Mapping urban metabolic functions – developing concepts and generating data

Sub-department of Environmental Technology

Researcher
Marc Spiller

Motivation

Urbanisations have a metabolism that converts inputs into outputs. Nowadays this metabolism is mainly linear, where resources are used mostly once and then discharged to the environment. Transitions towards more circular urban metabolism are thought to improve resource use efficiency and increase resilience of urban systems through functional substitution. In ecosystems diversity of metabolic functions is crucial for circulation of nutrients, for developing multiple pathways of resource flows and cascading of energy. As a result, functionally diverse eco-systems are more resilient to disturbance.

The concept of urban metabolism has not widely been applied in planning and design. One reason for this lack of applicability could be that metabolic studies aggregated data to the city or even region scale. As a result they do not show the wide diversity of functions that exist within urbanisations, which are essential to work towards more circular metabolism. Furthermore, there is a lack of fundamental understanding of the interactions of different urban functions in space and time.

Additionally, there we often approach the boundaries of data availability. For example, water and energy use data for industrial or commercial land uses are often poorly understood or mapped.

Aims and Objectives

This research aims:

- to develop a typology (theoretically and test empirically) of urban metabolic functions at the smallest unit of investigation.
- To map different typologies in a 2D an 3D space and time
- To develop scenarios (and models) to link different metabolic typologies in order to maximize efficiency and resilience
- Determine patterns of resource conversion and energy use for urban functions which are presently unknown

Methods

In these projects students may use the following methods and theories:

- Mass flow analysis
- GIS
- Conceptual understanding of resource flows
- Data bases (e.g. CBS, BAC – building inventory)
- Remote sensing
- Knowledge of environmental technologies
- Expert interviewing and interview analysis

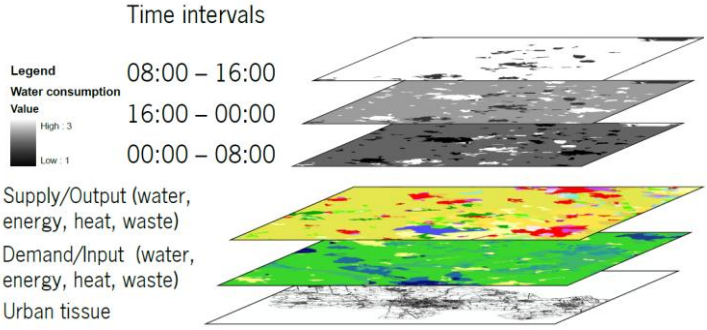
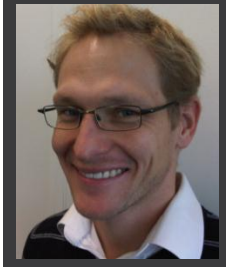


Figure 1: Spatial and temporal diversity of urban metabolism.



Contact: Marc Spiller
e-mail: Marc.Spiller@wur.nl
Tel:0317-483344

www.ete.wur.nl