

Terminology and application surrounding Blue-Green Cities

an updated classification

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Water in Urban Design – evolution of concepts

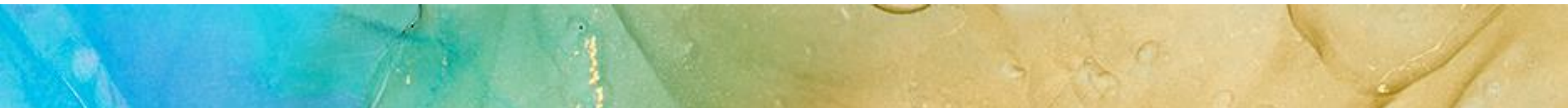
- LID; Low Impact Development (USA)
- SuDS; Sustainable Drainage Systems (UK)
- WSUD; Water Sensitive Urban Design (Australia)

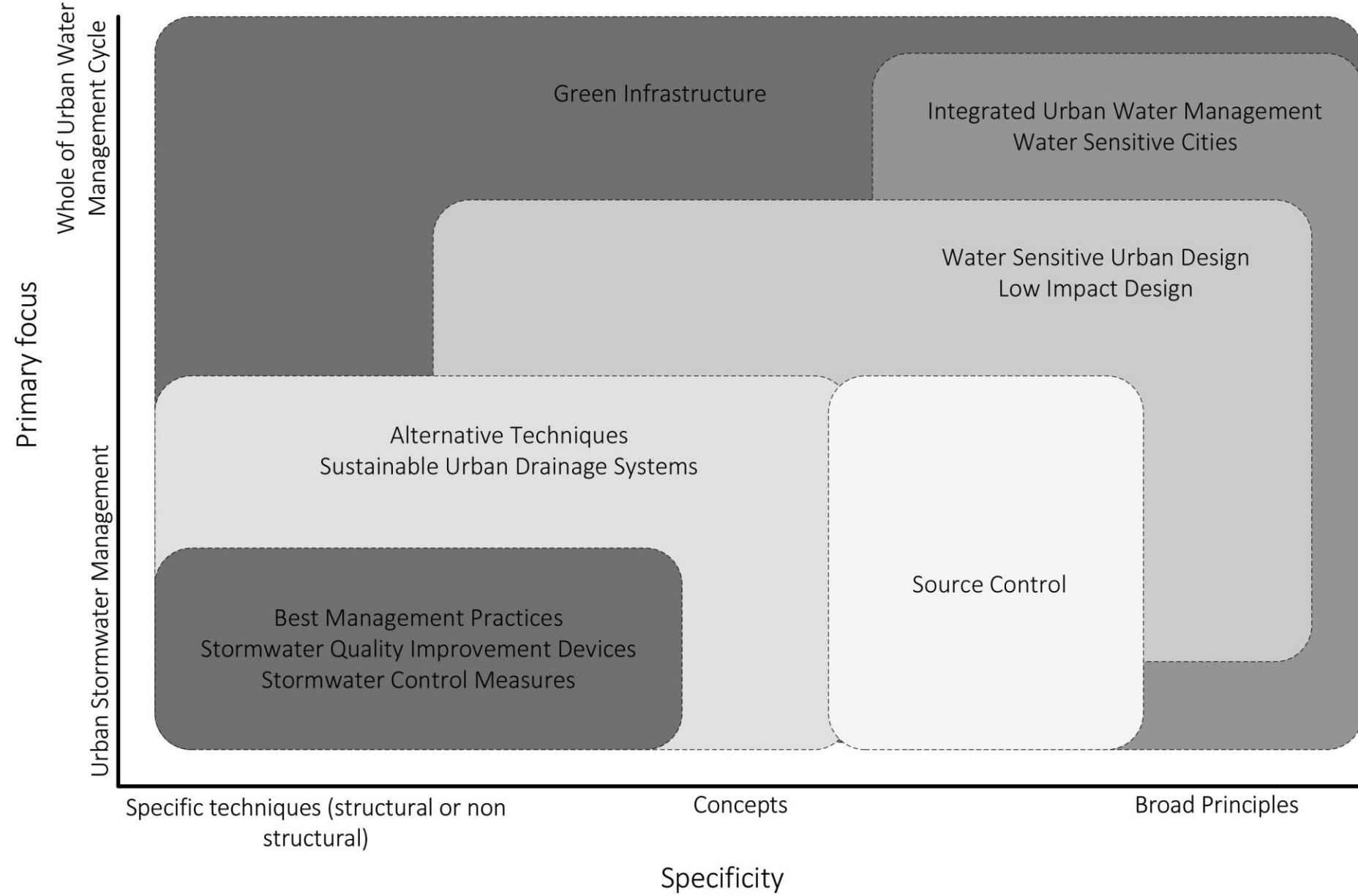
Related to/ known by other names:

- GI; Green Infrastructure / BGI; Blue-Green Infrastructure
- (storm water) BMPs; Best Management Practices
- Ecosystem Services
- (urban) NbS; Nature-based Solutions

As urban planning methods, these relate to strategies:

- Water Sensitive Cities / Water Wise Cities / Sponge Cities





“One possible classification of **urban drainage** terminology, according to their specificity and their primary focus. These classifications may change over time.”

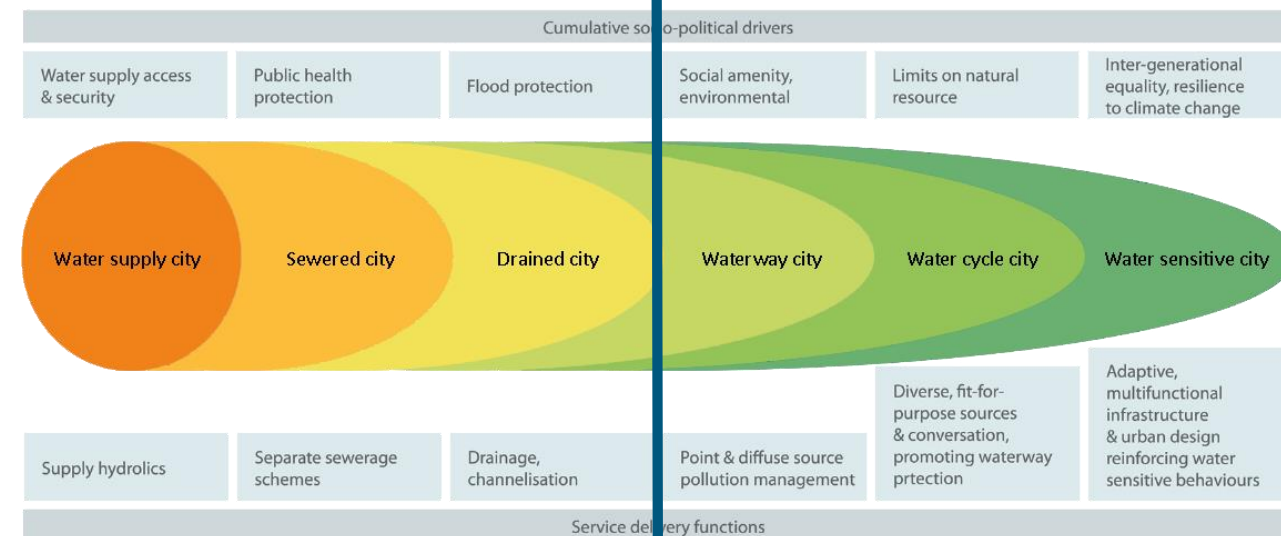
Source: Fletcher et al. (2014) SUDS, LID, BMPs, WSUD and more – The evolution and application of terminology surrounding urban drainage

Water-Sensitive City (WSC) as broad principle?

A Water Sensitive City combines **physical infrastructure**, such as water sensitive urban design (WSUD), with **social systems** to create a city where the infrastructure and systems enhance the connections people have with water and improve quality of life.

- A transition strategy rather than just a broad principle.

Urban water management transitions framework (Brown et al., 2008)



Infrastructure and institutions: *large-scale centralised* -> *flexible, integrated, distributed*

Thinking broader about urban drainage

Blue-Green Infrastructure

planned **interconnected networks of natural and semi-natural areas, including water bodies and green and open spaces, that provide different ecosystem services**

(own definition, drawing on EU Commission 2013, Voskamp and Van de Ven 2015 and Ghofrani et. al 2016)



Green Infrastructure

planned **networks of natural and semi-natural areas** with other environmental features designed and managed **to deliver different ecosystem services**

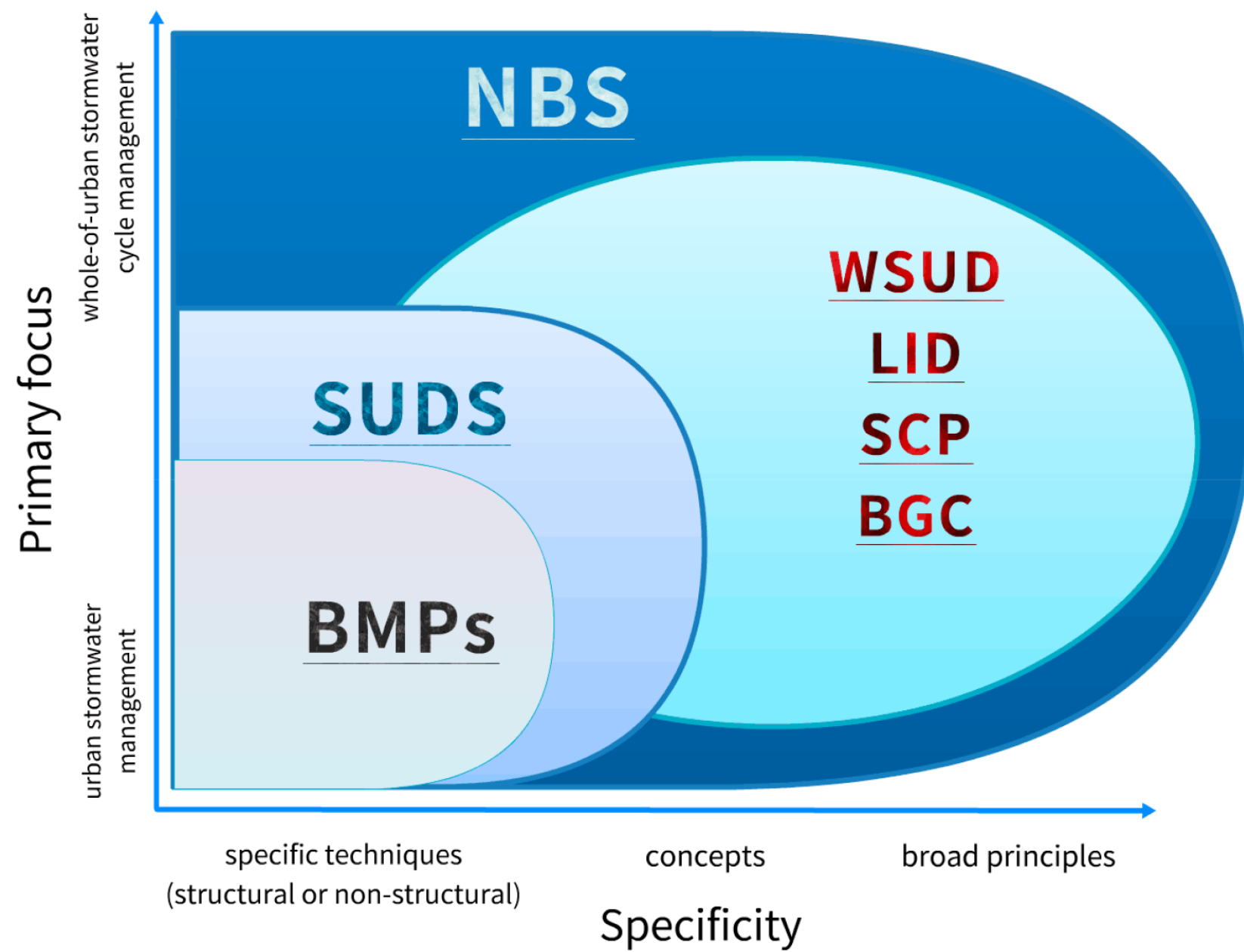
(EU Commission 2013)



Grey Infrastructure

traditional **human-engineered measures that perform infrastructure functions** such as water and wastewater treatment plants or protective infrastructure such as dykes and seawalls.





“Relationship of **Nature-Based Solutions (NBS)**, Best Management Practices (BMPs), Sustainable Drainage Systems (SuDs), Water Sensitive Urban Design (WSUD), Low Impact Development (LID), **Blue-Green Cities (BGC)** and **Sponge Cities Program (SCP)**.”

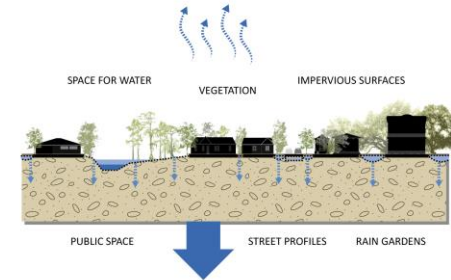
Source: Qi et al. (2020) SUDS, Addressing Challenges of Urban Water Management in Chinese Sponge Cities via Nature-Based Solutions

Sponge City Program (SCP) as broad principle?

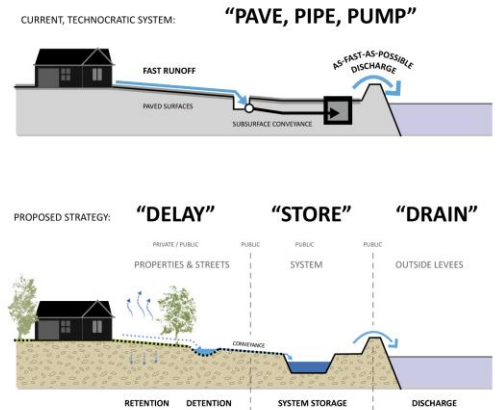
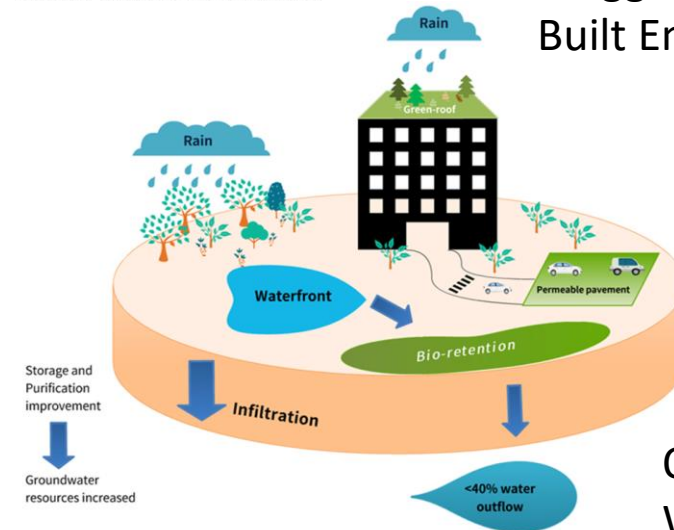
- SCP is a program in China:
 - Sponge City construction guidance published in 2014 (Ministry of Housing and Urban-Rural Development);
 - 20% sponge features by 2020 (up to 80% by 2030), 70-85% annual precipitation managed onsite;
- ‘City as a sponge’ as urban planning concept isn’t new:
 - Transforming urban surface water management systems;
 - Promoting water resilient, low impact development integrated with urban planning;
 - BGI to improve city’s ability to act as a ‘sponge’ - absorbs rainwater to manage flood risk, stores and purifies water for future reuse;
- A transition strategy rather than a (planning) concept a/o only a broad principle

CITY AS A SPONGE NATURAL AND CONSTRUCTED ELEMENTS IN THE CITY ABSORB WATER & HELP REDUCE RUNOFF:

MORE WATER EVAPORATES & TRANSPIRES



MORE WATER INFILTRATES



Waggonner et al., (2013)
Built Environment

Qi et al., (2020)
Water

Urban Nature-based Solutions (NbS)

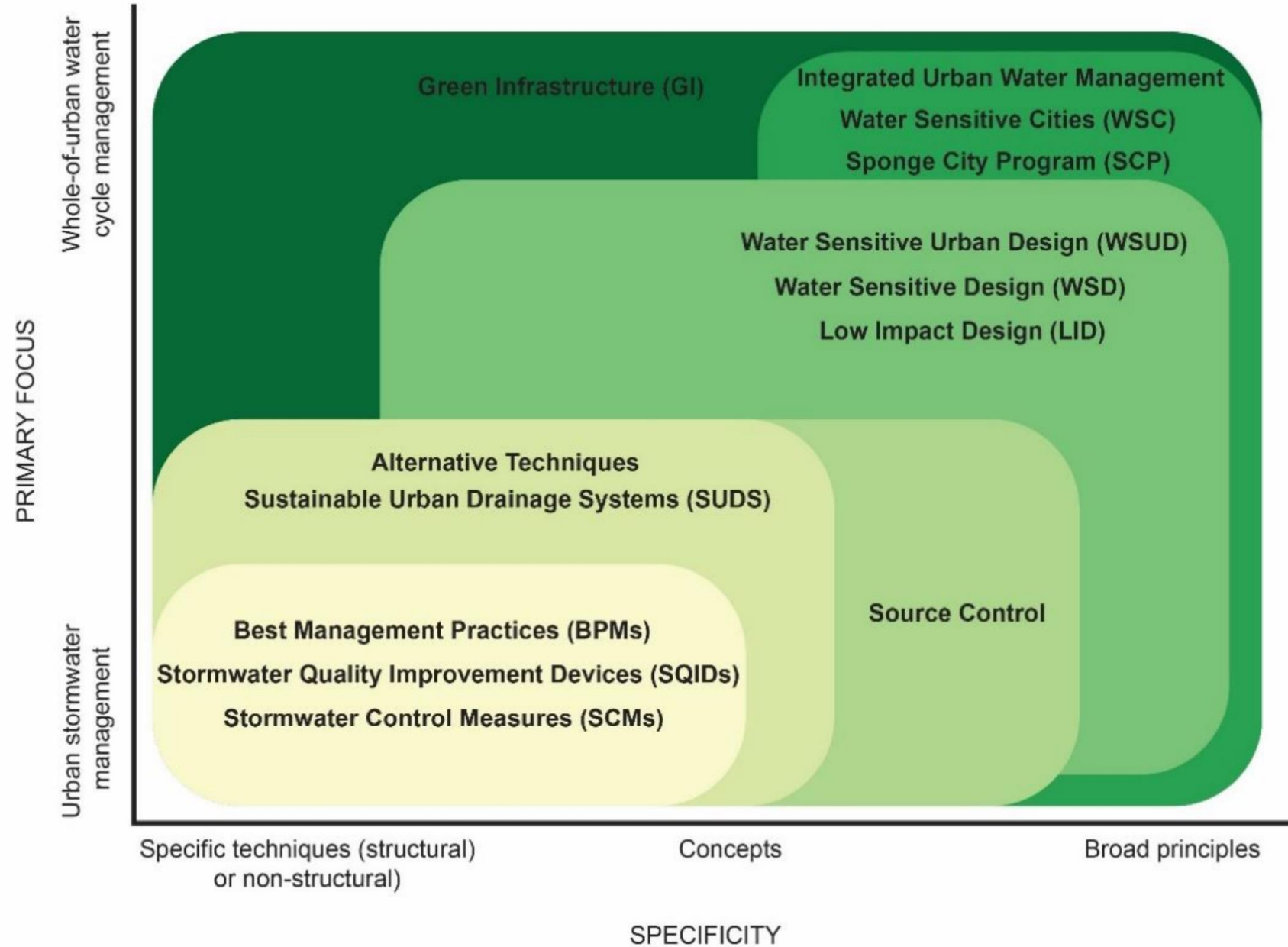
- “Ecosystem services, such as BGI or WSUD, are the contributions of ecosystems **to human benefits** that contribute to the economy and other activities”.

(Millennium Ecosystem Assessment report 2005; FAO, 2008)

- “Nature-based Solutions are defined as actions to protect, sustainably manage, and restore natural or modified ecosystems, which address societal challenges effectively and adaptively, simultaneously providing human well-being **and biodiversity benefits**”.

(IUCN, 2016; EC, 2019; UN, 2020)

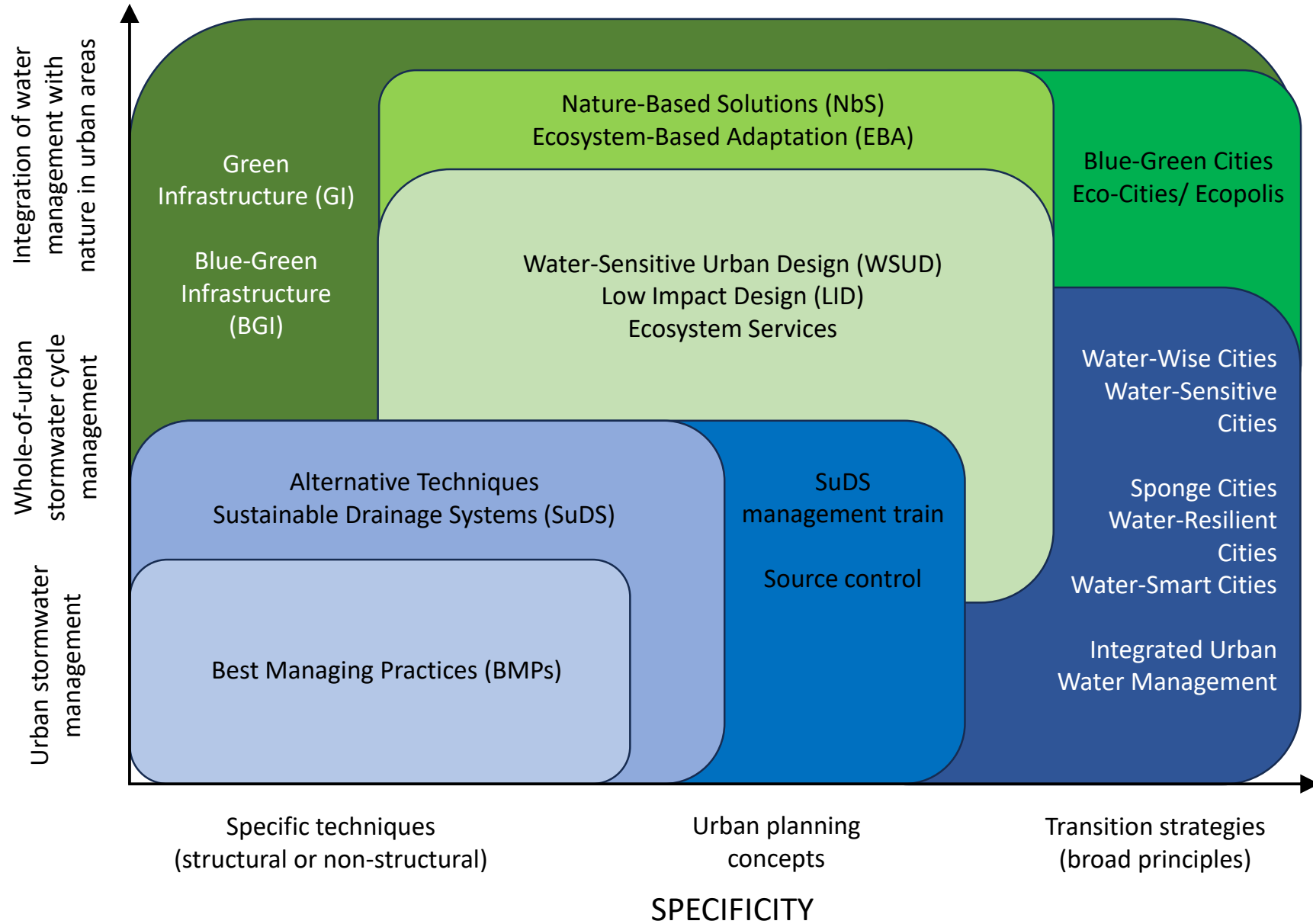




“Urban drainage terminology, drawn by the authors adapted from Fletcher et al. (2014).”

Source: Sedrez et al. (2021)
Integrating Water Sensitive Design in the Architectural Design Studio in China: Challenges and Outcomes

PRIMARY FOCUS

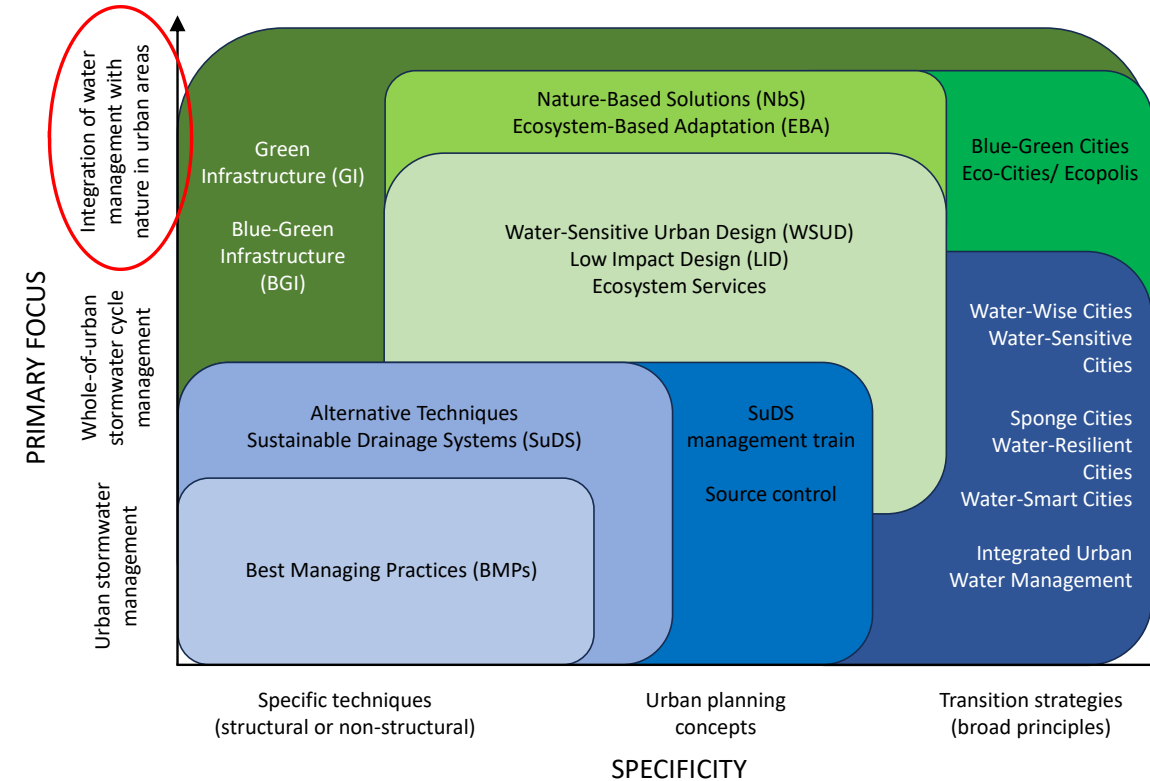


“Relationship of Blue-Green Cities terminology – an updated classification”

Source: Dolman (2023)

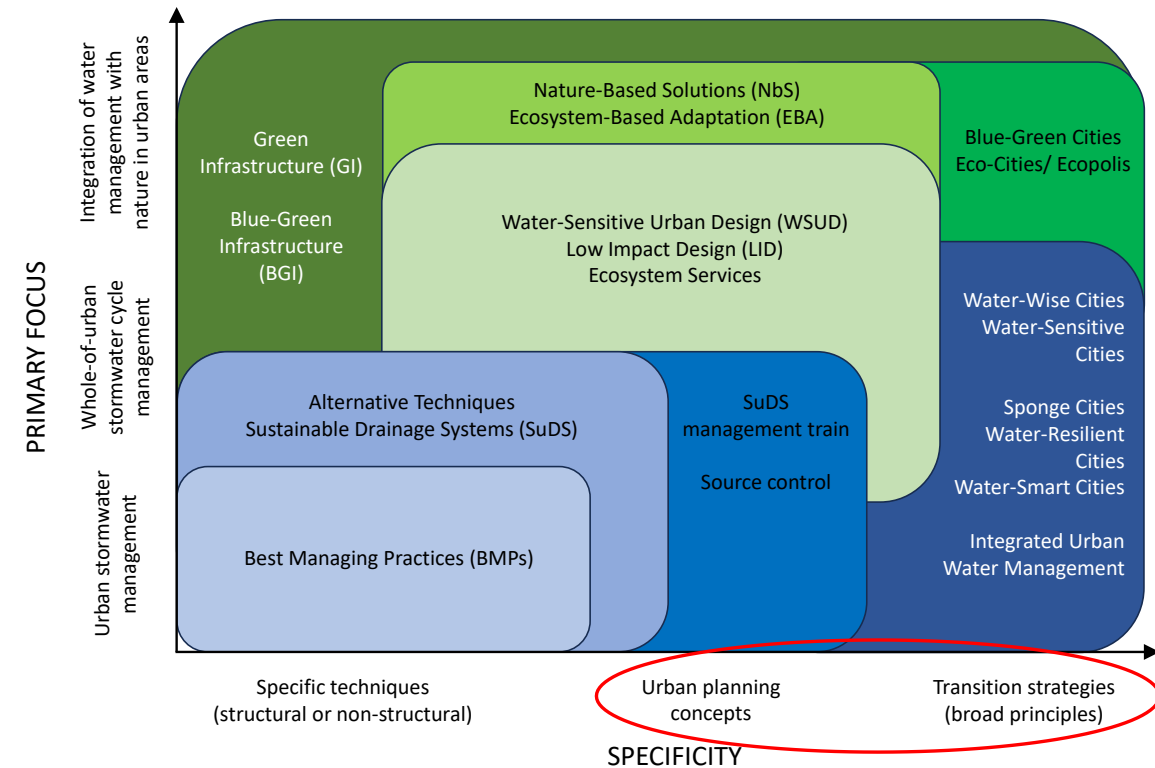
Primary focus (vertical axis)

- While Fletcher et al. (2014) primary focus was on ‘(urban) water management’, it is preferred nowadays to talk about blue-green infrastructure (BGI) and even urban nature-based solutions (NBS).
- The past COVID-19 pandemic and the international commitments on ecosystem restoration highlight the value of green spaces and improving biodiversity in cities.
- It is therefore proposed to extend the focus by adding an extra and 3rd element: **‘Integration of water management with nature in urban areas’**;



Specificity (horizontal axis)

- The specificity in the classification format of Fletcher et al. (2014) addresses concepts, although these mainly relate to urban planning.
- And the same goes for the 'broader principles', which mainly relate to strategies to initiate a transition.
- Therefore, it has been proposed to reformulate the heading of the 2nd and 3rd element, respectively in:
 - **'Urban planning concepts'**,
 - **'Transition strategies (broad principles)'**.



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