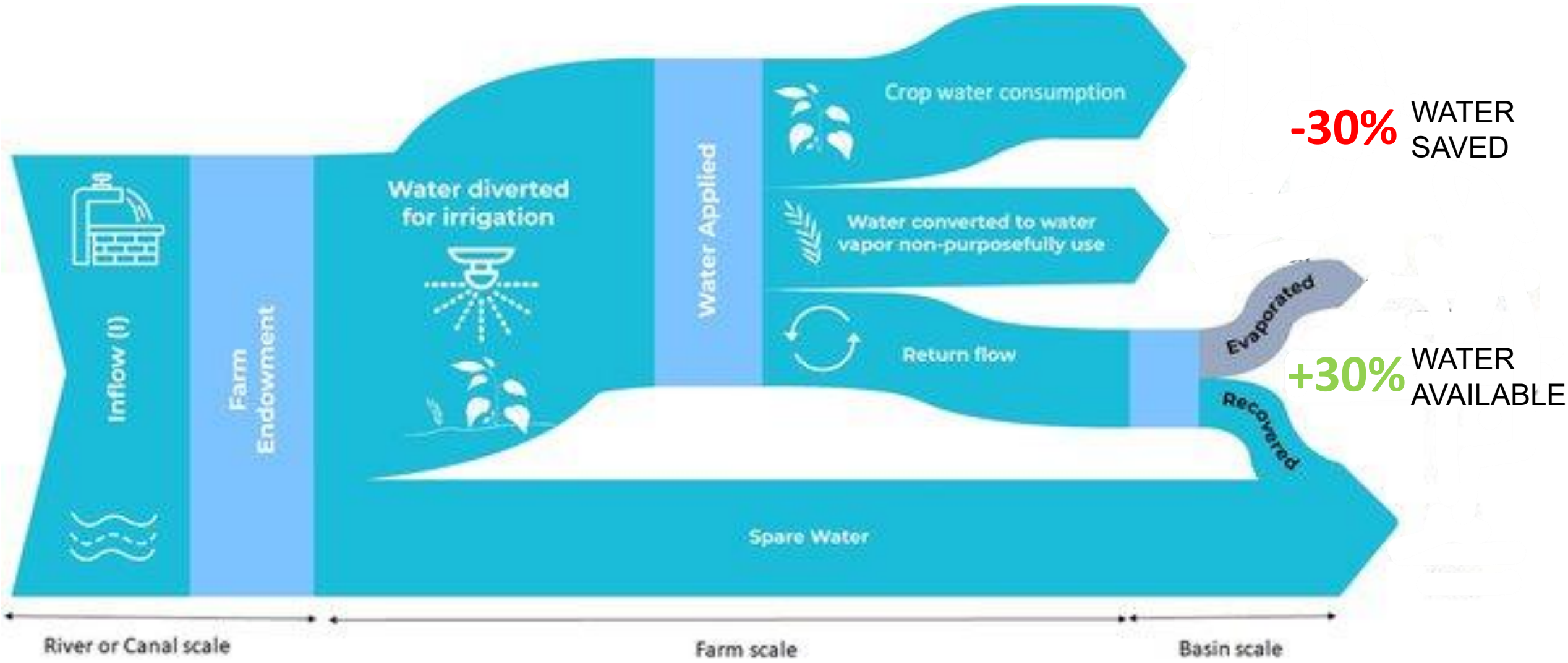


92% OF THE FARMERS DID NOT SAVE WATER

WATER BALANCE IN THE PROGRAMME'S AGRICULTURAL AREAS



-30% WATER SAVED

+30% WATER AVAILABLE

Savelli et al, 2025

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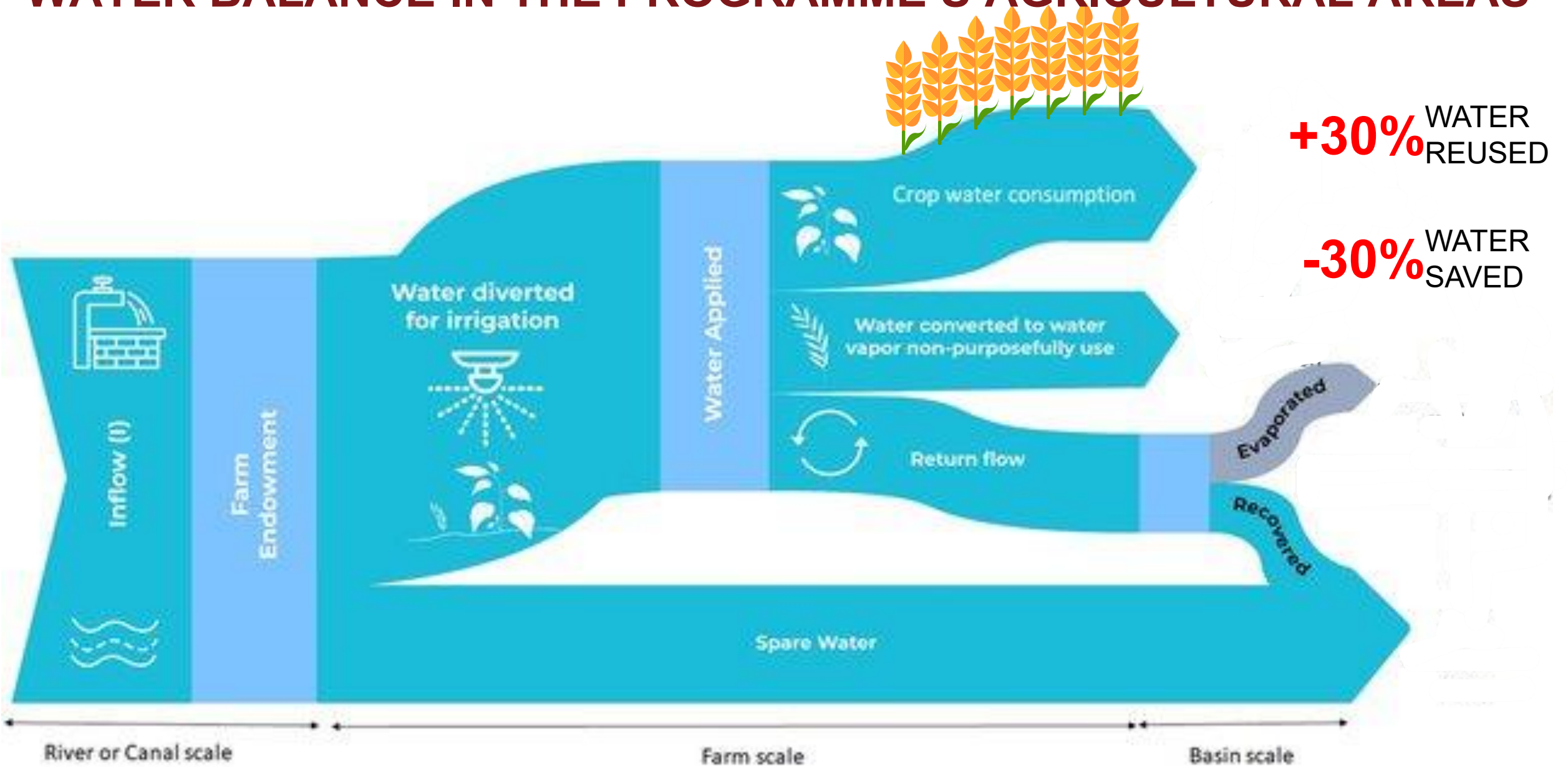


+30% WATER REUSED

-30% WATER SAVED

WATER SAVING TECHNOLOGIES ALONE CAN LEAD TO MALADAPTATION

- Water-Saving Technologies improved water use efficiency at the farm level.
- The water saved at the farm scale has been redirected for expanded irrigation or more water-intensive crops.
- Water-Saving Technologies have reduced the availability of water for other users and ecosystems.
- The benefits of Water-Saving Technologies favour wealthier and medium-sized farmers who were involved in the project and could afford the technologies.

(Dumont et al., 2013; Batchelor et al., 2014; Perry et al., 2017; Grafton et al., 2018; Savelli et al, 2025).

CLIMATE ADAPTATION IS NOT A NEUTRAL PROCESS

When we treat symptoms without changing the system, risk increases, and we push harsher crises into the future

THE CASE FOR TRANSFORMATIONAL ADAPTATION

Transformational adaptation, involves changes that fundamentally alter the characteristics of a social-ecological system in response to climate change.

Magnan et al, 2020

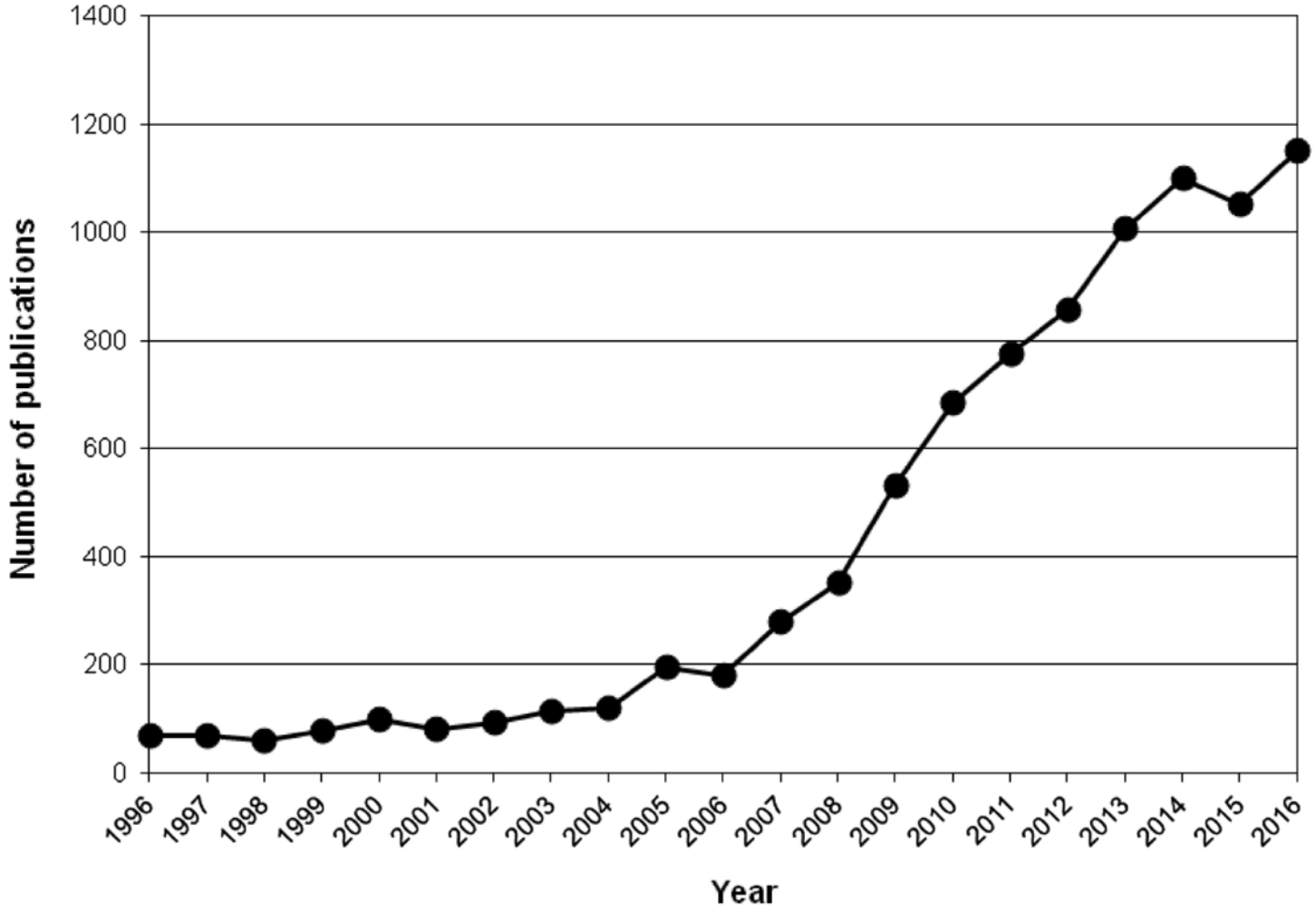
WHERE ARE WE NOW WITH CLIMATE ADAPTATION RESEARCH

The field of climate change adaptation has grown exponentially.

Average annual growth rate of publications is 28.5%,

Increased diversification of research topics and themes.

Key themes have remained stable, but new areas have gained prominence.



Nalau & Verrall, 2021; Di Matteo et al., 2018

CLIMATE ADAPTATION RESEARCH THEMES

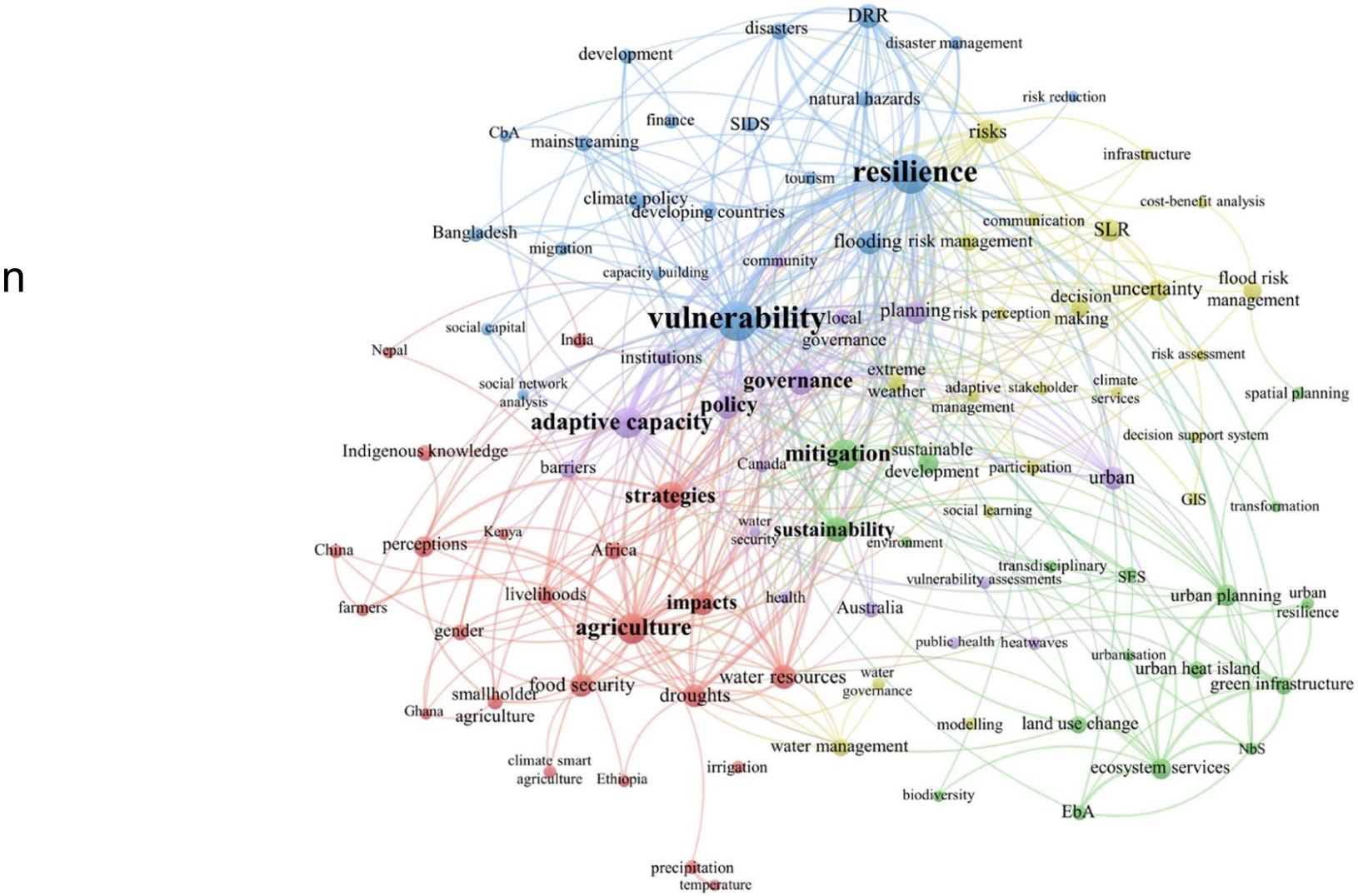
Vulnerability & resilience

Risk management & decision making

Agriculture & Food Security

Policy & governance

Sustainable development & mitigation



Nalau & Verrall, 2021

EVOLUTION OF CLIMATE ADAPTATION RESEARCH

Adaptation research has evolved from technocratic and focused on technical fixes to incorporating a more nuanced understanding of power dynamics, vulnerability, and social resistance.

Climate adaptation research is increasingly examining the sociopolitical dimensions of adaptation

Future research is likely to focus more on topics like climate justice, equity, maladaptation, and the effectiveness of adaptation strategies.

But we are not there yet…

GAPS IN CLIMATE ADAPTATION RESEARCH

Lack of clarity: adaptation as a concept suffers from a lack of clarity and consensus, especially when distinguishing it from related activities like disaster risk reduction or poverty alleviation.

Complexity and context: adaptation practices are deeply embedded in the specific social, political, and environmental contexts where they are implemented, making it challenging to establish universal definitions or success metrics.

Challenges in measurement: measuring the effectiveness of adaptation is complicated due to factors like uncertainty, lack of agreement on metrics, and the difficulty in attributing outcomes directly to specific adaptation activities.

Transformation.

European Commission

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

FutureMed
TRANSDISCIPLINARY NETWORK

Thank you