

Geographic Information Systems (GIS) in Egypt

Supporting Natural Resource Management and Local Development

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Abstract

Sobeih sets the context by explaining that Egypt has become one of the leaders in the technology sector across the Arab region, with advances in computer programming, ambitious plans to computerize schools, the establishment of public Internet access centres and general promotion of technological development. She describes Geographic Information Systems (GIS) as a technology that could be used by Egypt, and by other countries, to assist with natural resource management initiatives and enable increased public participation in decision-making. Finally, Sobeih offers a model and outlines specific policy suggestions to help realize Egypt's potential to use GIS technology to reach its sustainable development goals.



GIS can bolster a community development organization's efforts by enhancing decision-making, resource allocation, and strategic planning functions. In an age when knowledge is power, GIS can offer distinctive tools that enable an organization to gain an edge, provided the organization is willing to make the necessary investment of time and resources to develop a foundation in the GIS basics.



1

Introduction

Many countries are already using Geographic Information Systems (GIS) to plan and implement programs to promote sustainable socio-economic and environmental development. The technology, often called mapping software, can be used for a variety of purposes, including resource management, development planning, cartography, and route planning. For example, a GIS might allow emergency planners to easily calculate emergency response times in the event of a natural disaster or a GIS might be used to find wetlands that need protection from pollution.¹ In Egypt, many of the technical requirements for successful GIS-based development programs already exist, and the incentives to use these tools, especially in the areas of water management, natural resource preservation and public participation, are very strong. Egypt's major challenges in the successful use of GIS for meeting its sustainable development (SD) goals are twofold: first, Egypt has to build the capacity of its citizens, governments, communities and the private sector to use GIS tools; and second, it must increase access to the technologies required. This paper presents some examples of existing policies and practical programs being implemented and offers recommendations for further advancing the use of GIS for development in Egypt.

GIS technology can help in identifying gaps and disparities in service provision, and in drawing communities into the planning process. By helping create a sense of ownership, consensus, acknowledgment and transparency in the district level decision-making process, GIS can be the vehicle for creating a community's development potential.

In order to implement this technology effectively, Egypt needs policies that will support the development of human resources, acquisition of hardware and software, and building of institutional capacities. IT Clubs, community technology centres which already exist in over 700 locations in Egypt, present an opportunity to introduce GIS to communities and the general public. The IT Clubs can be used to provide basic natural resource management knowledge processed by GIS technology, a step that could lead to increased participation in public and private sector decision-making.

1 Wikipedia and Goodchild.

2

Research Methodology

The research entailed a literature review of Egyptian policy documents and international sources on participatory GIS, as well as a survey of practical projects in Egypt focusing on the use of IT for development. Further, consultations with technical experts, government officials, private sector employees involved in policy development and civil society members were undertaken through a survey questionnaire, informal meetings and a national workshop held in Alexandria in the summer of 2005.

The workshop, held in the Bibliotheca Alexandrina in conjunction with a public presentation of GIS and its potential for Egypt's development, included four thematic panels on cultural, economic, environmental and social aspects of sustainable development. It gathered 65 participants from different sectors: civil society associations, including Nahdaet AlMahrosa, The Friends of the Environment Association, Meshwar, Life Makers, Future Protector Association, Sustainable Development Association and others; international institutions, including The Anna Lindh Association, The ICT Trust Fund, the World Bank and UNDP; and academic participants from the Alexandria University, GIS professionals and representatives of Bibliotheca Alexandrina. In addition, government officials from the Alexandrian Municipality as well as the Ministry of Communications and Information Technology also attended. Finally, young people active in non-governmental organizations (NGOs), university initiatives and high school programs also contributed to the workshop. The recommendations from the workshop served as a basis for the recommendations for GIS applications in their respective thematic areas in this paper.

The "culture" panel stressed the need for practical solutions to meet the cultural needs of citizens through collaboration of "existing working forces"—business, government and private parties who have an interest in the development of GIS applications for cultural development. It also highlighted the need for further research so that cultural problems, or "bottlenecks" could be better described and understood. Illiteracy, IT illiteracy and the lack of awareness about environmental issues facing Egypt were given as examples of priority areas for focusing such research. Participants on the culture panel recommended that new projects and programs incorporating the use of GIS for cultural development be designed on the basis of these research recommendations, and results of evaluations of similar projects and programs in Egypt and elsewhere. The establishment of "IT Culture Clubs," envisioned as youth-led and volunteer-run initiatives, was proposed as a way to sustain continued development, implementation and improvement of these projects.

The panel examining economic aspects of sustainable development concentrated on production of "blueprints"—hardware and software solutions—to help establish and maintain procedures to encourage the preservation of Egypt's natural

resources. The panel's participants recommended that further work be conducted in order to account for potential economic impacts of environmental degradation in Egypt, and to implement control standards to minimize negative environmental impact of economic activities. Panel participants suggested three initiatives to be considered in the design of programs using GIS for economic development: one, a "Tourist Portal," a collection of interactive maps to be provided in airports and important tourist destinations that would help visitors find information about the different tourist attractions and about how to get there; two, a "Shopping Gateway," consisting of kiosks with interactive maps to be placed in markets and malls providing information about surrounding shops and other points of interest; and three, an "Info-Portal" that would inform members of civil society about the different governmental and non-governmental services available to them.

The group focusing on environmental awareness emphasized the need for increased availability of information to Egypt's citizens about their natural surroundings. The most important potential of GIS, according to them, is in "widening the horizons of civil society," allowing citizens to participate in decision-making in an informed and meaningful way and giving them some of the tools to recommend solutions for environmental crises. Their recommendations focused on developing the human resources in both the general public and public sector organization to build Egypt's capacity to use GIS, so that the country's sustainable development challenges can be better understood. Among specific initiatives suggested were an initiative to update information on rural and urban infrastructure availability and needs, a program to enhance networking of civil society organizations and individuals, and a project to gather and present information about Egypt's national resources through easily accessible means.

In general, the panel on social aspects made similar recommendations to those described above, and proposed the introduction of "GIS Screens" in sports and cultural centres, schools, universities, malls and government buildings, in order to provide data about available social services, youth activities and NGO operations in each neighbourhood, classified simply according to field of activity.

A theme running through the series of informal and formal interviews conducted for this paper is the lack of public awareness of the potential and demands of the IT market in Egypt. There is a perception among Egyptians that the IT sector remains weak despite the government's efforts to strengthen it. Numerous projects and programs, especially those aimed at engaging youth in the IT sector, seem to be met with little interest. Young people care mostly about employment issues, and their involvement in GIS research or other projects usually depends on the initiative's ability to create job opportunities. Youth respondents were the most vocal about the need to conduct evaluations and research supported by factual evidence, and to present results in terms of concrete proposals for change, instead of falling back into rhetorical debates which can be time consuming and inefficient.

The majority of interview respondents felt that Egypt could reap the most benefit from GIS technology by employing it to increase public participation. Egypt is already implementing GIS for several projects in this area, but most of these have yet to be evaluated. Their estimated impacts are positive, but participants called for publication of official reports of these projects so that they could be considered in the planning of future activities. One potential difficulty is that the use of GIS is still not widespread enough in Egypt to be seriously considered as a vehicle for increasing public participation.² Considering that the government encourages young people and civil society in general to get involved in the information society (IS) and to develop their skills,³ GIS access and education may be a strategic area for development of further capacity building programs in Egypt.

In the words of Abdallah Diwan, Community Development Coordinator of Egypt's ICT Trust Fund,

“GIS is considered to be one of the most important tools for increased public participation and development that offers new socio-economic development opportunities. It can encourage human resource development within the country, facilitate the participation of youth in public life, help provide an analytic and scientific understanding of development issues, and much more. Our generation is [lucky to have the potential to benefit from] such technology, and we should be encouraged to make use of it.”⁴

Informal interview respondents and workshop participants recommended presenting, in detail, successful models of participatory GIS projects, and exploring in more detail, through a survey, what people know about the information society, sustainable development and GIS.

A running theme heard in these consultations is that the social aspects of sustainable development and, more specifically, the issue of unemployment among young people should be considered in all policy planning. The question of unemployment continues to dominate all discussions around environmental protection, the development of an information society and the use of GIS in Egypt.

2 Mr. Hany Eskandar (Strategy and Planning Officer in the Ministry of Communications & Information Technology).

3 Dr. Nayer Wanas (ICT for Development Consultant - ICT Fund - MCIT, Egypt).
Mr. Sherif El-Tokali (Information and Communication Specialist in the UNDP, Egypt).

4 Personal conversation.

3

Logical Framework

The Egyptian government is adopting a vision to use information and its underlying technologies to advance sustainable human development. This vision is currently being integrated into the current activities of the Ministry of Communication and Information Technology (MCIT), which strives to:

- a) increase employment opportunities in the communications and information technology sectors through collaboration with the other ministries;
- b) build an information society able to absorb and benefit from the expanding sources of information; and
- c) foster poverty eradication initiatives.

This vision also focuses on advocating the adoption of sustainable human development policies and supporting operational activities that demonstrate ways to create jobs and techniques that protect the environment and promote sound governance, with special emphasis on the needs of underprivileged people.

But none of these targets can be reached easily, unless Egypt becomes a knowledge-based society capable of building communication and participation channels among all levels, towards its regional, national and local priorities while ensuring transparency in decision-making, enhancing public participation and empowering less privileged groups in society to create meaningful change in their lives.

With this in mind, this paper argues that GIS can be used effectively to help fulfil two sustainable development objectives in Egypt: first, to monitor and manage the use of natural resources, and second, to increase public participation and strengthen governance around natural resource management.

In addition to making the case for improved natural resource management and public participation through the use of GIS, the paper examines opportunities for coordinating Egypt's IS and SD policies around GIS-related dialogue between these two policy communities. In particular, it focuses on the lack of awareness of GIS technology and its potential; the lack of access to GIS tools within communities as well as within the government; the lack of training and capacity building opportunities; and the challenge of focusing IT resources on promoting and enabling GIS use for Egypt's sustainable development. Finally, it gives some practical recommendations for dealing with these issues. The paper is limited in scope and in no way presents a comprehensive overview of the potential for GIS application in Egypt. It aims to serve as a discussion piece among decision-makers and community members, with the hope that further examinations of the topic will follow.

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The Current IS and Sustainable Development Policy Landscape

Egypt faces many environmental challenges. Protecting the country's natural resources and regenerating those resources which have suffered degradation stand as important features of the country's sustainable development goals along with the campaign to help the poor. Collaborative efforts of the Ministry of State for Environmental Affairs and the Ministry of Information and Communication Technologies have focused on building the country's capacities to manage human and environmental resources and to enable Egypt to meet its obligations to international conventions and treaties. Egypt's environmental strategy focuses on the following areas:

1. **Climate Change:** The government's official aim is to promote renewable energy technologies, efficient lighting systems and energy conservation techniques, and to encourage Clean Development Mechanism activities, including the introduction of fuel cells and electric buses.
2. **Biodiversity:** Egypt's goal is to conserve medicinal plants and natural wetlands.
3. **International Waters:** The government has developed initiatives aimed at protecting groundwater and international surface waters from pollution and has demonstrated the use of low-cost techniques for wastewater treatment through a pilot project on Lake Manzala.
4. **Capacity Building:** Through what are called "featured projects," a national strategy is being planned to give every individual, business and community the opportunity to harness the benefits of the new information society.

Since the establishment of the Ministry of Communication and Information Technology (MCIT) in 1999, considerable progress toward meeting announced goals and plans has been made. MCIT has taken upon itself to build the Egyptian information society and work towards bridging the digital divide. In the next few years, it is expected that the ministry will have composed a comprehensive framework to lay the foundations for the Egyptian information society. This framework is to replace the ICT national plan which has achieved many of its objectives: the telecommunications infrastructure in Egypt has been developed and expanded; hundreds of information centres have been established; an expanded pool of IT skilled labour has been created; and information systems and databases have been established among governmental and private entities. In addition, the country's access to ICTs and connectivity has been strengthened and some automated government services have been made available online. Numerous projects have also been implemented with a range of development-related goals, including fostering local content and applications; providing improved e-government services for citizens; improving the education system and health services; and promoting Egypt's cultural identity through digital documentation and dissemination of the country's cultural and natural heritage.

5

GIS as an Opportunity for Coordinating Egypt's IS and SD Policies

Two key issues for advancing Egypt's sustainable development goals include increasing public participation in decision-making and improving the management of Egypt's natural resources, especially its waters. Geographic Information Systems, or GIS for short, could prove to be one of the most important technological tools Egypt can employ in order to tackle these issues.

5.1 What is GIS?

A GIS is a system for managing spatial data. In the strictest sense, it is a computer system capable of integrating, storing, editing, analyzing and displaying geographically-referenced information. In a more generic sense, GIS is a "smart map" tool that allows users to create interactive queries, analyze spatial information and edit data.

During the 1960s and 1970s, people recognized the need to assess the earth's surface in an integrated way according to the independent aspects of the earth's surface. They used a certain technique of overlaying transparent copies of resource maps on light tables and looked for places where the various attributes on the maps coincided.

The computer map-making and other related areas, such as soil science, surveying, photogrammetry and remote sensing, developed side by side in the late 1970s. At first, this evolution did not produce much until systems evolved, experience grew and geographic information systems emerged.

The early 1980s witnessed the expansion of GIS. Nowadays, GIS is widely recognized by public agencies, research laboratories, academic institutions, private industry and public utilities as a useful tool for supporting urban and provincial resource planning and management.

5.2 GIS components

Components of a GIS include more than just computer technology. GIS is an integrated system of users, data, hardware and software. Data tend to be at the centre of any GIS system, while the computer components of the system support data management and analysis.

The most essential component of a useful GIS is people. In order to analyze locally-generated data, Egypt needs individuals with technical expertise as well as knowledge of the national and local contexts in which she or he operates. Therefore, Egypt needs to develop its own capabilities in GIS and related technologies. The need for local expertise is recognized by international agencies such as the Food and Agriculture Organization (FAO), which encourages countries to develop

their own capabilities in GIS and related technologies in order to provide technical expertise at the national level.

5.3 GIS, Egypt's natural resources and public participation in decision-making

Egypt has a fast-growing population whose basic needs are met principally from the natural resources of the river Nile, its floodplain and delta. The growing pressure on water resources obliges the country to re-use drainage water for irrigation and industrial purposes. The water finally drained into the complex of coastal lagoons, or into the sea, is of low quality.

Water is a constant preoccupation at the national level, given also that it affects—and is affected (directly and indirectly) by—all other elements in the country. To effectively deal with this vital resource, extensive networking and close collaboration between all levels/parties in the country are necessary. This includes the public and private sectors gathering all efforts in order to create a common vision to build an influential information society capable of reaching sustainable development goals.

The special importance of water for Egypt makes it a good example of an area where GIS could be used to advance the country's sustainable development goals. For instance, GIS can be used in decision support systems to help execute specific interventions in water, foster environmental protection and encourage cultural heritage conservation among communities at all levels in Egypt. GIS can also be employed to increase public participation in decision-making. For Egypt, participatory GIS presents an opportunity to increase monitoring of water resources and fisheries by local communities.

Enabling citizens to better understand environmental problems facing their communities and to critically evaluate proposed solutions is the first step in increasing public participation at all levels. Technology in general, and GIS in particular, presents the possibility for public empowerment and awareness-raising about environmental problems in local communities. GIS is also an important teaching technique in university geography departments, but there remains a need to increase access to training and GIS technology itself among the general public.

6

Examples of Current GIS Use in Egypt

The Egyptian government has designed a number of useful GIS-based applications in different sectors throughout the country, however, the use of GIS is still limited and GIS remains, to a large extent, a technology restricted to the public sector and academia, unknown to the majority of the public. At present, no dedicated department or unit for GIS exists in any ministry or branch of government, save for a few experts and employees who are working under the umbrella of specific projects adopted by the government. Nonetheless, it is important to recognize that the Egyptian government has drawn on GIS technology in a number of promising projects, including the following examples:

6.1 GIS for capacity building

The following three projects have a focus on building the country's human resource capacities.

1. MCIT's GIS effort

MCIT has set up a geographical information system (GIS) workgroup to develop plans and coordinate efforts with the Egyptian GIS community to introduce GIS projects in various business sectors, such as telecommunications, the postal system and others. The workgroup's strategy is to promote the role of the private sector, utilize existing GIS investments and efforts, adopt worldwide GIS standards, and create synergy and cooperation among all Egyptian GIS stakeholders.

2. The Educational Buildings Project

Eleven years ago, the Ministry of Education initiated a project to develop GIS that would provide information on the status of educational buildings. The system today includes 360,000 photographs and more than four million registers including details about educational buildings and suppliers. The system consists of a primary layer of basic statistical data, including demographic data on gender, age, administrative division, geographical area and level of education; and a secondary layer of information and databases, including school maps, quality control, electronic archiving and more. A third layer includes applications related to procedural interactions including project monitoring, specialized programs analyzing the buildings' requirements, planning for students and class scheduling. A final layer of programs is based on a geotechnical system that supports top-level decision-making and includes applications to help determine prime construction locations and underserved areas and needed facilities. This matrix has improved the planning of educational buildings and allowed decision-makers to respond properly to urgent budget situations, transactions with suppliers, and even natural catastrophes.

3. The CAPMAS GIS

The Central Agency for Public Mobilization and Statistics (CAPMAS) developed a system that covers five governorates through a computer network. It enables the governorates to more easily engage in various planning and monitoring operations. The program provides maps for collecting census data and conducting surveys; establishes a territorial GIS for governorates; and provides training on both geographical information and communications systems.

It is worth mentioning here that most of projects of this nature are still undergoing construction and evaluation. In other words, their impacts have not been tested yet nor have their services yet reached the level required to make them interesting for the general public. Without a doubt, establishing further projects and programs with no evaluation of the ones currently implemented can be dangerous. The local communities and the next generations need accurate documentation, reports and analytical evaluations of all plans and projects in order to work towards goals of sustainability. In fact, exact lessons about the real needs of their communities, are necessary to build on the current programs and plans.

6.2 GIS for natural resource management

The following two projects adopted by the Egyptian government with the collaboration of international institutions and other countries focus specifically on natural resources management.

1. Egyptian Italian Environmental Cooperation Program (EIECP), Phase II

Led in partnership with the United Nations Development Programme (Egypt), this project aims to strengthen the capacity of national and local institutions and organizations to effectively manage water resources through a fully-tested decision support system (DSS).

In particular, it supports the National Water Research Centre's work to implement GIS in the design, testing and networking databases to enable public and private sectors and client agencies and organizations access to the available data.

Policy implication

The absence of an institutionalized system to monitor and assess the use of scarce water resources presents a major challenge for successfully using GIS in Egypt. There is a need to design sound water-use policies, so that a system for efficient water management can be built.

2. The MELMARINA Project: Making management tools for aquatic resources in North Africa

The overall objective of the project is the development of a lagoonal ecosystem monitoring mechanism which combines field surveys, long-term monitoring

through field instrumentation and remote sensing with hydraulic/ecological modelling. More specifically, it aims to:

1. develop early warning tools and decision support systems that examine the environmental equilibria between the aquatic resources of specific coastal and inland lagoonal areas;
2. establish and evaluate long-term research on monitoring, measuring and modelling sustainable development in the coastal lagoonal areas;
3. assess and model the impact of human activities on water availability, distribution and quality;
4. promote commonality in research methodology through information exchange and by instigating training programs for young scientists at North African partner institutions in specialist areas of aquatic resource monitoring and modelling; and
5. forge active links with other international and national bodies concerned with management of aquatic (especially lagoonal) resources and to exploit further the results of the project by widely disseminating results.

Two related projects, in Morocco and Tunisia, are also being implemented. Many North African coastal lagoons are severely degraded, yet some remain high value aquatic ecosystems that are important as natural resources for local human populations and contribute substantially to regional biodiversity. North Africa's lagoons are all impacted by a variety of environmental change processes, but human activities have had the greatest effect during the 20th century. Pressures resulting from these activities are set to continue and in many cases increase throughout the 21st century.

Policy implication

Environmental monitoring within North Africa's aquatic ecosystems is inadequate and management planning and policies are poorly supported by relevant scientific information. Policies need to support the development of lagoonal ecosystem monitoring (through field surveys and long-term monitoring through field instrumentation and remote sensing) and its integration within hydraulic/ecological modelling.

While the projects described above seem to be having a positive overall impact, it is important to stress once again that evaluating their efficiency in the development context should be a primary concern of all of the projects' stakeholders. More specifically, we should be aware of whether projects have been able to meet their internally-set targets such as, for example, increasing public awareness of environmental management needs and increasing the capacity of Egyptian citizens to effectively employ GIS.

Integrating IS and SD Policies

In 1996, the framework program for developing a national Integrated Coastal Zone Management (ICZM) plan for Egypt was prepared; it addressed the main issues confronting the coastal zone and water. During the last few years, the short-term objectives of the framework were achieved, and now the medium-term projects of the framework are being implemented:

- In 1996–1999, a project for preparing an ICZM plan for the Egyptian Red Sea Coastal region was carried out and it was financed by Global Environment Facility (GEF).
- In 1997–1998, the National Oil Spill Contingency Plan (NOSOP) was updated.
- In 1998, the NOSOP was included and presented to all involved authorities. Its mandate extended to include marine pollution emergencies.
- In 1997, a continuous Environmental Integrated Management Program (EIMP) was established to monitor the air and marine environment at the background and ambient levels.
- Inspection of industrial land-based sources of marine pollution is an ongoing process implemented in collaboration between the Central Unit for Industrial Inspection and Compliance and the EEAA Regional Branches and Laboratories.
- Finally, the EEAA implements all programs and projects in southern Sinai and the Red Sea protectorates, as they are typical marine parks. All are aiming to protect the existing ecosystems and enable rehabilitation of the damaged ecosystems.

Besides the previously mentioned programs and projects, a set of information sharing mechanisms have been adopted by the government, including the following.

Capacity-Building, Education, Training and Awareness-Raising: In 2000–2001, training of EEAA staff and other stakeholders on environmental management, risk assessment, identification monitoring and inspection was carried out. An emphasis was placed on the marine environment as a common interest to multiple stakeholders; for this purpose, seminars and training courses introducing the Environmental Impact Assessment (EIA) methodologies were offered to the tourism industry, domestic and foreign investors, private corporations and banks and, not least of all, government agencies.

Information Collection: Information and its availability is a crucial issue in environmental management. In response to the need for an advanced information system, EEAA has established a mechanism to collect data from different projects such as EIMP, NOSOP and GEF.

Research: Cooperation and coordination in the field of environmental research and technology are encouraged by EEAA. Universities, research institutes and leading governmental laboratories are integral parts of EEAA's research facilities. For instance, research in the field of mitigation of the impact of oil spills on the coastal and marine environment is carried out by local and international universities.

Financing: Financing coastal zone and marine activities is managed by EEAA through the Egyptian Environmental Fund, the recurrent budget and the investment budget. Some of the activities are jointly financed by donors and the Egyptian government.

Cooperation: Egypt is party to 30 global and regional treaties, conventions and other agreements relating to the marine and other aspects of the environment. Two sub-regional agreements also exist with neighbouring countries to cooperate and react collectively in case of marine pollution causality. Egypt sees itself to be very much part of the "global alliance," striving to balance the needs of conservation with the needs of development.

According to Tarek Kamel, Egyptian Minister of Communications and Information Technology,

"The Ministry [...] has two strategic objectives. The first is related to the spread of ICT tools nation wide, while the other focuses on the foundation of an export oriented ICT industry. The latter can be only achieved through joining forces with the private sector. We depend on out sourcing and all initiatives are implemented through public private partnerships. The ministry, for its part, triggers initiatives, formulates strategies, determines policies, stipulates regulation and gets stakeholders together."⁵

On the other hand, the Egyptian Environment Affairs Agency (EEAA) is rebuilding its infrastructure in part through the use of the *Egyptian Environmental Information System*. The Agency is collecting and classifying environmental data; conducting studies; documenting reports, especially regarding socio-environmental situations; helping in the preparation of policies and plans to rationalize decision-making; and monitoring its own use of information technology (both the hardware and software).

In collaboration, the Ministry of Communication and Technology, the UNDP and the EEAA have published a report of achievements in progress toward building a sustainable information society in Egypt. It mentions the following achievements:

- The EEAA's Web site, <http://www.eeaa.gov.eg>
- CEDARE Environmental Information Systems,⁶ including the development of:

5 Egypt's Information Society, MCIT, 2005.

6 *Ibid.*

1. Remote Sensing Data Systems covering the Red Sea and Gulf of Aden
 2. Red Sea and Gulf of Aden Marine Turtles Information System
 3. Red Sea and Gulf of Aden Birds Information Systems
 4. Nubian Aquifer Regional Information System (NARIS)
 5. Admiralty Charts Covering the Red Sea and Gulf of Aden Region
 6. Red Sea and Gulf of Aden living Marine Resources Modelling Software
 7. Alexandria Solid Wastes Complaints Tracking Information System
 8. North Africa Environmental Web Portal
-

Policy implication

Although ensuring access to these resources and the information contained within them is not in itself a guarantee of positive impacts on the local communities and their progress toward sustainable development, it is a first necessary step.

Such initiatives improve the implementation of public awareness and help build a knowledge-based society, provided that information about them is accessible to the public.

8

Opportunities for Using GIS in Egypt

GIS can be applied in terms of the questions the users want answered. It is set to survey the potential users to determine their information needs, and to identify those needs that can best be met by GIS incorporating various combinations of data retrieval and transformation. The crucial usage of GIS is based on its capacity for modelling: constructing models of the real world from digital databases, and using these models to simulate the effect of a specific process over time for a given scenario. For example, continentally, topography maps can be joined with hydrologic maps and climate data to produce maps of land suitability for various types or intensities of use, or specific crops. Demographic and administrative data can be added to provide projections of future supply-and-demand scenarios by region or country.

The Egyptian environment is quite fertile; however, the effort to preserve it faces numerous obstacles imposed by a lack of appropriate information systems and multidisciplinary expertise required for environmental management. Further, the conceptual understanding of, and plans for, practically addressing the links among environment, demography, economics and society, still need to be developed.⁷

Transparent decision-making in Egypt, as elsewhere, can be obstructed by a lack of public participation, caused by a perceived, or real, lack of knowledge which would allow the public to join in debates and decision making. According to Brian Carnahan:

“GIS can bolster a community development organization’s efforts by enhancing decision-making, resource allocation, and strategic planning functions. In an age when knowledge is power, GIS can offer distinctive tools that enable an organization to gain an edge, provided the organization is willing to make the necessary investment of time and resources to develop a foundation in the GIS basics.”⁸

A practical suggestion for the use of GIS in Egypt is through community-based IT Clubs.

IT Clubs: An opportunity to further GIS use in Egypt

There are a number of issues with GIS technology that need to be addressed for it to be successfully implemented as a tool for increasing public participation in natural resource management. First, although GIS is becoming more accessible and affordable, there is still a severe lack of awareness among the public about the technology and its potential. Second, while the level access to GIS tools varies, it

7 UNESCO; Dominique Roger. Egypt.

8 Carnahan, Brian. September/October, 2000. “Geographic Information Systems,” Shelterforce.

is generally low even in government departments, and let alone in local communities. Third, there is a serious deficiency in training and capacity building opportunities that would allow local communities, the public sector and business professionals to acquire the necessary know-how in order to effectively use GIS. These three deficiencies could be tackled through an expansion of the objectives of an existing initiative in Egypt that aims to introduce technology centres, or IT Clubs, to communities throughout the country.

IT Clubs are meant to serve the general public and local communities and to provide spaces for linking environmental, economic, and social issues in a sustainable manner. The term “IT Clubs” describes centres, currently in an expanding number of urban and sub-urban locations, where citizens can access the Internet, computer training and other services. Egypt is probably one of the first few countries, together with Peru and Estonia, to have launched community IT Clubs *en masse* for the general public.⁹

As The Ministry of Communication and Information Technology (MCIT) is directing considerable resources in the creation and expansion of such centres, it seems logical to integrate GIS into the project instead of creating new infrastructure for the use of GIS by the general public and local communities.

Each IT Club is situated in at least 50 sq metres of space, complete with rest-rooms, air conditioning, lighting and safe, modern electrical installations. Each club provides Internet access for just one Egyptian Pound (about US\$0.16) per hour. In each club, an instructor is available to train new users in basic keyboard skills, software applications and Web design. Each club provides its services for anyone, including local businesses, wishing to develop business material, work on spreadsheets and presentations, or even embark on their own e-commerce ventures. They can provide a great chance for students to do research electronically.

To the citizen, however, the centres may have much more relevance if a common thread of information content links them. To this end, an initiative to establish an Internet portal or, in other words, a common entry point to information related to issues important to the citizen, would assist her or him in the pursuit and development of additional socio-economic opportunities. The portal would sit at the core of the IT Clubs initiative, and constitute the content/information backbone of the system. The type of information presented, and the links to socio-economic, rural and development organizations will be mainly related to the following sample areas (however, an assessment survey may point to additional requirements which are likely to change over time):

Local Information, specific to the IT Club in each locality and provided by the managers of each IT Club: This will include local and regional events, local job opportunities, local news, etc. Moreover, managers of

⁹ For further information, consult the Egypt ICT Trust Fund's site: http://www.ictfund.org.eg/index.php?option=com_frontpage&Itemid=1&lang=

And the MCIT's site: <http://www.mcit.gov.eg/>, and the UNDP: <http://www.undp.org.eg/>

each IT Club will keep in touch with each other and exchange information, on behalf of their constituents, in an effort to create an active IT Clubs Network.

News Section, compiled daily in partnerships with development agencies. It will ensure that important development information will effectively reach citizens in rural areas. The news section may also include specific items of time-sensitive information such as daily commodity prices.

Food Security Area, developed in partnership with the Ministry of Agriculture and the Food and Agriculture Organization. It will include agricultural information, including prices, market information, weather warnings, education courses, advisory services, etc.

Employment Opportunities, provided by the project initially, then outsourced. This section will be provided in partnership with relevant government ministries, the Social Fund for Development, etc. It will include government and private sector vacancies, tele-working, small and medium enterprise financing, guidelines related to small loans and micro-financing, application forms and skills-building courseware. At a later stage, e-commerce, e-trade and related online opportunities may be developed.

Law, Rights and Social Services, provided by the project at a national level, by government administration at governorate level and in partnership with NGOs and Civil Society Organizations: This will include local and national government information, family-related legal information, National Council of Women information, legal assistance services, application for identifications such as a driver's licence, forms and guidelines.

Health, provided in partnership with the Ministry of Health, WHO, UNICEF and local authorities: This will include information about community health services, tele-medicine and diagnostic services for doctors (receiving end), health allowances (insurance), labour disability compensations, immunization campaigns, infectious diseases campaigns (HIV/AIDS, TB, etc.), water and sanitation.

Education, in partnership with the Ministry of Education and Higher Learning and UNESCO: this will include online literacy courseware, school curricula and skills and vocational training materials.

Environment, which will include information about environmental protection, incentives, water provision and river waterways.

The above information is supposed to be available as the default browser screen at each IT Club, and provided as a constantly updated service. Specific areas may be kept available for local content customization to increase exposure to local

services and opportunities. Other areas may include classified advertising, auctions, free e-mail offerings, etc.

When properly maintained and updated, the Community Development Portal may become the single most important factor in the overall success and acceptance of the IT Clubs in Egypt.¹⁰ And the feasible mechanism and technology to facilitate the role of IT Clubs in empowering the public participation and create new opportunities and open new gates for the local communities is the GIS.

According to all indications, Egypt has all the necessary facilities for such projects, but the main problem is in evaluating all these plans. Without evaluation, it's impossible to estimate progress and assess successes and failures. Many of the respondents in the interviews I conducted focused on this point.¹¹

GIS can be integrated with other multimedia technology, making it possible to present information in user-friendly formats. The IT Clubs could be provided with "edutainment" (entertainment and education) tools for different contexts in order to encourage participation among all levels.¹² The key value of combining GIS data with IT Clubs is allowing communities to use GIS tools. The efficiency of GIS as an educational and entertainment tool has been recognized by various GIS experts, based on the successful experiences with the public regarding its use in many fields. One of those experts, Michael Clarke, from the Buffalo Local Initiatives Support Corporation (LISC), describes his experience this way:

"By looking at the maps we created, people got a sense of the connections. They could see why certain areas were targeted [through a community planning process] as places to build housing, playgrounds, or community gardens. They could see the big picture and why certain things made sense. They also saw that there were nonprofits in the neighbourhood 10 blocks from where they live that have after school programs for their kids."¹³

In addition to the IT Clubs, Egypt has instituted several "Smart" schools which offer computer lab-based tutorials and mobile units to close the gaps in locations which are still out-of-reach to IT Clubs, and which also provide a movable platform for training. These information points could be used in a similar way to enable communities to benefit from GIS technologies.

10 Evaluation unavailable as Egypt is still taking the first steps with IT Clubs in the GIS era.

11 See Research Methodology Section.

12 (for example see: "Writing and reading a mouse click away," a project for UNDP, Egypt and Mobile IT Club: http://www.ictfund.org.eg/index.php?option=com_content&task=view&id=23&Itemid=44&lang).

13 Interview conducted as part of the research for this study.

9 Conclusion

The most important recommendation for policy development is to promote the use of GIS in decision-making and enhance opportunities for the public to use GIS to contribute to decision-making. A necessary component of development lies in strengthening democracy by empowering local communities. While Egypt seems to be heading down such a path, it seems to be suffering from a kind of nervousness about what lies ahead.

Building a participatory information system (PIS) needs a management information system with a geographic information system interface. PIS can be used to collect data on distribution of public services with area- and household-level data. These data, once processed, can be used by local government decision-makers to help in planning, implementing, managing and monitoring public sector development activities at district level. The collected data from communities can be disaggregated according to gender, educational level, occupation, as well as according to access to schools, water and health facilities. The GIS interface can be used to present data not only to government officials, but also to communities with the intention of making them aware of community strengths, weaknesses and development potentials and priorities. The GIS can also be used to overlay data on water courses, roads, settlements, forests, cultivation, power and communications infrastructure.¹⁴ One can imagine the numerous utilities if this knowledge reaches the public through, for example, the mass media.

A vital point emerges here, that of transparency. One cannot talk about public participation and GIS if an environment of mistrust exists between local communities and the policy-makers. Further, questions of equity (in access, training, etc.), efficient information exchange, and appropriate delivery mechanisms must be considered in any planning for the introduction of GIS for public use.

Knowing the results and impacts of current projects is critical for making GIS tools effective for achieving Egypt's sustainable development goals. Evaluating existing projects, such as the ones described in this paper, would present an excellent opportunity to inform the further development of sustainable development and ICT policy in Egypt. The necessary evaluations can be carried out in cooperation among governments, communities and local and international NGOs.

Using GIS to increase public participation in decision-making, particularly in the areas of environmental monitoring and natural resource management, has great potential for Egypt. This is especially true because many of the prerequisites for making participatory GIS a reality have already been put into place: the telecommunications infrastructure has been modernized with a reliable, fast and developed core backbone, telecom and Internet services have been expanded, and

14 Muhammed Usman Qazi, E-Government for Development: <http://www.egov4dev.org/balochistan.htm>

general ICT awareness has greatly been improved by IT Clubs. In fact, Egypt may be in a position to develop and test a framework for implementing participatory GIS in other countries in the region, and beyond.

Policy implication

A number of specific objectives could be more easily achieved through the use of GIS. Drafting information society and sustainable development policies should be done with the following objectives in mind:

- institutionalizing effective coastal resource planning and management in Egypt through a fully-tested decision support system (DSS);
 - creating or enhancing the exchange structures for the management of coastal resources through; establishment of inter-institutional coordination mechanisms for projects undertaken at the local and national levels;
 - developing demonstration activities at the most significant sites;
 - awareness-raising, training and networking of various demographic groups and key social and economic actors as well as establishing link-ages between them not only in Egypt but around the Mediterranean basin as well;
 - strengthening mechanisms for participatory planning at the local community level, by way of enabling local communities and civil society organizations to participate in information gathering, analysis, decision-making and enforcement;
 - strengthening the administrative capacity of local government; and
 - presenting a proposal for an Egyptian model for a sustainable information society, with a focus on creating public awareness among the Alexandrian community to fully realize the benefits of better integration of fisheries and agriculture with the rest of the economy.
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Conclusion

Information and communication technologies, like other tools, are not essentially or inherently good, or bad. They can, however, have positive as well as negative effects on development: they can narrow—or widen—gender gaps in employment; they can help reduce environmental strain, but can, and do, create additional damage through ICT-related waste; and they can help rectify, but also contribute to, problems associated with regional inequities.

This dual nature of ICTs, and the increased reliance on knowledge and information in general, have put the intersection of information society and sustainable development at the forefront of national policy-making. Many countries are currently developing information society strategies and looking to research institutions, the business community, other countries and international processes, such as the WSIS, for guidance. Until recently, however, few approaches have focused on harmonizing the visions of the emerging information society with the principles and priorities articulated by the United Nations' Millennium Development Goals (MDGs) and the World Summit on Sustainable Development. The reason for this, in part, is that the information society and sustainable development communities have each used different vocabularies and processes for determining national priorities. Information society specialists within governments have primarily been drawn from the fields of telecommunications and economic development and tend to work in ministries of telecommunications. Sustainable development specialists come from a range of social and natural science backgrounds and typically work in environment ministries.

The crafting of national information society policies is an excellent chance for crossing this, primarily operational, gap between the IS and SD policy communities and for enabling the transition to sustainable development. By presenting a number of national case studies, *A Developing Connection* articulates:

- national visions, based on various frameworks for understanding the linkages between the information society and sustainable development;
- explorations of national efforts and initiatives to realize this vision; and
- examinations of policy changes which might catalyze greater benefits of ICTs in the future.

In order to ensure that the research undertaken has impact on the policy process, the young researchers endeavoured to identify and engage in dialogue key national stakeholders and institutions for influencing relevant policy development in the realms of the information society and sustainable development. In most cases, the meetings and workshops organized by the researchers presented a rare opportunity for policy-makers from these two policy communities to meet and talk.

Through the *Information Society and Sustainable Development: Next Generation Policy Directions* research study which led to the publication of this book, we sought to engage developing country researchers and policy-makers in national

and international dialogues on the information society and sustainable development. We also attempted to identify and investigate priority areas for national policy and program development at the convergence of sustainable development and the information society. Finally, we hope that the young researchers from Brazil, Costa Rica, Egypt, India, Kenya and South Africa have built their capacity and confidence to undertake applied policy research and analysis on harnessing the information society to achieve national sustainable development priorities.

In other words, it was through the process of creating this book, as well as through its content, that we hope to have contributed to developing a connection between information society and sustainable development policy spheres.