Megacities and the Food, Energy, and Water System

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Summary:
Over the past 60 years, the worldwide urban population grew from 746 million in 1950 to 3.9 billion in 2014, and is projected to reach 5 billion in 2030, and 6.3 billion by 2050 (United Nations, 2014). As a result of this urbanization trend, urban population today accounts for more than half (53.6%) of the global population, and is projected to account for two thirds (66.4%) of it by 2050. In contrast, in 1950, less than a third (29.5%) of the world population was urban. This trend does not affect only the nature of the global population, but also the nature of the urban environment itself. Instead of an even growth of urban areas across the world, megacities (currently, formally defined as those urban settlements with a population exceeding 10 million) are expected to grow at a faster pace than the rest of the urban settlements. From 8 megacities in the 1970’s we now have 34, and some projections are that there will exist upwards of 60 megacities by 2050. This growth pattern is leading to future massive urban settlements that will pose unprecedented strains on the food, energy, and water (FEW) system. This situation is further complicated by the uneven patterns of FEW consumption across megacities in the developed and developing world (Kennedy et al, 2015), especially as we consider that most (if not all) of the new megacities are emerging in the developing world¹.

Understanding the local and global FEW impact of these emerging urban structures is becoming a substantial cross-disciplinary challenge.

For example satellite observations of night lights (Ma et al, 2015) can be combined with social media patterns (Cranshaw et al., 2012) to identify sociocultural and economic variations within such environments. In turn, this information can be used to derive complex models to simulate the ability and manner through which such systems respond to an array of events ranging from land-use changes (Malik et al., 2015) to resource scarcity (Xie and Fan, 2015) and natural disasters (Taylor et al, 2014) to name but few. The advancement of such capabilities is expected to be based on the fact that such large urban environments are also massive data hubs. With the advent of Web 2.0 technology, megacity residents are generating unprecedented amounts of data that can be analyzed to advance our understanding of how these citizens live and operate within their respective environments, how these urban spaces function as systems of networks and flows (Batty, 2013), and their relation to the FEW nexus.

References

¹ Karachi, in Pakistan, grew in population by an estimated 80% during the 2000-10 decade, while Shenzhen (China) grew by 56%, Lagos (Nigeria) grew by 50%, and Bangkok (Thailand) grew by 45% over the same period.