



المؤتمر العربي الثاني للأراضي

Second Arab Land Conference

22-24 FEBRUARY 2021
CAIRO, EGYPT

[Technical session a/5: Efficient Land Use: Tools and Practices]

Impacts of the Land Use Development Policy on Unplanned Human Settlement Growth in Assiut Governorate, Egypt.

Date: 23 February 2021

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Keywords: *(unplanned settlement growth; driving forces; in-depth interviews; strategic plan; spatiotemporal analysis)*

Executive summary

This study analyzed the impacts of land development policy on unplanned (informal) human settlement growth on agricultural land in Assiut Governorate, Egypt. We used a mixed-method approach to address two objectives. First, to compare the land use development plans with settlement growth using Remote Sensing, Machine Learning, and GIS. Second, to understand stakeholders' perspectives (governmental and civil society actors) about the driving forces of unplanned settlement growth. Successful aspects of the policy we found were shifting from the master planning approach to a strategic planning approach, and reducing the growth rate after applying the strategic plans for villages, investing in new settlements in the hinterlands to relocate the surplus inhabitants. The policy core gaps were: underestimating the future population growth, which led to a higher growth rate than planned; lacking to involve settlers in the plan development phase properly; lacking sufficient funds to achieve the targets of the plan; the bureaucracy that hinders both approving the plans and reacting to encroachments.

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Introduction

The analysis of human settlement growth enables the impact of development plans and policies to be assessed. As a developing country, Egypt has been facing rapid settlement growth on agricultural land since the 1950s. As a response, the state has been responding to this phenomenon by a set of policies that aim to manage human settlement growth and preserve agricultural land at the same time. This set of policies consists of three main approaches. First, by investing in new settlements in the Nile Valley's hinterlands to attract the surplus of the growing population (Sims, 2015; Tipple, 1986). Second, by preparing and implementing a land development plan for existing settlements inside the Nile Valley (GOPP, 2006). Third, by criminalizing unplanned growth on agricultural land (Abbas, 2015).

Nevertheless, unplanned settlement growth continued where the annual loss was approximately 30,000 acres of the fertile land between 1984 and 2007 (MALR, 2010) and 10,000 acres between 2011 and 2020 (eXtra news, 2020). While the state is working on the 2052 vision, it is essential to assess the land development

policy. Thus, we conducted this research to answer the five Ws questions: What types of unplanned growth occurred? When unplanned growth occurred? Where unplanned growth occurred? Who contributes to unplanned growth? Why unplanned growth occurred? Answering these questions may help policymakers shape future policies that overcome the drawbacks and exploit the successes of the previous land development policy.

To get the full perspective about unplanned human settlement growth in the Nile Valley, Egypt, we studied the situation in Assiut Governorate (Figure 1), located in the middle of the Nile Valley. This choice was based on a report by the Ministry of Agriculture and Land Reclamation in 2014 that reported that Assiut Governorate had the highest unplanned growth rate after the 2011's uprising in Upper Egypt (south of Cairo) (MALR, 2014). Also, Assiut is representative of the governorates that are not under the immediate socioeconomic influence of the Greater Cairo Region.

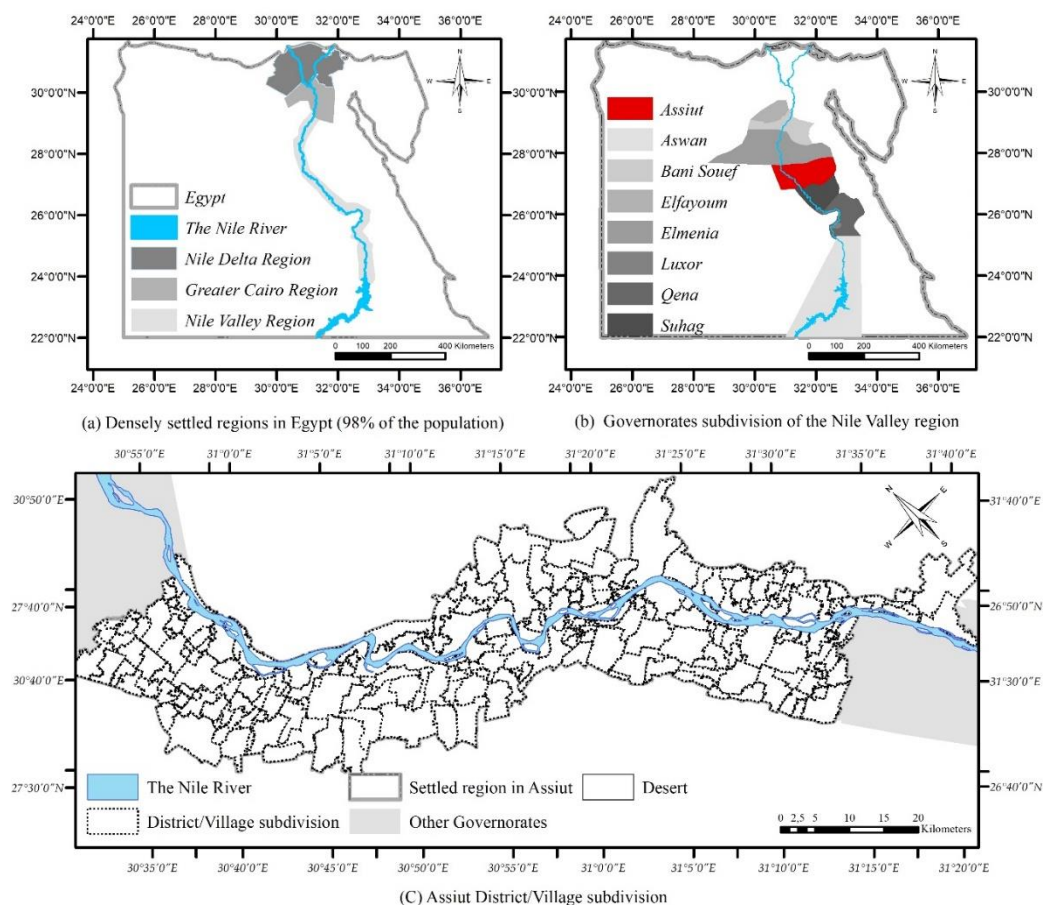


Figure 1: (a) The three main regions in Egypt; (b) Assiut Governorate and its location between other Governorates in the Nile Valley; (c) The district/village subdivision in Assiut.

Methodology

We used a mixed-method approach to the research. First, we analyzed the spatiotemporal dynamics of settlement growth between 1999 and 2020 using Symbolic Machine Learning, Remote Sensing, GIS, and Spatial metrics (Abdelkader, Sliuzas, Boerboom, Elseicy, & Zevenbergen, 2020). All data used for

the spatiotemporal analysis was open source (Lansat images, MASADA 1.3; Global Human Settlement Layer; Africa Land Cover map; Open Street Map). The spatiotemporal analysis was conducted to answer the question of where unplanned growth occurred? When unplanned growth occurred? And what types of unplanned growth occurred? Then we compared the result of this analysis with the land use development plan (2005-2020) targets. We also developed a new QGIS tool which is called Growth Classifier. (Abdelkader & Elseicy, 2020). This tool allows other researchers to analyze human settlement growth types where eight types can be identified. These types are infill, expansion, edge ribbon, linear branch, proximate cluster, isolated cluster, proximate scattered, and isolated scattered.

Second, we conducted 54 in-depth interviews with stakeholders from government and civil society (Abdelkader, Boerboom, Sliuzas, & Zevenbergen, 2021). These interviews aimed to understand the driving forces of unplanned human settlement growth in the Nile Valley from the stakeholders' perspective. The results of these interviews answered the question of who facilitates and benefits from unplanned growth? And why unplanned growth occurred? This allowed the understanding of informal institutions that facilitate unplanned growth on agricultural land. Finally, we identified the successes and gaps of the adopted land use development plan in Assiut.

Spatiotemporal Analysis

The spatiotemporal analysis showed that the settlement growth rate significantly decreased after implementing the 2005 land use development plan (The Strategic Plan for the Egyptian Village) (Abdelkader et al., 2020). The annual decrease was from 11 % between 1999 and 2005 to 5.9 % between 2005 and 2020, as shown in Table 1. Nevertheless, it exceeded the targeted plan at the expense of the agricultural land. The targeted annual growth rate between 2005 and 2020 was 1 % (15% for the total period). The results also showed that a peak in the growth rate occurred between 2010 and 2015. Results also showed that outlying growth types (linear branch, proximate cluster, isolated cluster, proximate scattered, isolated scattered) were occurring in all periods. This indicates that settlement growth was not compact, and the agricultural land was fragmented in all periods. As shown in Figure 3, the pattern of growth types in 1999:2005 was similar to 2010:2015, whereas the pattern between 2005:2010 was similar to the one in 2015:2020. This confirms that the 2011 revolution had a negative impact on managing unplanned growth on agricultural land.

Table 1. The new built-up area, annual growth rate, and the total area (km²) for each period (Abdelkader, Sliuzas, Boerboom, Elseicy, & Zevenbergen, 2020).

year	Total area (km ²)	New built area (km ²)	Annual growth rate (%)
1999*	85.5		
2005**	143.0	57.5	11.0
2010**	180.9	37.9	5.3
2015**	233.5	52.6	7.3
2020**	270.0	36.5	5.1

In-depth Interviews

The second step showed that the stakeholders perceived 38 driving forces for unplanned human settlement growth on agricultural land, which are affiliated to five dimensions: cultural, demographic, socioeconomic, political and institutional, and spatial dimensions (Abdelkader et al., 2021). The most important forces were identified as the proximity to roads and the core built-up area, the weak law enforcement towards encroachment on agricultural land, the household size, high costs on the agricultural inputs, and micro-holdings of agricultural land. The study also revealed some informal institutions that help encroachers escape from legal sanctions (e.g., *The Kahoul*). It also revealed that the slow judicial system allows informal settlers to build informal housing faster than any court action can be taken. This loophole leads to the loss of agricultural land even if the informal building would be demolished afterward.

Conclusion

The following conclusions were drawn based on the analysis. From the successes perspective, the strategic planning approach's shift from the master planning approach was useful to address development growth from a multi-dimensional perspective, leading to a decrease in the growth rate. The Growth rate between 2015 and 2020 was the lowest (5.1%). Another success for the land use development policy is investing in new settlements in the Nile Valley's hinterlands, which represents a reasonable alternative for unplanned growth in the Nile Valley. In Assiut, there are three ongoing projects in the hinterlands, which are: New Assiut City, which started in 1997, West Assiut City, and the Hinterland villages (*Korah Al-Zaher Al-Sahrawy*). Egypt's 2052 vision relied on these new settlements to attract the surplus of Assiut's growing population.

The conclusions about the gaps in the land use development policy are the following. First, there was a lack of successful rural development inside the Nile Valley that improves the quality of life for rural settlers as well as the quality of the agricultural land yield. Without this rural development inside the Valley, agricultural land's value will continue to decrease, and more farmers will convert the land use. Second, the hinterland's new settlements lacked proper incentives and economic structures to encourage the low and middle classes to leave their old settlements in the Nile Valley. Third, the objectives of the new settlement were usually overestimated where no new cities and villages had reached their targeted population as planned. For example, New Assiut City targeted 130 thousand inhabitants in 2017. In contrast, the 2018 census by the Central Agency for Public Mobilization and Statistics (CAPMAS) reported that the New Assiut's population was approximately 35 thousand inhabitants. Fourth, the strategic plan had achieved some reduction in the unplanned settlement growth rate, nevertheless, it lacked proper participatory practices during the planning phase, and its implementation was insufficiently funded. Moreover, the bureaucratic procedures for approving these plans may take years, leading to unplanned growth in the meantime.

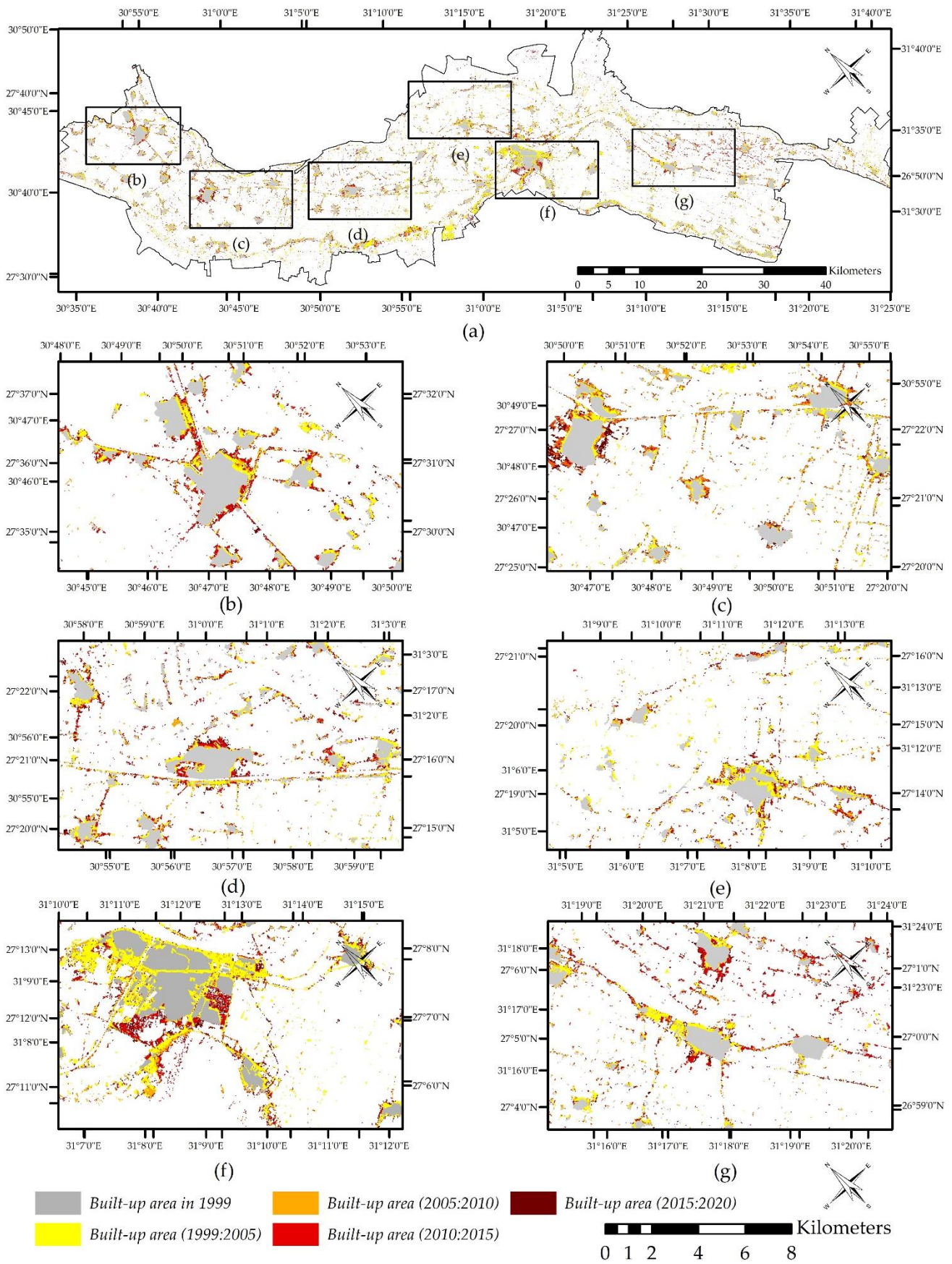


Figure 2: Human settlement growth in Assiut Governorate between 1999 and 2020 (Abdelkader, Sliuzas, Boerboom, Elseicy, & Zevenbergen, 2020)

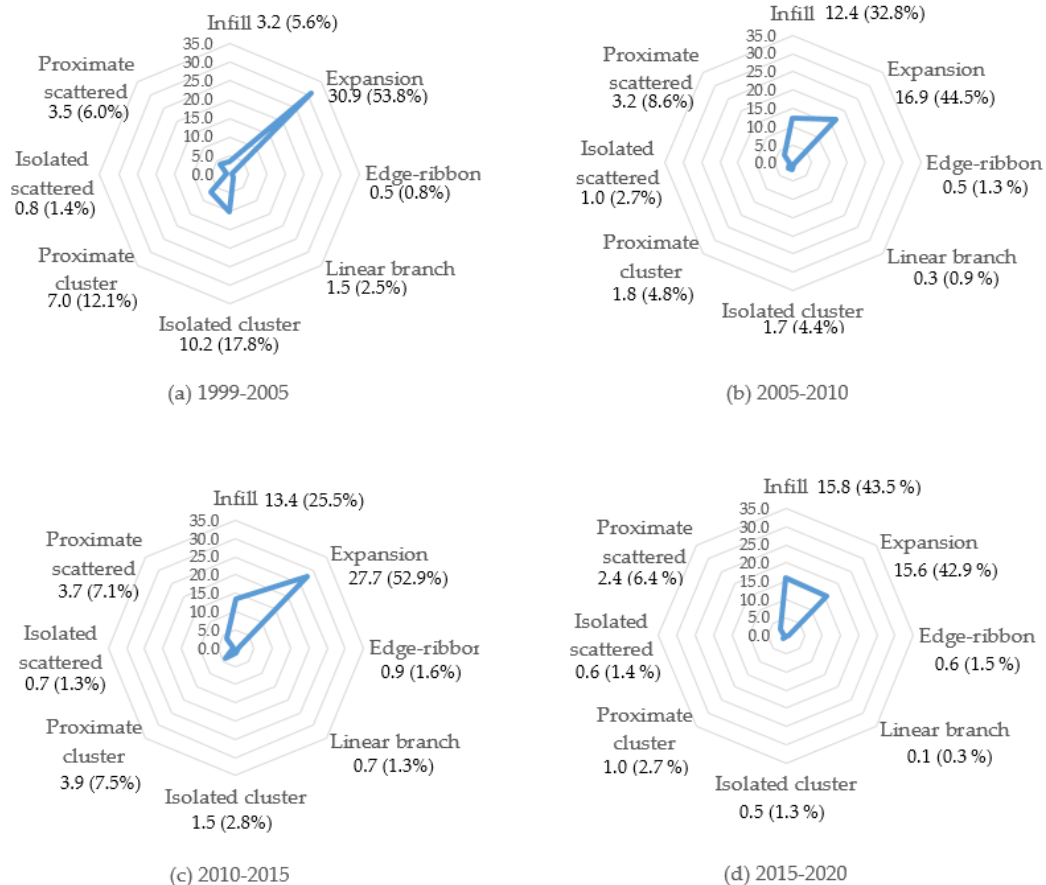


Figure 3: Human Settlement growth types in Assiut between: (a) 1999:2005; (b) 2005:2010; (c) 2010:2015; (d) 2015:2020 (Abdelkader, Sliuzas, Boerboom, Elseicy, & Zevenbergen, 2020).

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