The Potential of GIS Tools in Strategic Urban Planning Process; as an Approach for Sustainable Development in Egypt

Ayman M. Nour
Associate Prof. of Architecture, Helwan University, Egypt
E-mail: a_afify@helwan.edu.eg

Abstract

During the last 20 years, geographic information systems (GIS) have emerged from the scientific laboratories into the heart of conventional planning practice. During this period, planners have been aggressive adopters and adapters, and strong advocates for local governments deploying GIS. This is true at least in part because GIS provides spatial analysis and manipulation capabilities that align closely with the professional needs of urban and regional planners. GIS technology is currently converging with several other technologies to provide new levels of accessibility and functionality. As GIS use becomes more widespread, planners make up less of the market. The aim of this paper is to study the potential of GIS applications in supporting strategic planning process for effective urban governance in sustainable urban development projects in Egypt, and to interface the complex problems of urbanization, unplanned and negative impacts on the facilities and services and the environment in general in the cities of developing countries.

Keywords: GIS tools, Strategic planning, Urban planning, Sustainable development

1. Introduction

Planning seems simple enough: design the ideal community and ensure regulations support design goals. Reality is far more complex. Today, city, community, and regional planning mean dealing with constant change. Planning professionals have the technical expertise, political confidence, and fiscal understanding to translate a vision of tomorrow into a strategic action plan for today. Requirements handed down from federal and state regulatory agencies, regional boards, and an increasingly active public have made this job even more challenging. Literally thousands of local government organizations and planning agencies in particular, have embraced GIS tools as a means of meeting these demands while dealing with limited funding and staffing. Every day, planners use geographic information system (GIS) technology to research, develop, implement, and monitor the progress of their plans. GIS provides planners, surveyors, and engineers with the tools they need to design and map their neighborhoods and cities. Planners have the technical expertise, political savvy, and fiscal understanding to transform a vision of tomorrow into a strategic action plan for today, and they use GIS to facilitate the decision-making process.

GIS technology has long been valued for improving communication and collaboration in decision making, for effectively managing resources and assets, for enhancing the efficiency of workflows, for improving the accessibility of information, and generally offering tangible cost savings to organizations both large and small. In an effort to deliver geospatial information and functionality throughout an enterprise, organizations are choosing to leverage the geographic information that they create with their desktop GIS implementations and deliver it with servers for use in the enterprise and across the Web. In addition, focused sets of GIS logic can be embedded and deployed in custom applications. And increasingly, GIS is deployed in mobile field devices. This means that the influence of GIS is growing. It provides a powerful medium for managing, visualizing, and communicating about our world. In this paper, the research objective is to study the potential of GIS applications in support of the public participation of urban management, and through analysis of the possibility of using GIS in studying of urban processing of geo-database, which develops the capacity and the empowerment of local administration of the management tools and to interface the complex problems of urbanization, unplanned and negative impacts on the facilities and services and the environment in general in the city of Manfalut – Egypt, as an example of developing countries' cities.

2. Literature Review

The study of the potential of geographic information systems in supporting the urban governance process compels us to make explicit our assumptions about two main topics. The first will be about the information systems and GIS, the improvement and Importance of GIS to Urban Development. And the second topic will review Strategic urban planning Process, Objectives of Strategic Urban Planning and the Description and Basic Stages of a of Strategic Urban Planning processes, and finally we discuss the Critical Comments on Strategic Urban Planning Processes and Main Directions for the Strategic Urban Planning

2.1 Information Systems and GIS

Information systems and GIS have much in common because both use a computerized system for collecting, storing, analyzing and disseminating information. An important difference is GIS' capability for cataloging spatially referenced objects within the context of a map. GIS can also be used to perform quantitative analysis based on geographical principles, such as location in space, flows, or vertical and horizontal relationships

(Obermeyer and Pinto, 1994). Research issues at the intersection of computer science and geographic information sciences include database management systems, data mining, human-computer interactions (including graphics and visualization), transmission of vector data via the Internet, and development of algorithms and data structures (NRC, 2002a,b). The management of information systems across an organization and the development of an agency's enterprise GIS demand the formulation of long-term objectives and plans at a high management level; as well as operational decisions, goal setting, resource allocation, and staff development at the middle management level (Obermeyer and Pinto, 1994).

2.1.1 Geo-processing

Geo-processing is the processing of geographic information, one of the basic functions of a geographic information system (GIS). It provides a way to create new information by applying an operation to existing data. Any alteration or information extraction you perform on your data involves a geo-processing task. It can be a task such as converting geographic data to a different format, or it can involve multiple tasks performed in sequence, such as those that clip, select, and then intersect datasets (McCoy, Jill 2004).

2.1.2 The Improvement of GIS

According to Steven P. French, 1998) GIS was originally developed as an environmental technology. Roger Tomlinson (1998) coined the phrase *geographic information system* in the early 1960s when he led a project to map Canada's natural resources. During the same decade, Edgar Harwood, a professor of civil engineering and planning at the University of Washington, wrote some of the earliest computer mapping software, founded the Urban and Regional Information Systems Association, and conducted a number of highly influential short courses and conferences (Chrisman, 1998, 2006; Tomlinson, 1998). In the early 1990s, GIS began expanding into the business market, and as GIS became available on personal computers it became viable for a much broader spectrum of business users (Castle, 1993). Industries with deep pockets and clear geospatial needs, such as public utilities, transportation companies, and logistics firms, were early adopters. However, GIS technology has not yet followed an accelerating S-curve penetration of business like the one it displayed in the government sector (Pick, 2005).

GIS software was originally developed as a specialized, proprietary application, with its own arcane scripting and programming languages (e.g., the Arc/Info macro language, AML) which isolated it from mainstream information technology (IT). In many local governments and universities, central IT departments focused on mainstream database management systems and office automation applications (e.g., word processing and spreadsheets) leaving those with geospatial needs to support their own applications. This severely limited the pool of potential GIS managers, developers, and programmers. However, in the last five years commercial GIS software has been moving toward more mainstream software development platforms. The speed, performance, and staffing benefits of merging GIS with mainstream IT dictate that large organizations store their data in relational database systems like Oracle and SQL Server. This also facilitates the integration of GIS with the large customer and inventory databases maintained by most firms and agencies. (William J. Drummond, 2008).

2.1.3 Importance of GIS to Urban Development

GIS can aid in public-policy decisions for more effective allocation of resources for community and economic development, for better-managed community planning and growth, as well as for the efficient delivery and use of public services. It provides a common framework location for information from a variety of sources. Because many of urban development programs have goals that can be identified by location, GIS can be a powerful tool for understanding and managing the results of urban development efforts. Moreover, the modeling and visualization capability of GIS provides a means of testing alternatives and turning data into information, and subsequently into knowledge. GIS is a tool for data management and spatial analysis but the information derived from GIS is only as accurate as the data that went into the system and as relevant as the questions posed. The use of GIS has increased markedly over the last 10 years worldwide. Reasons include increased capabilities of computers generally, and GIS specifically; decreased costs of computer technology; and development of user-friendly, web-based interfaces (Obermeyer and Pinto, 1994).

2.2 Strategic urban planning Process

Strategic urban planning is a process which permits the articulation of the initiatives of public and private stakeholders which seek synergies for the development of a city (Florian Steinberg, 2005). Urban strategic planning is a specific instrument of management which encourages citizen participation in local policy decisions. The partnerships which emerge from urban strategic planning are especially created for designing and managing sustainable projects for the city. But these processes of citizen involvement are not spontaneous: it is the local government which is primarily responsible for fostering opportunities for civil society organization participation. Furthermore, the process of participation must include actors with a strong technical orientation who have the capacity for dealing with the needs and requirements of society. This kind of public-private partnerships requires clearly established rules so that collective and individual benefits are produced which in turn strengthen the actors' motivation for continuing to participate in a project.

Urban strategic planning allows local governments to enlist the participation of social actors, to achieve consensus about policies and projects and to encourage partnerships aimed at proposing, implementing and evaluating projects. Urban strategic planning is only possible, however, if the government is willing to share the power and respect the decisions which emerge from the process of negotiation. There are three basic sources of input: political decisions and the know-how of both professionals and social actors. During the stages of a strategic plan (Diagnosis, Planning, Strategic Management, Monitoring and Evaluation) social and political actors work together using a specific methodology. In the Strategic Management stage of the plan, the actors define their own responsibilities in the projects and design monitoring systems such as Urban Indicators Systems. Depending on the changes in the social context, the agenda is adapted to suit different conditions or circumstances (García, M. 2007). It is about:

- an adaptable, non-rigid methodology for which flexibility is an indispensable precondition;
- a tool for local development which conceives strategic interventions that guarantee the quality of life, and economic and social progress;
- a mechanism to promote progressive forms of governance, substantially improving local democracy through a real collaboration between public and private urban stakeholders;
- a modern, participatory and democratic form of thinking about urban development which permits to establish a reference for all those economic and social actors who can harmonize their own strategies with those scenarios which are desired for their city or territory;
- a new instrument which facilitates the management of a city in a period of frequent and substantial changes which stimulates the necessary imagination to deal with this.

2.2.1 Objectives of Strategic Urban Planning

The general objectives of strategic urban planning include clarifying which city model is desired and working towards that goal, coordinating public and private efforts, channeling energy, adapting to new circumstances and improving the living conditions of the citizens affected. Strategic planning is a technique that has been applied to many facets of human activity, however, the application of strategic planning to urban contexts, or cities, regions and other metropolitan areas is a relatively recent development whose beginnings were eminently practical and artistically: a mixture of thought, techniques and art or expertise. At that meeting it was demonstrated, along with other relevant aspects, that if cooperative processes are used in large cities in order to carry out strategic planning processes, and if a reasonable degree of comprehension is reached between the administration, businesses and an ample representation of social agents, organizational synergies will develop that will eventually improve resource management and citizens' quality of life.

2.2.2 Description of Strategic Urban Planning processes

According to Borja and Castells A strategic urban planning process is: The definition of a project of city that unifies diagnoses specifies the public and private actions and establishes a coherent framework of mobilization for the urban cooperation of social actors. When the definition of content, as this process will be the basis for the vitality of the objectives and actions proposed, a participatory is a priority. The result of the strategic plan will not necessarily be the creation of regulations or Government program (even though its adoption of State and local Government should mean inducing investments, regulations, administrative measures, policies, etc.) but rather a political agreement between public institutions and civil society. For this reason, the process following the approval of the plan and the monitoring and implementation of measures or actions is just as or more important that the process of elaboration and approval of a consensus. Strategic urban planning is now considered a type of Governance (Borja and Castells, 1998).

2.2.3 Basic Stages of a Strategic Urban Planning process

- Using the work of the Technical Secretary as a starting point, work groups debate and approve a diagnosis of the city that includes its localization. The document must be approved by the Executive Committee, by the General Council or a full meeting of the Corporation as the case may be.
- Based on the diagnosis, and keeping in mind its antecedents and conclusions, strengths and weaknesses, the next step is the creation of scenarios and, based on the use of imagination and firmness, the development of prospective tasks related to the creation of future alternatives so that the Executive Committee can select a model or vision for the city. Their choice will be the basis for the generation of related key topics and/or directions for general actions to be taken.
- Once the work teams have been reorganized, mainly made up of key decision-makers and implementers, each key topic and line of action will be dealt with separately, designing a detailed list of necessary and/or advisable projects. Once the results have been consolidated, a prioritized list of projects will be made available from which a selection will be made. The next step is the elaboration of an action plan that includes the agents involved, timing and resources. The people involved in the structure of the process, at least theoretically, are capable of carrying it out; for an example, please consult the

document from the General Council of strategic urban planning of Valencia (Jquintas, Mdd & others, 2010).

- Once all of the previously mentioned documents have been approved, the next step is implementation - carrying out the project itself. This stage is decisive; at this point plans are usually given a structure in which the organization is even more explicitly clarified.

2.3 Sustainable development

The main motivation behind sustainable development is to sustain the species homo sapiens. The Rio Declaration, which forms the preamble to Agenda 21, states very clearly that "Human beings are at the centre of concern for sustainable development". Humans are therefore the main focus of the sustainable development debate. The key concern is to keep planetary conditions favorable for human life at a global as well as local level. As we do not fully understand the complex interrelationships between the different components of the biosphere, a prudent approach is advocated, hence the call for biodiversity conservation and environmental protection (Satterthwaite, D. (ed.) 1999).

Sustainability is thus the condition or state that would allow the continued existence of homo sapiens, and it is the goal we would like to achieve. Because of endlessly changing external and internal (societal) conditions, this is not a fixed state, but one of dynamic balance where we will have to continuously adapt to these changing conditions. In order to achieve this state, we will have to meet certain requirements. Firstly, we need to balance the needs of humans with the carrying capacity of the planet, and with the need to protect that capacity so that the needs of future generations can continue to be met.

However, mere survival is not our goal. We want to be able to live in an environment that provides a certain quality of life – that meets our full hierarchy of needs. The most basic requirement for this is the ability of all to live a safe, healthy and productive life in harmony with nature and local cultural and spiritual values (UNCHS, 1996).

To get this, we need to achieve a measure of social and economic equity between individuals, as well as between communities, nations and generations. We have to find a way to equitably distribute wealth (in the form of access to resources and opportunities) and increase prosperity for all. This line of reasoning led us to the so-called three pillars of sustainable development – people (social development), the planet (ecological protection) and prosperity (economic development). In other words Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs… As such it requires the promotion of values that encourage consumption standards that are within the bounds of the ecologically possible and to which all could reasonably aspire." Our Common Future, (WCED, 1987).

3. Material and Methods

3.1 Issues of Urban Planning in Egypt

According to the UN, approximately 50% of the global urban population can be classified as slum dwellers - individuals who suffer from inadequate access to safe water, sanitation and other infrastructure; poor structural quality of housing; overcrowding; and/ or insecure residential status. In least developed countries, estimates amount to approximately 78% of the urban population (UN Habitat, 2003). When couched in the larger political economic context, it becomes clear that improving slum conditions necessitates the effort of, not only governments, but also that of community members, entrepreneurs, and slum dwellers themselves. The past 50+ years of international housing finance demonstrated the shortcomings of both the public and private sectors in providing affordable solutions to scale, especially ones that truly target the demographic group in greatest need (Payne, 1999).

Table 1 shows that Egypt has been urbanizing from quite early in the 20th century, but it also shows that that the urban population appears to have leveled off (and even declined) in the last decade, at roughly 42 per cent of the total. Over the same period national population growth has been brought down from 2.8 to 2 per cent annually. Two per cent national annual growth is still high, and seems to be worryingly stuck at this level. Total female fertility has also stagnated at 3.5 children/lifetime, (UN-Habitat, 2003).

3.2 Study area

3.2.1 Historical background and urban development of the city

The Manfalut of the ancient cities of the Egyptian state since the ancient Pharaonic and was called the land of gold and is also called the Valley of wheat. The town of Manfalut in Assiut Governorate, one of the provinces of Asyut, where away from the north-east of the city of Asyut (the capital of the province), about 28 km away from the east at about 1.5 - 3 km west of the Nile River, which separates between them and the River Nile agricultural land. As bounded on the west Abrahamia canal which extends from south to north. And take the city generally has an irregular shape tends to relatively elongation, which extends in the axis of south-east / north-west of length up to about 3.2 km, and average view about 1 km .As in figure 1.

Although the incidence of the city on the canal Abrahamia that have limited the growth to the west, but the presence of the main artery of the agricultural road Cairo / Aswan helped the growth of bar entrances to the west

associated with the city over the bridges along the canal Abrahamia. The Manfalut city connected with the city of Assiut (provincial capital) through the agricultural road with a length of about 28 km, also associated with some of the villages in the same way.

3.2.2 The urban development of the city of Manfalut

The urban of Manfalut city has developed since 1950's throw four important phases formed is the current construction of the city, as shown in Table 1, these stages differ in social and economic conditions and political, which ruled the city and therefore different construction which are in each of these stages. As in table 2 & figure 2

3.3 Analytical studies of the geographic database

This analysis depending on the Physical Survey of the City's Urban Space Based On 2008 And Processing Of Geographic Database Using Arc GIS 9.3 Application. The first phase will include the following items using satellite images for the study area in 2008 to produce the final GIS maps.

- Land use data.
- Services distribution and economic activities
- Analysis of existing buildings according to the type and construction materials.
- Elevations, heights and zoning according to the densities of the population.
- Ownership of available lands for urban development
- Determination of unplanned (informal) urban areas and the lack of facilities or services.
- Population survey data Include study population and the most important social phenomena that affect the development of the study area
- Supply of facilities and infrastructure

Survey provides the infrastructure of the city and a description of the size and quality of infrastructure, and linking these data and information by population size and areas they serve, so that numbers can be obtained with clear evidence. In general the data are collected following the current situation of public facilities, roads, traffic and transportation networks, systems and current and future requirements of her and opportunities such as sources of fresh water and lowland areas suitable for land filling solid waste, water supply system, and the current regulations for sanitation. On the other hand, the first phase focuses on studying the networks and existing infrastructure capacity based on the term of references (TOR) for preparation of the strategic general planning of the Egyptian cities, 2006, and amended in 2007 (GOPP, 2007). Based on similar experiences to prepare the strategic master plan of the city of Asyut (GOPP, 2009), the second phase of the multi-purpose urban analysis, will prove the effectiveness of geo processing tools of the Arc GIS application, by make combination of analytical survey data of different layers of physical planning to get sophisticated and more effective indicators and understanding of the dangers and weaknesses in the physical structure of the study area, and opportunities for development and areas of strength. This will help the local and center governmental authorities to a good urban governance.

3.3.1 The objectives of the study area

The study aims to prepare the strategic plan of the city as well as some outlines, and feasibility studies for the priority projects of the city until the year 2027 goal. Through the active participation of relevant parties and stakeholders in the preparation and adoption of the resolution, including participation in agree on issues, set goals and develop visions, strategies and programs as a mechanism to develop projects. Therefore determined the General objectives and of a study of the strategic plan of development of the city as follows:

- Contribute to advancing development through the consolidation and development of the city's economic base and providing new opportunities to work with.
- Dealing with issues of urbanization and shelter, housing and identifying existing slums and contribute to the reduction of the emergence of more sites.
- Providing services and strengthens the city's infrastructure and environmental development to improve the living conditions of citizens in the light of the proposed development strategy.
- Contribute to the good management of land, and upgrading of local administration and support access of low-income housing and services.

3.3.2 Satellite Images Properties of the study area

Quick Bird satellite images of the study area were acquired for the years 2008 (Satellite Imaging Corporation, 2010). The original spatial resolution of the 2008 image was 61 cm (nadir) to 72 cm (25° off-nadir). The data for Land maps for all selected areas were compiled by means of a supervised maximum probability classification. The classified land data classes are built-up areas land, vacant land, grassland, and water surfaces. The built-up category contains all paved areas, including residential and commercial zones, industrial areas, roads and parking spaces. The overall accuracy of the land data maps was verified through a comparison of the maps with aerial

photographs (at a scale of 1:5,000). The percentage of correctly classified pixels is 86.3% for 2008. Table 3 detailing the Quick bird satellite sensor characteristics (Satellite Imaging Corporation, 2010)

4. Results

In this part we will present the main results of the analytical process within the GIS application due to the data captured from the field survey, and will re-analyze the main results with advanced geo processing tool that builds and executes analytical models to support strategic urban planning process for effective urban governance.

4.1 The use of basic data flow diagram

The analytical process used in this paper is based upon a detailed 'data flow diagram' which is shown in Figure 9. In this system, the primary generic data is differentiated according to its nature, with three major data types being defined as base data, physical-spatial data and socio-economic data, respectively. Of these, the first two will be linked to the dwelling and the last one to the head of household (Abbott, 2001).

- The first data type (the base data) is constructed around raster images (most often in the form of aerial photographs) of varying resolution, which provide a visual backdrop. These raster images provide the basis for the shack vectors map of the site, to which shack numbers can be added to provide dwelling identification.
- The second data type (the physical-spatial data) relates the site itself. Thus it comprises all data relating to the site on which the dwellings are situated and cadastral data, as well as the spatial planning framework elements that impinge on that site. The term 'physical' is used here to describe those attributes of the site that can be seen or, if below the ground, given geo-spatial definition. Thus the term covers the topography and the natural features above the ground, as well as any additional features such as water standpipes, latrine structure or telecommunication poles. Below ground it will show the engineering services and, through the use of geotechnical surveys, the nature of the underlying ground formation and the water table. The cadastral data covers all cadastral boundaries as well as servitudes. The term 'spatial' relates to the non-physical-spatial definition of the site. This could include zoning boundaries or spatial structuring elements already proposed for the site.
- The third data type relates to the people living in the settlement. Here the generic data comprises essentially demographic data. Now there is a great deal of additional data that can be gathered about communities. In New Rest a major household survey, covering every household, was funded by an overseas donor and carried out as a community-based activity. This provided a large amount of additional social and economic data. However, this data is not essential to the development of the generic integrated database and is the property of the community, although the output from any analysis may be shared with other parties. Thus this data is termed non-generic primary data. A typical demographic data output would be the number of people per dwelling.

Having identified all the primary data types, the next issue becomes the structuring of an appropriate database. As described earlier, the base dataset is straightforward, comprising a shack vector polygon and dwelling reference number. Similarly, the physical and spatial data is relatively straightforward, as it can be grouped easily according to its source. However, the data related to the community is particularly complex, and needs to be structured with care. The complicating issue here is the multiple use of this data. The development of an appropriate database was an iterative process (Abbott & Douglas, 2001; Abbott, 2001), and improvements are still being made.

4.2 Land uses for the city

The analysis of land use for the city by the results of surveys of urban and a database of geographic information systems, which were prepared during the year 2008, in order to create a comprehensive view on the status of land use in the city, and this analysis has been out a set of results on the distribution of land uses at the city level and these results can be summarized as follows :

- The area of services and the various facilities at the city level 72.28 acres up to 10.68% of the total area of urban cluster of the city and a small percentage of what is found in most Egyptian cities, due to the unavailability of some services in a manner sufficient .
- the current density of the city (133 persons / acre)
- The total area of residential use 277.8 acres by up to 33.49% of the total area of the city, while the building area-use residential mixed (residential, commercial, residential management, residential verbatim) about 51.14 acres and up to 7.56% what was low significantly as a result to increase the proportion of agricultural land, has led to a decline in the supply of housing, causing a significant increase in the prices of housing units and the rental value to them .
- The area of land space 53.49 acres and the rate reaches 7.90%, a percentage remarkably low and perhaps this explains the large rise and continued in the price of building land at the level of most of the city, putting pressure towards urban sprawl of the city on agricultural land, and the decline in the proportion of occupied space represents a challenge when developing the general plan with less land

available for the provision of basic services and facilities needed by the city, in addition to land available for housing .

- The area of the cluster the current construction of the City 2008 amounted to about 655.91 acres, as in table 4, and figures 4, 5 .

4.3 City's buildings conditions

Analyzed the case of the city's buildings by the results of surveys of urban, has been through monitoring of buildings, in order to create a comprehensive view on the status of the buildings in the city and areas with different situations (good - average - poorly) and areas of concentration and the impact on the physical structure of the city, and this Analysis has been out a set of results on the distribution of the case of residential buildings at the city level and these results can be summarized as follows :

- the proportion of buildings in the city with a good case in terms of construction 27.17% of the total building area of the city, and give the figure a strong indication that the city tend to the rural nature of where the load bearing walls, medium, and that in the vast majority of areas of the city .
- The area of buildings, 55.58% of the total buildings in the city, these are located mainly in the older areas of the city and the random and This ratio reflects the situation prevailing in the city .
- The area of buildings, poor 17.22% of the total buildings in the city, located in the same areas that reside the rundown buildings where the proportion of the rundown buildings 0.03% which is extremely low, as shown in table 4, and figures 6, 7.

From this analysis we find that buildings with a status of the poor reside mainly in the slums and the old district of which are areas of relatively poor and reduced the ability of owners and residents of these facilities on the replacement, which requires the provision of different methods of material and technical support to owners and residents of these buildings to carry out replacement of these buildings, and explains Table 5 of the buildings of the city of Manfalut .

4.4 The housing analysis

Housing Studies include a general analysis of the housing situation and housing conditions of the current city Manfalut and for this study is addressed through a combination of several themes, including:

- **Connection to facilities, infrastructure**

Improved housing conditions are relatively in the city of Manfalut during the ten years from 1998 to 2008, and reflected the proportion of housing related to safe water and the proportion of housing-related sanitation and the proportion of housing units relating to electricity was the most important features of this improvement is as follows :

  - For connection to safe water has increased the proportion of housing-related source of safe water at the level of city Manfalut from 96.7% in 1998 to 100% in 2008, which is higher than the average for the province of Assiut, 83.9% and an average of 91.3% of the Republic
  - As for the connection to sanitation has decreased the proportion of housing-related facility sanitation level of the city Manfalut view of the extension of the physical RAM of 30% in 1998 to 87.7% in 2008, which is higher than the average of Assiut Governorate's 73% and the average of the Republic of 93.6%

With regard to contact with electricity has increased the proportion of dwellings that have a permanent source of electricity at the level of city Manfalut from 95.44% in 1998 to 100% of 2008, which is higher than the average for the province of Assiut, 92.9% and an average of 98.7% on the national level. Figure 8 illustrates the current Land use budget of the Manfalut city

- **Second: The number of housing units**

The number of residents of the city Manfalut of 65141 inhabitants in 1998 to 86125 people in 2008, and thus the increase in this period of 20984 people, and this increase was accompanied by an increase in the number of households from 12589 households in 1998 to 19574 families in 2008, an increase of 6985 families during this period of 12 years, helped by reduced average family size of 5.17 persons / families to 4.4 person / family in 2008, and this increase in the number of families was not matched by an increase in the number of residential units on the level of the city Manfalut the same percentage. Where increased numbers of units affected the outcome of the housing market in the city and housing conditions and these results can be presented as follows:

  - Proportion of vacant units at the city level 11.21% in 2008 and, despite the advantages that this represents in numerical terms, but it does not reflect the value of quality of housing available at Manfalut city.
  - The sharp rise in housing prices and land due to the inadequate supply of what is required in addition to the inability of the city to expand because of the determinants of the surrounding landscape

5. Discussion

The first issue for the discussion is the recognition that large-scale, replicable strategic urban planning projects is only possible through the use of spatial information technologies. At the same time, there is the need to recognize that the primary objective of strategic urban planning has to be the social and economic development of the urban community. According to Abbott, if GIS is to be used effectively, it has to support this process. It is not simply a technical tool to underpin physical development. In fact, were this to be its sole function, it would have failed. Rather, it should be seen as a tool that liberates local authorities, communities and professionals from the constraints of paper-based space, and allows for the interaction between the spatial and physical elements on the one hand, and the social and economic opportunities on the other, in a three-dimensional virtual environment. This then allows all parties to work in a much more interactive way to address the multi-faceted nature of informal settlements (Abbott, J. 2003).

5.1 Key issues behind the methodology

Strategic planning for the development of the city is a structured decision focuses on the major issues and how to solve them. Based on monitoring and analyzing the current situation, identifying stakeholders and how to work with them, identifying and defining the vision and translate them into long-term goals, short-term objectives, and activities achieved these goals and identify means to contribute to and preparation of detailed action plans for implementation of the planned implementation mechanisms (GOPP, ibid 2007).

This strategic plan will be under development for the future growth of the city in the form of formal map and urban planning, and will deal with strategic issues affecting the development of the city and the preconditions for the successful implementation of the scheme, and principles and foundations of the city administration in decision-making redevelopment, this chart will also include the implementation schedule and directions and guidance on investment plan for financing the operational program and the follow-up and evaluation of the scheme. The methodology emphasizes on local decision-making and integrated development of the city in identifying key sectors affecting urban development of the city, notably but not limited to:

- Shelter and slums housing issues.
- The local economy.
- Basic services and facilities.

To promote these key sectors and ensure broad representation of city development partners, especially the poor and marginalized groups of children and young people and women, with emphasis on environmental and social dimensions to achieve the objectives of the third millennium is the advancement of these key sectors with addressing each accidental in terms of:

- Urban governance issues (management and decision making, empowerment of local management of quality control instruments Urbanism).
- The social dimension and the issues of poverty, women and marginalized.
- Environmental issues (natural resources, pollution and its impact and environmental services)

5.2 Discussion of the analytical study

The work of a number of analyses of multiple studies of the status was represented in three major analysis using geographic information systems

- Land space and pockets of agricultural: they were counted by the GIS was the work of analysis of these areas available for development to be divided according to the possibilities of these areas and their problems and needs of the population to areas suitable for extension of urban future, and areas suitable services, such as to compensate for deficiencies in the services area and the distribution of its service.
- Uses of buildings, heights and condition with an analysis of the study population and the distribution of population densities, construction on the entire flat slums six Baksmi turf and in particular to take advantage of this analysis to identify areas where there are concentrations of high and the very fabric of compact, to stir up these densities and increased proportion of services and open areas and identify areas where there are low altitudes and the status of residential buildings are good and the very fabric of urban regularly to intensify work in these areas and increase the number of inhabitants
- Basic services available in your area: The inventory of services in the region and analysis of basic services in the region and the determination of per capita has been compared to the average rates planning Arab Republic of Egypt, which specifies that the per capita share of services and this shows that the percentage of deficiencies in the quality service and must provide the surfaces of the services in these areas of 107.15 acres

Through the identification of the bodies should be available for services to meet the needs of the population in the region with the selection of the lowest rates planning as a result of the limited land can determine the current need of services.

There is also a number of sub-analysis that helps in the formulation of the general plan of the study area

- Urban growth in the region: After a number of mapping urbanization of the area in previous years and limit the areas of extension and lineage of every five years reflected the general trend of urban growth in the study area, which Touch previous studies to confirm the development of areas of packing in this direction to reduce the growth of slums by future
- Problems have been the work of analysis of a number of problems of population and social, environmental, natural, economic and urban areas faced by the six random to try to resolve most of these problems, the new scheme
- The competitive advantage of the study area to analyze all the possibilities available and the competitive capabilities available in your area to exploit to the fullest.

6. Conclusions

In this paper, contribution of geographic information systems in the formulation of the objectives of planning alternatives with a general outline could be summarized in the next main points:

- Distribution of land uses on areas of urban sprawl to achieve the needs of users and potential investors with the study of their relationship to each other, so that the functional equilibrium between them in terms of the percentage of flat and appropriate to the total mass of urban flat.
- To achieve population densities, construction of appropriate areas of urban sprawl and the levels of its housing, as well as achieving the design criteria and planning the appropriate rates for services and roads at various levels.
- Distribution of public services and open areas distributed spatially so as to achieve walking distances to suit the age of users and their reluctance to repeat the service.
- Provide flexibility within the bloc urban areas sprawl so as to achieve the desired equilibrium between supply and demand for land, and in the case of the emergence of quantitative and qualitative difference between the actual needs of the territory after the establishment of buildings and the general outline Helms.
- Study the stages of the implementation of the scheme are available so that the flexibility needed at every stage to achieve integration between population and activities, services and infrastructure and the needs of the land.

In addition we have been taking advantage of geographic information systems in determining the land of urban sprawl in terms of area and sites, which include land space and pockets of agricultural land adjacent to residential areas with low agricultural productivity and classification of these areas in terms of importance and distribution of land uses proposed to be added to the cluster the current construction.

the geographic information systems identified a number of factors affecting the selection of the limits of urban sprawl the proposal and formed a number of classes to guide the areas of extension proposed and included the layered growth trends of urban area and of population densities, construction in the study area. And finally, included the analysis of patterns of land holdings of different region delivery infrastructure also included classes within rural and urban areas in the study area and the surrounding areas to achieve a partial separation between rural and urban

- Has also been seeking the partial separation between the existing zones and areas of urban sprawl through the development of new services suffer from the limitations of the study area as a transition between areas of existing and new areas.
- Been taking into account the decentralization of services in the areas of urban sprawl to cover the ranges of service and be accessible to the population.

Acknowledgments

I would like to thank the employees at the Municipality of Manfalut and governorate of Assiut for their time and the ideas they shared with me during the interviews. I am grateful to the General Organization for Physical Planning (GOPP) in Cairo for all the facilities that I had during this research. The author wishes to thank GPUS's GIS professionals and systems analysts group, the people of municipal administration departments of Manfalut declaring that this paper is a truly an achievement of the whole team.

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Table 1. Egypt's Population and Urbanization

Year	National Population (Million)	Urban Population (Million)	% of National Population which is Urban Annual Urban Population	Growth Rate in Intercensal Period
1960	**25.98**	**9.87**	**38.0%**	**n/a**
1976	**43.73**	**19.15**	**43.8%**	**3.0%**
1986	**48.25**	**21.23**	**44.0%**	**2.8%**
1996	**59.31**	**25.27**	**42.6%**	**1.8%**

Source: CENSUS of Egypt, various years

Table 2. urban development of the city during the period 1958-2008 Manfalut

Period	Area added (acres)	area of the city (acres)
Until 1958	**-**	**168.1**
1958 - 1985	**390.9**	**559**
Until - 1998	**25**	**584**
Until - 2008	**71.92**	**655.91**

Source: GIS geographic information database, GOPP & GPUS, 2008.

Information and Decision Support Center (IDSC), http://www.idsc.gov.eg/default.aspx , Cairo 2008.

Table 3. Quick bird satellite sensor characteristics

Orbit Altitude	**450 Km**
Orbit Inclination	97.2°, sun-synchronous
Speed	7.1 Km/sec (25,560 Km/hour)
Equator Crossing Time	10:30 AM (descending node)
Orbit Time	93.5 minutes
Revisit Time	1-3.5 days, depending on latitude (30° off-nadir)
Swath Width	16.5 Km x 16.5 Km at nadir
Metric Accuracy	23 meter horizontal (CE90%)
Digitization	11 bits
Resolution	Pan: 61 cm (nadir) to 72 cm (25° off-nadir) MS: 2.44 m (nadir) to 2.88 m (25° off-nadir)

Source; Satellite Imaging Corporation, 2010

Table 4. the current Land use budget of the Manfalut city

Land use	Area ratio %	Area (acres)
total residential use	43.96 %	277.8
total Services	10.68 %	72.28
other uses (roads - Blanks Industry – character)	40.88 %	276.56
total Area Urban	100.00 %	655.91

Source: GIS geographic information database, GOPP & GPUS, 2008. Cairo 2008.

Table 5. the current Building Condition of the Manfalut city

Building Condition	Area (acres(	Area ratio%
Good	179.91	% 27.75
Fair	361.2	% 55
Bad	114.8	% 17.25
Total	655.91	100

Source: GIS geographic information database, GOPP & GPUS, 2008. Cairo 2008.

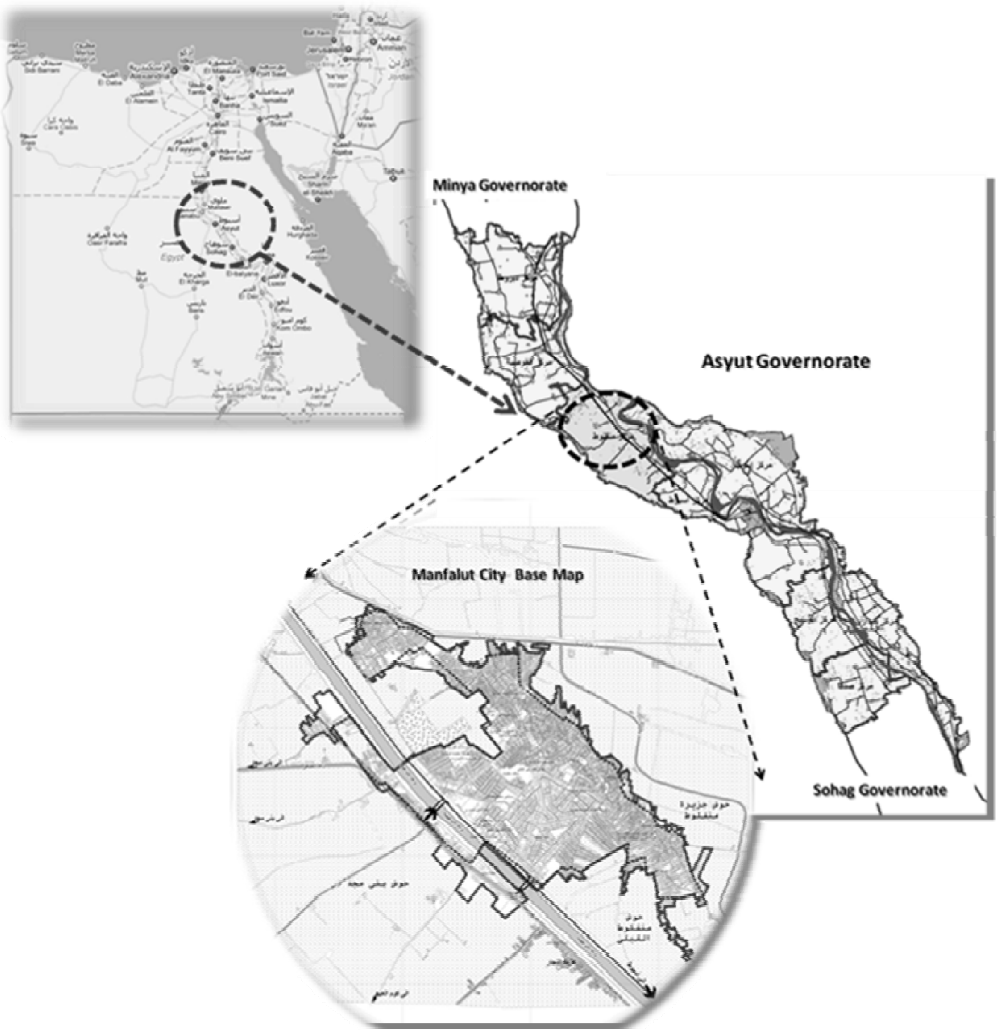

Figure 1. Location of Manfalut City according to The Asyut Governorate

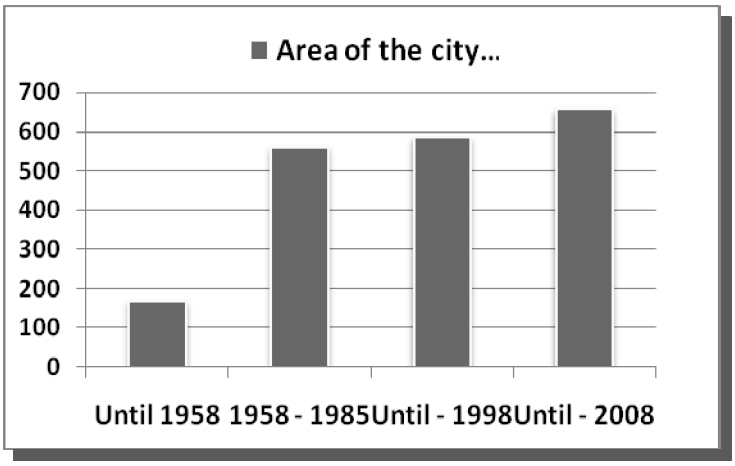

Figure 2. urban development of the city during the period 1958-2008 Manfalut
Sours: CAPMS Central Agency for Public Mobilization and Statistics 2008, The city's planning survey report of the strategic plan of Manfalut, GOPP & GPUS. phase I 2009

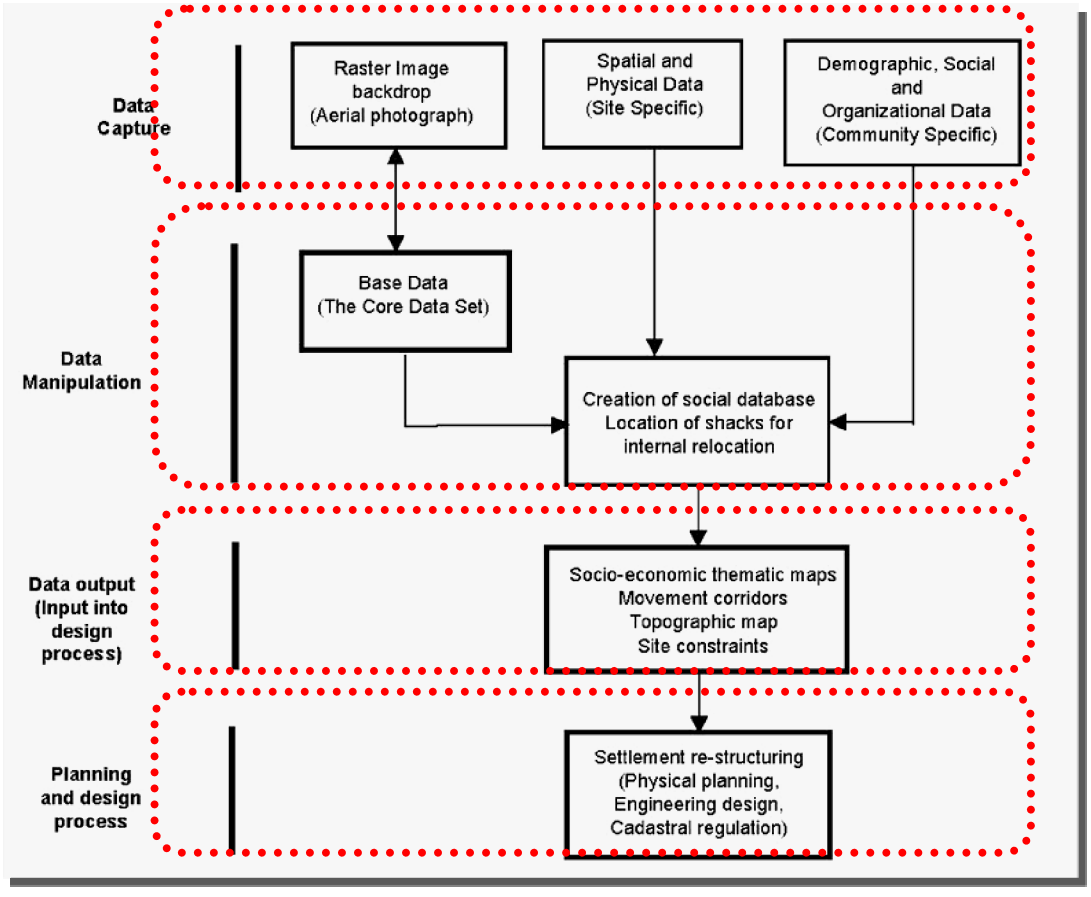

Figure 3. data flow diagram for informal settlement strategic planning.
Source; (Abbott, 2001).

ISSN 1913-9063 E-ISSN 1913-9071

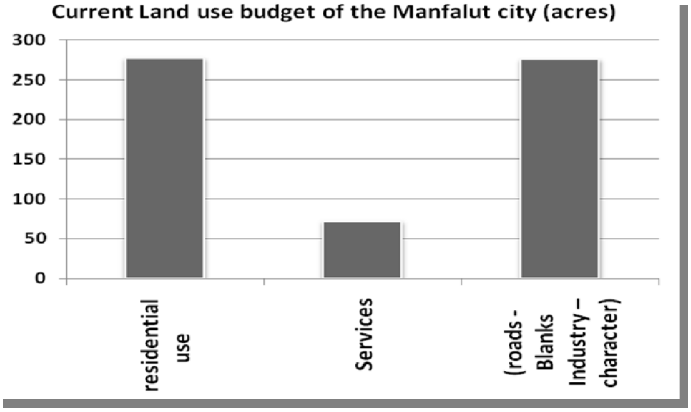

Figure 4. the current Land use budget of the Manfalut city
Sours: Report of the strategic plan of Manfalut, GOPP & GPUS. phase I 2009

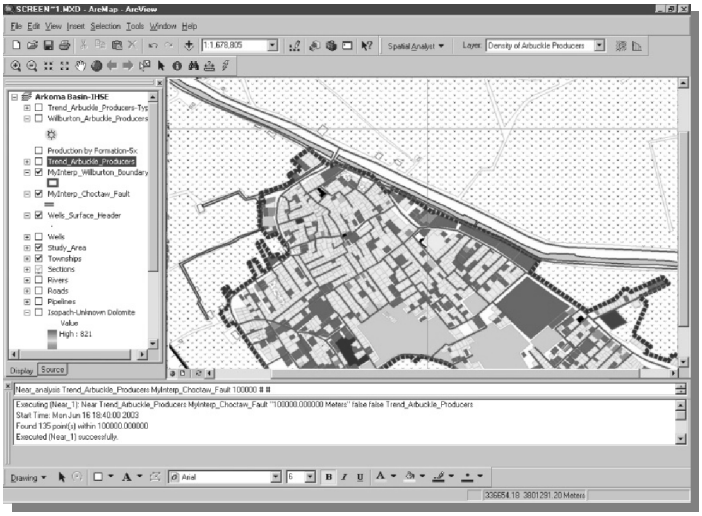

Figure 5. Screen shot for Land Use map,
Sours; GIS data map, Strategic Master Plan Manfalut City, GPUS & GOPP – Phase I, Cairo 2009

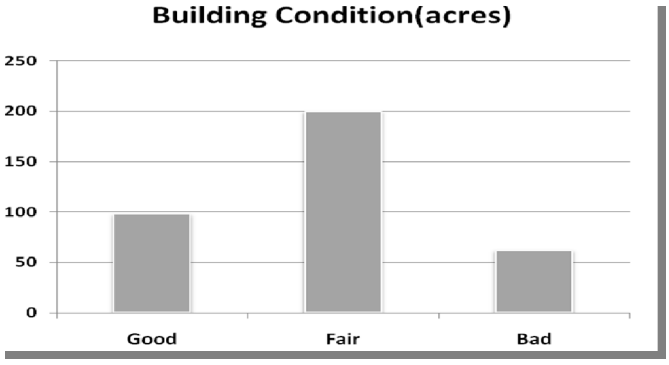

Figure 6. the current Building Condition of the Manfalut city
Sours: Report of the strategic plan of Manfalut, GOPP & GPUS. Phase I 2009

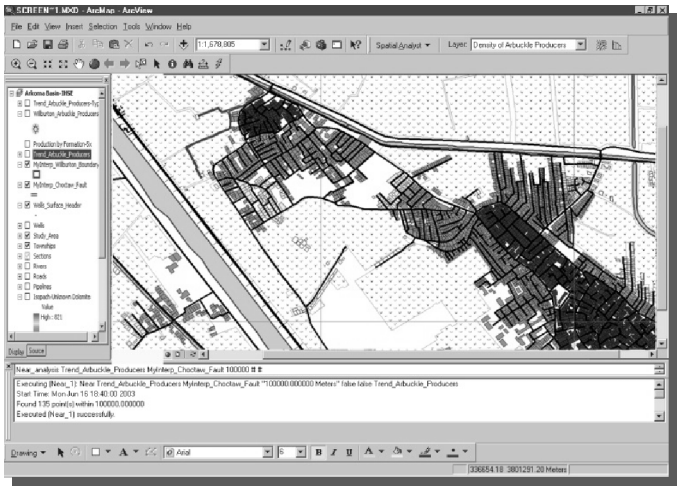

Figure 7. State of the buildings of the city
Sours; GIS data map, Strategic Master Plan Manfalut City, GPUS & GOPP – Phase I, Cairo 2009

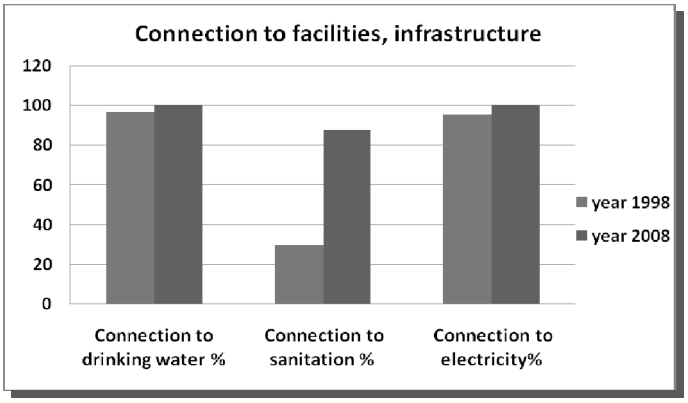

Figure 8. the current Land use budget of the Manfalut city
Source: GIS geographic information database, GOPP & GPUS, 2008.
(IDSC), http://www.idsc.gov.eg/default.aspx , Cairo 2008.