Functional Complexity

of SuDS/GI and Grey Infrastructure under non-flood conditions

FACTSHEET

Project area: *System interactions of SuDS*
Intended readership: *Practitioners, academics and other interest groups*

SuDS/GI can have multiple functions under non-flood conditions. The dynamics of these hydrological-ecological-built environment functions are not fixed and may change under these different condition states and from installation to installation. This factsheet highlights the interdependencies relating to SuDS/GI multi-functionality under non-flood conditions.

Due to their multi-functionality, SuDS/GI potentially create new interdependencies in urban areas which might not have previously been designed into their functions as flood risk and water management infrastructure. The multi-functionality of SuDS/GI could be categorised as three main groups: *built environment functions*, *hydrological functions* and *ecological functions*. The built environment functions include services that support human inhabitants, such as those providing utilities, transport services, and facilitating social and commercial activities. The hydrological functions provide hydrological services of storing and conveying water flows. The ecological functions support biodiversity and urban ecology. SuDS/GI can create interdependencies to the water, food and agriculture, transportation, energy, health and social systems (Figure 1).

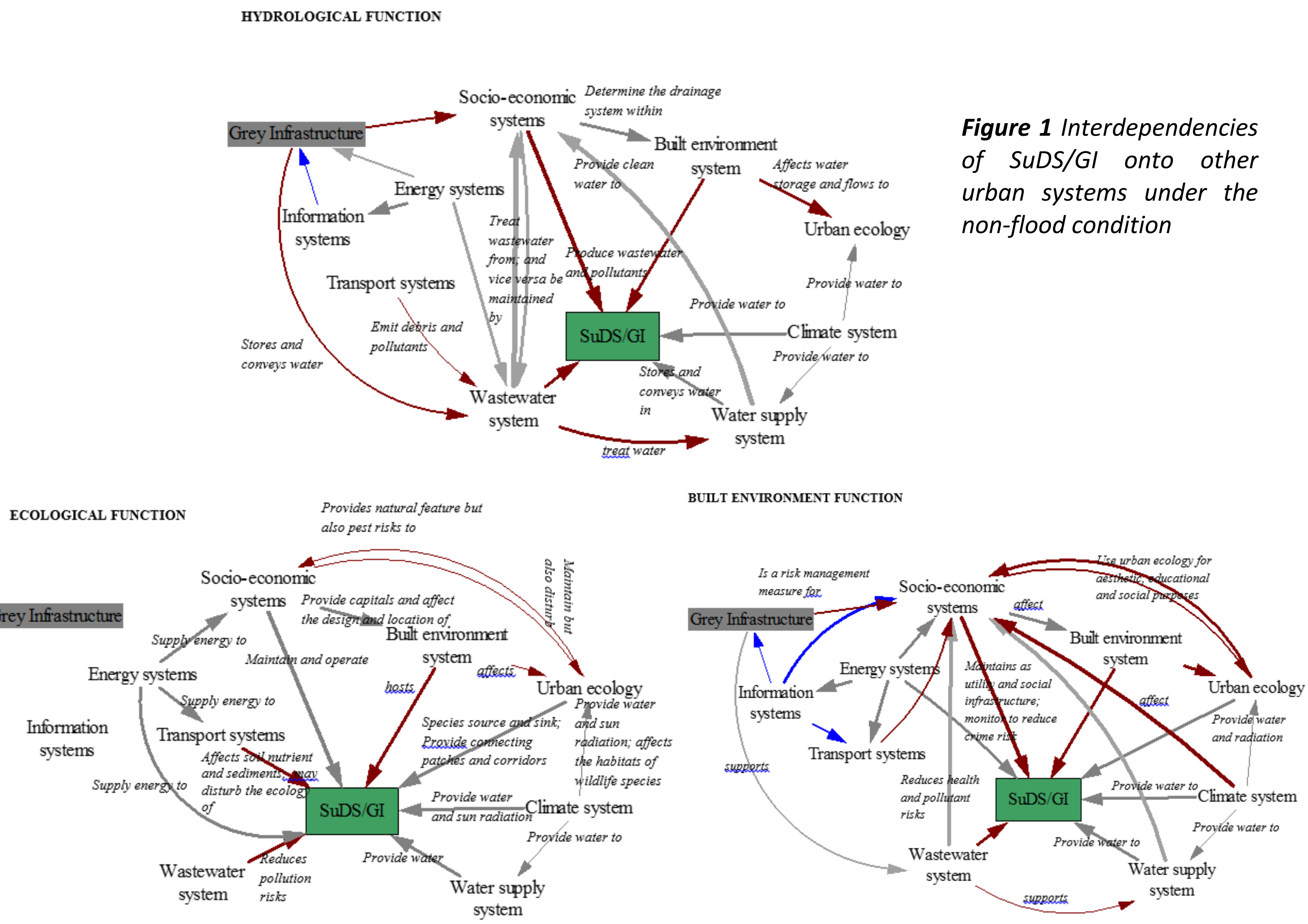

Figure 1 *Interdependencies of SuDS/GI onto other urban systems under the non-flood condition*

However, the integration of SuDS/GI into the urban system may also lead to potential problems and disruption (Table 1).

Table 1 *Impacts of SuDS/GI installation on other urban components under the non-flood condition*

Urban components	Services	Potential disruptions
Water supply (sources)	Trap pollutants, reduce water treatment need and can release water back to the water system and underlying ground	Become a pollutant source if not treated properly
Wastewater (conveyance and treatment)	Provide local solution for wastewater treatment	Tree roots can damage sewer pipes
Food and agriculture	Reduce pollutants and provide pollination and grazing sites	Pest and disease hotspot if not maintained properly
Transportation	Traffic calming, traffic noise reduction	May block views if trees are too high, risk of branch and leave falling in strong wind
Energy	Urban cooling from heat island effect, carbon sequestration which might reduce climate change impacts fuelling energy demand	May require energy to maintain such as pumping water
Communication	n/a	n/a
Ecology	Provide corridors and habitats for wildlife species	May host pests and pollutants
Health	Provide spaces for physical activities and relaxation, improve air quality	Pollen allergy, may host disease vectors
Social	Provide space for socialising; crime reduction	May create opportunity for crime at night due to reduced vision, may be aesthetically unpleasant
Buildings	Provide shading (green roof) and reduce carbon footprints via carbon sequestration	Might increase water-related risks around the building and loads on the structural strength of the building
Economic	Provide services that might have economic values such as carbon sequestration	May incur costs for maintenance and cleaning

Efficient stormwater management needs to ensure the performance of SuDS/GI while deploying them for flood mitigation but also account for SuDS/GI interdependencies on other urban components in the wider urban system.

For further information see:
Hoang &Fenner (2015) System interactions of stormwater management using sustainable urban drainage systems and green infrastructure, Urban Water Journal, DOI:10.1080/1573062X.2015.1036083.

Research team @ University of Cambridge: *Dr Lan Hoang (lnh24@cam.ac.uk), Dr Richard Fenner (raf37@cam.ac.uk) and Dr Malcolm Morgan (mem48@cam.ac.uk)*

Blue-Green Cities in an interdisciplinary research consortium made up of partners from UK and international universities, government bodies and practitioners supported by:

bluegreencities.ac.uk
@BlueGreenCities

EPSRC Engineering and Physical Sciences Research Council
EP/K013661/1

Environment Agency

RIVERS Agency

NATIONAL SCIENCE FOUNDATION