Sustainable Development, Policy Reform and Tenure Security: Combining People, Technology and Information through Land Information Systems

by

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Tuesday, Sept. 28, 1993
A.M. Session: Reducing the Costs that Limit Effective Participation by the Rural Poor.
Panel Topic: Reducing Transactions Costs in Land Tenure Security Programs.

Relevance:

Headlines show the increasing need for geographically-referenced information. Policy-makers and planners need access to data on refugee relocation, urban and rural access to land, demographics (including population growth), taxation, environmental management (air, water and land), disaster relief, humanitarian assistance, waste disposal, infrastructure, telephone networks, and so on. These data can be included in a compatible, accessible, centralized geographic information system. In most of Latin America and the Caribbean, such systems are nonexistent. Consequently, decisions are made based on belief, anecdotal evidence, case studies or political prejudice, and not on empirical data. Further there is little domestic capacity for monitoring or evaluating such efforts.

Linkages between Cadastral Information and Developmental Sustainability:

Typically in Latin America, people do not pay their taxes, largely because governments lack the ability to collect. Consequently, programs like education, health, disaster preparedness, democratic reform, the environment and counter-narcotics efforts lack resources. The goals of domestic growth and international competitiveness are undercut. And the lack of effective taxation operates as an indirect subsidy, distorting market forces and creating an unlevel playing field both domestically and internationally.

For property tax collection to be effective, the government must have accurate land data.
In Chile, a cadastral modernization effort paid for itself simply by filling in the holes in earlier maps and collecting the tax. In the U.S., we pay for many of our programs through taxation. If countries are ever to "graduate" and become self-sustaining financially, they must develop an effective means of tax collection. The new Multi-Purpose Land Information System (MPLIS/GIS) approach is a strategy to get there.

Democratization and Land Information Systems

In some LAC countries, lack of title is used to deny citizens access to the institutions of government and participation in democratic society. Because of their status as "informal," they are denied education, water, sewage, fire protection, police, health service, roads, voting

privileges, and so on. On the other hand, they pay no tax, thus avoiding the responsibilities of participation in democratic society.

Land information systems make data available to the public. This means corrupt practices will be exposed, and transactions will become more transparent, promoting the rule of law.

Costs and Benefits:

In the U.S. and Canada, **we spend about BB$3/year on geographic information systems.** Daniel Parr has estimated that probably about **$BB2.5 of that is wasted** due to inefficiencies and failures in the system.

Very few geographic information systems fail due to technology or the ability to use the system. Usually they fail because policy-makers fail to define why they want or need a system: they fail to focus on the most important things first and move straight to the technology. They buy technology and technical assistance without knowing why they are doing it, without defining needs and objectives.

In Latin America and the Caribbean, most countries have separate information services in each Ministry needing geographic data. These include the Property Registry, agrarian reform, colonization, tax authorities, natural resource management and parks, phone, electric, gas and water companies, mining activities, mail delivery service, police, fire, ambulance, environmental zoning, school districts, etc. To say the least, there is a duplication of effort and great inefficiency. In this sense, the level of waste is higher in the LAC than in the U.S. and Canada!

A Multi-Purpose Land Information System (MPLIS/GIS), as the name implies, is a land information system designed to serve a variety of purposes. The MPLIS/GIS typically contains a variety of information about land, including ownership, use, cover, soils, geology, zoning and other use restrictions, wetlands, and floodplains. The MPLIS/GIS also includes a geodetic foundation, usually the geodetic survey network, which serves as a means to link or integrate the data in the system. Land survey monuments (actually the coordinates of their location) serve as the pins by which we can tie these data together.

The World Bank is making a positive effort to make sure that all future land regularization or normalization projects will preserve data in a way that can be later used as the basis for an MPLIS/GIS. The goal is to avoid duplication of effort and insure a higher degree of confidence in the data collected.

When do "titling" efforts make sense?

Recording of ownership information in a property registry is sometimes called "titling." Property registries are one form of geographically-referenced information systems. Typically

in Latin America, the property registry is not tied to a cadastral map, nor is the data used for taxation or any other purpose other than documentation of legal ownership of land. It is a stand alone system. Almost never is it automated in the LAC.

The academic literature has debated whether "titling" of land is cost-effective. The first such study was probably the one undertaken by the World Bank in Thailand. That study showed a strong positive link between titling and agricultural productivity. Since then, different countries have been studied. These evaluations have typically looked at systems designed for only one purpose or benefit, that of securing legal ownership to land. Typically, we might expect "titling" projects to be least cost effective where land is occupied by poor peasant smallholders on the margins of economic forces. This was typically the case in World Bank and Land Tenure Center studies in much of Africa. In these areas, land registration is unlikely to increase agricultural productivity or land values.

On the other hand, we are likely to find that it is cost effective where:

1. land already is valuable (due to quality of the land or location), especially land held in larger, commercial estates, and land located in urban or peri-urban areas,

2. there is economic competition and an active market economy,

3. litigation or disputes concerning land or land use exist (examples: (1) the current crisis in Nicaragua; (2) agrarian reform beneficiaries whose land is later taken and used to form a national park as in Bolivia or Venezuela).

4. squatters have no legal rights,

5. a registry system requires all land to be registered to guarantee secure boundaries for other properties, such as parks, reserves, mining, more affluent or productive farms, and so on (example: the Torrens System of land registration).

6. protection of wetlands, parks, reserves, concession areas (mining, forests, etc.) is important. "Land is both a resource and a commodity. Conflicts about its use are inevitable and ultimately geographic." (URISA, Introduction to GIS, p. 1-8).

In some places, the academic literature may be behind the technology. If a system is designed for multiple purposes, as an MPLIS/GIS, the "benefits" in any cost analysis should include all uses. Several types of benefits accrue when MPLIS/GIS systems are put in operation. These include benefits due to increases in efficiency, responsiveness, effectiveness, and equity.

Greater efficiency results from implementation of an MPLIS/GIS. Costs are lowered due to the reduction in duplication of data collection and maintaining multiple similar map sets. Other costs, while not lowered, will be stabilized, benefiting government operation.

Improved responsiveness is a second class of benefits that accrue to an MPLIS/GIS. Titles can be issued more quickly due to availability of a complete, coordinated database. New technologies and new data, such as location data from global positioning systems, can be added to the database quickly and easily.

Improved effectiveness of government is a third benefit of an MPLIS/GIS. Improved access to data and analyses stored in the system, and ability to use them for additional tasks, improves the government's effectiveness, which in turn makes government more competitive, whether within departments, within the country, or competing in world trade. Improvements in the land-transfer process, providing an equitable basis for property taxation, and providing information for resource management and environmental planning can be expected with the carrying out of an MPLIS/GIS.

MPLIS/GIS systems are perceived to be more fair and equitable than manual systems, since land information technology can incorporate detailed information without the real or perceived biases that are sometimes associated with manual systems. Use of the system will increase since users believe they are being treated more fairly.

Land records modernization will be particularly essential with increasing proximity, density, interrelationships, concerns about accessibility, pressures on space, and need for spatial interactions. In other words, an MPLIS/GIS becomes more important as we make connections between questions and answers, problems and solutions, and their relationships.

In the U.S., the academic debate about whether MPLIS/GIS projects were worth while on a cost-benefit basis ended during the 1970s. Today the debate is really how to take best advantage of the technologies to get the biggest bang for the buck, and which additional applications are justified on a cost-benefit basis.

Financing MPLIS/GIS Projects:

Two major points need to be made regarding MPLIS/GIS Projects:

(1) The projects can be self-financing in the long term. The AID Project in Chile during the 1960s is an example of this. The LAC TECH/Land Tenure Center report on Guatemala also explains ways this could be accomplished, mainly through cost savings generated by elimination of duplication of effort, property tax collection and fiscal management reform; and

(2) The key is the project design, not the technology. Countries desperately need the technical assistance to design and implement projects properly. Vendors of GIS technology are marketing their products wildly. Caution should be the watchword. If governments are not to waste further donor resources, those resources are best spent on system design, assessment of needs and planning. Hardware or software come later.

The financing of an MPLIS/GIS presents several problems. For example, costs of MPLIS/GIS systems tend to occur early in the life cycle. Costs for hardware, software, and data (often amounting to 75 percent or more of total system costs) must be paid for before the system can go into operation.

Benefits, on the other hand, tend to be generated as a stream over a longer period than costs. This means that total benefits do not equal total costs until 5-10 years of operation. Further, benefits are often of the intangible variety, such as having more accurate data faster and being able to generate new products that were not possible before. Not only are many benefits intangible, many are unknown or not expected when the project begins. These factors all combine to make it difficult to develop a precise economic evaluation of an MPLIS/GIS before it is put into operation.

To ensure continuing financial support of an MPLIS/GIS by policy-makers, they should be clearly briefed on costs and benefits that are to be expected with an MPLIS/GIS. The implementation plan should also take into consideration ways to incrementally put in place the various pieces of an MPLIS/GIS. The ability to phase in certain costs should also be analyzed in terms of the immediate needs of government (and the private sector) for output from the system. That is, a particular need to improve the property registry system, revise the property tax system, or solve a specific environmental or land use problem may make it necessary to give priority to items not foreseen in a strict cost analysis.

One way to develop a priority list for funding MPLIS/GIS costs is to consider the components of the system itself. For example, a geodetic foundation is often one of the first components that is funded, since this is the foundation (that is, the basis for spatial coordinates) by which all "layers" of data can be linked and analyzed. A base map is often developed as an early step, to be used as a background for other spatial data layers. Computer hardware and software are needed immediately to produce high-quality graphics often required to maintain support for the system. Finally, people and procedures are needed to operate and maintain the system.

This suggests that the major area where decisions can be made to set up an MPLIS/GIS incrementally is regarding the construction of specific data layers. Here again, the most demanding needs, coupled with availability of resources to fund these particular applications, can help in making these tough choices. As additional funds and needs surface, more data layers can be added. This approach makes it critical that a comprehensive plan be completed before any part of the system is carried out. Such a plan will ensure that pieces added later will drop neatly into place and provide the output needed.

Plans to monitor benefits need to be included in implementation plans for the system. Expected benefits should be labeled as such and documented when practical. Also, procedures should be developed to help identify and quantify unexpected benefits that are certain to occur as the system continues to operate over time. The importance of these unexpected benefits is very important. Experiences with prototype MPLIS/GIS systems operating in Wisconsin suggest that these unexpected benefits account for most benefits. (Thus, while we call them unexpected

because we are unable to identify them specifically, they are "expected," since we know that many benefits of this type will occur.)

Once an analysis is made of the potential costs and benefits, a set of measurable objectives can be developed against which actual performances of the system can be compared. While it is unlikely that targets will be met precisely, they will provide a general indication of how well the MPLIS/GIS is operating and suggest any modifications needed in the implementation plan.

Conclusion:

At present, tremendous amounts of money are being wasted on the collection of geographic data stored in incompatible formats and not shared with other governmental agencies. This has led to a duplication of effort, inaccuracy of records, high levels of "informality," and poor government management. This in turn has negatively impacted economic policy, natural resource management, disaster relief, education, health and other important government policies and programs.

Traditionally, titling efforts have been justified on the basis of increased agricultural productivity, based on increased investment due to enhanced tenure security. Today, multi-purpose systems allow the data to be used for literally an infinite number of uses. In the past, land records gave security of ownership. While they still perform that function today, they also form the basis of a geographic information system. This system allows policy-makers access to basic information needed for appropriate policy creation in a climate of shrinking budgetary resources and rising needs.

Modernization of land records into a multi-purpose system can be financed mainly from increased tax revenue and elimination of inefficient duplications of effort. However, technical assistance is needed to design the system to meet user demands and needs. Unfortunately, many systems are poorly designed, beginning with technology first, rather than the people, the information needs and policy objectives.