



Mapping the Trends of Water-Food-Energy/Urban Nexus Research – A Bibliometric Review

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Water, food, and energy are the basis for human livelihoods and economic activities; they are also closely inter-related: Agriculture, forestry and the energy sector simultaneously depend heavily on and affect water resources. Energy is essential for water management, but also for agricultural production, processing, and marketing. Land is needed for the production of food, fodder and renewable energy as well as for water resource protection. Demographic trends – such as population growth, progressive urbanization and globalization, changing lifestyles and consumer habits – are increasing pressure on already limited natural resources. A sustainable urban system requires the achievement of mitigating human impact on natural ecosystems while fulfilling our need for development. Since its first usage in 1965 by Abel Wolman, professor and pioneer of modern sanitary engineering, the concept of urban metabolism (UM) has been developed for over 50 years. It is generally defined as the analysis of the elementary flows of energy and materials associated with the production and consumption activities in cities. As cities grow, the flow of energy and material through them usually increases, but the intensity of such flows could decrease given better technology and policy. While consumption patterns and drivers of energy, water, and food in cities have been addressed for a long time, their “nexus” has not been the subject of attention until the recent research and practice. The science community has recognized the importance of studying the coupling of different socioeconomic and natural factors in urban systems and uncovering the nexus of these factors in our society. Some argued the importance of analyzing the energy–water–food–nutrient nexus within urban metabolism. Rather than focusing on the challenge of individual elements of urban circulation, a new trend in this field concerns more on the urban metabolism or dynamic interaction, using nexus approach to optimize the interconnections within the whole urban systems and identify the leverage point to obtain the tradeoffs and even synergies, thereby keeping city’s resilience and sustainability over time. Despite the potentialities, the nexus approach in urban metabolism or dynamic interaction have only been recently applied, and a comprehensive bibliometric analysis on the performance and characteristics of its publications is missing. The purpose of this study is to investigate the characteristics and implications of the water-food-energy/urban nexus research by using bibliometric techniques. A general profile of authorships, mainstream journals, Web of Science categories, leading countries and institutions was recognized by the bibliographic statistics. A summary of the most frequently used keywords obtained from the title, author keywords, and keywords plus analysis provided the clues to discover the current research emphases. Findings will provide a better understanding of trends of in this line of research which serves as a useful reference for future studies.