



# Impacts of large-scale residential projects on urban sustainability in Dammam Metropolitan Area, Saudi Arabia



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## ABSTRACT

Developing countries have been experiencing phenomenal urban growth within the last five decades, especially in urban areas. In fact, out of the anticipated 2.5 billion increase in world population by 2050, about 90% is expected to take place in just Asia and Africa. In Saudi Arabia, with urbanization rate of 83%, major cities are increasingly sprawling to cater for their increasing population. Dammam Metropolitan Area (DMA) is one of such cities that is witnessing the emergence of many large-scale residential development projects within the built-up areas and at the periphery. However, these projects have many implications on the sustainability of the built environment. Based on review of official documents, maps and previous studies, this paper explores the nature, scale and unsustainable impacts of these projects. The present study found that there are 45 such projects covering about 32,807 ha of land in the study area, out of which about 11,740 hectares (or 35.8%) are infill into the Arabian Gulf. Other unsustainable features of these projects are exclusiveness, low density, single housing type and poor connectivity with the surroundings. The paper concludes with some recommendations towards sustainable urbanization in DMA.

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## 1. Introduction

More than half of the World population are currently living in urban areas and the proportion is expected to reach two-third by 2050, and the majority of the global increase in urban population is expected to take place in developing countries (UN, 2014). By 2050, about 2.5 billion people will be added to the global population out of which about 90% is expected to take place in just Asian and African continents (UN, 2014 p. 2). In Saudi Arabia, with current of 30.77 million people (citizens and foreign residents), the proportion of urban dwellers is expected to reach 89% of the population from the current 83% (UN, 2014 p. 22). The number of people in urban areas in Saudi Arabia have been growing at the rate of about 6% annually, compared with the average national population growth rate of 2.6% (<http://www.stats.gov.sa/en> [18 March 2016]). According to Abubakar and Aina (2016), over half of the population of Saudi Arabia are living in just seven major cities of Riyadh, Jeddah, Dammam, Makkah, Madinah, Buraydah and Hofuf-Mubarratz. Apart from natural population increase, other reasons for rapid population growth in these major cities is the concentration of

economic, industrial and administrative activities that provide many jobs opportunities and the presence of better health, educational and other basic services, which are increasingly attracting large domestic and foreign population (Abubakar, 2013).

As such, in order to cater for the growing population and due to the interest of real estate company in more land speculation and housing constructions (Aboukorin, 2011), large-scale housing projects are continuously being planned and implemented in these cities. So far, there have been too little studies that explore the environmental or sustainability impacts of these projects. As such, the present study presents a quantitative analysis of the large-scale residential projects in DMA and their impacts on urban sustainability. The analysis is based on review of recent data from Saudi Ministry of Municipalities and Rural Affairs (MOMRA-KSA., 2008), and the Saudi Department of Statistics and other relevant agencies. Then the paper proposes some approaches to achieve sustainable urbanization in DMA. In the next section, literature review covers the concepts of sustainable cities and urbanization and the benefits of urban sustainability principles. Then section three explains the methodology of the study after which section five presents with results and discussion. The paper in section five offers some recommendations on how to mitigate the unsustainable impacts of large-scale residential projects in DMA, and to prevent the

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emergence of such large-scale projects in the future. The paper concludes in section six.

## 2. Literature review

Sustainable cities are urban areas that have been able to integrate social and economic development with environmental management and urban governance (UN, 2013; UN-Habitat, 2009 2002). Paul James in his book, “*Urban Sustainability in Theory and Practice*”, proposes what he calls the “*circles of sustainability*” for assessing urban sustainability on four domains: a) Ecology, b) Economics, c) Culture, and d) Politics (James, 2015). The ecology domain refers to sustainable management of the environment: land uses, materials and energy, water and air, plants and animals, utilities and waste management. The economic domain on the other hand, entails production and resourcing, consumption, labour, technology and industrialization, wealth and distribution. While the book refers to social aspects under the cultural domain (including well-being, health, equity, identity), the politics domain underlines governance and organization; communication and accountability; representation and negotiation; dialogue and reconciliation (James, 2015).

Similarly, the UN-Habitat (2014) has identified five planning principles necessary to foster urban sustainability: (1) an efficient street network that encourage walkable neighbourhoods and reduce car dependency; (2) high density urban growth to alleviate urban sprawl and maximize land efficiency; (3) mixed land-use and functionally diversified urban environment to foster local employment, local production and local consumption; (4) social-mix, supporting socially equal and thriving communities in economically viable ways; and (5) limited land-use specialization, allowing economically and socially diversified communities (UN Habitat, 2014).

Sustainable cities can only be achieved when the urbanization process is sustainable as well. Sustainable urbanization is a dynamic process that aims at achieving better life quality in the urban environment for both present and future generations by addressing environmental, economic, social and governance concerns (James, 2015; Roy, 2009; Shene, 2011; Ziegler, 2009). This shows that the ultimate goal of sustainable urbanization is to achieve sustainable cities. Indeed, for cities to be sustainable the constituting districts and residential neighbourhoods must also be designed and managed based on the principles of sustainability. The concept of sustainable neighbourhood refers to a locality that is socially, environmentally and economically healthy, safe, well planned and built to last (UNESCO, 2014). Sustainable neighbourhoods are socially cohesive and diverse, have a mix of residential and economic activities, a diversity of housing types and employment opportunities, prioritize walking, cycling and transit, encourage energy efficiency and promote efficient use of resources (Abdellatif & Othman, 2006; City of Pickering, 2015). In order to foster sustainable urban development, the following sustainability concepts should be highly considered.

### 2.1. Small-size subdivisions and balanced hierarchal structure

The relationship between settlement size and sustainability has been an issue of continuous debate during the last two decades. There is a growing opinion among urban theorists and professionals that large cities and urban developments of the Industrial Age are not appropriate in this Information Age. There is an argument that “*bigger isn't always better*”, especially for the developing countries (Barista, 2015). Doxiadis (1965) argued that small-size developments provide shelter, employment and community life of a quality that is not available in large developments

and that the first preserve human values which are gradually being lost in the latter. Other advantages of small-size communities lie in promoting pedestrian movement, the possibility of developing in them a sense of identity, a feeling of belonging and participation among usually homogenous residents, a corporate spirit and outlook covering the whole population, which could make governing easier and encourage civic development initiatives (Camagnie, 2002; Dix, 1986; Speare & White, 1990). Along this line of argument, Doxiadis made three key recommendations in residential development: creating small communities with human scale, keeping natural resources intact, minimizing motor mobility. From the environmental point of view, small communities have less concentration of pollutants and have an architectural scale that improves their esthetical values (Aboukorin, 2014).

Conversely, large settlements usually have higher per capita cost for maintaining clean water and safe removal of garbage, and air quality is difficult to maintain in high population areas. Indeed some large cities, such as Los Angeles, have difficulties dealing with air quality because air is often trapped (Camagnie, 2002; Speare & White, 1990; UNEP, 2007). Traffic problems are also associated with large-scale development, as the size of residential development increases, so also traffic congestion and car parking problems increase. This is particularly true in Saudi Arabia where car ownership rate is very high with no, or a very limited, role of public transportation (Abubakar & Aina, 2016).

Many studies about residential preferences have consistently shown that people who live in large cities would prefer to live in small cities, towns or rural areas. However, most of those wishing to live in rural areas preferred them to be within 30 miles of a city of over 50,000 inhabitants (Fuguitt & Zuiches, 1975). What seems to be preferred is a relatively small scale for one's immediate residential surroundings, but, at the same time, with good accessibility to shopping, services, cultural and recreational opportunities associated with a metropolitan area (Aboukorin, 2014; Filion, Bunting, & Warriner, 1999; Speare & White, 1990). Recommending small-size developments does not mean promoting low residential densities.

### 2.2. High residential density: functional efficiency and combating sprawl

Many recent researches recommend high residential densities to achieve urban sustainability and argue that communities operate more efficiently when residents live in denser urban surroundings. Although higher densities tend to increase traffic congestion; communities of high densities tend to have greater transportation options and encourage the residents to adopt more active mobility modes: walking and bicycling (Berggren, 2014; Burge & Trospen, 2013). Moreover, high density is seen to prevent urban sprawl and promote sustainable urban extension and as such, it is regarded as a necessary tool to achieve land-use efficiency (Abubakar, 2013). In its recent publication, the UN Habitat recommended high population density as one of the fundamental principles of sustainable neighbourhood planning (UN Habitat, 2014).

According to a Lincoln Institute of Land Policy report, cities in developing countries had an average built-up area density of 129 p/ha in 2000 (Angel, Parent, Civco, & Blei, 2010). In fact, the UN Habitat (2014) recommends a minimum density of 150 p/ha for a sustainable neighbourhood, which is feasible albeit slightly above the average urban density in developing countries. The UN Habitat argues that high density has many benefits including: slowing down urban sprawl; reducing public service costs, car dependency and parking demand; increasing support for active mobility and public transportation; increasing energy efficiency and decreases pollution; and supporting social equity, better community services,

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