Physical Capital: Improving access to quality infrastructure services
Rural Infrastructure Services for Poor People and Businesses

Given the common mismatch between needs and available budgets for rural infrastructure services, countries have to make a number of strategic choices including the intensity versus extent of service coverage and explore innovative public-private-community partnerships to stretch available government resources. It is clear that while the private sector can and must play a critical role in both the provision and production of rural infrastructure services, governments at national and local levels must ensure that the policy framework enables poor communities and poor people to effectively access services of acceptable quality.

This note focuses on the common themes and issues that cut across the different rural infrastructure sub-sectors. Whilst these themes are critical to keep at the forefront when formulating strategies for public action to engender inclusive and sustainable rural development, attention should not be diverted from the various sector specific issues that need to be considered. For more detail on key issues with regards to the provision of energy, transport, water and sanitation, and information and communication technology please refer to the dedicated infrastructure chapters in this sourcebook.

Conceptual and empirical linkages

Reliable access to affordable rural infrastructure services bestows tremendous opportunity to rural people to access markets and social services, and is essential to rural growth and poverty reduction (World Bank, 1994; Ahmed and Donovan, 1992). Infrastructure services stimulate economic growth, contribute to build poor peoples capabilities, facilitate their connection to political processes, markets and social relations, and reduce their vulnerability to risk and shock. Many infrastructure services are intermediate inputs that enable poor people in rural areas to generate income, access health, education and financial services, build social capital, and, when done right, preserve the natural assets on which they depend.

**Economic opportunity.** Provision of essential infrastructure increases both agricultural and non-farm opportunities in rural areas. Studies demonstrate that provision of reliable energy supply and serviceable roads not only increases agricultural productivity, reduces costs of inputs and outputs, and encourages greater use of efficiency-generating technologies (Binswanger et al 1987; Barnes and Binswanger, 1984), but also supports the emergence of small businesses in rural areas, which can be a significant source of employment and incomes for poor people (Binswanger, Khandker and Rosenzweig, 1989; Lamach et al 2000). Likewise, transport and telecommunication services promote communication and information flow between communities and with urban centers, fixing information asymmetries and linking farmers to
markets for goods and input supply as well as agricultural extension advice (Fan, Hazell and Throat, 1999).

**Capabilities.** Equally critical, infrastructure services enhance opportunities by building human and natural assets. The most well known link is perhaps the impact of safe water and sanitation on improved health through reduced incidence of diarrhea-related sicknesses and death (Klees, Godinho, and Lawson-Doe, 1999). Improved access to water and energy can also free up significant amounts of time from collection of water and firewood, resulting in time savings that can be used for productive, reproductive, educational or leisure activities. Electricity builds human assets by providing light in the evenings to study, and by improving health care through lighting, and improved medical services. Even improved road services has been found to strengthen human capabilities by promoting higher levels and quality of education.

**Social inclusion.** Infrastructure can play an important role in empowering people, linking isolated communities to the rest of the world and giving poor communities greater access and influence over political and local decision making processes. Roads, telephones and internet connections can directly improve communications and enhance poor people’s access to information. Electrification can also be critical for broadening access to electronic communication and radio. Indirectly, well-delivered, quality infrastructure is likely to attract better teachers, better agriculture extension agents, and stimulate agro-industrial development. These influxes are like many window opening up on the outside world, bringing with them outside ideas and stimuli, correcting information asymmetries and result in profound changes in mental attitudes (Pouliquen, 2000).

**Good governance.** Often overlooked, but equally important is the opportunity created by well crafted interventions in rural infrastructure to improve local governance through the establishment of transparent and accountable practices for priority setting, decision-making, implementation, operations and maintenance. In Brazil, the Rural Poverty Alleviation Program (RPAP) in the poor Northeast region of Brazil has facilitated the establishment of Municipal Councils (MCs) comprising predominantly community representatives.¹ These councils provide a representative and transparent forum for local government and communities to discuss and prioritize investment proposals, primarily in rural infrastructure, and has through the planning and implementation of small scale rural infrastructure investments improved local accountability by strengthening the voice of local users including poor and vulnerable rural groups (refer also chapters on Governance and Community Driven Development).

**Enhancing security.** Finally, the provision of quality essential infrastructure can substantially reduce the vulnerability of poor people by helping them to cope with disasters and shock. Good drainage, a well maintained network of roads, and telecommunications to assist with relief and food redistribution efforts, go a long way towards alleviating problems of flooding, drought, famine and earthquakes. Infrastructure also indirectly serves to reduce weather related uncertainties (mainly rainfall), plant disease, pests and other harvest risks, by providing rural communities with access to modern technologies (e.g. irrigation, pesticides, disease-resistant seed varieties). Access to infrastructure can also ameliorate the effects of economic shocks on poor communities—good transport facilities are integral to stabilizing food price fluctuations, and through arbitrage, for ensuring that poor sellers receive fair prices. Because of its employment potential, infrastructure works programs can be important components of crisis mitigation packages during times of economic shock (see chapter on Social Protection).

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¹ Municipal councils are elected bodies, comprising 80 percent of community representatives and up to 20 percent membership by broader civil society and local government representatives.
How do we attain universal access by poor people to affordable rural infrastructure services of decent quality? There is no easy solution, in part, because of the heterogeneous nature of rural infrastructure services (refer the chapters on energy, information and communication technology, transport, and water and sanitation). Notwithstanding the specificity of each sub-sector, critical to addressing this question is an understanding of three overarching challenges in rural infrastructure service provision—namely, sustainability, replicability and poverty reduction. Way too often are rural infrastructure programs implemented in a piecemeal fashion because they are not institutionally or financially sustainable and can not be scaled up for national coverage.

**Sustainability—how to ensure assets and services will be operated and maintained.** This challenge is the result of the confluence of design, administrative and financial problems. Rural infrastructure services are very dispersed and have to be provided over a wide range of contexts—from remote villages to rural towns and small market centers, benefiting at the extreme just a few families. The requirement to link many services to higher level networks further complicates provision, particularly for roads. Because of the small number of beneficiaries often served, economic considerations dictate that rural infrastructure investments be designed to fairly low standards. This, in turn, makes them fragile and maintenance intensive. If the skills and resources for their maintenance are not readily available, they will quickly break down. Given their geographical dispersion, solutions have to be found at the local level.

**Replicability—how to ensure institutional and financing arrangements can be scaled up for universal coverage.** Total costs of rural infrastructure service provision are high. While low cost technology may mean that the cost of an individual well or unit cost of road may be low, massive and widespread needs implies huge investment requirements with serious implications for financial policies, particularly cost-sharing arrangements. The small size of individual rural infrastructure investments makes them easy candidates for pilot operations and numerous programs target a few communities. The amount of technical assistance and financing (grants/subsidies) such programs provide can be all but impossible to replicate at the national level. The institutional and financial models they promote may therefore be unsuitable for scaling up and thus largely irrelevant for universal coverage.

**Poverty reduction—how to ensure the right balance is struck between requirements for cost-sharing and reaching poor communities.** In rural settings, sustainability and replicability rely to a large degree on community capacity and autonomy, whether it is with regard to implementation or financing. This also means that policies that encourage sustainability and replicability will favor communities with better human and financial resources and could exclude the poor. On the one hand, too much intervention/subsidies to correct this imbalance will be costly and can break the national government budget, and it may frustrate local initiatives. On the other hand, too little intervention/subsidies will fail to relieve regional or social inequalities. Striking a balance between these two extremes is difficult and depends a great deal on country circumstances.

These challenges present a formidable test, often inhibiting the provision of adequate, reliable, affordable infrastructure services for poor people in poor areas. A further obstacle stems from the complex organizational structures involved in rural infrastructure service provision. At the government level, rural infrastructure services are the responsibility of local governments but are often provided through donor-
financed project with central agencies such as Ministries of Agriculture, Rural Development, Local Government, Public Works, Water or Energy. At local levels, rural infrastructure may be financed by multiple social and community funds and non-governmental organizations (NGOs), and, on rare occasion, by the private sector (there are often numerous obstacles to private sector provision). The many actors involved often means that there is no leader who champions the policy and resource issues at the national level. As a result, rural infrastructure services are often under-resourced and implemented in an unsustainable fashion, resulting in chronic under-provision.

Policy and investment options

Over the last decade we have improved our understanding and gained considerable experience in the design of sustainable rural infrastructure services. Many efforts and projects, however, remain pilot or small-scale, in part because they can not be sustainably scaled up. The challenge is to develop sustainable policies and investments that can be replicated at a large scale and reach the poorest. Actions focused on three crosscutting areas are critical—clear and consistent policies and strategies, more effective and sustainable institutions, and sustainable financing arrangements. Policies and actions need to explicitly take account of gender differences in service preferences and technologies and recognize that rural areas span a significant spectrum from high income and high density areas to low income and low density areas. Climate, topography and farming systems also influence the range of technology and financing options available for infrastructure service provision.

Formulating rural infrastructure policies and strategies. Sound policies and strategies for each rural infrastructure sub-sector that are applied consistently country-wide are critical to ensure both national coverage (replicability) and increased sustainability (see the chapters in this sourcebook on energy, information and communication technology, transport, and water and sanitation). Although infrastructure services may be provided by a variety of actors—both government and non-government agents—effective and efficient delivery requires sector-specific, and consistent ‘rules of the game’ (e.g., cost recovery policies, technical standards, level of service guidelines, and so on). While sound sector policies sometimes have to be pursued in parallel to the design and implementation of investment programs, it is important that all rural infrastructure programs explicitly recognize their value and support their development and application. In addition to national sector policies, there is a strong case for examining crosscutting policy framework affecting all types of rural infrastructure service provision (e.g., the enabling environment for private sector participation, availability of affordable credit, and national decentralization strategies). Policies need to be developed in a participatory fashion involving all concerned stakeholders including representatives of poor people and other beneficiaries.

Decentralizing institutional arrangements to tap the potential of local agencies and stakeholders. Accumulated experience has shown that monopolistic provision and production of rural infrastructure services by central government agencies rarely works. The dispersed nature of most rural infrastructure services means decentralized arrangements are a necessity—there is little sense in trying to manage the operation and construction of village wells from the capital city (refer chapter on decentralization). Programs need to involve and build on the initiative and local accountability of community-based organizations, decentralized local governments, non-governmental organizations and the private sector.

The role of central sector ministries and agencies should be to support rural infrastructure development through (i) the provision of policies and technical guidelines, developed in a participatory fashion; (ii) the provision of critical public secondary rural infrastructure such as regional roads; and (iii) serving as a

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2 This scenario is mirrored in the organizational structures of many international aid agencies.
national level facilitator for donor-supported programs. Parliamentary representatives of rural areas and rural organizations, who build ties to and put pressure on public decision-makers including central sector ministries, may best pursue advocacy at the national level for rural infrastructure development. Elected local governments are well positioned to gauge local priorities and need. They need to plan in a participatory fashion and provide or facilitate the provision of the type of infrastructure services their constituents want and are willing to pay for such as tertiary roads and electricity. Local governments and/or local organizations can catalyze assistance to communities who wish to improve service access. In line with this paradigm, three broad types of program designs are worth exploring: (i) service provision (and financing) by the public sector (central, regional, and local governments), with private sector service production, (ii) service provision by community organizations, with private sector and/or community production, and (iii) service provision by the private sector, with government regulation.

The involvement of the local private sector as a contractor financed by government or community funds is increasingly common (arrangements (i) and (ii) above). Significantly more limited in extent is the involvement of the private sector in the direct provision of rural infrastructure services. The relevance of private sector financing depends on the nature (public or private) of services provided, but there is considerable potential for involvement of private operators as most rural infrastructure services are rather ‘private’ in nature—with the possible exception of roads.³ Indeed, at the micro project-level, the modus operandi of local communities is often much closer to that of the private sector than to that of government (Pouliquen 2001). Growing evidence, however, suggests that private sector partners can increase the efficiency and effectiveness of service delivery with the potential to make services more cost effective and responsive to the needs of poor users. Private sector management and financing of infrastructure services also relieves overburdened and scarce public resources and administrative capacity, complementing public sector programs and helping to ensure services reach more communities.

Examples include the use of minimum subsidy concessions for private provision of telecommunications services in rural Chile, and provision of electricity by small and medium sized entrepreneurs in rural towns in Cambodia.

Whether rural infrastructure is public or private, or whether it is managed at the community level, by the private sector, or at a more or less decentralized level of local government, the foremost consideration has to be accountability to poor users, and it should not be taken for granted. Local communities are not necessarily less immune to corruption, incompetence or cronyism than governments, and without competition and transparency the private sector is no guarantee of efficiency. Accountability has to be enforced through well designed mechanisms including (i) transparency in decision and project implementation and operation, (ii) open competitive bidding, (iii) aligned incentives for performance, (iv) effective audits, (v) participation by all the subgroups of the beneficiary community, and (vi) wide dissemination of the achievements of individual communities (Pouliquen 2001) (refer also chapter on governance).

**Developing innovative and replicable financing strategies.** Sound and replicable financing arrangements are critical to the sustainability and broad-reaching impact of rural infrastructure investments. In addition they can play a key role in the choice of investments and constitute the single most valuable tool available to governments in meeting poverty alleviation targets. As discussed immediately above, while government financing is needed for public good services, this does not imply government management or production of such services, nor does it prevent the creation innovative private-public-community partnerships for financing of rural infrastructure services. An example of a

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³ Notwithstanding conventional assumptions, there is strong evidence of the advantages (quality and cost-effectiveness) of community ownership of low volume roads through local roads associations (Malmberg Calvo 1998).
community-NGO-government partnership for the provision of water and energy services in rural Guatemala is given in Box 1.

Given the wide range of rural infrastructure services and local contexts, there are no standard blue prints for financing, however, three broad principles should be consistently applied to program design. First, **adequate cost recovery** is often the only effective way to deal with the lack of resources for maintenance and operation. Not surprisingly, the potential for cost recovery is also a critical prerequisite to attract ‘profit seeking’ private sector investors. Adequate cost recovery alleviates the burden on national budgets, allowing scarce public resources to be stretched over more communities, and removing one of the primary impediments to replicability. While policies that rely on operating and maintenance costs subsidies are often well meaning attempts to address poverty issues, experience, for example from the water sector, shows they often end up doing poor consumers more harm than good, by forcing them to rely on alternatives that are far more expensive than paying the full cost of adequate service provision.

Second, **upfront contributions from beneficiary groups towards initial investment costs should be maximized, bearing in mind the affordability constraints of the poorest.** Not only are community contributions an important component of any cost recovery strategy, but in addition, contribution to investment costs increases the likelihood that investment decisions are made in a responsible way. There is little incentive for a community to turn down an investment that comes free while, if it has to make a significant contribution to its cost, there is a much higher likelihood that it will think seriously about its relative priority vis-à-vis other investment alternatives. Finally, the “ownership” that goes together with partaking in the investment cost can be a significant factor in the quality of the maintenance and operation essential for sustainability, and also be a major factor in the choice of appropriate design standards and construction methods.

Third, **promoting private sector provision of services.** Allowing for adequate cost recovery potential is the first step in opening this door and must be complemented by simple and fair regulatory mechanism and effective financial intermediation channels. In contexts where private sector financing makes sense, it can be promoted by ensuring (i) a conducive legal environment—including, but not limited to clearly assigned and enforceable property rights, a legal framework for management of contracts, including means of recourse, (ii) an appropriate policy framework—e.g., removal of barriers to market entry, and elimination of distortive grants for those goods and services capable of being financed by the private sector, and (iii) removal of physical and financial obstacles to private sector development, such as improving access to affordable credit, and improved access to basic facilities. As in the case of cost recovery, however, the best intentions can often lead to the worse fiascos. For example, many seemingly pro-poor policies such as compulsory service provision requirements or low interest rate ceilings must be evaluated against the prospect that the private sector may keep out of the most deprived areas or that the commercial financing sources on which some private sector investors may depend will dry up (Pouliquen 2001).
Box 1: Promoting cost recovery and affordability in Guatemala

An innovative program in Guatemala that offers a blend of grant, and credit to match upfront community contributions, has been effective in increasing both affordability, and cost recovery of community infrastructure services in rural villages.

Genesis Empresarial—a self-sustaining NGO specialized in microfinance services—provides credit and technical assistance to community groups interested in investing in water and energy services in Guatemala. With the assistance of Genesis, communities mobilize their own resources, apply for partial grant funding from concerned ministries, and meet additional investment needs through a community loan at market interest rates (typically 24 – 28%) from the NGO. Projects are thus managed, implemented and partially financed (typically 40 – 100%) by the communities themselves. Access to credit allows the community to restructure their costs into manageable three to six monthly payments over a three year period, thereby increasing affordability whilst at the same time promoting cost recovery of upfront investment costs, allowing scarce public grant funds to be spread over a greater number of poor communities.

Indicators of performance and needs

A detailed discussion of performance and monitoring indicators to measure the poverty reducing impact for the different rural infrastructure sectors can be found in the respective infrastructure chapters on energy, information and communication technology, transport, and water and sanitation. It is worthwhile, however, when attempting to understand the overall needs for rural infrastructure services in a country and the extent to which existing facilities serve poor people, to examine cross-cutting aspects as they related to service availability, reliability (quality), and affordability.

Unfortunately, in spite of the critical links between infrastructure services and attainment of the international development targets, there is a dearth of sensible information on the level of access to quality water and sanitation services, transport, energy, and communications in developing countries. Data on physical availability often mask issues of quality, which is a crucial component of benefits derived from service provision. For example, figures on the provision of electricity supply in low-income countries do not provide information on the reliability of the supply: frequent electricity outages or voltage fluctuations both cause losses in output, productivity, and time. It is essential to have information on quality of the available infrastructure in order to make any meaningful conclusion about accessibility. There are real difficulties however, in incorporating quality aspects into figures on availability due to problems quantifying “quality” as well as the lack of cross-country standards. The scarcity of cross-country standards is further hampered by imprecise definitions of indicators of rural infrastructure availability. For example, a common measure used for water and sanitation is ‘reasonable access to safe water’ which may clearly have many alternate interpretations.

In addition, data on physical “availability” does not adequately reflect the true level of ‘access’ or utilization that poor people in rural areas may have to infrastructure services. For example, the existence of a rural road does not ensure transport for poor people, if they cannot afford to pay the fares. As important as proximity and quality in determining ‘access’ to infrastructure services, particularly for poor
people, is the ‘affordability’ of services. Although the service may be available, poor people will not be able to use the services unless they can afford to pay for it.

Moreover, within rural areas, access to infrastructure services may be out of reach to the poorest because of socio-political reasons, based on socio-economic class, ethnicity, gender, religion and caste, among others (Pouliquen 2000). This form of exclusion can be observed in many programs—for example, in a rural water supply project India, water supply points were placed near influential households (White 1997 as cited in WDR 2000/1).

Specific indicators will depend on context and will vary by sub sector. For purposes of illustration sample indicators that could be used to measure the performance of non-piped water supply services are provided below. For in depth guidance on sector specific indicators, refer to the respective chapters on energy, information and communication technology, transport, and water and sanitation.
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<thead>
<tr>
<th>Performance Dimension</th>
<th>Indicator</th>
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<tr>
<td>Availability</td>
<td>Distance to closest water source (km)</td>
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<tr>
<td>Demand</td>
<td>L consumed/person/day (should be differentiated between personal and agro-industrial uses)</td>
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<tr>
<td>Price</td>
<td>Average number of hours per day and per person spent collecting water</td>
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<tr>
<td>Affordability</td>
<td>Willingness to pay</td>
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<tr>
<td>Cost</td>
<td>$/cubic meter</td>
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<tr>
<td>Reliability</td>
<td>Average number of days a year traditional source dries up</td>
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<tr>
<td>Efficiency</td>
<td>Average number of days a year facility is not functioning</td>
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<tr>
<td>Equity</td>
<td>Ratio of average daily consumption for individual in sixth and first deciles of income bracket</td>
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