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ARTS

Benchmarking Water Sensitive Cities and Identifying Transition Pathways

Briony Rogers
School of Social Sciences

GROUP OF EIGHT AUSTRALIA

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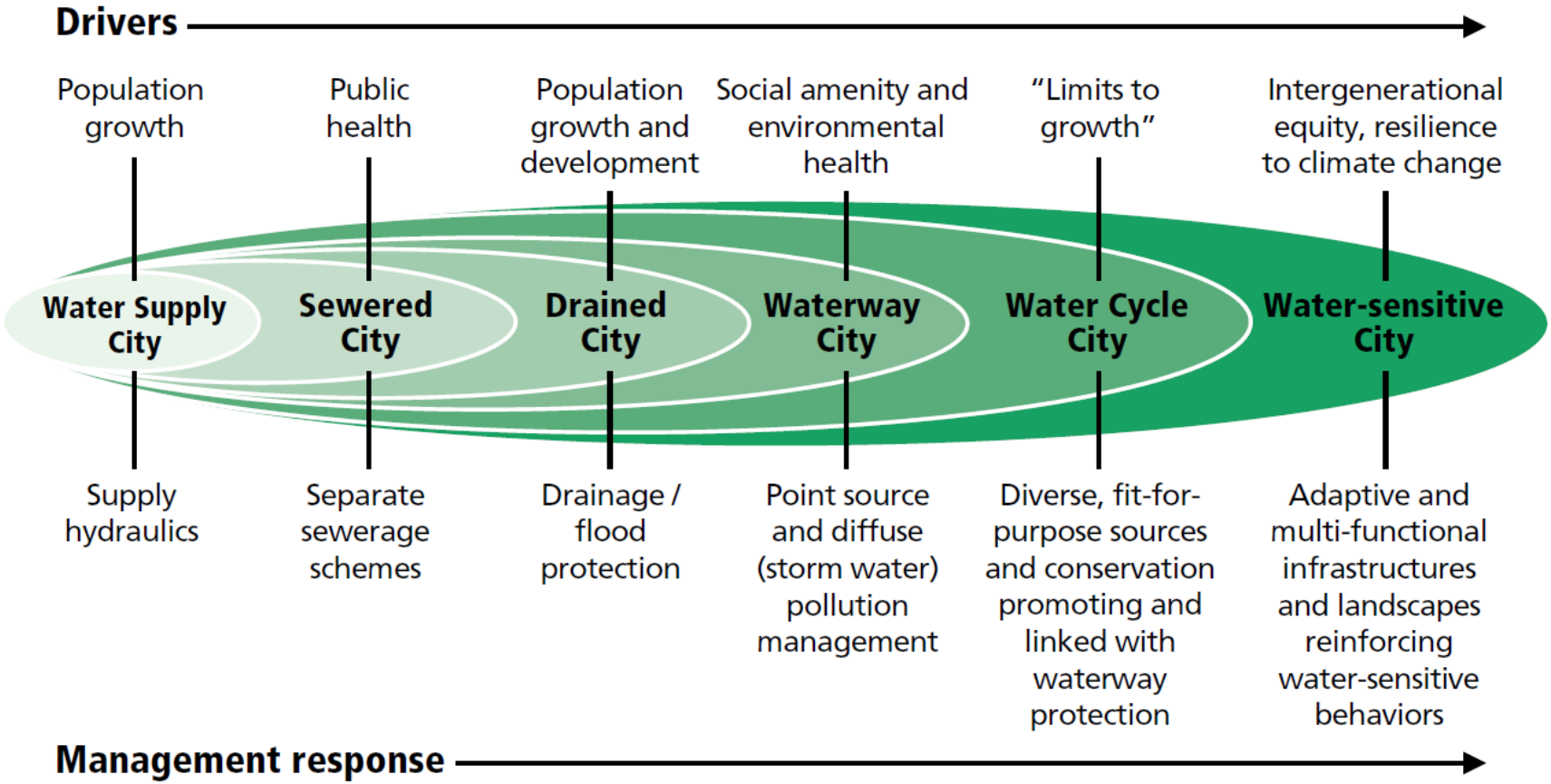
Urban water system transitions

Urban water transition phases



Source: Based on T. Wong and R. R. Brown. 2009. The Water Sensitive City: Principles for Practice. Water Science and Technology *60(3):673–682.*

Urban water transition phases

Drivers →

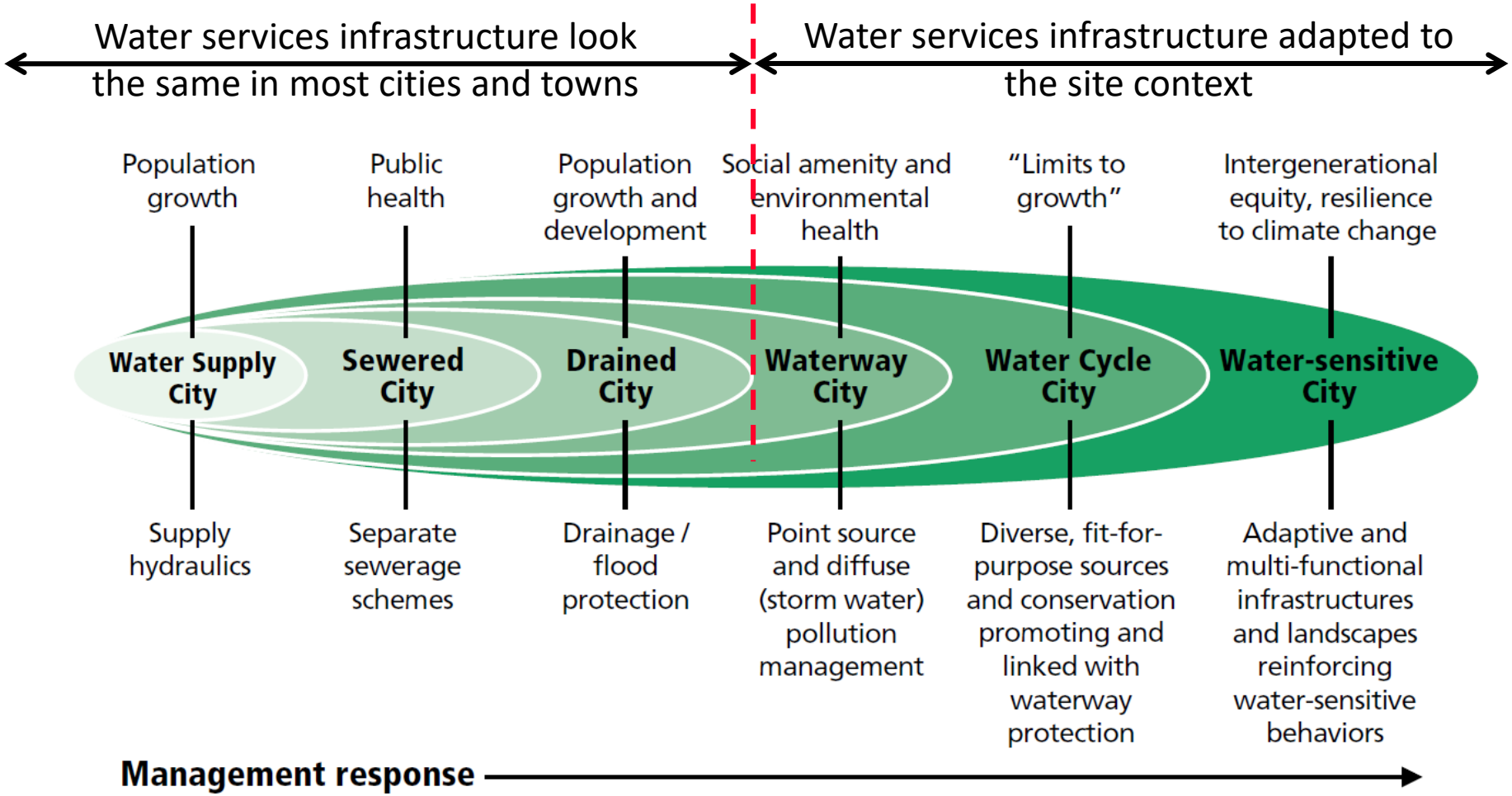
Population growth	Public health	Population growth and development	Social amenity and environmental health	"Limits to growth"	Intergenerational equity, resilience to climate change

Supply hydraulics	Separate sewerage schemes	Drainage / flood protection	Point source and diffuse (storm water) pollution management	Diverse, fit-for-purpose sources and conservation promoting and linked with waterway protection	Adaptive and multi-functional infrastructures and landscapes reinforcing water-sensitive behaviors

Management response →

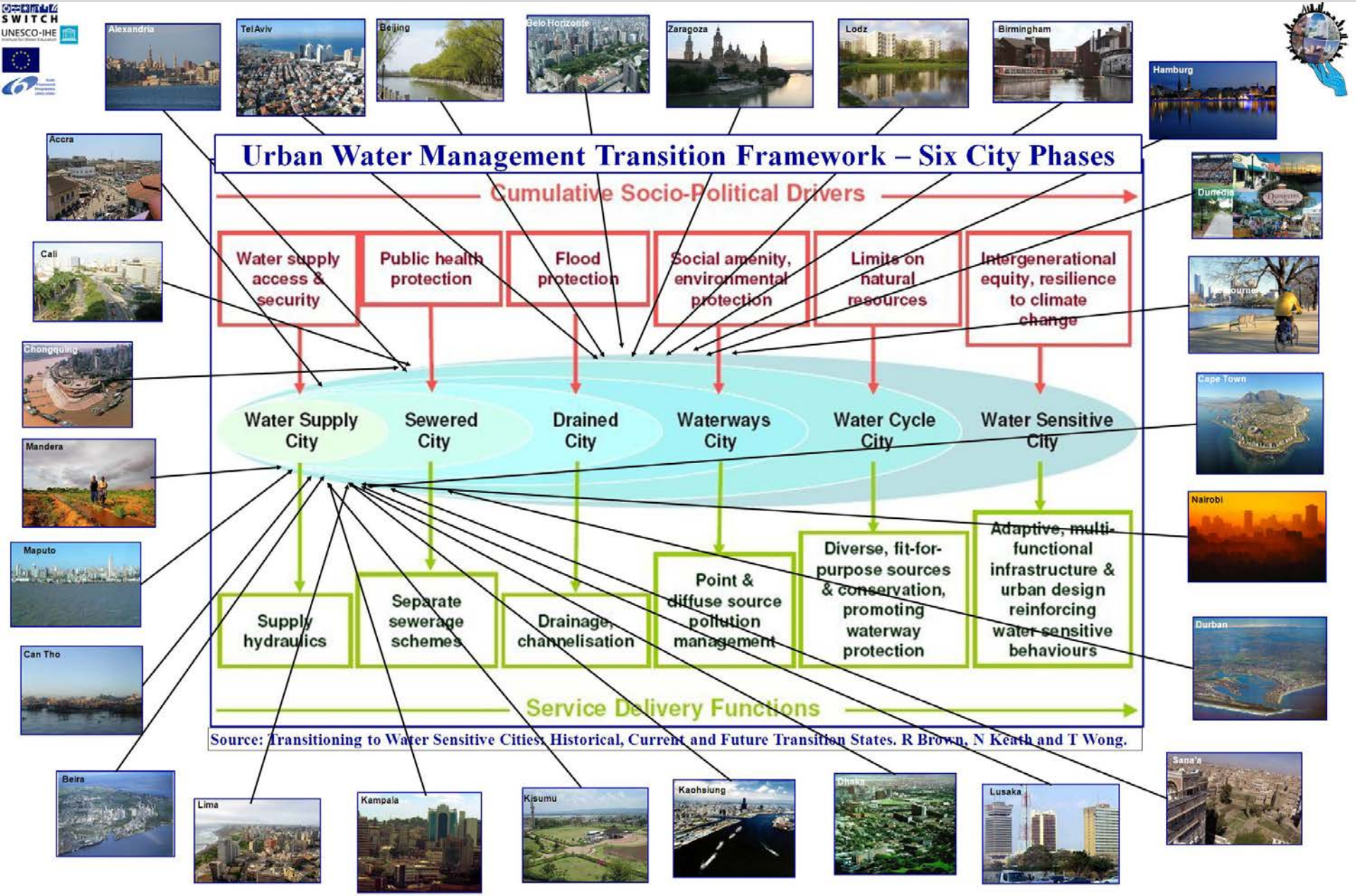
Source: Based on T. Wong and R. R. Brown. 2009. The Water Sensitive City: Principles for Practice. Water Science and Technology *60(3):673–682.*

Urban water transition phases



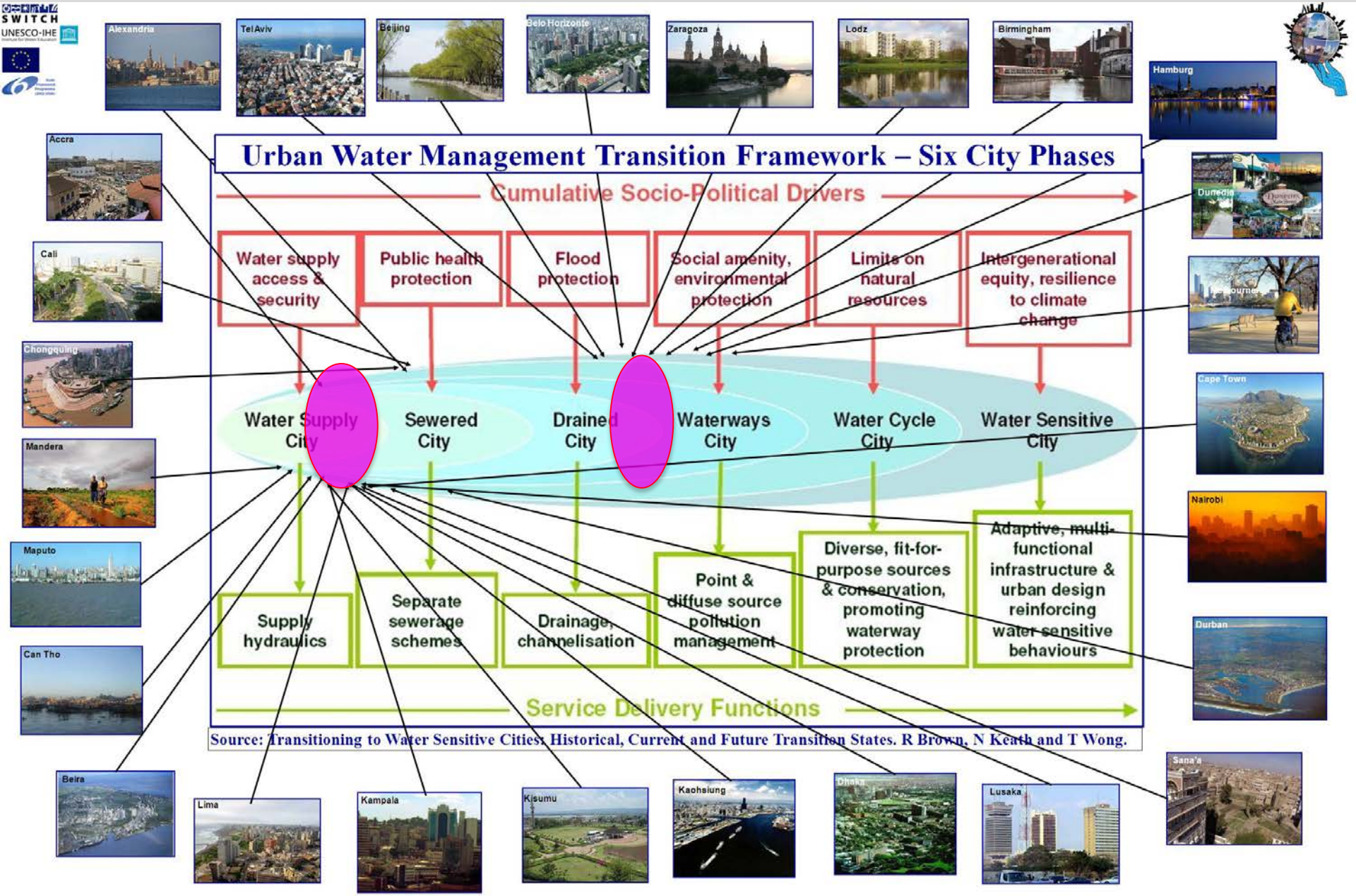
Source: Based on T. Wong and R. R. Brown. 2009. The Water Sensitive City: Principles for Practice. Water Science and Technology *60(3):673–682.*

UNESCO SWITCH project: Developing and developed cities



Jefferies and Duffy, (2011), *SWITCH Transitions Manual*.

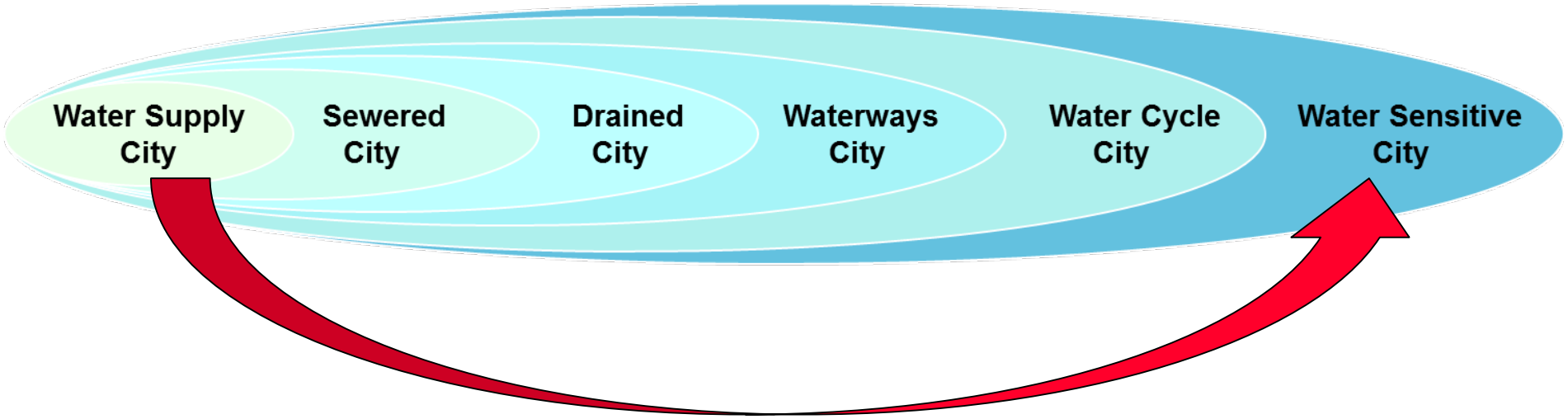
UNESCO SWITCH project: Developing and developed cities



Jefferies and Duffy, (2011), *SWITCH Transitions Manual*.

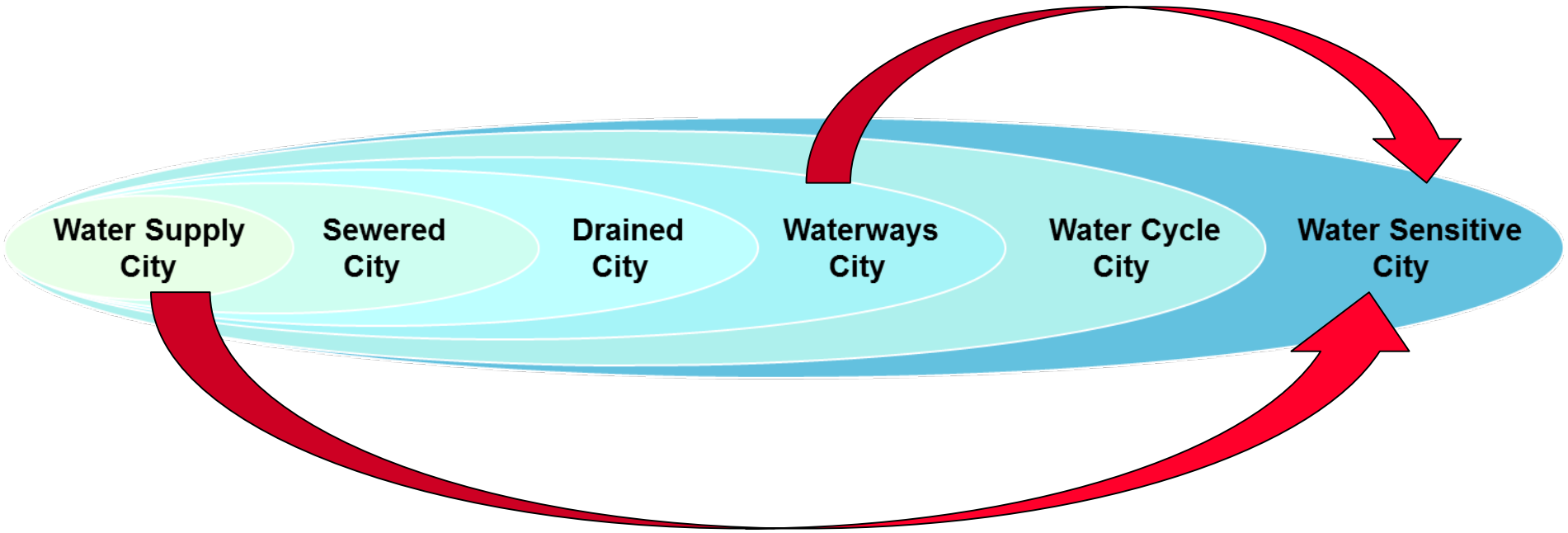
Transitioning towards water sensitive cities

Opportunity for developing cities to 'leapfrog'



Developing countries, where infrastructure and institutions are not well established, are more flexible and conducive to contemporary urban water solutions

Understanding current water management practices



Developing a Water Sensitive Cities Index to guide governments, organisations and communities to transition cities into liveable, resilient, sustainable and productive places through water related actions.

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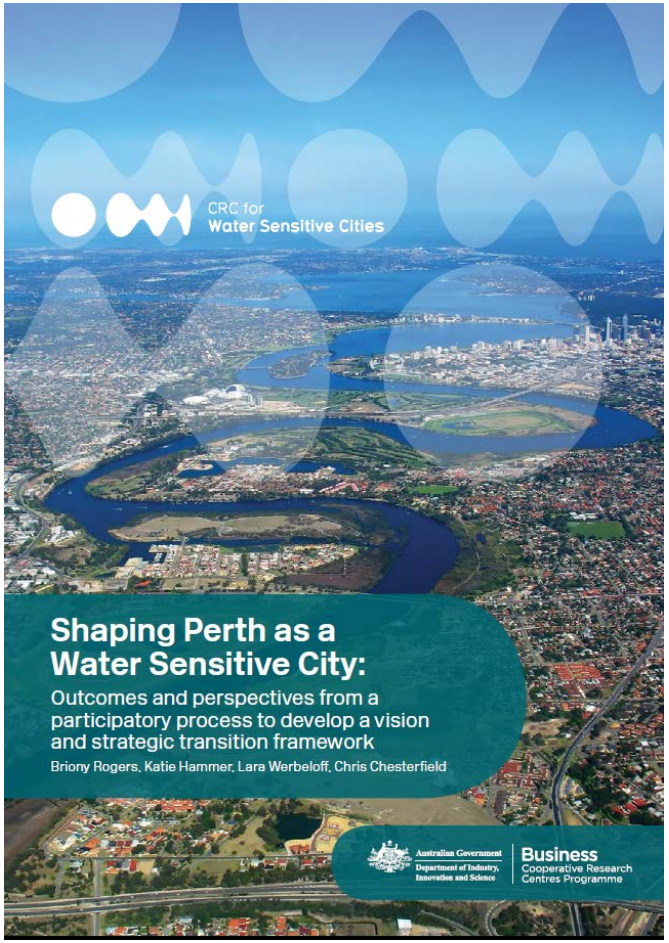
Benchmarking with the Water Sensitive Cities Index

Water Sensitive Cities Index

- Provide **benchmarking** for a city

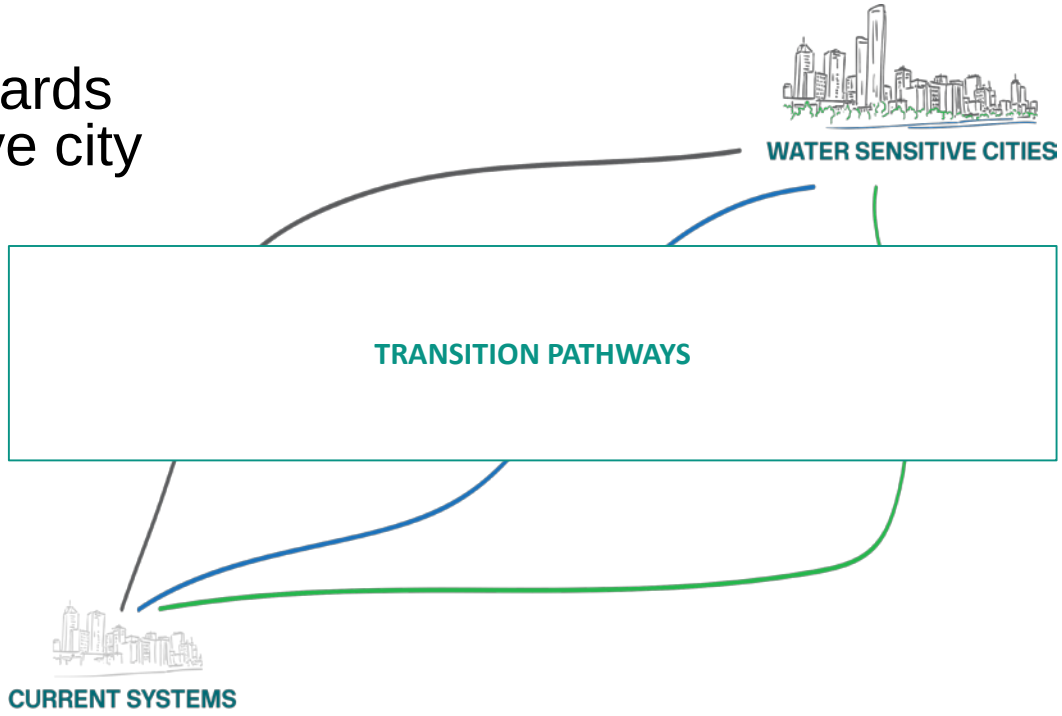
Water Sensitive Cities Index

- Provide **benchmarking** for a city
- Articulate a **shared set of goals**



Water Sensitive Cities Index

- Provide **benchmarking** for a city
- Articulate a **shared set of goals**
- **Measure progress** towards achieving water sensitive city goals



Water Sensitive Cities Index

- Provide **benchmarking** for a city
- Articulate a **shared set of goals**
- **Measure progress** towards achieving water sensitive city goals
- Assist decision-makers **prioritise actions**, define responsibility and foster accountability for water related practices

Water Sensitive Cities Index

7 Goals

Ensure good governance	Increase community capital	Achieve equity of essential service	Improve productivity and resource efficiency	Improve ecological health	Ensure quality urban space	Promote adaptive infrastructure
Knowledge, skills & organisational capacity	Water Literacy	Equitable access to safe & secure water supply	Benefits across other sectors because of water-related services	Healthy and biodiverse habitats	Activating connected plesant urban green & blue space	Diversify self sufficient fit-for-purpose water supply
Water is key element in city planning & design	Connection with water	Equitable access to safe & reliable sanitation	Low GHG emission in water sector	Surface water quality and flow	Urban elements functioning to mitigate heat impact	Multi-functional water infrastructure systems
Cross-sector institutional arrangements & processes	Shared ownership, management & responsibility of water assets	Equitable access to flood protection	Low end-user potable water demand	Groundwater quality and replenishment	Vegetation coverage	Integration & intelligent control
Public engagement, participation & transparency	Critical role of water in professional & business communities	Equitable & affordable access to amenity values of water-related assets	Water-related business opportunities	Protect existing areas of high ecological value		Robust Infrastructure
Leadership, long-term vision & commitment	Community preparedness & response to extreme events		Maximised resource recovery			Infrastructure & ownership at multiple scales
Water resourcing & funding to deliver broad societal value						Adequate maintenance
Equitable representation of perspective						

34 Indicators

Benchmarking with the WSC Index

1. Ensure good water sensitive governance	1.9
2. Increase community capital	1.5
3. Achieve equity of essential services	2.1
4. Improve productivity and resource efficiency	1.8
5. Improve ecological health	1.5
6. Ensure quality urban space	2.5
7. Promote adaptive infrastructure	1.5

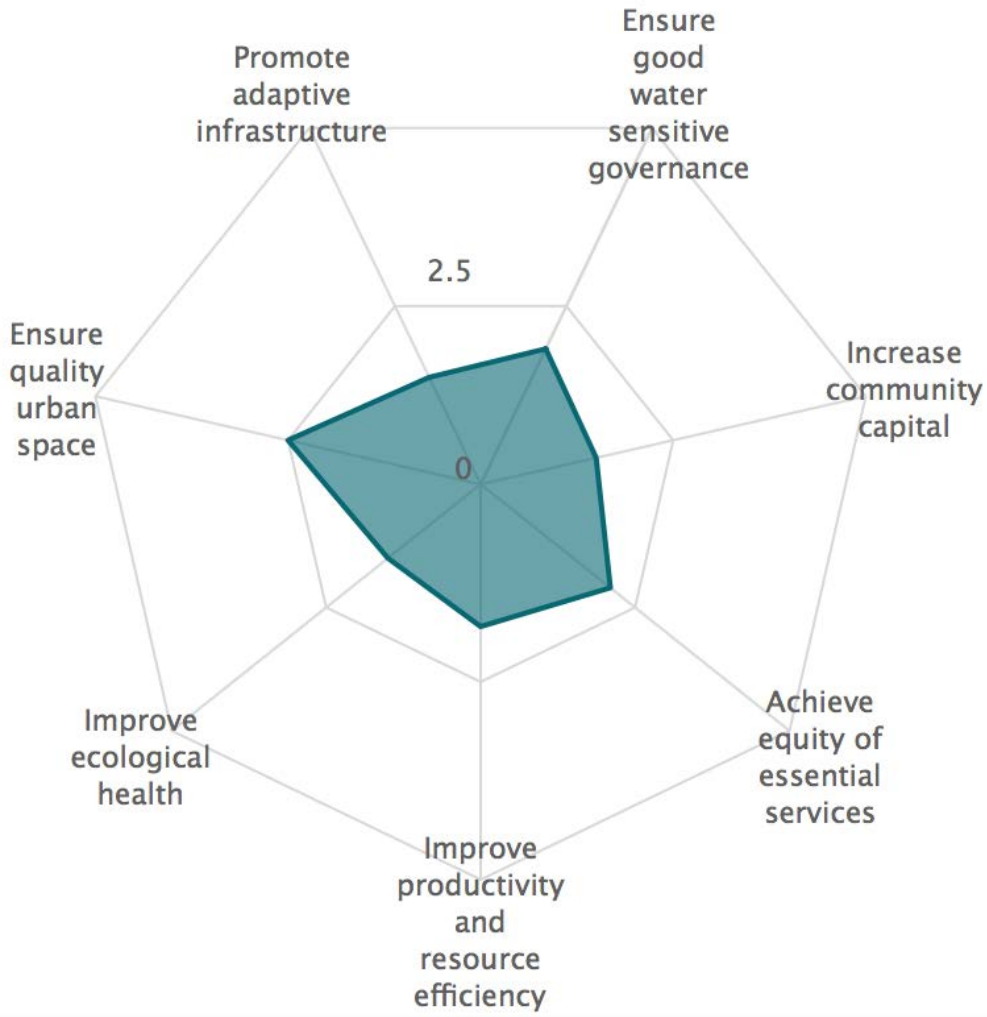
Benchmarking with the WSC Index

1. Ensure good water sensitive governance	**1.9**
2. Increase community capital	**1.5**
3. Achieve equity of essential services	**2.1**
3.1. Equitable access to safe and secure water supply	3.0
3.2. Equitable access to safe and reliable sanitation	1.5
3.3. Equitable access to flood protection	2.0
3.4. Equitable and affordable access to amenity values of water-related assets	2.0
4. Improve productivity and resource efficiency	**1.8**
5. Improve ecological health	**1.5**
6. Ensure quality urban space	**2.5**
7. Promote adaptive infrastructure	**1.5**

3.1. Equitable access to safe and secure water supply

1. **Few people** (**less than 30%** of urban population) have access to safe and secure water for basic needs, where safe means '**without health risk**' and secure means supply is available **at least 4 days** a week. The source of supply (communal stand pipe, well, roof tank or metered supply) is **within 1000 m** of the home and collection time **does not exceed 30 minutes**. River, creek or other represent inadequate access.
2. **Some people** (**more than 30%** of urban population) have access to safe and secure water for basic needs, where safe means '**without health risk**' and secure* means supply is available **at least 4 days a week**. The source of supply (communal stand pipe, well, roof tank or metered supply) is **within 1000 m** of the home and collection time **does not exceed 30 minutes**. River creek or other represent inadequate access.
3. **Many people** (**more than 60%** of the urban population) have access to safe and secure water for drinking and other consumptive purposes, where safe means '**without health risk**' and secure* means supply is available **at least 4 days a week**. The source of supply (communal stand pipe, well, roof tank or metered supply) is **within 1000 m** of the home and collection time **does not exceed 30 minutes**. River, creek or other represent inadequate access. Water is affordable at less than 3% of household income.
4. Safe and secure* water is available to **almost all people** (**more than 95%** of the urban population) all of the time for drinking and other consumptive purposes, where safe means 'up to **developed world potable standards**' and available as **metered tap water** (**or tank** water) in houses. Water is affordable at **less than 3% of household income**.
   *if security of supply is not achieved then rating is reduced to 1 point.
5. Safe and secure water is **available to everyone** for drinking and other consumptive purposes, where safe means 'up to **developed world potable standards**' and available as **metered tap water** (**or tank** water) in houses. Water is affordable at **less than 3% of household income**. The relative cost of supply increases as household income increases, meaning **low incomes relatively pay less** (through discounted bills, etc.) than high incomes.

Benchmarking with the WSC Index



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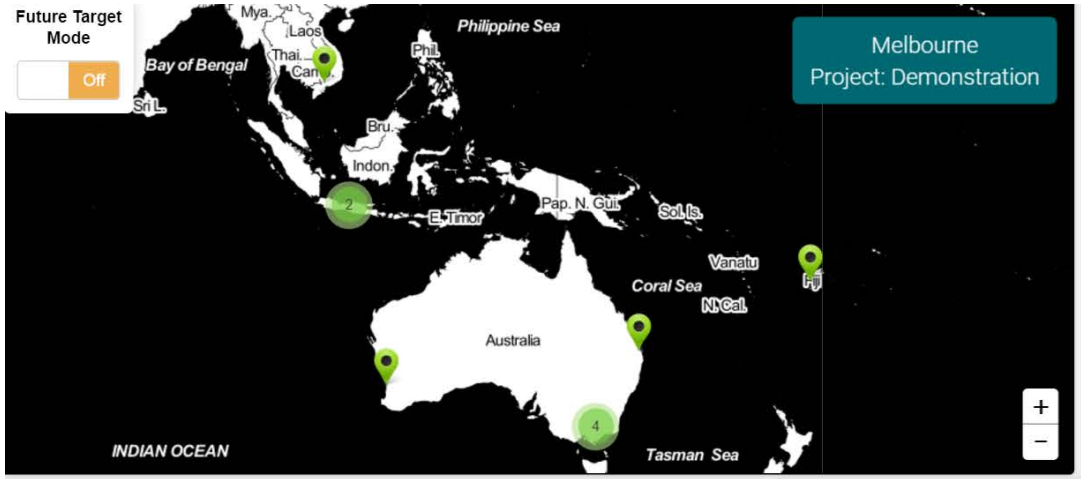
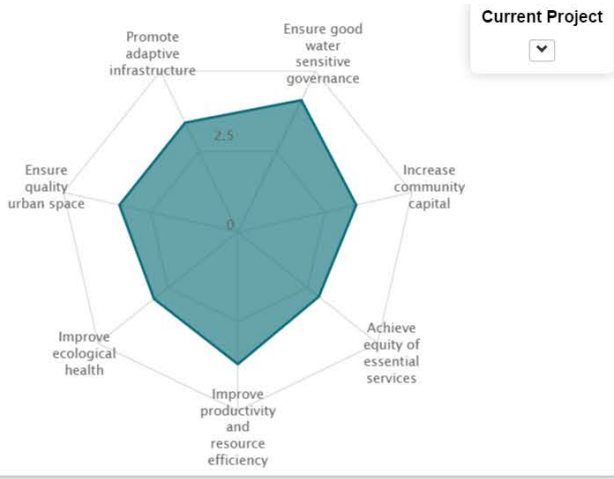
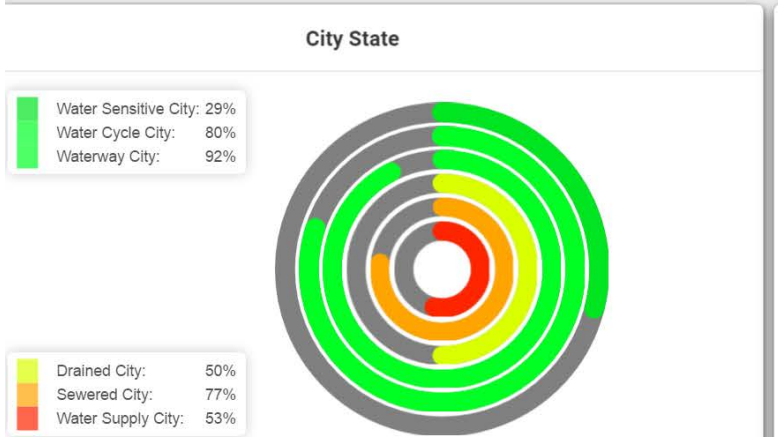
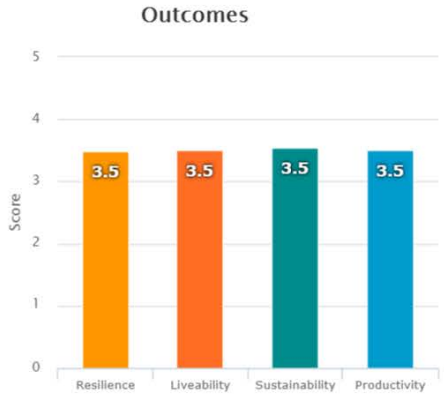
Example applications of the WSC Index to identify transition pathways

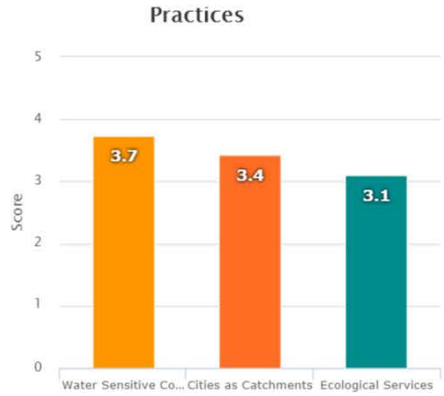
Rating cities to inform strategic investments











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CRC for Water Sensitive Cities

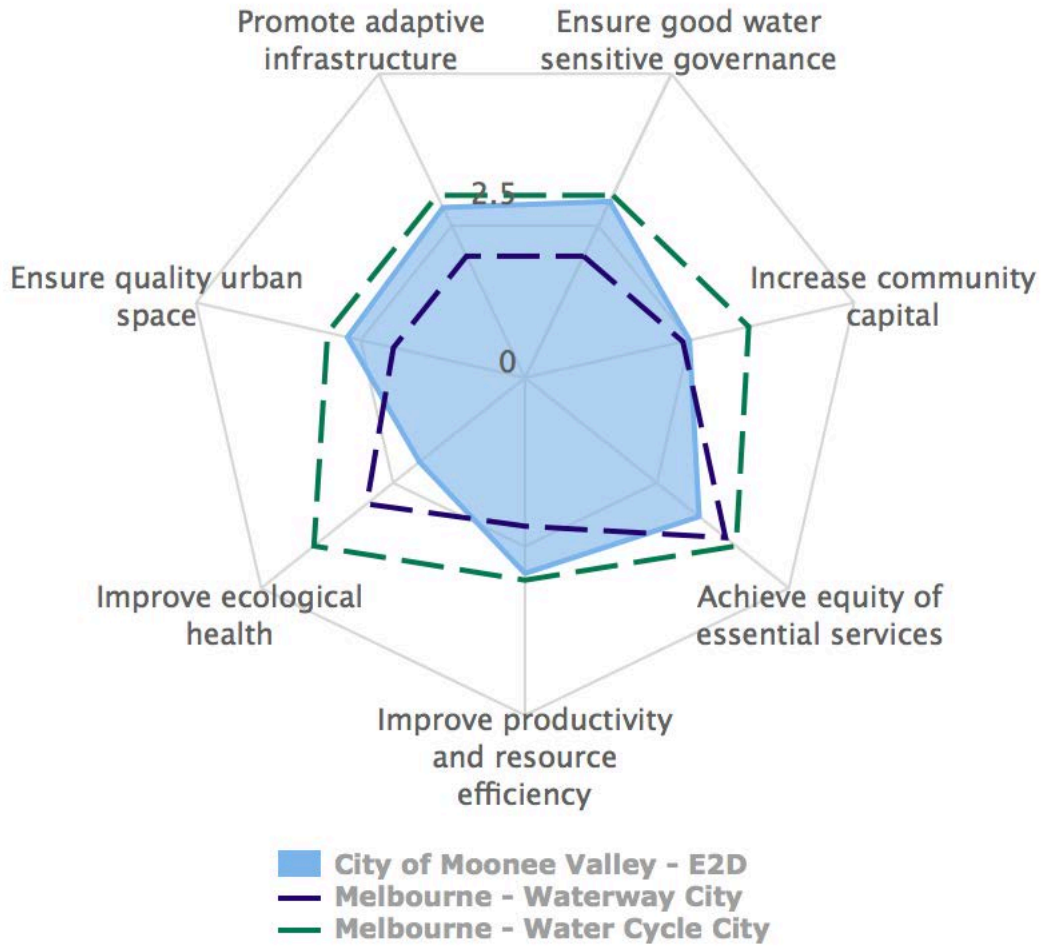
Water Sensitive Cities Benchmarking and Assessment

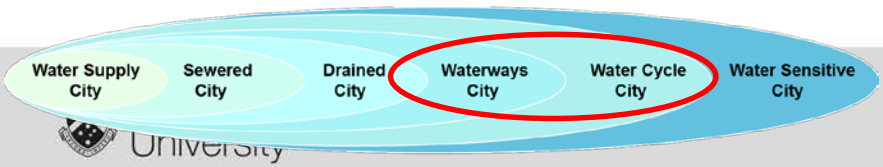
Moonee Valley City Council

E2DESIGNLAB

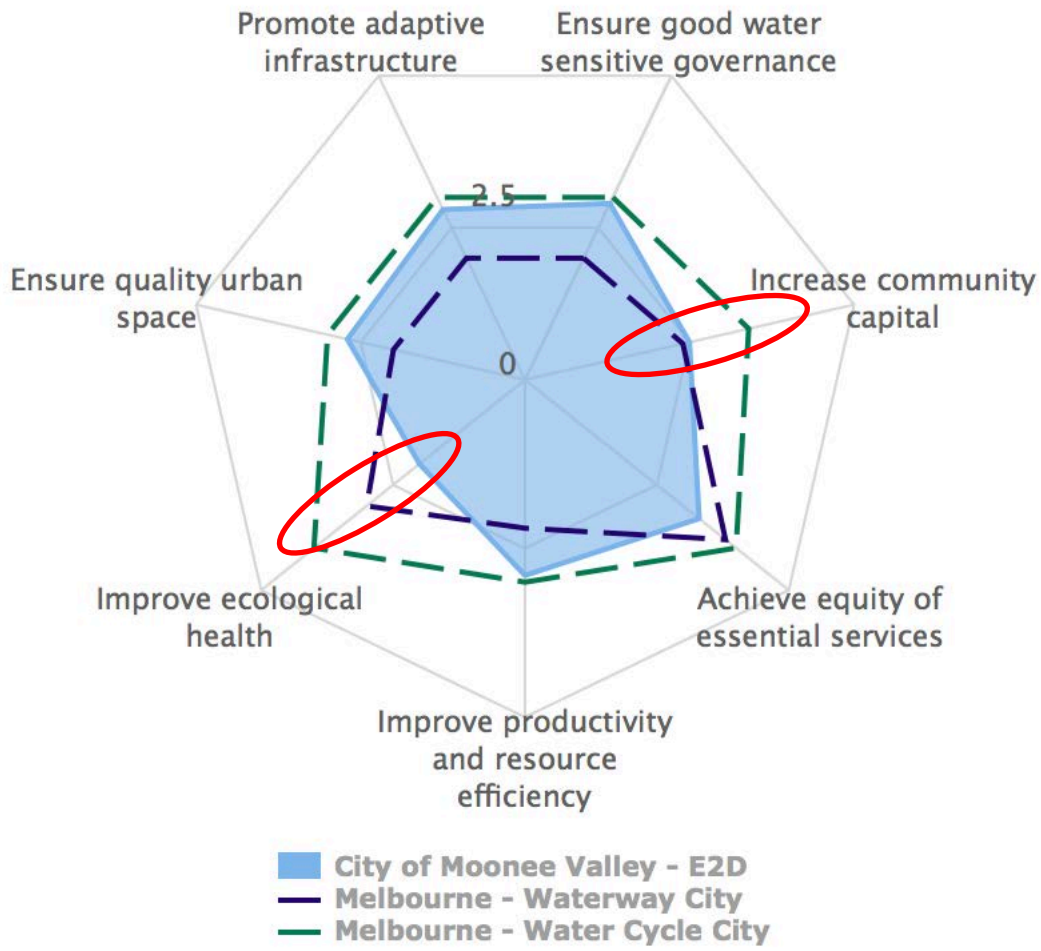
CRC for Water Sensitive Cities

System diagnosis – Footprint of the WSC goals

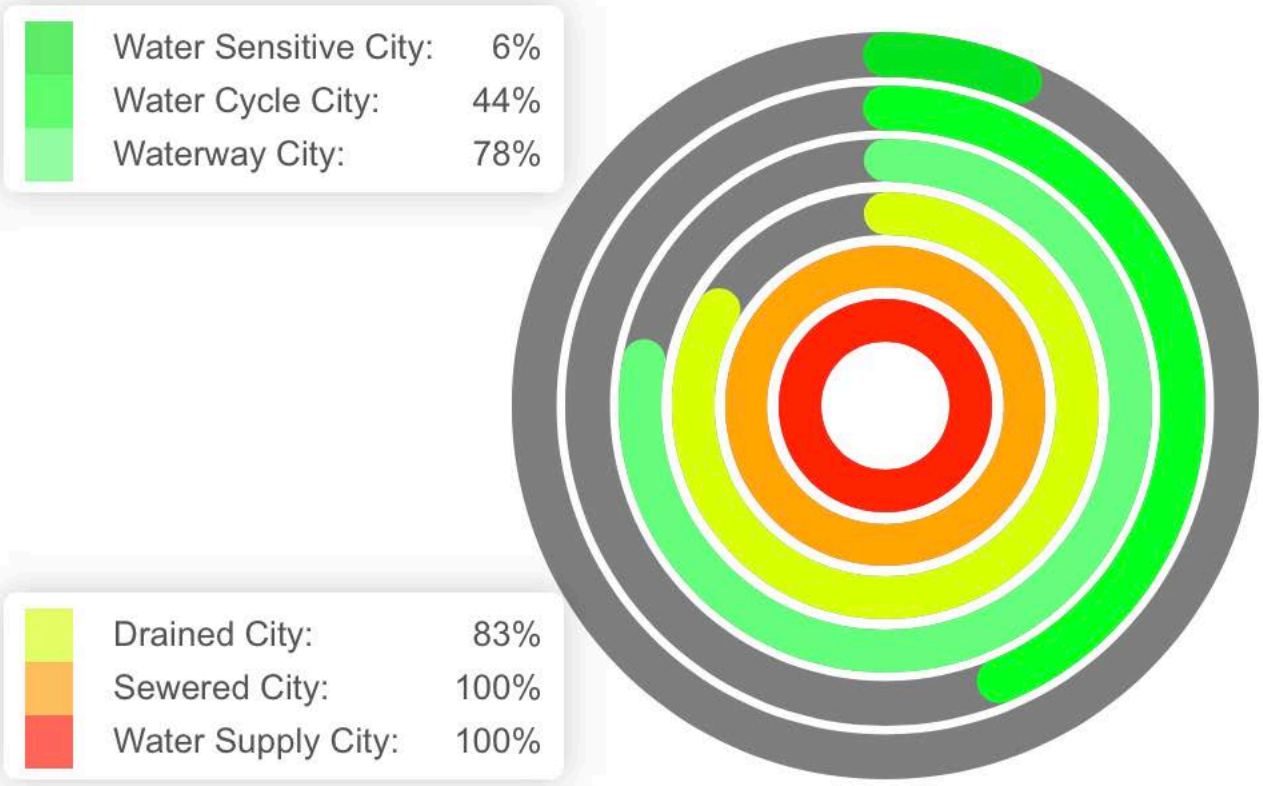




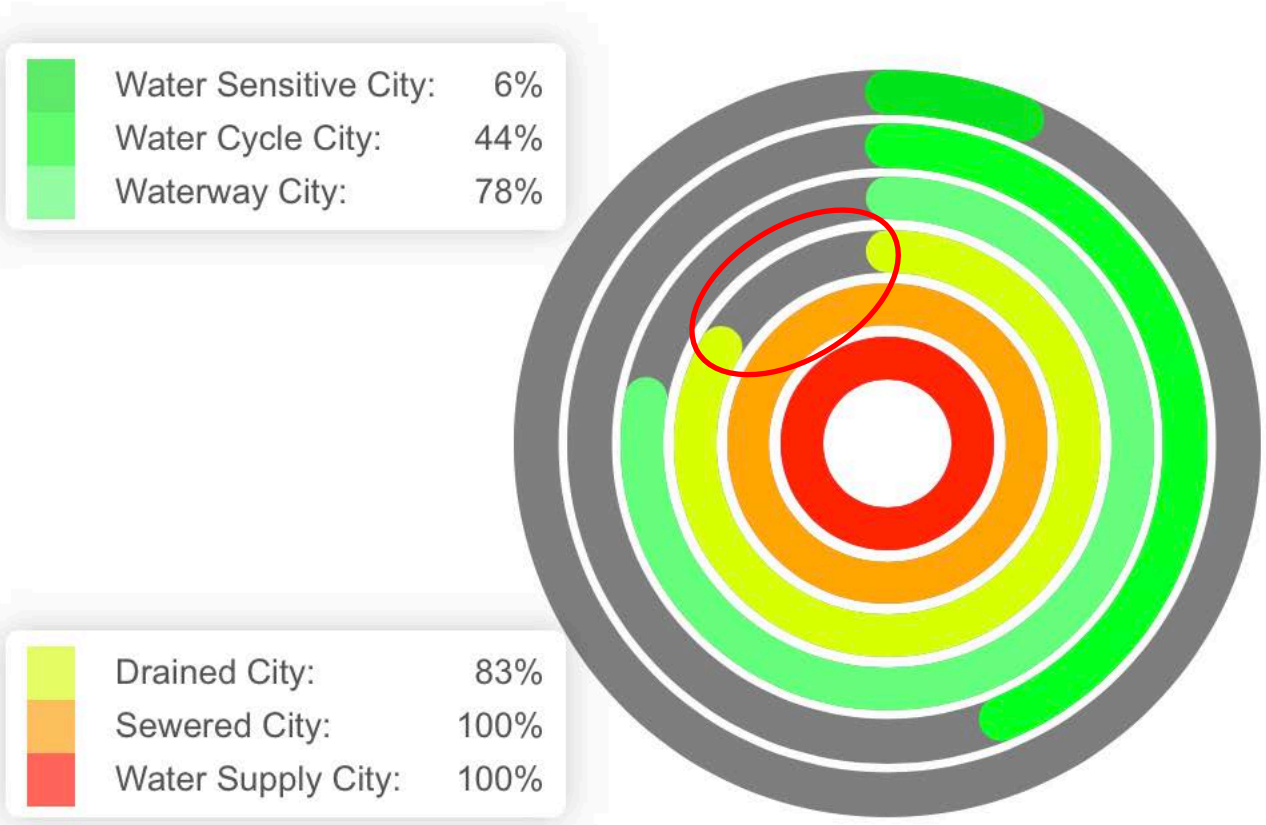
System diagnosis – Footprint of the WSC goals



System diagnosis – Urban Water Transitions Framework



System diagnosis – Urban Water Transitions Framework



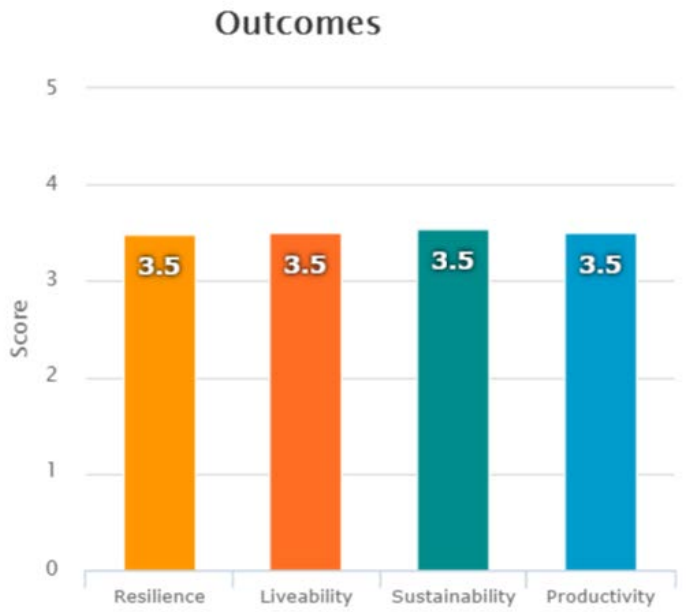
System diagnosis – Water Sensitive Outcomes

Resilience is the capacity to maintain water system services under acute or chronic disturbances

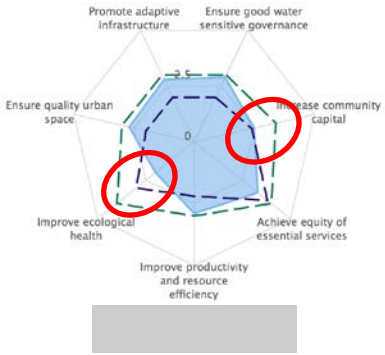
Sustainability is the capacity of water system services to deliver benefits for current and future generations

Liveability is the capacity of water system services to deliver a high quality of life

Productivity is the capacity of water system services to generate economic value



System diagnosis – Water Sensitive Outcomes



CRC for Water Sensitive Cities

System diagnosis – Water Sensitive Outcomes

Identifying management actions

WATER SENSITIVE CITIES

Enabling Structures

Vision & narrative
Evaluation frameworks
Policy & strategy
Legislation & regulation
Incentives
Revenue,funding & investment

On-ground Practices

Water systems planning
Urban and landscape design
Water systems design
Operation & maintenance
Monitoring & evaluation
Citizen engagement
Cost-benefit analyses

Socio-Political Capital

Leadership
Science influence
Networks
Capacity
Community connection
Learning culture

CURRENT SYSTEMS

Identifying management actions

On-ground Practices

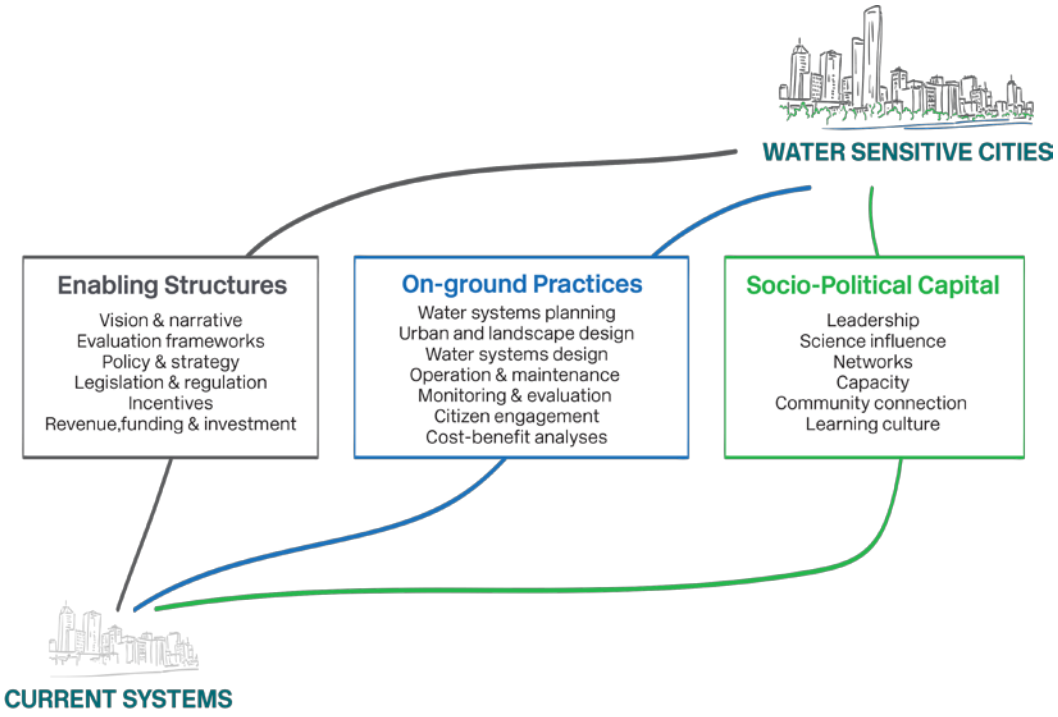
Action 1: Identify **corridors** to connect patches of biodiverse habitat to deliver a range of social and ecological services

Enabling Structures

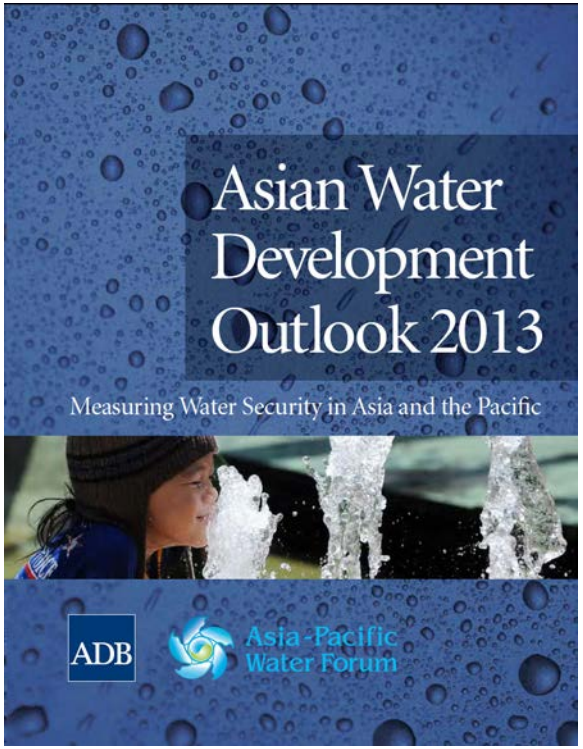
Action 5: Update Council's **Open Space Strategy** to better reflect the Urban Ecology Strategy to ensure protection of ecological values associated with natural and constructed systems.

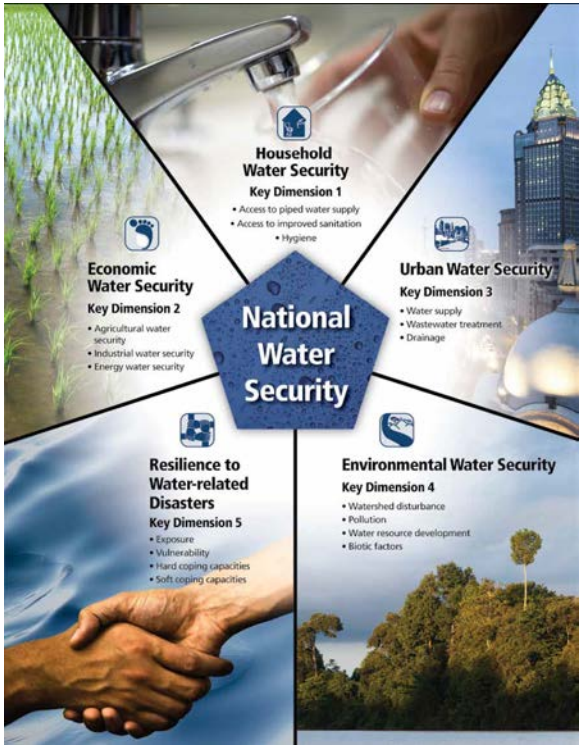
Socio-Political Capital

Action 8: Undertake a **water literacy initiative** to improve community understanding of the urban water cycle and the benefits of green-blue assets



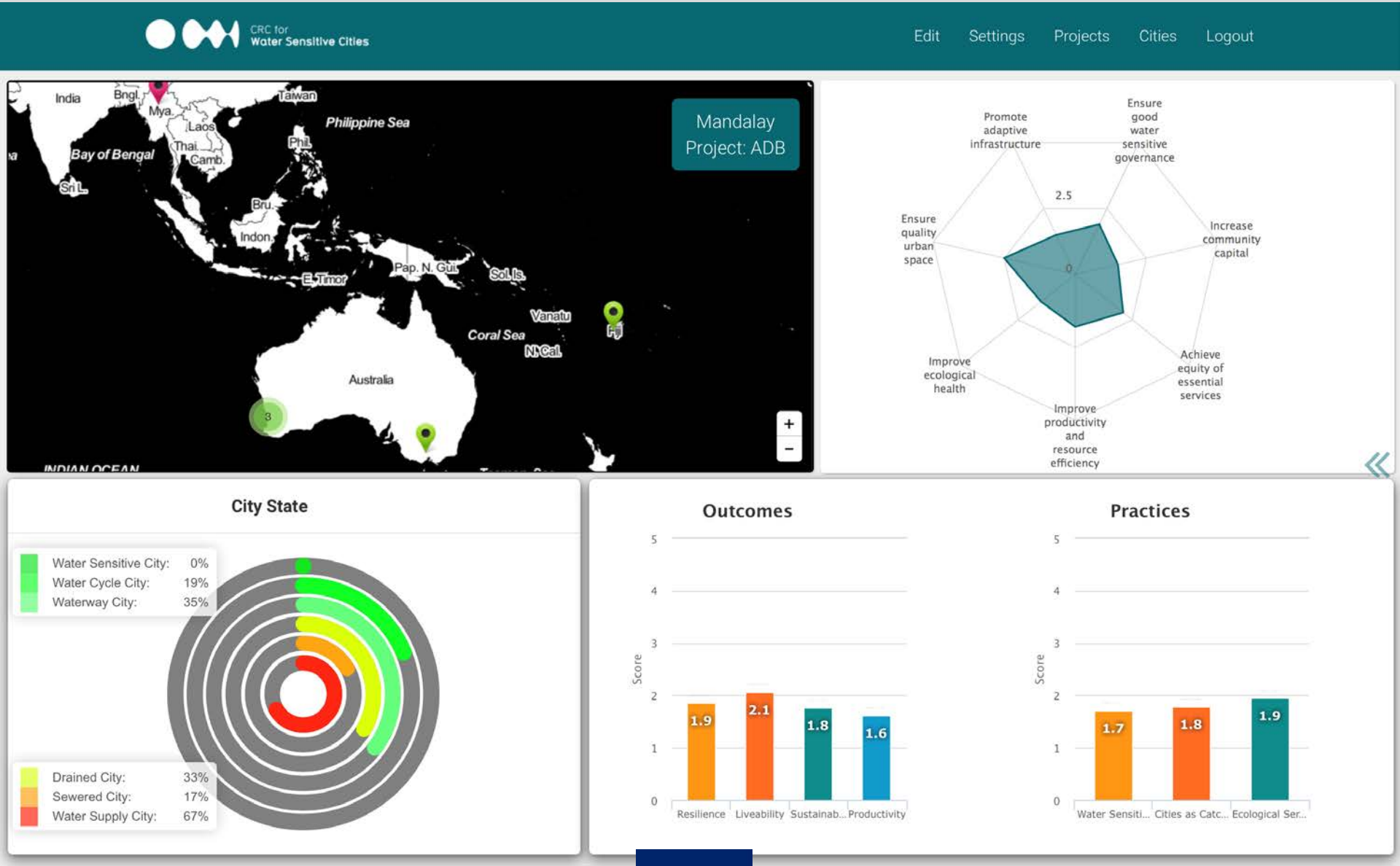
Asian Development Bank Future Cities Program





Assessment of proposed large infrastructure investments

Mandalay benchmarking results



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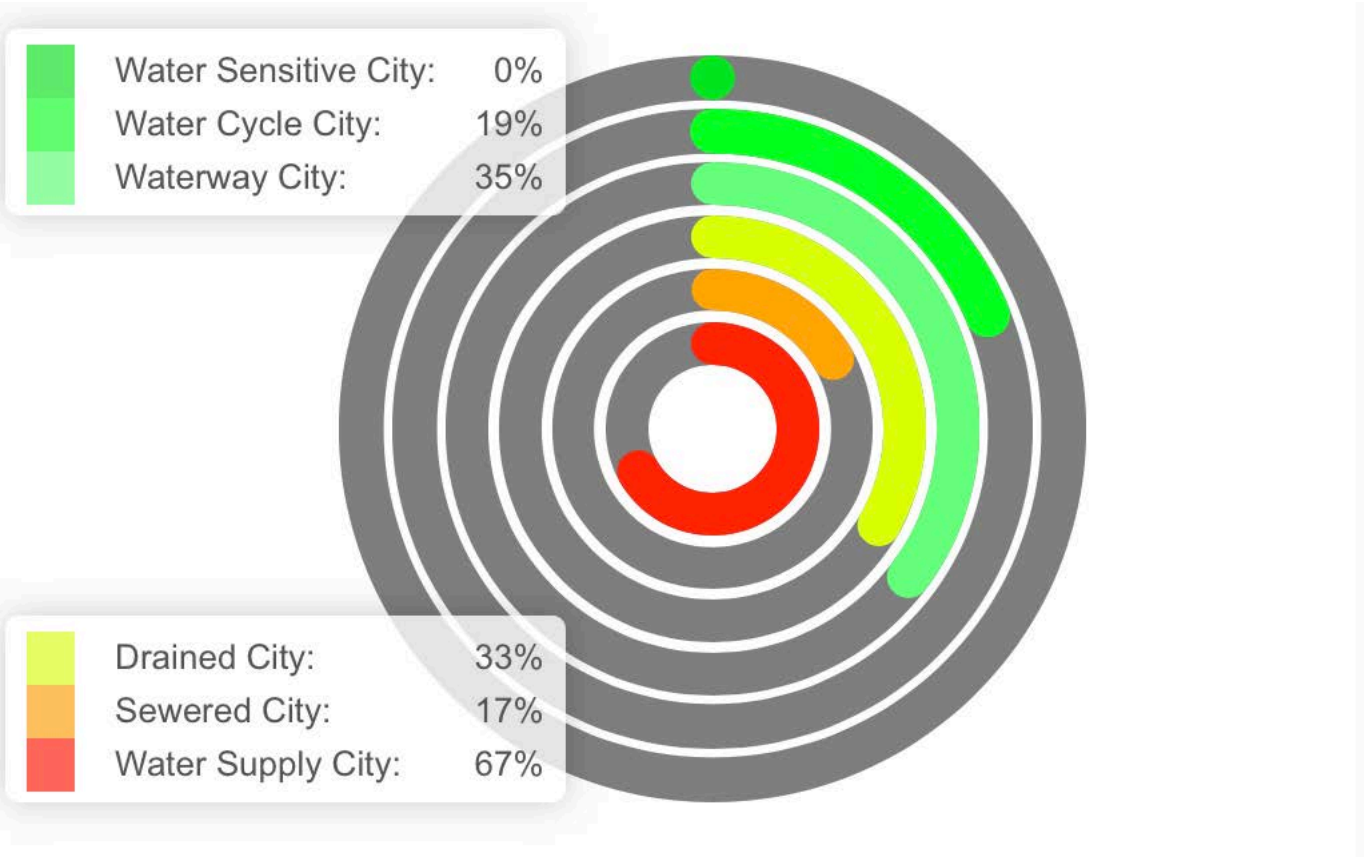
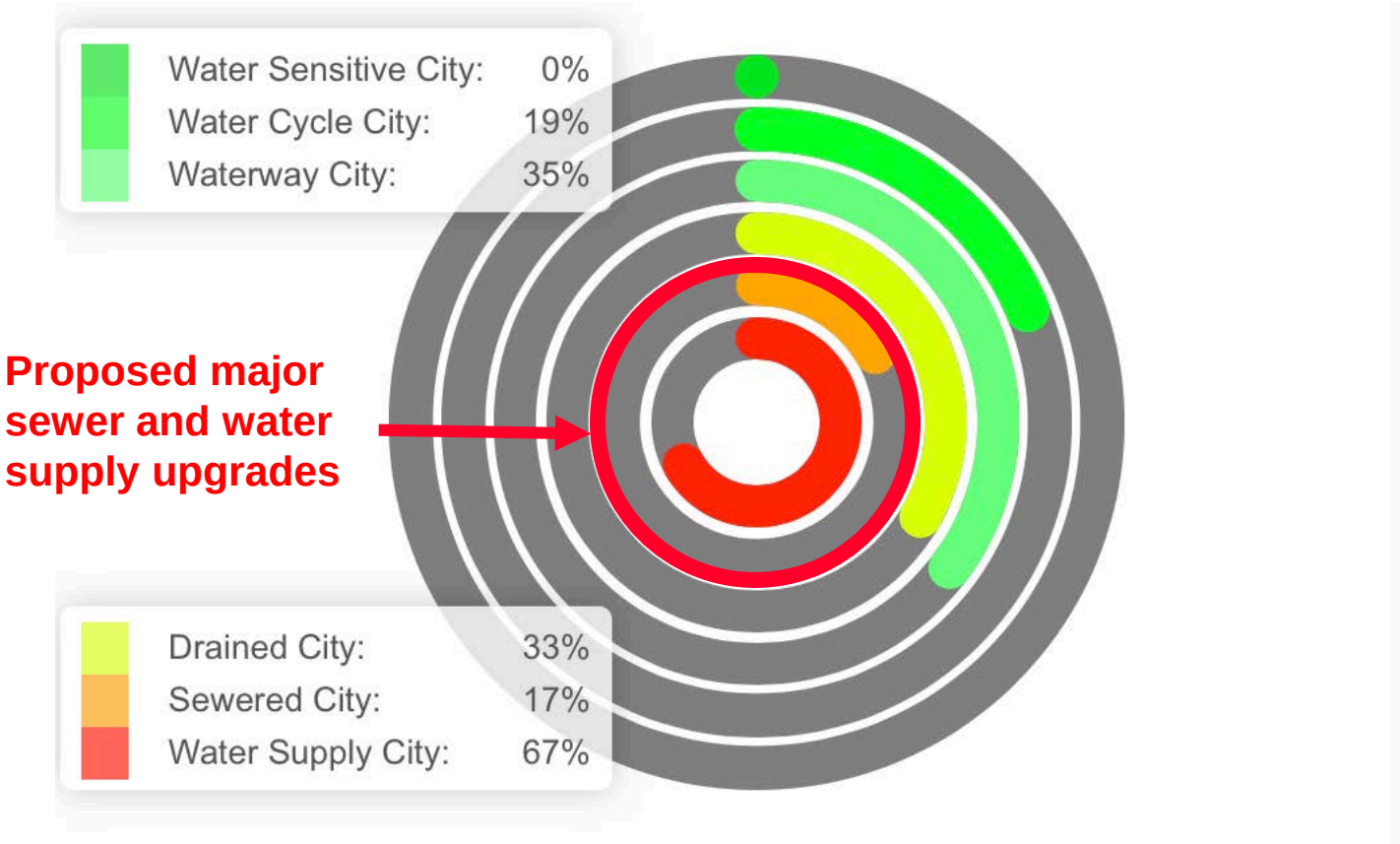
ADB

CRC for Water Sensitive Cities

Mandalay benchmarking results



Mandalay benchmarking results



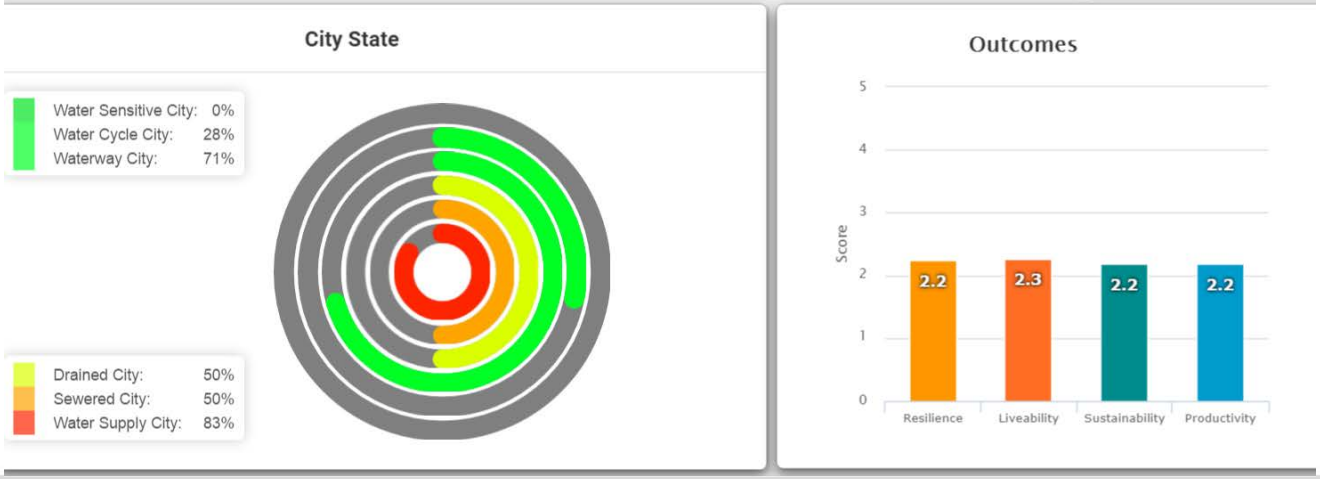
Assessment of proposed infrastructure upgrades

1. Ensure good water sensitive governance	+0.6	2.5
2. Increase community capital	+0.3	1.8
3. Achieve equity of essential services	+0.7	2.8
4. Improve productivity and resource efficiency	+0.2	2.0
5. Improve ecological health	+0.3	1.8
6. Ensure quality urban space	+0.2	2.7
7. Promote adaptive infrastructure	+0.6	2.1

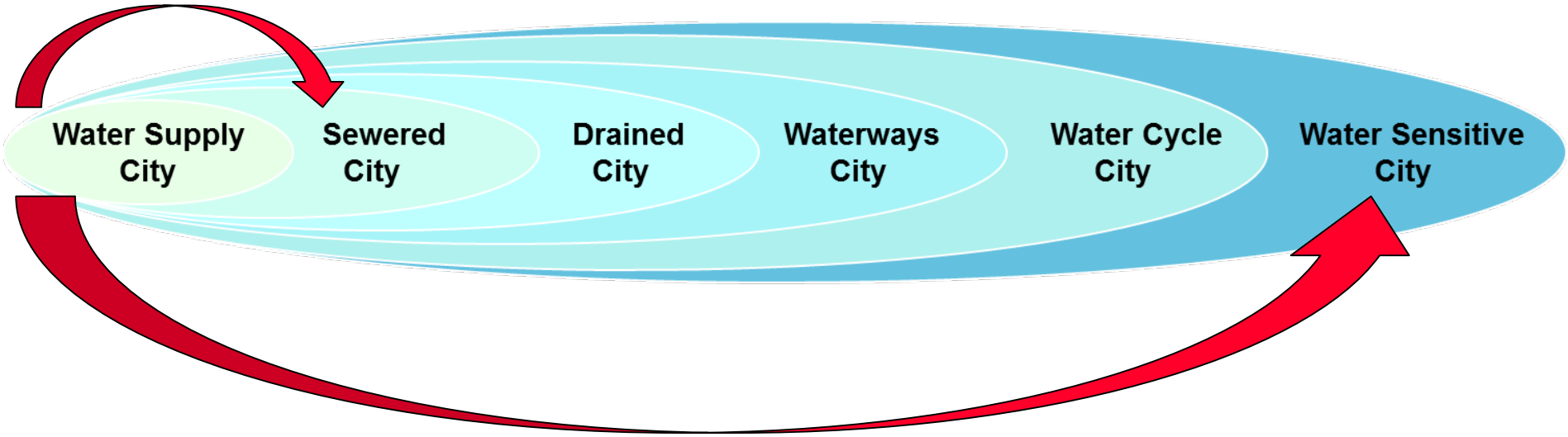
Assessment of proposed infrastructure upgrades

Existing Conditions

Post MUSIP 1 – Proposed major sewerage and water supply upgrades



Potential for leapfrogging



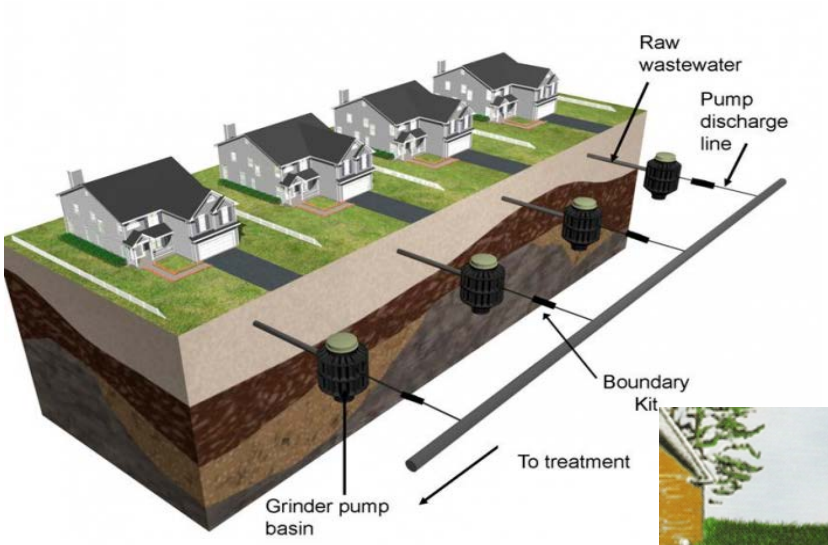
What infrastructure investments would enhance Mandalay's leapfrogging potential?

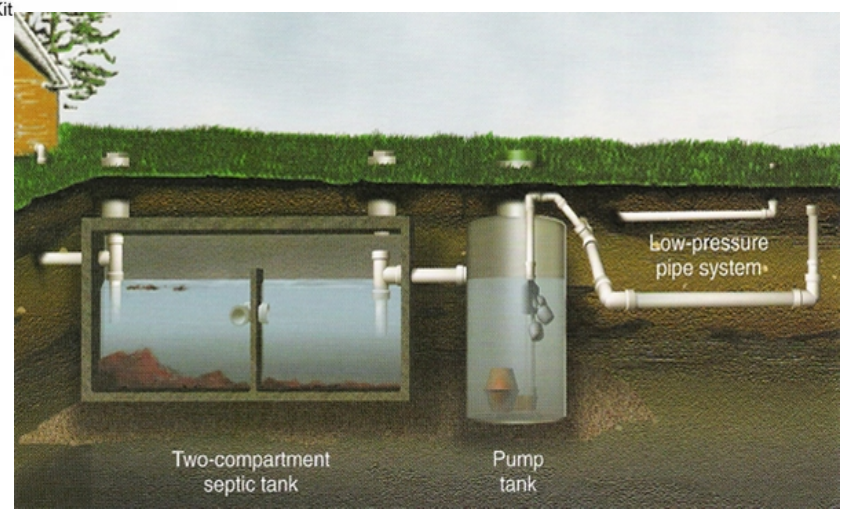
Future Cities Program opportunities

Proposal 1 – Enhancing water quality of *Thin Gazar Creek* through Water Sensitive Initiatives

Future Cities Program opportunities

Proposal 2 – Trialing pressure sewers





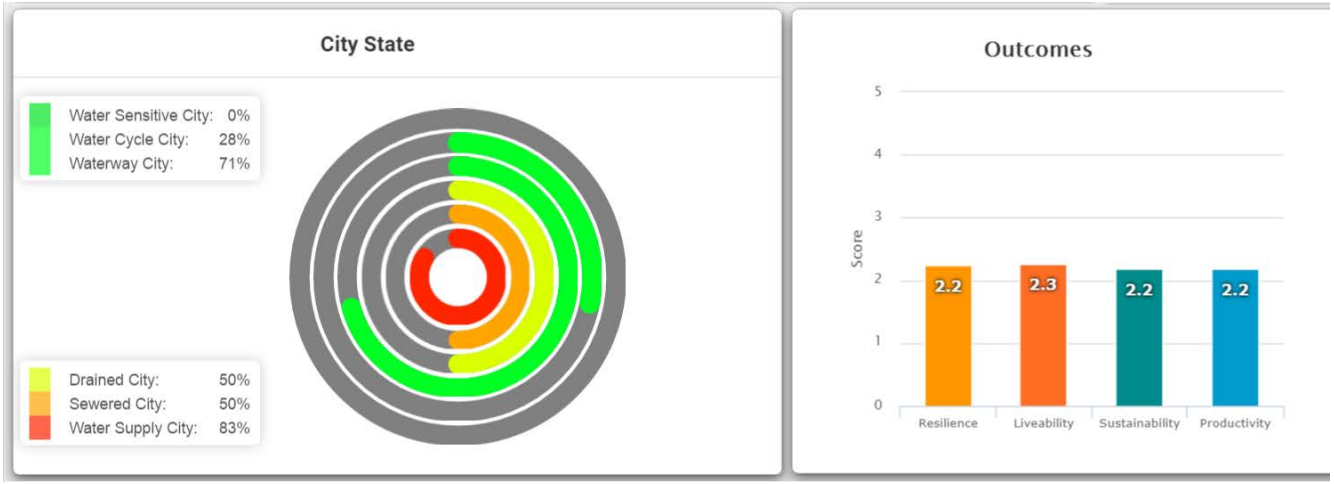
Assessment of water sensitive initiatives

1. Ensure good water sensitive governance	**+0.6**	**2.5**
2. Increase community capital	**+0.3**	**1.8**
3. Achieve equity of essential services	**+0.7**	**2.8**
4. Improve productivity and resource efficiency	**+0.2**	**2.0**
5. Improve ecological health	**+0.3**	**1.8**
5.1. Healthy and biodiverse habitat	+0.0	2.0
5.2. Surface water quality and flows	+1.0	2.0
5.3. Groundwater quality and replenishment	+0.0	2.0
5.4. Protect existing areas of high ecological value	+0.0	1.0
6. Ensure quality urban space	**+0.2**	**2.7**
7. Promote adaptive infrastructure	**+0.6**	**2.1**
7.1. Diversify self sufficient fit-for-purpose water supply	+1.5	3.0
7.2. Multi-functional water infrastructure system	+0.0	1.0
7.3. Integration and intelligent control	+0.0	1.0
7.4. Robust infrastructures	+1.0	2.5
7.5. Infrastructure and ownership at multiple scales	+0.0	3.0
7.6. Adequate maintenance	+1.0	2.0

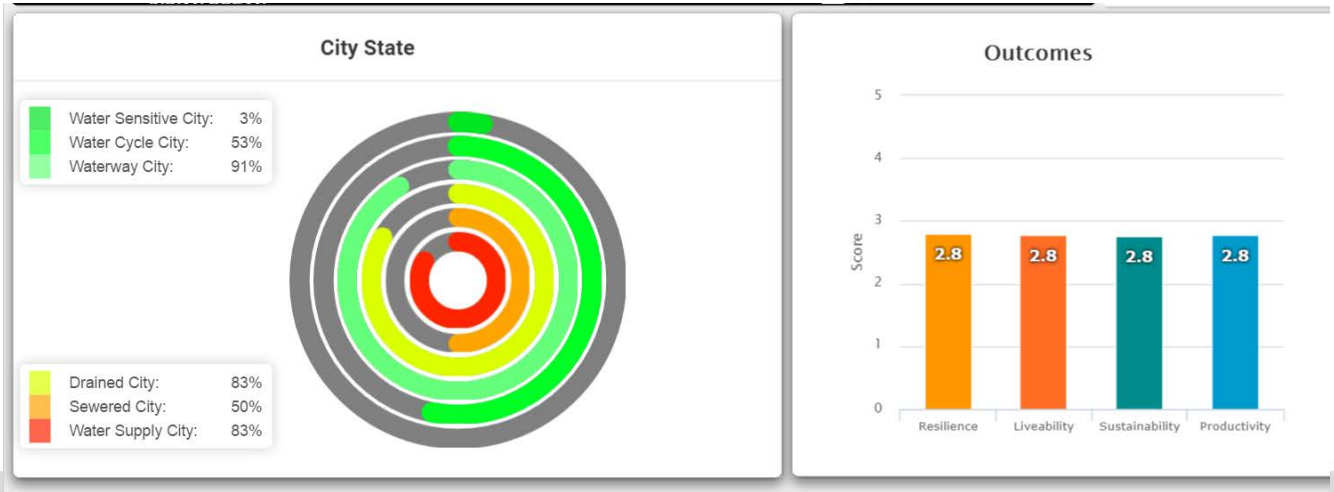
1. Ensure good water sensitive governance	**+1.0**	**2.9**
2. Increase community capital	**+0.7**	**2.2**
3. Achieve equity of essential services	**+1.0**	**3.1**
4. Improve productivity and resource efficiency	**+0.8**	**2.6**
5. Improve ecological health	**+1.3**	**2.8**
5.1. Healthy and biodiverse habitat	+1.0	3.0
5.2. Surface water quality and flows	+2.0	3.0
5.3. Groundwater quality and replenishment	+0.5	2.5
5.4. Protect existing areas of high ecological value	+1.5	2.5
6. Ensure quality urban space	**+0.5**	**3.0**
7. Promote adaptive infrastructure	**+1.2**	**2.7**
7.1. Diversify self sufficient fit-for-purpose water supply	+2.0	3.5
7.2. Multi-functional water infrastructure system	+1.5	2.5
7.3. Integration and intelligent control	+1.0	2.0
7.4. Robust infrastructures	+1.0	2.5
7.5. Infrastructure and ownership at multiple scales	+0.0	3.0
7.6. Adequate maintenance	+1.5	2.5

Assessment of additional benefits through water sensitive initiatives

Post MUSIP 1 – Proposed major sewerage and water supply upgrades



Post MUSIP 1 + Future Cities Program Initiatives



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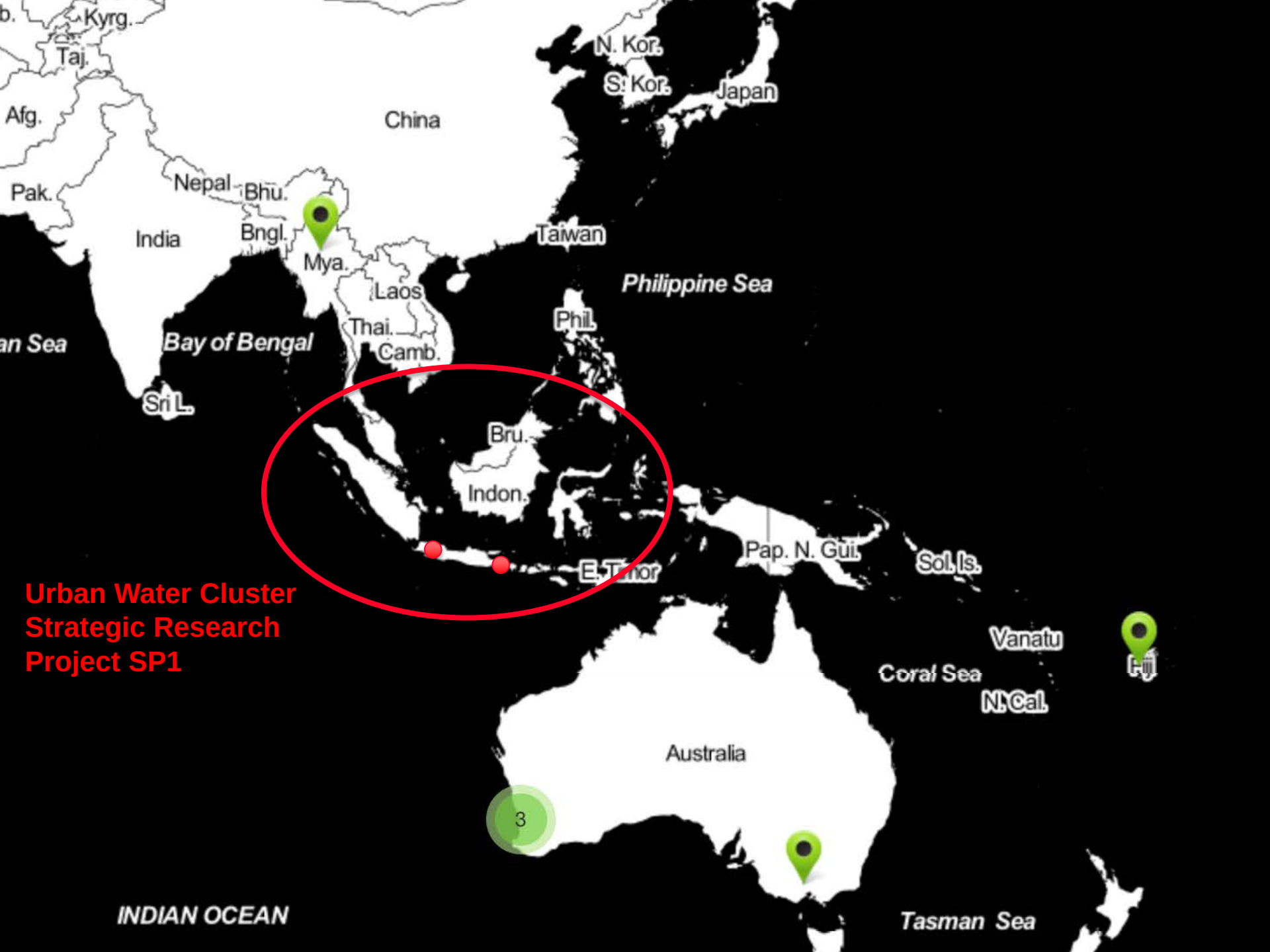
Developing the WSC Index for Indonesian cities

Applications of the WSC Index to date


Kyrg.
Taj.
Afg.
China
N. Kor.
S. Kor.
Japan
Pak.
Nepal
Bhu.
India
Bngl.
Mya.
Taiwan
Philippine Sea
Laos
Thai.
Camb.
Phil.
an Sea
Bay of Bengal
Sri L.
Bru.
Indon.
E. Timor
Pap. N. Gui.
Sol. Is.
Vanatu
Coral Sea
N. Cal.
Fiji
Australia
3
INDIAN OCEAN
Tasman Sea
Urban Water Cluster
Strategic Research
Project SP1

Research outlook

- WSC Index valuable as an organising framework
  - Benchmarking current conditions
  - Developing local WSC visions
  - Developing management actions and prioritising investments

- In-depth research into leapfrogging opportunities
  - Socio-institutional pathways
  - Infrastructure adaptation pathways
  - Green technology pathways
  - Urban design and demonstration

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