



## A SYSTEM FOR PLANNING AHEAD

**The potential use of Geographic Information Systems (GIS) for planning in India is enormous, given the large size of the country and the centralized nature of the decision-making process. The need for comprehensive repositories of data that can be integrated and analyzed together is essential.**

Among the best known GIS projects in India is the Natural Resources Database and Management System, supported by the Department of Science and Technology. A number of other government agencies have also used GIS, but most have focused on forestry, water resources, and wastelands.

Another GIS in India — the Bihar information system — is somewhat different. It is the only large GIS in the country that is not financially supported by the government directly or by any of its agencies. As such, access is not confined to government users; information generated by the Bihar GIS is open to anyone with an interest in the state.

Funded by IDRC, it is based at an undergraduate college. It has a staff of three — one faculty member and two research assistants. It is mainly concerned with producing spatial information of use to planners and administrators. Its databases therefore feature only a few “natural physical” items. Most of the data is concerned with physical infrastructure and with demographic, social, and economic features.

The Bihar GIS shows how an information system can help planners make space-related decisions. These may be simple exercises that involve the calculation of distances and areas or they could be more complex analyses that incorporate several variables. In some cases, planning decisions may prove impossible to make without a GIS. The following few examples illustrate the system's varied functions.



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Many children in Bihar, especially girls, are illiterate. The Bihar GIS, using data on enrolment and the number of schools, can identify districts where the ratio of boys' to girls' schools is greater than ten to one. Using this yardstick, the education department can determine which districts most urgently require girls' schools.

Rural services in Bihar are limited and highly localized. The GIS shows that villages that are not connected by paved roads are seldom chosen as locations for new services. Conversely, villages with better access to communication systems become enclaves of isolated development by being repeatedly selected as service centres. For example, bank branches in one district are always located within five kilometres of paved roads and railways. Rural telephone exchanges in another district are only found in villages linked by paved roads.

Similarly, development bypasses many towns that are not part of a regional communications network. GIS techniques can establish which

towns are poorly connected by locating all those that are not within five kilometres of a paved highway or railway station. One-tenth of the towns in Bihar fall into this category. Planners can employ this GIS-generated information constructively to ensure balanced regional development.

A final example of how GIS can be used for planning in Bihar relates to India's New Industrial Policy of 1991. The policy states that new manufacturing units cannot be located within 10 kilometres of cities with more than 100,000 inhabitants. There is only one city in Bihar, along with its satellite towns and urban outgrowths, that has a population of 100,000. The GIS helped delineate the city's outer limit and defined the 10-kilometre zone from which new industrial units were excluded.

Although the Bihar GIS illustrates the many functions of an information system, it is also useful to highlight some of the capabilities of a GIS applied on a wider scale. Planners often require that one set of data be overlaid with another in order to find associations between variables. They

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also need to identify patterns and exceptional situations. For example, a planner may wish to see whether poor hygiene conditions and inadequate drainage are associated with areas infected by a particular disease. But in many parts of India, maps are not available on a uniform scale. Under these circumstances, a GIS can integrate data from maps of different scales and even from satellite images to get a picture of the area under study.

GIS is not only important in the process of spatial planning but also at the level of monitoring and physically evaluating development programs. In India, such evaluations are usually done on the basis of financial allocations and expenditures. A GIS could incorporate factors such as the creation of physical assets and their maintenance into evaluation procedures.

More specifically, a GIS can help study the effectiveness of the public distribution system for subsidized grains, sugar, cooking oil, and kerosene. These commodities are distributed through "fair price ration" shops, which are found in villages and towns throughout the country. A large section of the population cannot afford to pay full-market prices so the smooth flow of subsidized goods to these shops, which number in the millions, is essential. A GIS provides a good way to regulate the flow of these commodities from warehouses to retail ration shops. By identifying shops where there is a greater or reduced demand for particular goods, prompt delivery and better availability of goods can be assured.

Geographic information systems are clearly valuable tools for planners and administrators. But widespread use of the technology in India faces several

obstacles. The process of establishing the Bihar GIS serves to highlight some of these difficulties along with certain characteristics of the information environment in India. These findings are as important as the results derived from the analysis of data on Bihar.

Much stress is placed on developing and acquiring GIS hardware and software in India. The equipment and software packages are generally imported and they are expensive. This is a major problem in a country where import duties are high and access to foreign currency is restricted. Moreover, replacement of hardware parts can take months because few servicing agents stock components.

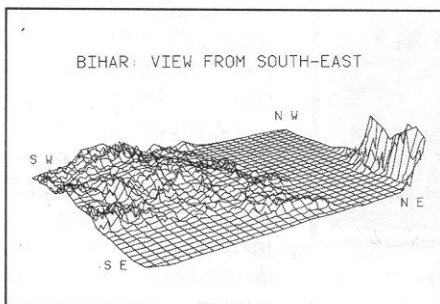
It is recognized that these factors discourage the adoption of GIS in India. Less emphasis, however, is placed on the importance of developing technical skills and databases. There is a dearth of skilled GIS technicians in India today and there are few people who can advise on the various aspects of setting up a GIS. If the technology is ever to be widely used in decision-making, databases will have to be developed in a systematic manner. This is laborious and time-consuming and it requires special abilities and equipment. It is therefore urgent that greater priority be given to training GIS technicians.

A vast amount of information exists in India today but there is no culture of using it to support spatial decision-making. This paradoxical situation is partly the result of government control of map data. In India, the greatest deterrent to the development of GIS databases is the government's restriction of access to maps. Much of the data is also outdated. But as agencies computerize the process of map production, new databases will be created. Perhaps this development will provide an opportunity to guarantee access to all interested parties, including non-governmental organizations, to these databases.

Many people who could profit greatly by the use of GIS in their work are completely unaware of the technology. The highest priority should be given to exposing potential users to GIS data and to the strengths of GIS tools and techniques. There is also a need for an institution or resource

group that can give information on how to establish a GIS. Only by addressing these concerns will GIS be given its rightful place in India's planning and development process.

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