UNIVERSITY OF TECHNOLOGY SYDNEY

THINK.
CHANGE.
DO

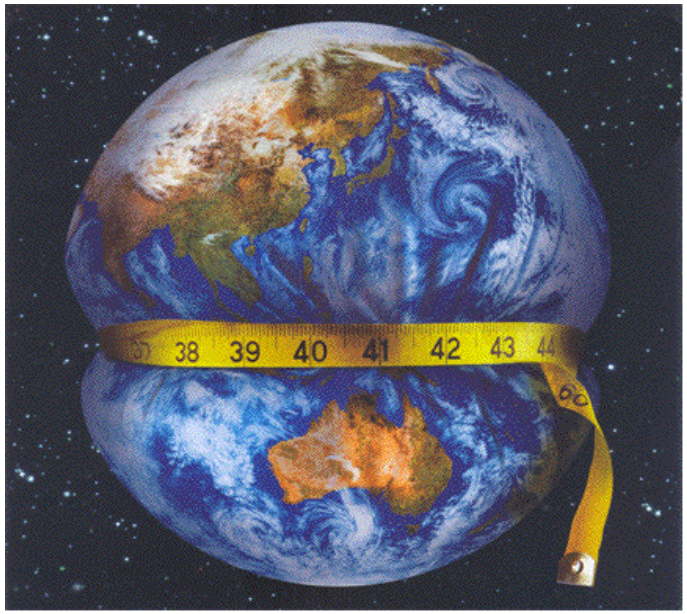
Restorative urban water systems: Making the transition

Professor Cynthia Mitchell

Institute for Sustainable Futures

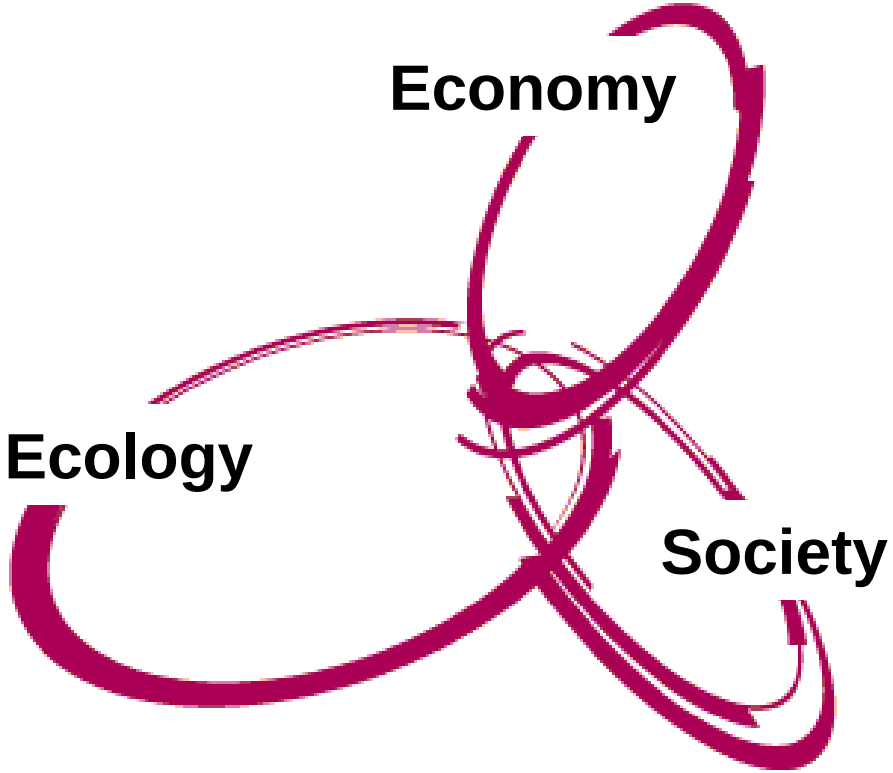
Take home messages

1. The water industry is at the start of a period of transformational change
2. Current approaches to sanitation will not serve us well in the medium term.
3. Distributed systems present special opportunities for transitioning to water sensitive/restorative futures
4. We need iconic examples to help set new expectations

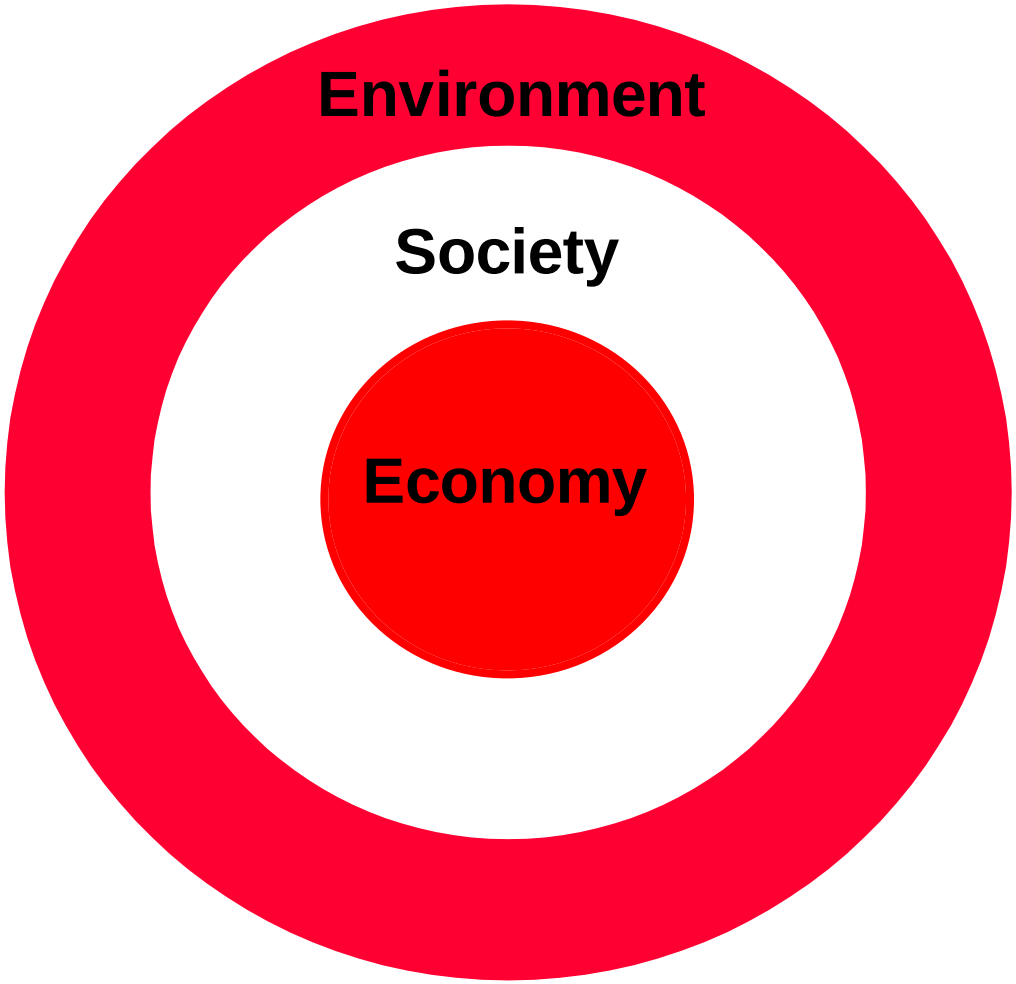


Digital Illustration, Irvine Gowans / Getty Images

Introducing the Institute for Sustainable Futures



A better representation of ISF's values?



It's all about lining up short term actions with preferred long term outcomes in ways that enable transitions for people and organisations

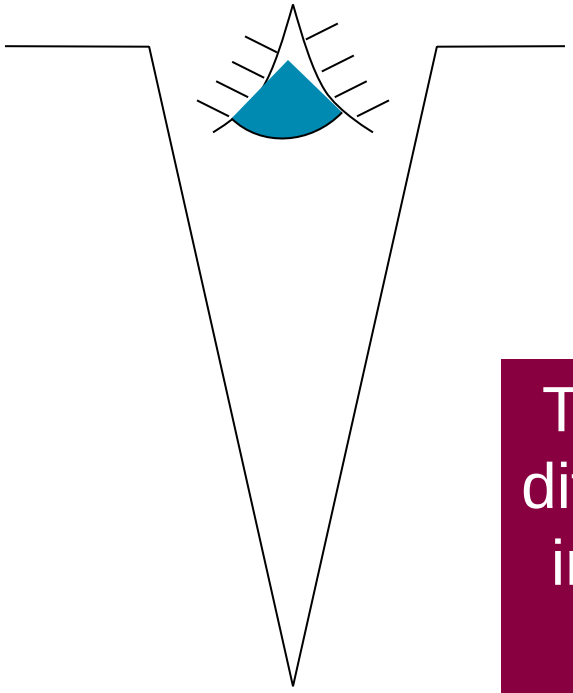
Our model at ISF is unusual and working well

Facts and Figures

- 50 staff (wide span), 25 postgrads, 6 adjuncts
- AUD $6-7M pa in 60 contract research projects with government, industry and community, around the world, with publicly available reports and outcomes
- foster public debate: in 2009, noted in 98 print media stories, 20 on-line stories; gave 50 radio interviews

We take a ‘both and’ approach to disciplinary and inter/trans-disciplinary research

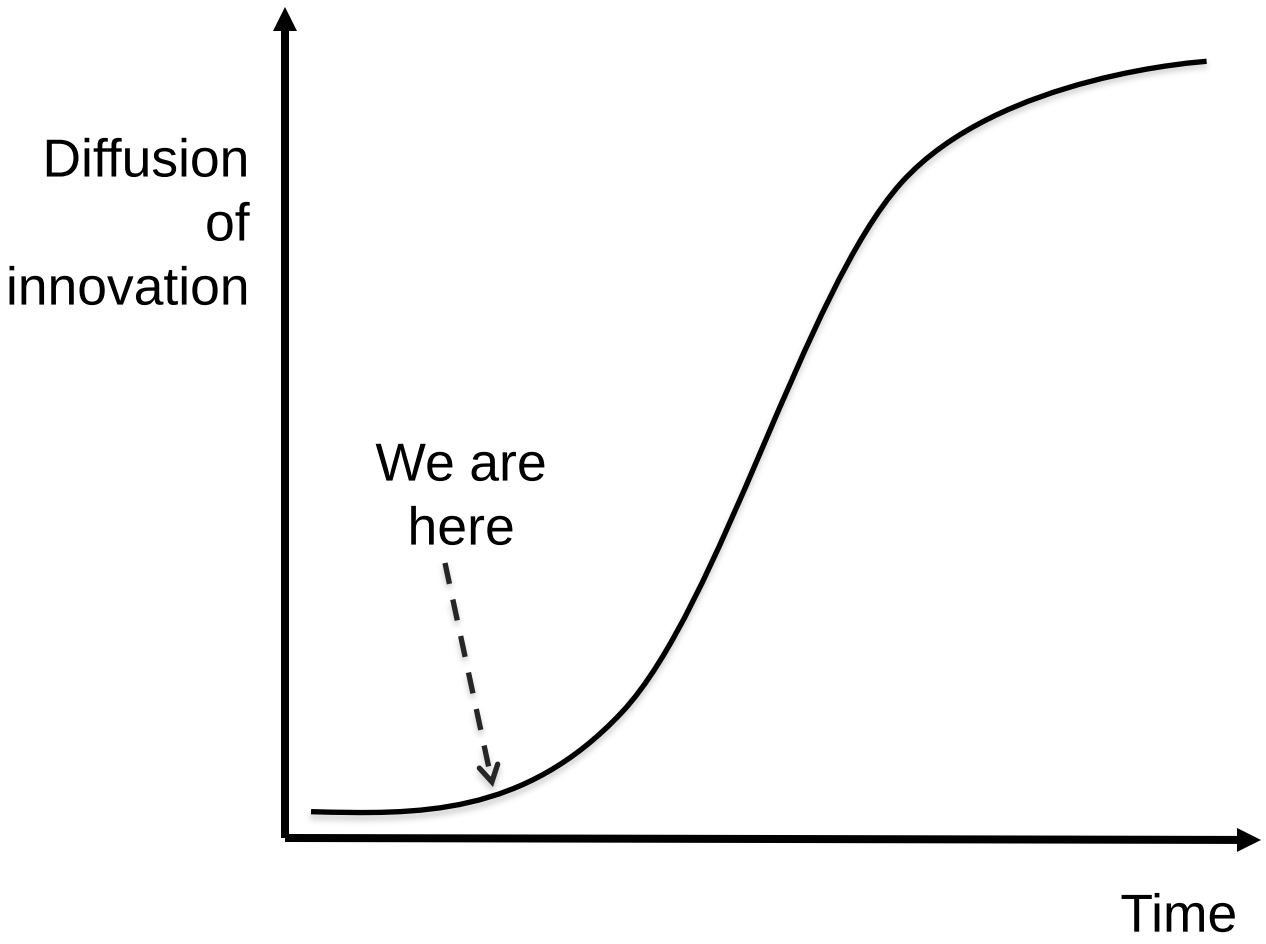
Disciplinary perspectives



Inter- and transdisciplinary perspectives

The perspectives give different and necessary insights for improving the most intractable issues we face.

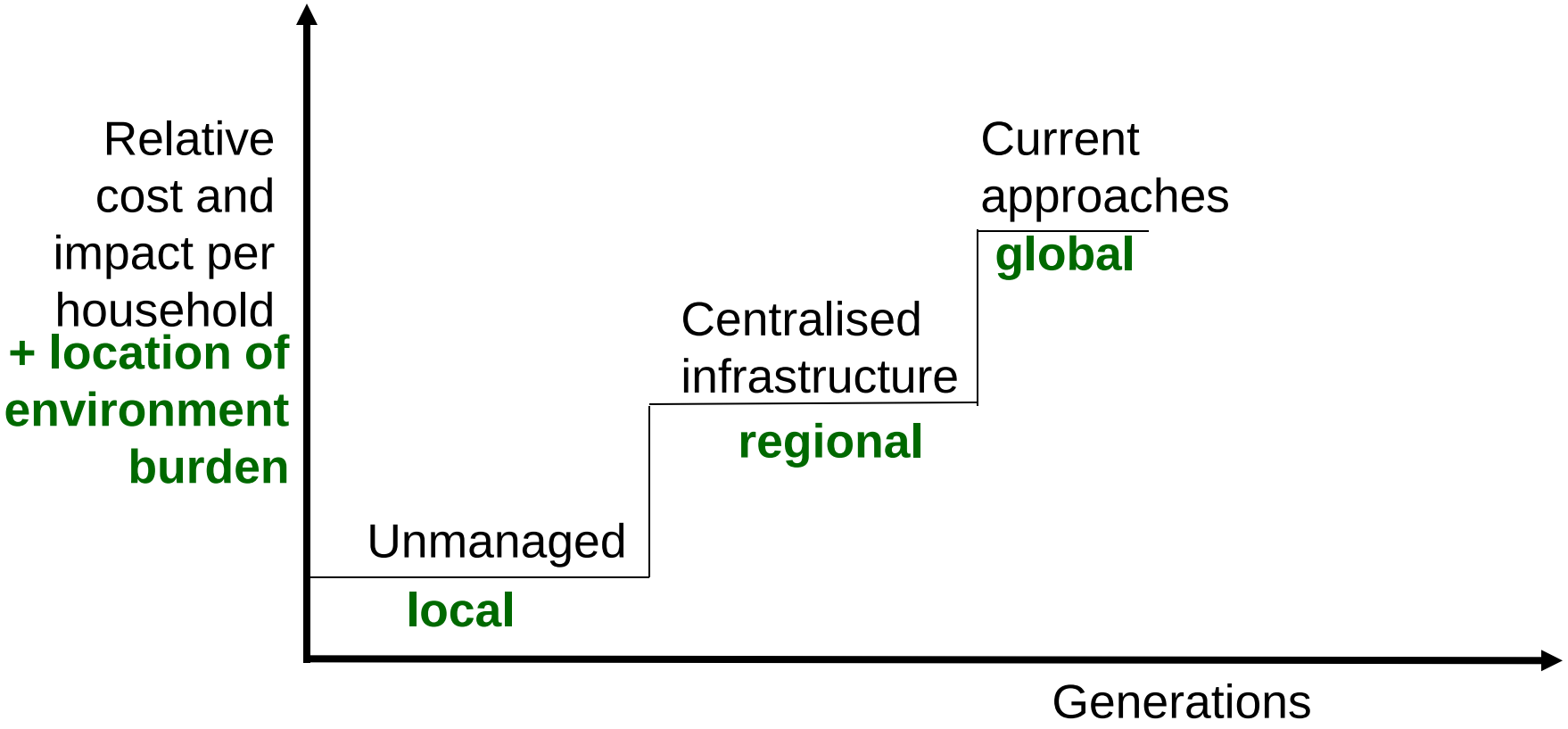
I reckon we are at the start of sweeping change in our industry



The single most important contribution we can make now is to avoid locking out alternate paths i.e. avoid copying current approaches

After Rodgers, E.M. 2003, *Diffusion of Innovations*, 5th edn, Free Press, New York

Why? Our history has served us well, and has unintended impacts that cannot continue

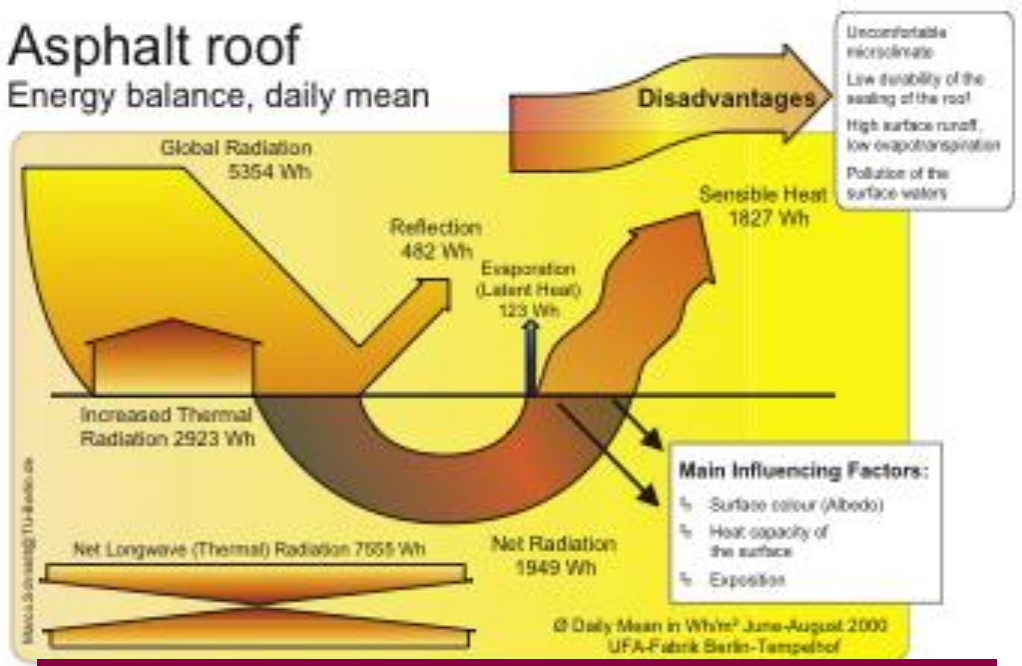


We need to recognise and work with and avoid being unduly constrained by the weights of the system we have

Why? The pressures are mounting and expectations are changing

- > Climate change
- > Population growth
- > Inflexible infrastructure
- > Peak phosphorus
- > Global food security
- > Urban heat island
- > Green water

- > Treatment: ??, PCPs, gene transfer, products
- > New business models

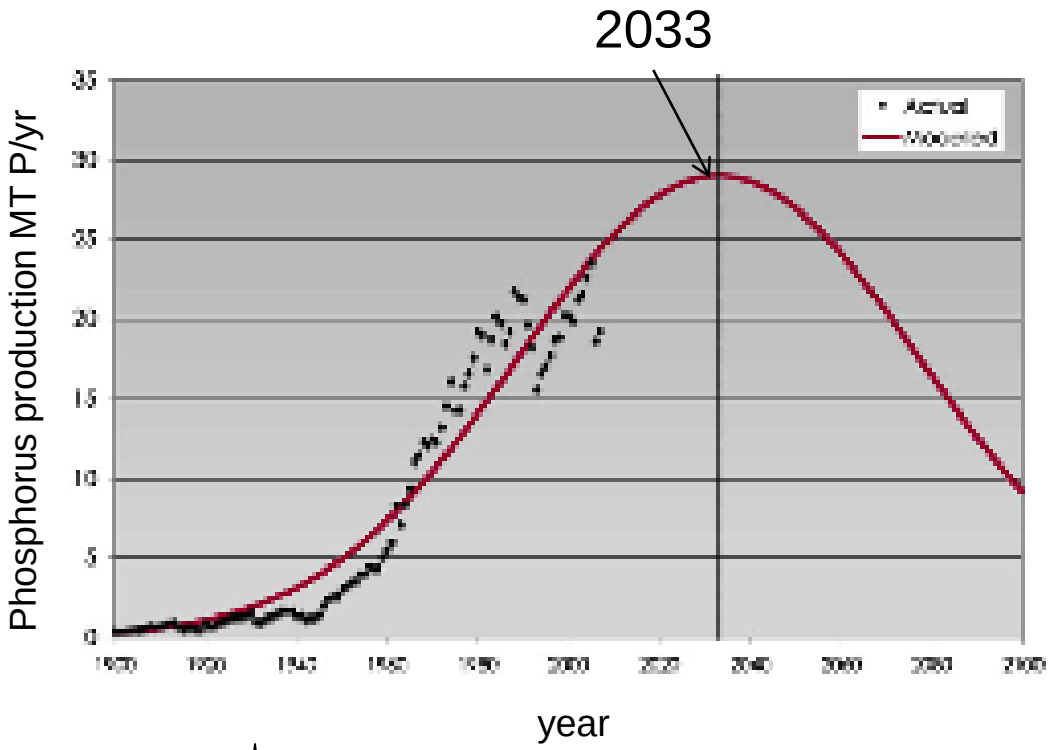


The choice is about <u>how</u> to respond to these, not <u>whether:</u>
? more or less sustainable ?

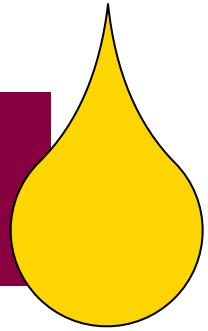
Schmidt, M., B. Reichmann, C. Steffan: Rainwater harvesting and evaporation for stormwater management and energy conservation. Proceedings 2nd International Congress on Environmental Planning and Management, 5.-10.8.07, TU Berlin. In: Landschaftsentwicklung und Umweltforschung S20, p. 221-224. ISBN: 978-3-7983-2049-9. http://www.urbenvironcongress.tu-berlin.de/

Peak phosphorus (P): a looming crisis for global food security

- Phosphorus is vital for all life on earth – no substitute!
- Growing population, changing diets
- Peak phosphorus production very soon
- Political / ethical concerns may make it even sooner



Guess what is full of P(ee)?
BAU is simply not an option



Cordell, Drangert & White (2009) The story of phosphorus and food for thought *Global Environmental Change*, doi:10.1016/j.gloenvcha.2008.10.009

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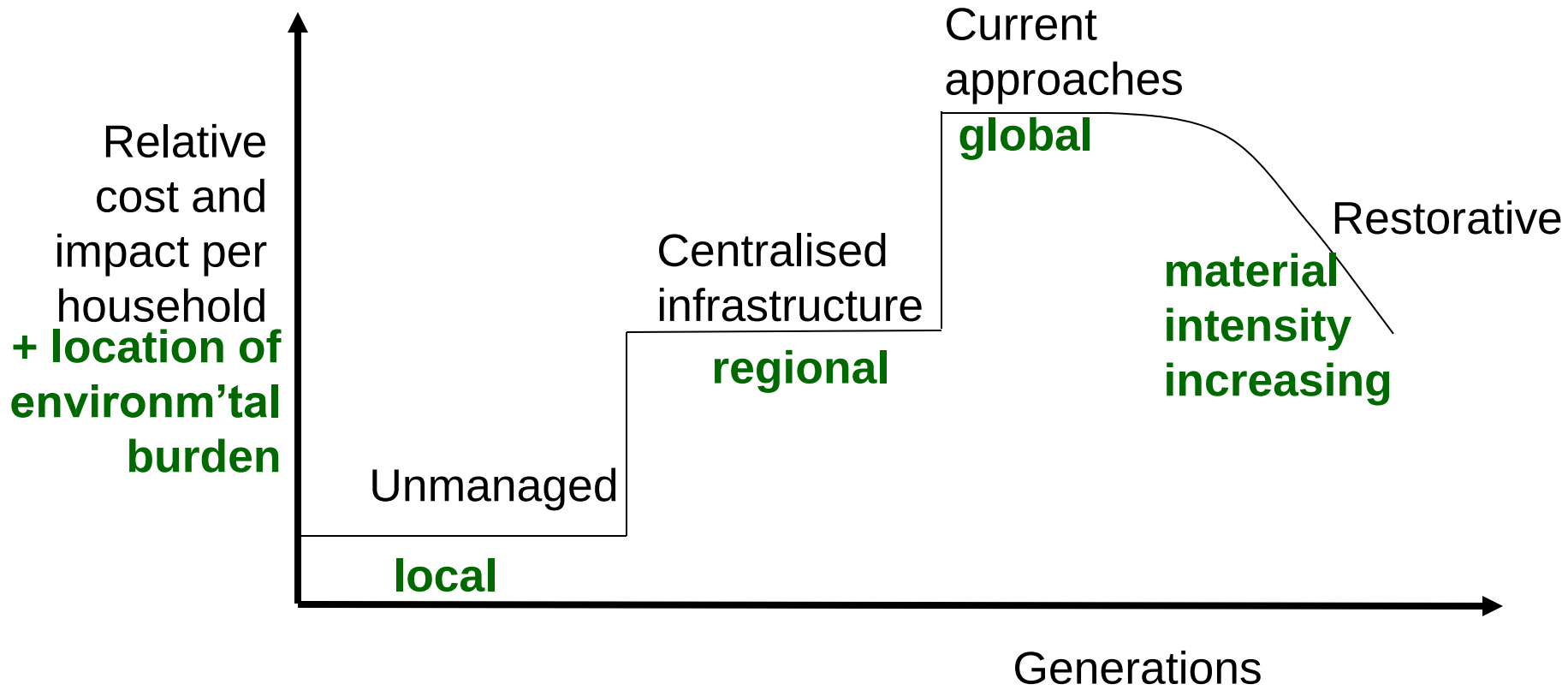
Why? Aspiring to a better future for all means tunnelling through the cost and impact barrier



It means going beyond individual technologies to system innovation, and scale is an important part of the answer.

Distributed approaches allow improved material intensity - an integral part of a restorative future

Water is heavy!

C is useful.

Nutrients are essential.

- Meet demand incrementally.
- Qualitatively different risk profiles.
- Variety of business models and management approaches (see eg www.werf.org/rme)
- New services and products create new revenue streams and markets.

The cluster-precinct scale is large enough to be noticed, and small enough to be protected

Distributed systems will be key to long-term shifts for water security and phosphorus

Distributed systems allow us to

- trial many elements
- in different contexts
- at low risk and
- at low cost

whilst providing other benefits.

Trials will allow no-regrets strategies to emerge, rather than picking (the wrong) winners now

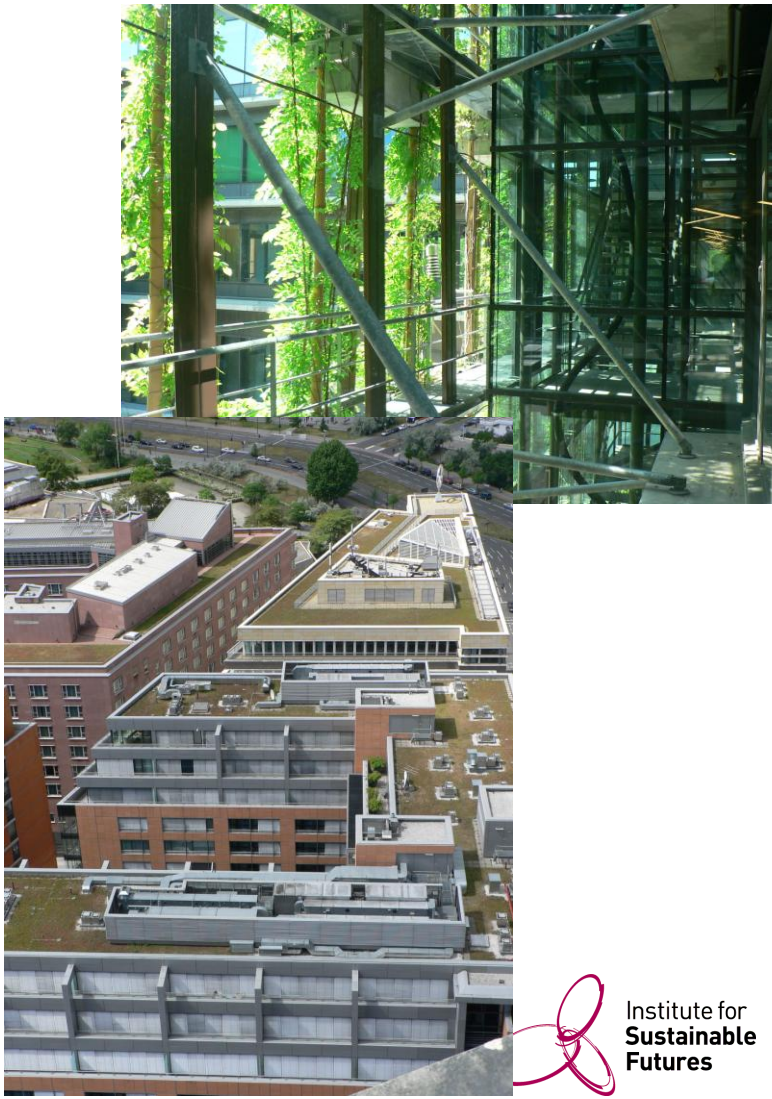
It will require connecting the water cycle with other cycles: energy, nutrients, waste…

Water: reduce volume and distance

Wastewater: flip from remove problem to reuse resource

Stormwater: rehydrate landscape, reduce building heat loads, new heating/cooling technologies, shift radiation patterns

Systemic thinking will maximise the synergies.



It also requires new approaches to costing

Costs are a fundamental decision input
➜ so we want to be correct and transparent

Key characteristics of alternatives impact heavily on costs and benefits
➜ so we need a method that fairly accounts for those differences

Costing process should promote sustainable outcomes
➜ so we need to account for efficiency and effectiveness in resource, social, and economic outcomes

Integrated resource planning, life cycle thinking and cost effectiveness analysis provide useful principles

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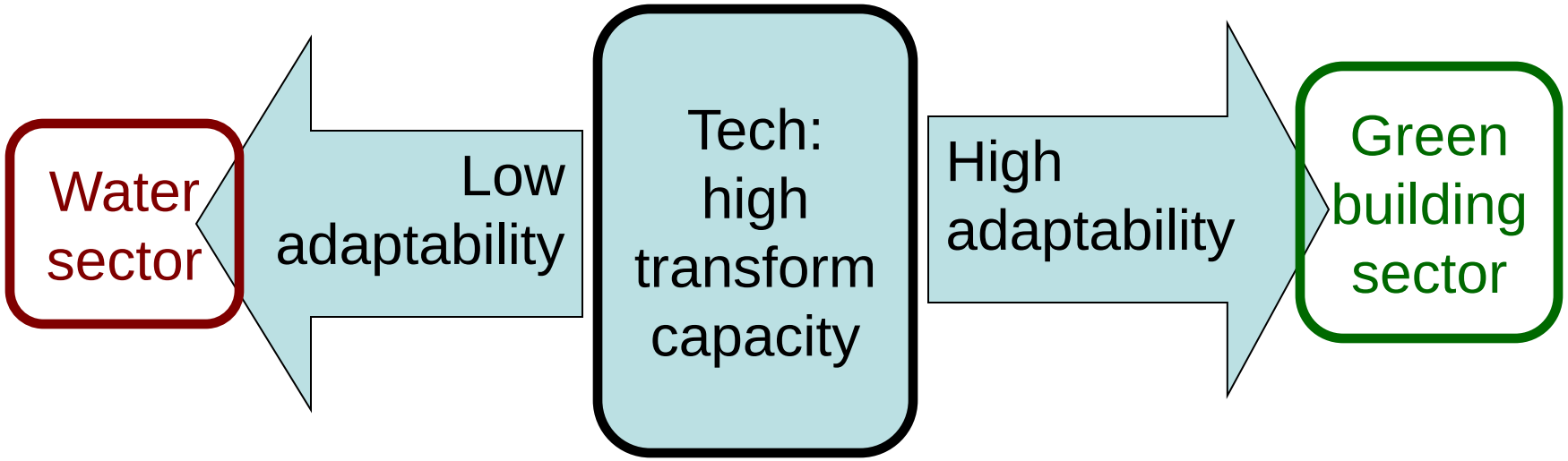
Implementing new ideas means significant institutional and socio-cultural changes

- New regulations e.g. WHO
- New risks and responses e.g. distributed systems
- New institutional arrangements e.g. service teams
- New decision-making processes e.g. deliberative
- New interpretations of personal responsibility e.g. behaviours
- New pricing and payment structures e.g. feed-in tariffs
- New markets e.g. nutrients

The real challenges lie here, not in technology

Transformative capacity, sectoral adaptability: key dimensions of barriers and opportunities



Instability exists because of this tension.
Well-targeted interventions can help direct change.

Dolata (2009) Technological innovations and sectoral change. Transformative capacity, adaptability, patterns of change: An analytical framework. *Research Policy* 38: 1066–1076

Sharing stories:
Using principles to create new paths in practice

1. New servicing models for peri urban development: Can Tho, Vietnam
2. Transdisciplinary trials: Urine diversion
3. Setting and shifting the goalposts for precinct scale development: Barangaroo
4. Truly integrated service provision: City of Sydney and networked recycling
5. A frame to guide sustainable infrastructure investments: AGIC

Servicing new development in Can Tho, Vietnam

Our goal: Relevant tool to assess centralised and decentralised sanitation options on an equal footing

2000 ha

150,000 to 280,000 residents

Sustainability assessment

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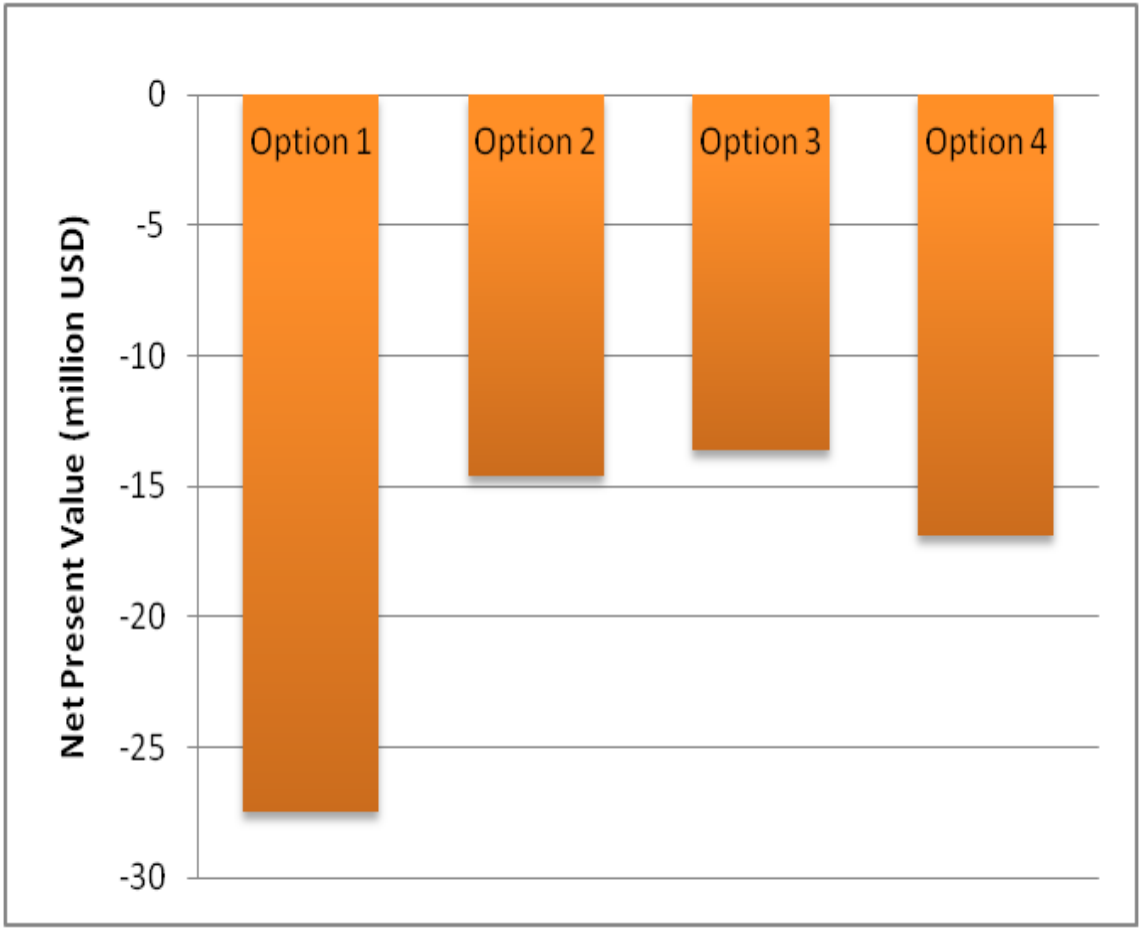
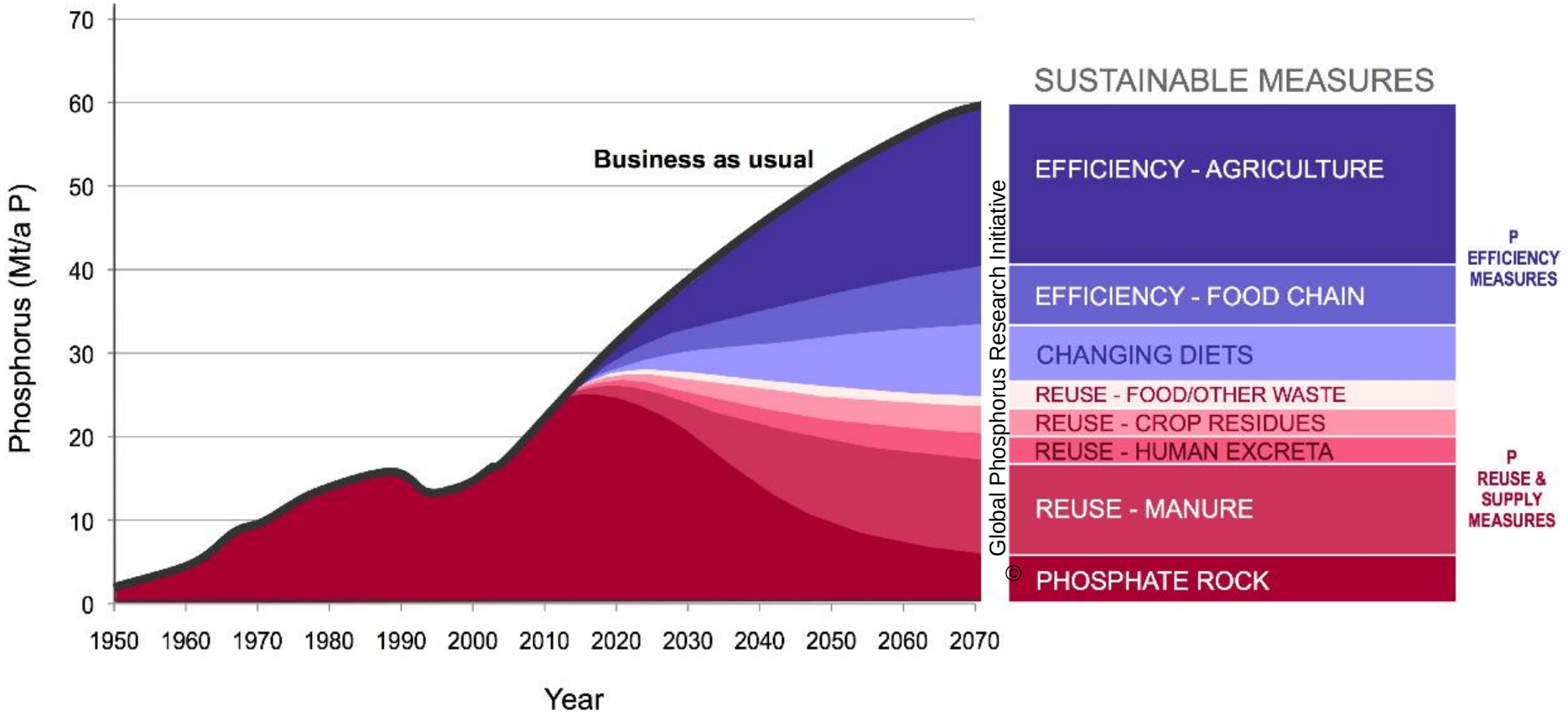
Significant differences in whole-of-society option costs open up new conversations



Capital costs relate to People's Committee

Operating costs/revenue relate to sewage company

Global food security requires new sources of P *and* improved efficiency



In Sweden, urine diverting toilets are failing to move from niche to regime

Initial enthusiasm and $$ followed by

> early technology/design issues
  > eg uncomfortable for users
  > eg odour and struvite precipitation
> lack of support for implementation
  > eg missed out key stakeholders
> lack of ongoing policy support
  > eg centralised plant upgrade

The transition must be actively managed in a systemic way so that each step in implementation is successful.

UTS Urine Diversion and Reuse Project: Leading and learning by doing

TECHNOLOGY

VISUAL COMMUNICAT'N

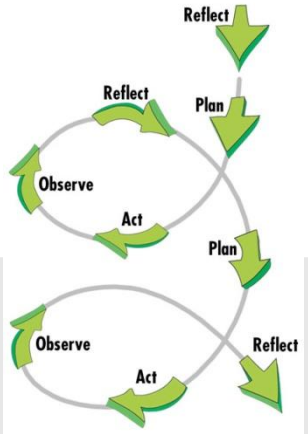
upcycle

STAKEHOLDER ENGAGEMENT

- 350 comments over 12 weeks
- 2 surveys (pre/post installation)
- 30 in-cubicle questionnaires

REGULATIONS INSTITUTIONS

INTEGRATION



Our goal: bring all the key stakeholders in, 'skin our knees' together, work out what questions matter, and help create paths

What govt and business perceived as possible and preferable developed over time

Final Vision: a place to inspire innovation for generations to come. Work, play, live, learn.

- Be studied for generations to come as a world benchmark
- Dynamic place
- Financially viable, maximising public returns and value to business
- Exemplar of next generation of sustainable development: Climate Positive, uphold community wellbeing,
- **… to value what matters to people and planet**

Integrate commercial, residential, retail, educational, civic, cultural, and entertainment with financial hub

Lesson: People want to be part of something iconic: have a vision, don't fuss with 'how' initially, mind the process

City of Sydney is going further: a MasterPlan for a decentralised non-potable water N TWORK

- Sustainable Sydney 2030: leade d vision
- Energy (tri-gen) focus to dat
- Water focus now: multip s
- TOTAL Water Cycle ency, sub-catchment supp , flooding, stormwater, ked supply, …
- Implem business models, so effec artnership are key
- S y.nsw.gov.au/2030/

Game changer:
integrate water + energy + solid waste retrofits

Infrastructure as if sustainability mattered

AGIC (Australian Green Infrastructure Council) is creating a world-first:

a sustainability rating tool for infrastructure

> Encompasses natural, economic, and social capital

– 25 categories under 7 themes

See www.agic.net.au

What sets this tool apart? It is grappling with tough concepts – what does 'positive legacy' mean in practice? resilience, adaptability, systemic, transformational … … iconic

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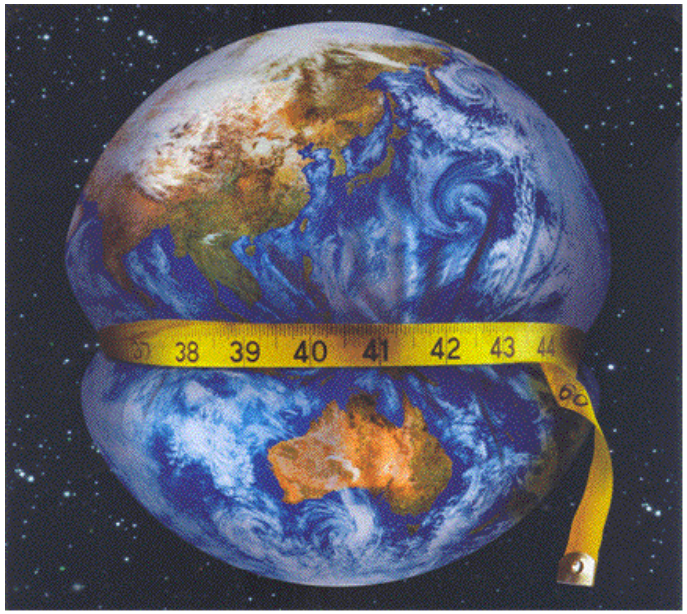

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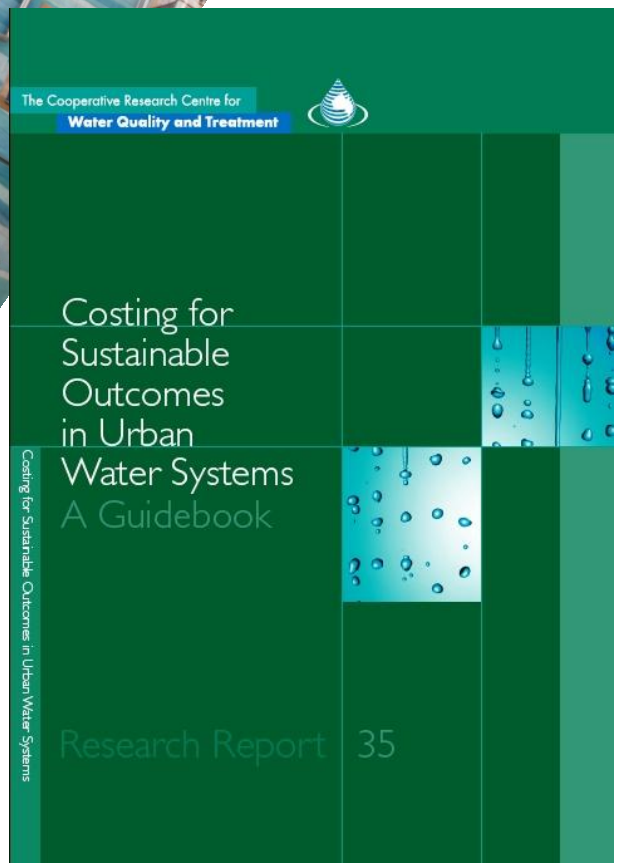
All we've got to do is to be brave enough to learn by doing

Teşekkür ederim



Professor Cynthia Mitchell
Institute for Sustainable Futures
University of Technology Sydney
+61 (0)2 9514 4953
cynthia.mitchell@uts.edu.au
www.isf.uts.edu.au