



A USER'S GUIDE TO GIS

Geographic Information Systems (GIS) technology is not a tool for doing business as usual; it could revolutionize the management of human and material resources in the developing world. To realize its benefits, individuals and institutions must be open to change in the ways they collect, process, handle, and disseminate information. They must be willing to rethink the purpose and structure of their organizations. For those that are innovative and capable of mastering the technology, the potential of GIS is virtually limitless.

GIS technology, however, is widely misunderstood in the developing world. Exposure to GIS is frequently limited to dated technical journals or the occasional visit from a travelling sales agent peddling computer equipment. Moreover, individuals in the South charged with introducing GIS often overestimate their organizations' readiness to use the technology and underestimate the time and effort needed for its successful and sustainable implementation. The same is true for international GIS consultants, who rarely have prior experience with adapting the technology to conditions in the developing world.

What must a developing nation know to set up a GIS successfully? Practically, a geographical information system is nothing more than a set of software tools designed for managing, analyzing, and displaying the contents of a database. The data is geocoded, meaning that selected elements are assigned unique identifiers that relate to their physical location on the earth's surface. In the case of Egypt's Water Resource Management GIS (WRMGIS), data that has been geocoded includes the location of rivers, roads, bridges, wells, and irrigation systems.

A knowledge of mapping, and to a lesser extent of surveying, is required to use GIS successfully. It is more important, however, to have a thorough knowledge of the task to which GIS technology will be applied. An in-depth understanding of irrigation management in Egypt was essential to the development of the system for WRMGIS.

The more expensive the system, the more complex the toolkit. Top-of-the-line GIS software is not for novices unless they have the time and money to become experts. Not every organization needs a deluxe GIS. For most, it makes sense to start with a simple system and develop staff expertise slowly and deliberately.

The successful implementation of GIS depends almost completely on the availability of people with a suitable educational background and practical skills who are interested in learning the technology. As few developing countries have a large pool of personnel who meet these requirements, the experts chosen to introduce GIS systems must provide appropriate training. (See box)

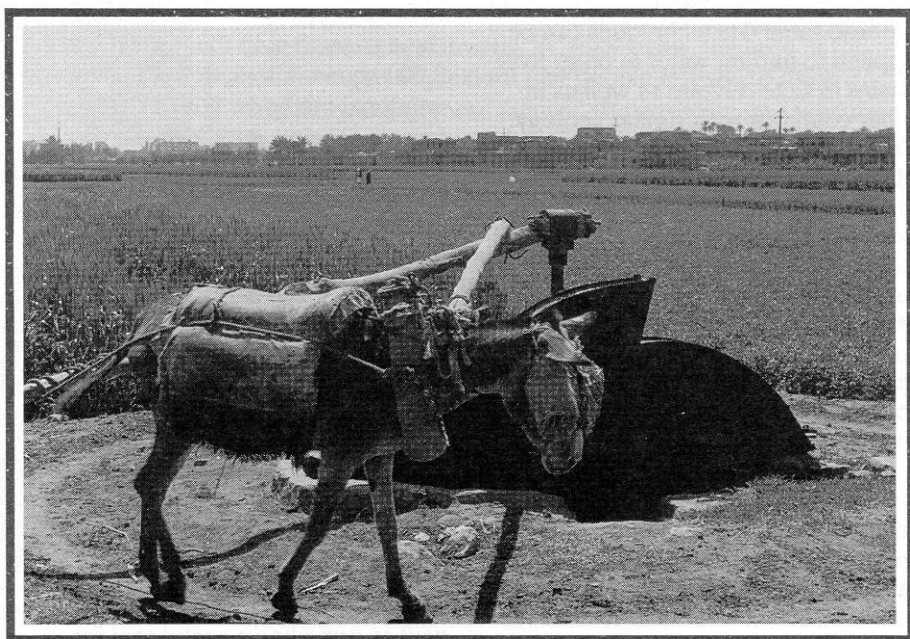
Anyone who has worked in a bureaucracy knows that the control

of information is the ultimate source of power. Government agencies in developing countries are highly bureaucratic and centralized. Any system that changes the approach to information collection, management, and dissemination will immediately be seen as a threat to the entrenched power holders.

As a result, GIS consultants working in developing countries frequently find their access to information barred or at least made very difficult and time-consuming. The task of introducing GIS technology to a developing nation is not for one who is easily frustrated or short on patience.

Conversely, implementing organizations must recognize that bureaucratic delays cost money. They must be prepared to run interference for their consultants by aggressively attacking organizational barriers and inertia. If they are not prepared to do so, they should abandon the idea of using GIS.

Although it is by no means a panacea for all that ails a developing country, prudently implemented, GIS technology offers a forward-looking nation many potential benefits. For example, a number of demonstration projects in Egypt have conclusively



In Egypt, new GIS technology is used in conjunction with traditional methods to help improve the management of water and other resources.

REPORTS

TIPS ON TRAINING

In assessing the qualifications of GIS consultants, agencies should pay close attention to proposed training programs. Consider the following:

- Does the program provide off-shore instruction for a few promising trainees? The long-range sustainability of a national GIS program needs people with advanced academic training.
- Has a provision been made for upgrading the skills of trainers? A GIS project must have the capability to train personnel as the need arises.
- Are the objectives of the training plan clearly spelled out? Are they realistic given your staff's current level of expertise? Be honest with yourself. Don't let personal or organizational pride cloud your judgement. You are far more likely to overestimate rather than underestimate the capability of your staff.
- Are the costs reasonable and can you afford them? Good training takes time and it is not cheap. New users of GIS technology grossly underestimate the time required to attain even a modest level in proficiency. Ten to 15% of your budget is not too much to spend on training.

In addition to training staff in the rudiments of GIS, a consultant must stress the importance of defining the

tasks for which the technology is being used. Management and users should participate in this definition process. To assist their clients, consultants should be able to address the following issues:

- A working GIS should be demonstrated. It does not have to be complex nor does it have to cover the specific applications of the implementing agency (although this would be more effective). It should be complete enough to enable potential users to imagine how they and their organization might profit from the introduction of GIS. Moreover, the inherent capability of all geographical information systems to respond to such routine inquiries as "how many (roads, bridges, trees, schools etc.) are within a certain area?" is frequently not understood or greeted with scepticism. A brief exposure to a working GIS will help beginners understand the technology's capabilities.
- GIS technology has introduced a new variable to information management — location. It makes possible the formulation of "what if" questions relating to the placement and movement of physical objects. Consultants should be prepared to explain and demonstrate this capability to potential users before asking them to define their requirements.

shown how geographical information systems could improve the country's ability to manage its land, water, and agricultural resources. GIS can help plan the scheduling of irrigation, assess the impact of pesticides on water quality, and determine the best places to plant rice. There is little doubt in the minds of those associated with these projects that GIS is a technical necessity for Egypt and its application should proceed immediately throughout a number of ministries.

Unfortunately, the wholesale implementation of GIS will cost millions of Egyptian pounds — money that is not available now nor in the foreseeable future. From a political and financial perspective, GIS technology is a luxury and will likely remain so for years. What then is Egypt to do?

At present, it must continue to rely on such organizations as IDRC, the German Agency for Technical Cooperation, and US Agency for International

Development to fund the development of GIS. Until now, these agencies have only been willing to finance demonstration projects. If GIS technology is to be introduced on a large scale, a way must be found to convince international development organizations that it is in Egypt's — and their — best interests to recognize that GIS is not a luxury but a necessity.

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