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PLANNING FOR PHYSICAL RESOURCE METABOLISM TOWARDS ECO-CITIES

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Abstract

Many of the present problems that we are facing arise as unanticipated side effects of our own actions. Often, the solutions implemented to solve important problems create new problems. To avoid unintended consequences, understanding complex systems are essential to devise policy instruments as well as to improve environmental management. In addition, monitoring the environmental performances of physical resource management in urban metabolism or any kind of societal development is very important to understand the development trend and identify the upcoming threats. Mainstream monitoring approach mostly covers emissions to air, water and land, i.e., the outflows from the societal metabolism. However, it is important to monitor inflows and stocks to the societal metabolism to take a proactive response and address the sustainability challenges and possibilities.

The state/impact-based monitoring approach (e.g., monitoring lake water quality) has developed during last few decades and is now deeply rooted in practice. This mainstream approach is indeed the fundamental way to manage the environmental problems. However, this approach is a reactive response, since the society takes necessary measures when the impacts are perceived. Instead of the focusing on the mainstream monitoring approach, we propose to monitor physical resource stocks and flows in terms of environmental pressure in a life cycle perspective. Thus planning for stocks and flows monitoring are essential in order to manage urban metabolism towards the Eco-City.

Based on monitoring environmental performances and to avoid unintended consequences, future city planners will have to understand the complexity of managing future stocks and flows. First, static accounting plays a key role in mapping the stocks and flows in the preliminary discussion on the understating of complex systems. Material flow analysis, LCA, Input-output analysis, computational equilibrium modeling analysis are capable to portray stocks and flows in urban metabolism as well as to introduce initial complexity and inter-connections between the systems. In addition, these static analyses are suitable for monitoring environmental performances. Furthermore, dynamic modeling approaches on top of the static modeling allow us to understand systemic complexity of the metabolism to analyze future scenarios for devising and testing policy instruments. In conclusion, urban planner should integrate future physical resource metabolism in their planning.