Land Use Policy 63 (2017) 1–19

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

China's megaregion policy: Performance evaluation framework, empirical findings and implications for spatial polycentric governance

Shiliang Su[a,b,c,d,*], Zebin Liu[a], Yifan Xu[a], Jing Li[b], Jianhua Pi[a], Min Weng[a,b,d]

[a] School of Resource and Environmental Sciences, Wuhan University, Wuhan, China
[b] Chongqing Geomatics Center, Chongqing, China
[c] Collaborative Innovation Center of Geospatial Technology, Wuhan University, Wuhan, China
[d] Key Laboratory of Geographical Information Systems, Ministry of Education, Wuhan University, Wuhan, China

ARTICLE INFO

Article history:
Received 29 June 2016
Received in revised form 3 December 2016
Accepted 10 January 2017
Available online 23 January 2017

Keywords:
Mega-urbanization
Megaregion policy
Performance evaluation
Polycentric governance
Spatial planning
China

ABSTRACT

Megaregion has emerged as a new dimension of global urbanization. A megaregion approach based on polycentric strategy is deemed to enhance regional economic competitiveness. Numerous studies have highlighted the economic benefits, celebrated the spill-over effects, and outlined the creative potentials of contemporary megaregion policies in different nations worldwide. However, further policy instruments require the knowledge about the achievement and failure of megaregion policies that seek for spatial, economic, social, and environmental efficiency and sustainability. This paper introduces China's megaregion policy and proposes an analytical framework for performance evaluation from four principle domains (rational urban growth, economic development, social equity, environmental protection) at three levels (internal collaboration, integral development, and overall development). Using a case of the Megaregion around Hangzhou Bay (MAHB), we find very limited success of China's megaregion policy. In particular, the megaregion policy only accomplishes the economic goal, and fails to achieve the goals of rational urban growth, environmental protection, and social equity. A series of mechanism based regressions are established and show that the implementation duration of megaregion policy: (1) associates positively with the economic growth; (2) relates negatively to social equity and urban rational growth; and (3) has no significant relationship with improved environmental quality. Institutional fragmentation, no unified spatial planning, and inadequate legislation at megaregional level are the underlying causes of the expected performances within the policy context of governance itself. We finally propose some possible solutions and discuss the implications for spatial polycentric governance. The demonstrated methodological framework can be applicable to other megaregions around the world. This paper is thus believed to provide some new insights for land use policy.

1. Background

1.1. Megaregion: global new dimension of urbanization

World's urban population began to boom at unprecedented rate from the 1950s and has nearly quintupled during the past three decades (UN-Habitat, 2013). Over 50% of the total world's population inhabits in urban areas (UN-DESA, 2011) and the figure is expected to reach 70% by 2050 (UN-Habitat, 2013). Receiving the brunt of the accelerating population accumulation, urban areas keep growing physically and expand outside their geographic limits (Zhang and Su, 2016). As such, the interurban borders are on longer an essential obstacle, leading to a cross-regional urbanization phenomenon. A broad stretch of settlements, rather than the physical border with rural hinterlands, emerges between urban areas. These spreading and converging urban areas (e.g., metropolitan areas, metropolis and other agglomerations) gradually merge into new polycentric and spatially coalesced city-regions. These polycentric city-regions, referred to as megaregions (Atlanta Regional Commission, 2008; UN-Habitat, 2008), are geographically and functionally linked through economic, infrastructure, and environmental interactions.

Megaregion is an organic community or complex, more than just physical summing version of cities (Ross and Woo, 2009). It does not operate in monocentric manner that isolated central agglomerations grow towards the empty spaces; rather, the central agglomerations encompass each other and the small cities. Being members of megaregions, the cities participate in urban net-

* Corresponding author at: No.129 Luoyu Rd, Wuhan, Hubei Province, China.
E-mail addresses: shiliangsu@163.com, shiliangsu@whu.edu.cn (S. Su).

http://dx.doi.org/10.1016/j.landusepol.2017.01.014
0264-8377/

works following widening orbits. These cities are linked via sound transportation and telecommunication networks, and featured by transactional flows of goods, people, and services (Dablanc and Ross, 2012). Cities can consequently benefit from the socioeconomic advantages beyond their own dimension. It promotes the formation of synergy economies (innovation and cooperation) and the emergence of specialized economies (labor division), helping achieve agglomeration economies and yield high economic efficiency (Ross and Woo, 2009). Megaregions are considered to the most critical engines for driving global economic growth and development (Harrison and Hoyler, 2015). It is estimated that over 60% of the global total economic output origins from the world's 40 largest megaregions (Florida et al., 2008). More specifically, 57% of patents, 43% of economic activity, and 56% of the most influential scientists concentrate in the world's top 10 biggest megaregions, while they only accommodate 6.5% of global population (Florida et al., 2008).

The rise of megaregions has been reported in Western developed nations during the past decade. Older recognition of megaregion in Europe includes the Rhine-Ruhr region in Germany and Netherlands's Randstad. Faludi (2005) entitles the large conurbation stretching from Italy's Milan and Genoa to UK's Manchester and Liverpool as 'the blue banana'. Marull et al. (2013) delineates 11 megaregions in Europe and finds that Frankfurt-Stuttgart, Glasgow-Edinburgh, London, Paris, and Madrid are the most economically active megaregions. Typical examples of US mega-regions suggested in the literature include the Philadelphiae-Baltimoree-Washington region, the Great Lakes and the Northern California region (Metcalf and Terplan, 2007). The Regional Planning Association (RPA, 2006) and the Metropolitan Institute at Virginia Tech (Lang and Dhavale, 2005) identify 11 US megaregions, namely Arizona Sun, Cascadia, Florida, Front Range, Great Lakes, Gulf Coast, Northeast, Northern California, Piedmont Atlantic, Southern California, and Texas Triangle. These megaregions house approximately 79% of US total population and produce 76% of total economic output. More recently, megaregions in Asia and developing countries have received increasing attention. Literature has documented the rise of the Nagoya-Osaka-Kyoto-Kobe megaregion in Japan, the Rio de Janeiro-Sao Paulo megaregion in Brazil, the megaregions in Philippines, and the Yangtze River Delta megaregion, the Pearl River Delta megaregion, and the Jing-Jin-Ji megaregion in China (Barragán and de Andrés, 2015; Ortega et al., 2015; Vogel et al., 2010).

Observations highlight that the megaregions have been keeping growing and expanding worldwide (Barragán and de Andrés, 2015; Marull et al., 2013; Ortega et al., 2015; Vogel et al., 2010). They become more and more massive and present very complex patterns, morphologies and interrelations, totally distinct from the former urban forms a few decades ago (e.g., Taubenböck et al., 2014; UN-DESA, 2011). The UN-Habitat states that megaregions are new urban configurations (UN-Habitat, 2008). It is safe to surmise that megaregion will continue to expand, incorporate adjacent urban areas into their scope and emerge as a new dimension of global urbanization (Bunnell et al., 2012). Given the emergence of these new urban forms, the scientific community has advocated to reconsider the priority fields and treat megaregions as frontiers in urban theorization (Bunnell et al., 2012; Roy, 2009).

1.2. Megaregion: conceptualization and spatial scope

Historically, urban areas are characterized by continuous and centralized settlements and they generally present a monocentric form (Tsai, 2005). As urbanization moves beyond local borders and becomes a cross-regional phenomenon, the former politically and historically distinct cities that are separated by open spaces become spatially connected and present a polycentric spatial organization (Finka and Kluvánková, 2015). The established concepts and theories developed for the monocentric characteristics of urban area as 'one place' are insufficient to describe the new polycentric urban forms. Scholars over time have introduced a diversity of concepts to describe these new urban forms, and the related term typically include megacity, metacity, city region, urban agglomerations, megalopolis, metropolitan area, conurbation, polycentric urban regions, mega-city region, megaregion, urban systems/networks (Lang and Dhavale, 2005; Morrison Institute, 2008; UN-Habitat, 2009). Spatial relation and juxtaposition of these concepts are shown in Fig. 1.

The concepts of megacity, metacity, megalopolis and agglomeration, in nature, still belong to the category of monocentric individual urban constructs. The term of agglomeration refers to cities with population over 5 million (Bourdeau-Lepage and Huriot, 2006). Megacity and metacity represent the agglomerations with more than 10 million and 20 million inhabitants, respectively (UN, 2006). The metropolis is a relative concept and it denotes the individual city with specific significance with respect to size and importance within a region. The concepts of metropolitan area, conurbation, city region, urban agglomerations, and conurbations, in nature, express similar constructs but are proposed by different countries or institutions (Georg et al., 2016). They describe the situation that cities and neighboring towns are linked through transportation and labor flows and the open spaces in between are vanishing. In particular, these concepts indicate a single functional unit constituted by a system of loosely connected cities and towns in high proximity (Pacione, 2009). Such single functional units are usually named in reference to the central city (Lambooy, 1998), such as the Greater London and Greater Paris conurbations in Europe (Soja and Kanai, 2007), the New York and Phoenix metropolitan areas in America (OECD, 2012), and the Mumbai, Istanbul, and Wuhan agglomerations in Asia (Bronger and Trettin, 2011; Tan et al., 2014).

Urban systems and networks are concepts of classical economic geography, denoting mixed structures that a set of cities are hierarchically and non-hierarchically linked. These two concepts emphasize the economic collaboration and specialized division rather than the polycentric spatial organization. However, the urban network paradigm suggests that we should extend the scope of analysis into polycentric organization beyond the metropolitan limits (Groth et al., 2011; Marull et al., 2013). Polycentric urban regions, mega-city region, and megaregion are all polycentric concepts. Polycentric urban regions have been defined as functionally networked cities that are geographically connected and strategically planned (Finka and Kluvánková, 2015). Mega-city region denotes a cluster of 10–50 separate but functionally networked cities that have one or more megacity (Georg et al., 2016). Megaregions refer to functionally polycentric networked metropolitan areas and their surrounding areas that are connected through economic, infrastructure, socio-cultural, political, and eco-environmental linkage and convergence (Ortega et al., 2015). A typical megaregion has three distinguished characteristics: (1) a territorially bounded area formed by the aggregation of metropolitan areas and other agglomerations in close proximity; (2) a polycentric form with very complex pattern and morphology; and (3) a small-world network with large number of nodes but low separation degrees.

1.3. Spatial polycentric governance

As the metropolitan boundaries become increasingly blurring, megaregion presents a new geographic unit for spatial planning and governance (Ross, 2012). Under coherent spatial governance, the megaregion is regarded to be an efficient approach to enhancing territorial identity, economic competitiveness, environmental sustainability and social equity (Benner and Pastor, 2011; Dewar