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Rural Infrastructure in Peru
Effectively Underpinning Local Development and Fostering Complementarities

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LIST OF ABBREVIATIONS

ADINELSA	*Empresa de Administración de Infraestructura Eléctrica S.A.* (National Public Enterprise for the Administration of Electricity Infrastructure)
CAS	Country Assistance Strategy
CND	*Consejo Nacional de Descentralización* (National Council for Decentralization)
DEP	*Departamento Especial de Proyectos* (Special Projects Department)
DIGESA	*Dirección General de Saneamiento Ambiental (*National Directorate of Environmental Sanitation)
DNS	Dirección Nacional de Saneamiento (National Directorate for Sanitation)
ENAHO	*Encuesta Nacional de Hogares* (National Household Survey)
FITEL	*Fondo de Desarrollo de las Telecomunicaciones* (Telecommunications Development Fund)
FONCODES	*Fondo de Compensación y Desarrollo Social* (Compensation and Social Development Fund)
FONCOMUN	*Fondo de Compensación Municipal* (Municipal Compensation Fund)
FOSE	*Fondo de Compensación Social Eléctrica* (Electricity Social Compensation Fund)
GDP	Gross Domestic Product
GOP	Government of Peru
IADB or IDB	Inter-American Development Bank
ICI	Information and Communication Infrastructure
ICT	Information and Communication Technologies
INADE	*Instituto Nacional de Desarrollo* (National Institute for Development)
INE	*Instituto Nacional de Estadísticas* (National Institute of Statistics)
IVP	*Instituto Vial Provincial* (Provincial Road Institute)
JASS	*Juntas Administradoras de Servicios de Saneamiento*
LCE	*Ley de Concesión de Electricidad* (Electricity Concession Law)
MEF	Ministry of Economy and Finance
MEM	Ministry of Energy and Mining
MIMDES	Ministry of the Women and Social Development
MTC	Ministry of Transport and Telecommunications
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
OLADE	*Organización Latinoamericana de Energía* (Latin-American Energy Association)
OSIPTEL	*Organismo Supervisor de Inversión Privada en Telecomunicaciones* (Entity for the Regulatory Supervisión of Private Investment in Telecommunications)
PII	Provincial Infrastructure Institute
PRONASAR	*Programa Nacional de Agua y Saneamiento Rural* (National Rural Water/sanitation Program)
RIPA	Regional Institute of the Province of Arequipa
RWSS	Rural Water Supply and Sanitation
SNIP	Sistema Nacional de Inversión Pública
VAT	Value-Added Tax
WEF	World Economic Forum

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The World Bank team was composed of Aurelio Menendez, (team leader and transport economist), Nicolas Peltier (co-team leader and infrastructure economist), Eduardo Zolezzi, Susan Bogach, Demetrios Papathanasiou (electricity sector), Robert Stephens (information, communication and telecommunications), Maria Angelica Sotomayor, Miguel Vargas and Rafael Vera (water/sanitation), Elizabeth Dasso (NGO coordinator and social specialist) and Alonso Zarzar (social scientist). The following consultants were responsible for preparing the background studies and presentations at discussion seminars: Javier Escobal and Maximo Torero (complementarity of investments and impacts on rural incomes), Augusta Dianderas (rural water/sanitation), Ismael Aragon (rural electrification), Jose Luna (rural transport services), Jose Tavara (rural telecommunications), Miguel Rodriguez (expenditure review), and Michel Azcueta (municipal capacity and decentralization). Peer review and quality guidance was provided by Jennifer Sara, Marianne Fay, Franz Drees-Gross, Christina Malmberg-Calvo, Alexander Bakalian, Daniel Lederman and LCSFP sector managers.

FOREWORD

Following the definition of a rural development strategy for the Peruvian Sierra [1] and its own strategy for poverty reduction, [2] the Government of Peru (GOP) requested World Bank's support in the definition of a multi-sector strategy for the enhancement and management of infrastructure [3] in rural areas. This request for support was reflected in the CAS presented to the Government in July 2002 and approved by the World Bank Board in August 2002. The preparation of the strategy underpins the efforts of the Government of Peru to increase the prioritization, efficiency and effectiveness in the delivery of public investment programs that have a direct impact on the productive lives of the rural poor and to support policy and institutional reforms that aim at decentralizing responsibilities and resources to the local level. Along these lines, the CAS Program Matrix includes the strategy as part of the support by the World Bank Group to the dimensions of competitiveness and equity, to facilitate productive investments and increase access to social services in poor rural areas.

The ESW examines the current institutional and delivery arrangements for infrastructure service provision in rural areas of Peru, focusing upon the water, sanitation, electricity, communications and transportation sectors, and proposes mechanisms for improvement. The analysis is based upon cross-sectoral dialogues with a variety of government agencies at the national, regional and municipal levels, government information and supplemental reports, and seven background studies commissioned by the World Bank specifically for this work.

The commissioned studies are the following: [4]

- *"Análisis de los Servicios de Infraestructura Rural y las Condiciones de Vida en las Zonas Rurales de Peru"* by Javier Escobal y Máximo Torero (*Grupo de Análisis para el Desarrollo*, GRADE) - This study analyzes the effect of rural infrastructure investments on the incomes of rural households, the changes in the composition of the income sources (e.g., increases in non-agricultural activities), and on the number of working hours.
- *"Análisis de Gastos de Inversiones y en Provisión de Servicios de Infraestructura Rural y su Comparación con la Evolución de los Indicadores Socio-Económicos de las Áreas Rurales en Perú"* by Miguel Rodríguez - This study provides an assessment of the resources spent on the rural infrastructure sectors (water/sanitation, roads, electricity and telecommunications) during the period 1998-2002, their geographical distribution across Peruvian departments, and the possible correlations of sector expenditures with percentage of rural population and poverty by department, province or district.

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[1] "Peru: A Rural Development Strategy for the Peruvian Sierra," Country Management Unit for Bolivia, Ecuador and Peru, World Bank/FAO Cooperative Investment Center, Environmental and Socially Sustainable Development Network, June 2002.

[2] "Bases para la Estrategia de Superación de la Pobreza y Oportunidades Económicas para los Pobres," Gobierno del Perú, 2002.

[3] Infrastructure refers to the facilities and services related to the provision of water (for domestic consumption and minor irrigation), sanitation, electricity, transport (mainly roads in the rural Sierra and coast, and other modes, such as rivers, in the Selva, and the services operating on them), telecommunications (mainly telephone services and information technology).

[4] Background papers are available upon request from amenendez@worldbank.org or can be downloaded from http://wbln0018/LAC/LAC.nsf/ECADocByUnid2ndLanguage/71B4692A34C9EAB885256EB30050D744?Opendocument

- *"Análisis de Capacidades en los Gobiernos Locales del Perú"* by Michel Azcueta - Upon interviews in a sample of 42 district municipalities and 17 provincial municipalities, this study summarizes the opinion from the municipal authorities and other key informants about the role of local governments, the planning mechanisms at their disposal, their on-going responsibilities, their technical and administrative capacities in the planning, investment and operation of infrastructure services, as well as their stated priorities on each of these services.
- *"Estudio para la Definición de Criterios de Priorización de las Inversiones y de Medición de la Eficiencia en la Provisión de Servicios de Agua Potable y Saneamiento Rural"* by Augusta Dianderas - This study provides an overview of the alternative coverage rates and prioritization mechanisms for each of the rural infrastructure sectors—water/sanitation, roads, electricity and telecommunications—as a basis for proposing an enhanced methodology in the definition of investment priorities for the rural water/sanitation sector.
- *"Análisis de la Provisión de Servicios de Electrificación en las Zonas Rurales del Perú"* by Ismael Aragón - This study summarizes the current situation of the planning, financing, construction, operation, maintenance, and regulation of the provision of electricity in rural Peru.
- *"Situación de los Servicios de Transporte en Zonas Rurales del Perú"* by José Luna - This study evaluates the current conditions of transport services in Peru, describing the institutional framework and the results of a series of interviews in about 46 district municipalities in the rural Sierra, complemented with five additional districts in other municipalities in departments surrounding the rural Sierra.
- "*Estudio para la Definición de una Estrategia de Fortalecimiento y Expansión del Programa de Telecomunicaciones e Info-centros en las Zonas Rurales del Peru*" by José Tabarra - This study, based on a survey of three representative rural areas in the three macro-regions of Peru, draws attention to the factors and variables for the definition of sustainability mechanisms in the provision of internet services in rural areas through info-centers, with an description of the technological options and the prevalent investment and operating costs. This study complements a more comprehensive one on ICTs in rural Peru that was carried out concurrently, with funding from the Public-Private Investment Advisory Facility (PPIAF). [5]

In addition to these studies, this strategy draws from an ample base of information generated by the ongoing PRONASAR and Rural Roads Projects, as well as supplemental research that provides context, history, and analysis regarding rural development in Peru and other developing and developed countries. Previous World Bank studies, including *"Rural Strategy for the Rural Sierra"* (2002) and the above-mentioned PPIAF ICT study (2004, in process) provided further strategies and information for the present report.

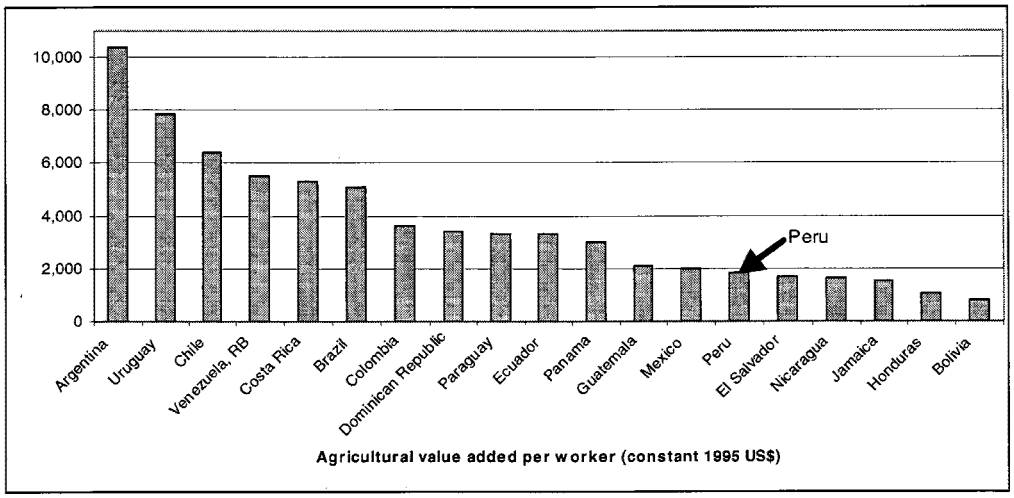
The continued Bank-Government dialogue and infrastructure research program culminated in a national cross-sectoral workshop in Peru, in December 2003, as well as several meetings with the Intersectoral Commission for Rural Infrastructure (under the Presidency of the Council of Ministers) in May and September 2003, to discuss the contents and scope of the commissioned studies. The above studies, combined with the cross-sectoral dialogues, have provided the findings and recommendations incorporated into this ESW and are expected to aid in the design of a forthcoming rural electrification project and of a possible future rural infrastructure project.

[5] PPIAF, 2004, *Fostering Private Sector Provision of Infrastructure in Rural Peru*, prepared by Intelecon-ITC-ITDG, August.

EXECUTIVE SUMMARY

Rural Peru is characterized by dismal poverty, limited access to services and the attendant lack of opportunities. Three quarters of the rural population lives in poverty, and, at 51%, the extreme poverty rate is five times what it is in urban areas. This differential is particularly large, even for a region already characterized by significant rural urban differences. Access to infrastructure services is similarly unequal, with Peru much below comparable countries, notably for sanitation, electrification and telecommunications. More immediately, the lack of services certainly constrains the rural economy's productive potential and helps explain why Peru's agriculture ranks among the least productive of Latin America (Figure 1). It also limits the diversification of the rural economy towards non-agricultural activities, an evolution that is key to higher rural incomes. This "double dividend" on both productivity and diversification is possible because productivity improvements can be labor-saving and they can therefore free some working time that can be used for productive activities outside the agricultural sector. Indeed, a central argument of this report is that improved rural infrastructure will be key to improving rural livelihoods on a sustainable manner.

Figure 1: Peru's agriculture is one of the least productive in Latin America

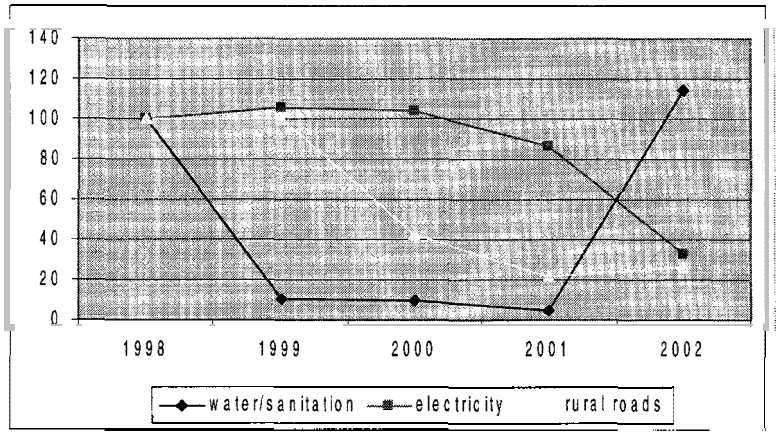


Source: World Development Indicators, 2004.

The experience from the past decade shows that the importance of infrastructure has been only partially reflected in Peru's rural development policies. While a number of national and local plans have emphasized the demand for enhanced access to infrastructure services in rural Peru, public expenditures in rural infrastructure have been highly volatile, with a decreasing trend (Figure 2). On the other hand, although private participation in construction, operation and maintenance of rural infrastructure is on the surge, direct private investments in this area are still marginal. During the period 1998-2002, only 2.6% of total investment in rural infrastructure came from private sources. The higher risks associated, the lower profitability and the increased marginal costs in areas with lower population density, but also in certain cases the lack of adequate incentives and the existence of regulatory constraints, are main deterrents for the private sector to directly

invest in rural infrastructure. Nevertheless, the experience of other countries shows that a large proportion of funding for rural infrastructure has to come from public sources (though not necessarily centrally-managed), even though this funding can be used to promote, to a very large extent, private sector participation in rural infrastructure's construction, operation and maintenance. However, the proportion of public funding varies significantly across sectors. Capital investments in rural roads are generally almost entirely funded from public sources while private investment can contribute greatly to the extension of rural telecommunications services. In the case of Chile, private operators financed on average 72 percent of capital expenditures associated with the development of public telephone services in rural areas. In sectors like electricity and telecommunications – which, unlike rural roads and water/sanitation, are generally considered as private goods – a sound incentive framework (and corresponding public funding) can be effective in attracting substantial private financing for infrastructure, including in rural areas. The Peruvian experience, with the exception of rural public telephones, over the last decade suggests that the existing incentive framework has not been effective in fostering such participation.

Figure 2: investment levels for some rural infrastructure sectors (1998-2002) (base 100 in 1998).



Sources: RODRIGUEZ, M. (water/sanitation), ARAGON, I. (electricity), MTC (rural roads).

The Government of Peru is well aware of the need to promote a more balanced development. Active steps have been taken to address the issue within the new institutional framework introduced since 2002 when ambitious decentralization reforms were passed. In particular, a number of national and sub-national development plans have now been developed to confront the problems of rural areas. All of them acknowledge the importance of infrastructure to reduce physical isolation, increase productivity and diversify economic activities. Ninety percent of the poorest quintile of the rural population work in the agriculture sector (mostly subsistence) and for them, access to local markets is key. Thus, infrastructure's impact on agricultural productivity or diversification outside the agriculture sector can trigger significant benefits for the rural poor, as specifically discussed in the *National Strategy for Poverty Reduction and the Development of Economic Opportunities for the Poor.* The *National Plan for Territorial Development* proposes to strengthen the emergence of secondary cities through a territorial perspective of the rural space, and better and more affordable urban infrastructure and communication services. The *Sierra*

Rural Development Strategy stresses the need to develop links between urban areas and agriculture/livestock production areas as well as economic corridors, productive infrastructure and private investment. Finally, the *Plan for the Sustainable Development of the Amazonia region* identifies a large number of projects, of which about one third are in the infrastructure sectors.

These plans and strategies each have intrinsic value. However, they do not yet constitute a unified rural development strategy. Nonetheless, three recommendations emerge that should underpin the efforts to strengthen the delivery of infrastructure services in rural areas. The first is to focus resources on areas with stronger economic potential. The second is to adopt a territorial perspective that links rural economies to the surrounding towns in the context of a larger rural space – this should help avoid separate sectoral interventions that are planned with limited connection to the productive development of the rural territories. And the third is to develop new approaches – as well as new implementation models - to the provision of infrastructure services with stronger linkages to local realities and participation. Together these three sets of recommendations will help promote the transition from subsistence to a more competitive agriculture, provide access to income-generating opportunities, and facilitate economic diversification outside agriculture.

In addition, the ambitious agenda of decentralization reforms is being implemented with the goal of stimulating local economies, by making more resources and institutional capacity available at the local level. Since 2002, major laws have been passed to define the principles of the decentralization process, address its fiscal consequences, and develop the institutional framework. As a result, the share of public expenditures managed at the sub-national level has increased from 14% in 2002 to 23% in 2004. In parallel with the fiscal reforms, a national assistance plan for local and regional governments has been prepared to ensure that sub-national governments can reach sufficient institutional capacity, acknowledged by a certification from a national accreditation system.

This is promising for rural development in general and for the provision of adequate services in particular. The creation of local institutional capacity and the devolution of adequate budgetary resources are critical steps that should progressively allow the shift from a central, sector-based, vision of rural development, to a decentralized territory-based approach. With the new model, local participatory planning and prioritization workshops are being used to identify potential economic opportunities and elaborate local development strategies. When such planning is performed at a sufficiently decentralized level (such as the province), rural stakeholders' needs are reflected more effectively, allowing them to contribute to the identification of the rural infrastructure needs that could be more effective at promoting local economic development and increasing rural incomes. In spite of the progress achieved, Peruvian mayors remain cautious and aware of the challenges ahead: most think that the fact that municipalities take over new responsibilities will have a positive impact on local development but they also recognize that they are not yet prepared to take over new responsibilities.

In order to capture the main features of Peru's rural infrastructure gap, this report examined infrastructure provision through three dimensions: *prioritization* (is infrastructure

investment properly aligned with the priorities set by the government for rural areas and the demand of the target population?), *efficiency* (are infrastructure services provided in an efficient manner with due attention paid to environmental, social and gender issues as well as ability to attract complementary private sector investments?) and *effectiveness* (does the provision of infrastructure services effectively contribute to increasing rural incomes, which is the ultimate effect sought for the long-term reduction of poverty in rural areas?).

With regards to *prioritization*, although some similarities can be detected across sectors, there are major differences in the way planning and implementation is performed for the various rural infrastructure sectors. The degree of involvement of local stakeholders is one difference but, more broadly, the criteria and methodology used to prioritize investment alternatives differ significantly. In brief, the water/sanitation and rural road sectors have tended to give more weight to social and poverty considerations while electricity gives more importance to economic criteria. The telecommunications sector (through FITEL) attempts to balance both considerations. These differences in planning methodology are likely to be the main reason behind the higher correlation between poverty and provision of water/sanitation and rural roads, than between poverty and that of electricity and telecommunications. In addition to relying on different planning criteria, each infrastructure sector has its own national planning instrument, its own funding mechanism and even its own definition of rural areas. Finally, there is little opportunity for coordination and exchange of success stories across rural infrastructure sectors.

Although the quality of spending could certainly be improved, the amount of resources allocated to rural infrastructure is dismally low. Over the 1998-2002 period, Peru invested about $97 million per year in rural infrastructure, amounting to 0.18% of GDP or about $24 per person per year. 97.4% of these resources came from public sources. In comparison, Chile with half the rural population share, invests about 0.28% of its GDP in rural infrastructure or four times as much in per capita terms. In the case of Guatemala, which has a large rural population, investment in rural infrastructure reached an average of at least 0.31% of GDP over the past 5 years. The limited resources allocated to rural infrastructure is due to the generally low priority granted to investments in general (and to investments in infrastructure in particular) in the country's budget: Peru's public investment in infrastructure have hovered around half a percentage point of GDP over the last few years and, when including private investment, the total just slightly exceeds 2% of GDP on average over the period 1998-2001 (1.5% in 2001). This places Peru largely below Chile (around 2% of GDP for public investment in infrastructure alone and almost 6% when including private financing) and Brazil (around 1% for public investment and around 2.5% for public and private investments cumulated).

In terms of *efficiency*, Peru's rural infrastructure gap is noticeable in terms of coverage, quality and cost. Only 28% of rural households have access to an unpaved road in good condition (13% to a paved road), 49% have access to sanitation services, 62% to water, 30% to electricity services and only 9.3% of villages had a public phone in 2003. In addition to the reduced availability of most services, other services are of low quality (water, Internet, use of traditional fuels as an alternative source of energy) or are expensive (electricity, freight transport, and telecommunications).

Nonetheless, progress has been achieved in each of the four infrastructure sectors (transport, water/sanitation, electricity, and telecommunications) with regards to the participation of the private sector in operation and maintenance with positive impact on the efficiency of such investments. New legislation [6] has set a proper regulatory framework to liberalize the telecommunication and electricity sectors and to create incentives for sharing of right-of-ways between these sectors. Increased competition in telecommunications and private participation in electricity have substantially improved efficiency and fostered new investments. Nevertheless, the main electricity distribution concessions are concentrated in small areas around urban centers, and electricity distribution companies outside of Lima remain mainly state-owned. In spite of the existence of a best practice incentive mechanism (FITEL), that helped create two small private companies that provide public telephone and some Internet services in Peru's most isolated rural communities, the main operator continues to be the de-facto monopolist for the provision of basic telecommunication services in most rural areas and less than 50% of Peru's population is covered by cellular networks, one of the lowest in Latin America.

In the rural water/sanitation and rural road sectors, construction of the physical infrastructure is contracted to the private sector and operation and maintenance activities is performed by market-based community mechanisms. The use of micro-enterprises to perform the maintenance for rural roads has proved an efficient mechanism to maintain rural infrastructure while at the same time helping develop entrepreneurial capacity in rural Peru. Although many tasks related to the construction, operation and maintenance of rural infrastructure are delegated to private actors, they are publicly funded so that direct private investment in rural infrastructure remains marginal – about 3% of total funding flows in 1999-2003. This is due to the higher risks and lower profitability.

When considering the *effectiveness* dimension, analysis performed by Escobal and Torero (2004) for this report found that the availability of infrastructure services in rural areas promotes income-generating opportunities, strengthens social capital and, ultimately, reduces poverty. Their work specifically address the direction of causality (the impact of infrastructure on rural households' income as opposed to the consumption effect of wealthier households purchasing more infrastructure services) relying on the propensity score matching approach. [7] Escobal and Torero found that access to infrastructure services increases the number of hours worked per week, an impact that becomes significant when households have access to at least 2 services. In addition, economic diversification

[6] Such as the 1993/1994 Telecommunication Law, the 1992 Electricity Concession Law and the 2004 Law requiring sharing of right-of-ways.

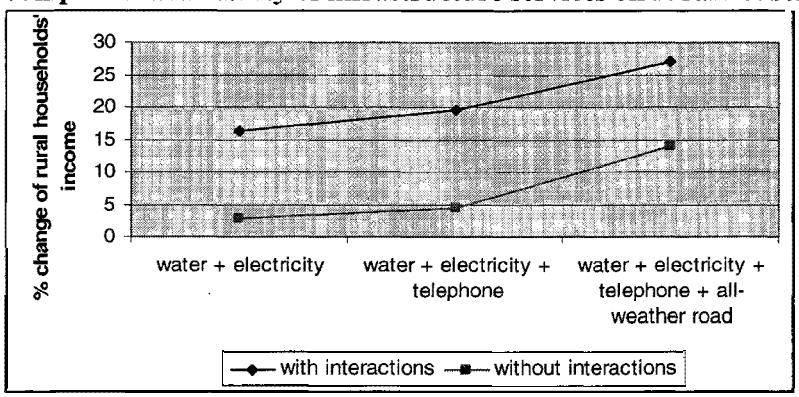
[7] Propensity score matching was first developed by two statisticians, Rosenbaum and Rubin, in 1983. Since in observational studies assignment of subjects to the treatment and control groups is not random, the estimation of the effect of treatment may be biased by the existence of confounding factors. Propensity score matching is a way to "correct" the estimation of treatment effects controlling for the existence of these confounding factors based on the idea that the bias is reduced when the comparison of outcomes is performed using treated and control subjects who are as similar as possible. These methods have become increasingly popular in medical trials and in the evaluation of economic policy interventions.

increases with the number of available infrastructure services: 85% of the working time of rural households without access to any infrastructure service is devoted to agricultural activities, compared to 55% for households with access to three or more services. [8]

A simulation also shows that the distribution of rural households' income shifts up as more infrastructure services become available and that, as a result, poverty rates are reduced. According to this simulation, bringing all infrastructure services to the 30% of the Peruvian rural population without access to any service could help lifting half a million Peruvian out of poverty. [9] Therefore, this impact on poverty could be even greater if investments in rural infrastructure were to focus on poor rural areas, with strong potential for economic development (and where some infrastructure services may already be partially available). The additional payment contributions that may arise from the existence of several services will be more than compensated by the increases in income.

Another important observation is that the different existing approaches for the various rural infrastructure sectors reduce opportunities for positive interactions. Seventy-four percent of rural households have access to zero or one infrastructure service and only 5% have access to the four services. At the same time, there is substantial evidence that cooperative interactions across services can increase the impact of combined services on households' income compared to the sum of each infrastructure service taken individually (Figure 3). For example, rural households granted access to both water and telephone services have seen their income increased by 38% compared to 11% if adding the individual effect of accessing each service separately (accounting for causality effects). Interactions arise because many productive activities in rural areas require access to several infrastructure services. The need for combined services can be identified through local development plans pointing out the various potential productive activities that could be developed in a particular territory.

Figure 3: Impact of availability of infrastructure services on rural households' income.



Source: Escobal and Torero (2004).

[8] While the evidence gathered by Escobal and Torero is already substantial, this strategy proposes to complement these results and test their robustness by establishing a specific monitoring and evaluation mechanism during the implementation of the proposed agenda.

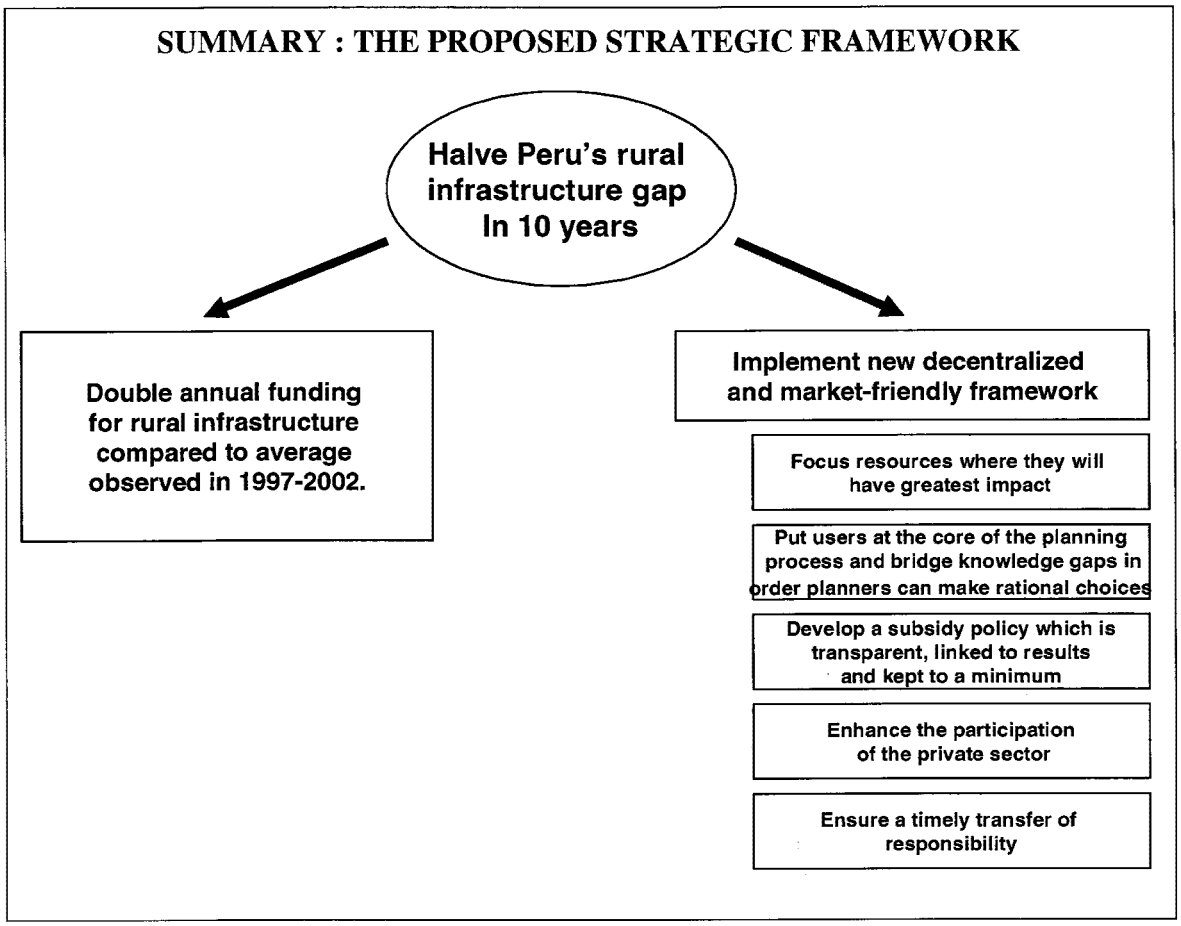
[9] However, this might not be the most efficient use of resources since this population without access to any service is likely to live in the most remote parts of the country (i.e., where the marginal cost of bringing access to infrastructure services is the highest).

Finally, the contribution of rural infrastructure investments to local economic development in rural areas is enhanced when they can be aligned to local strategies through the greater participation of local stakeholders. In this regards, significant progress has been achieved with the implementation of a decentralized framework. While the "higher-tech" sectors with larger potential economies of scale (like electricity or telecommunications) remain significantly centralized, the water/sanitation and rural roads sectors have been decentralizing planning and operation at the municipal and community levels with the technical support of central agencies. For example, in the water/sanitation sector, district municipalities are involved through their own participatory planning instruments in the detailed design of projects, including determining who the beneficiary communities are. Similarly, rural road planning is performed through district and provincial plans in which local governments must define the modalities of construction, rehabilitation and maintenance. In the rural electricity sector, some participatory mechanisms have been put in place, such as the "electrification committees" but this involvement of local stakeholders remains limited and mostly "upstream" in the planning process. Surveys show that while about half municipalities declare themselves to be involved in a water/sanitation program, and a third in rural roads, this proportion drops to one out of five for rural electricity and less than one out of ten for telecommunications.

In this context, the proposed strategy intends to answer two key questions: How can rural infrastructure be harnessed to promote sustainable rural development and poverty alleviation?; and how should it be done? The strategy seeks to improve access to infrastructure by the rural population along the three dimensions of prioritization, efficiency and effectiveness. These three dimensions provide a conceptual framework that makes explicit the key tradeoffs/tensions involved in improving the access to rural infrastructure and enhancing its provision. These trades-offs address the "what should be done" and "how", as follows:

- "level of access versus availability of resources": the amount of resources allocated to achieve higher coverage rates versus those that can be budgeted or collected from beneficiaries;
- "prioritization versus effectiveness": the selection of social and economic criteria for the prioritization of investments versus achieving larger impacts in terms of greater sustainability of investments and higher increases in rural incomes;
- "effectiveness versus efficiency": the selection of the appropriate institutional level to better reflect rural users' needs versus achieving the need for economies of scale and sufficient institutional capacity to manage the various infrastructure assets;
- "affordability versus incentive framework": necessity of revisiting the existing subsidy policy for rural infrastructure;
- "in-house versus contracting": the need for an framework that could foster better private sector involvement in rural infrastructure; and
- "transfers versus capabilities": the timing of the transfer of new responsibilities to local governments in a progressive manner and along with related technical expertise.

The proposed strategy aims at implementing a new decentralized and market-friendly framework for rural infrastructure through a two pronged approach: the *allocation of complementary resources* to align Peru's coverage rates of rural infrastructure with countries at similar level of development; and *improved expenditure efficiency*. Appropriate sequencing is also an important element of the strategy since some substantial improvements in efficiency should precede major increases in expenditures. In particular, noticeable progress should be achieved with regards to the methodology adopted to prioritize investments, the reshaping of the subsidy policy or the strengthening of the management capacity at the local level.



Some of the implications of the proposed strategy are common to the four infrastructure sectors. The desire to foster complementarities across infrastructure services and better align rural infrastructure investments with local development strategies justifies the use of a common framework. This common framework should address the full cycle of rural infrastructure investment from planning, to funding to implementation.

Halving Peru's rural infrastructure gap in the next decade would align the country with its neighbors and peers. It would promote local economic development through enhanced rural/urban linkages, help strengthen Peruvian secondary cities and reduce rural poverty.

Such an objective requires doubling in the current annual level of funding for rural infrastructure from its current level of around US$100 million over the coming decade. While this clearly implies a budgetary effort for the Government of Peru, this would be modest (an annual $200 million would represent around 2% of the 2003 national budget and about a third of a percentage point of GDP). This budget target should not be out of range, given past public spending in infrastructure. In fact, this amount is just slightly higher than the sum of the funding available in 1998 for rural roads and water/sanitation, combined with the statutory objective envisaged by the Law creating the Rural Electrification Fund and the current resources available for rural telecommunications through the Telecommunications Development Fund (FITEL).

If the additional effort was considered out of range given the current fiscal constraint, financing for rural infrastructure should be found within the sectors. FITEL is already working under such a model (its resources do not come from the general budget but, rather, from a 1% tax on the revenues of telecommunications operators). In the electricity sector, a revision of the tariff policy with the introduction of cross-subsidies could be the way to generate additional resources that could be channeled through the Rural Electrification Fund (once effectively created). In the road sector, some countries like Brazil or El Salvador have earmarked transport-related user charges (eg. gasoline tax, vehicle licence fees) in a road fund and used the resources to finance the maintenance of transport infrastructure. While the key issue for Peru remains the necessity to find additional financing to develop its rural infrastructure, a customized strategy could be elaborated for each sector, either by raising the priority given to such investments in national (or local) budget allocation decisions, or by finding ways to generate additional resources within the sector by implementing earmarked users' charges or cross-subsidies.

As to the means to improve expenditure efficiency, they involve the following:

- **Focus resources where they can generate larger economic impacts** – It is proposed that a mix of social and economic criteria - as well as the presence of other infrastructure - are used to allocate budgetary resources from the various infrastructure funds, up to the current level of resources. This would allow balance between the objective of reducing rural poverty, while ensuring an efficient use of resources by focusing on territories where access to infrastructure will help reveal potential economic opportunities and where complementarities across services can take place. For the additional resources, only economic considerations (productive potential) and opportunities for complementarities (presence of other infrastructure) should be taken into account. As such, these additional resources could make a substantial contribution to Peru's competitiveness agenda. This "two windows" model – the first window for existing resources combining social and economic allocation criteria, and the second for additional resources, aligned with the competitiveness agenda – would both finance rural infrastructure projects identified through the same methodology of decentralized participatory planning. A methodology consistent across sectors should be developed in the short term for the two windows as well as monitoring and data collection mechanisms. In order to maximize opportunities for complementarities across services, incentive mechanisms should be established for the coordination in the use of the four

existing sector-based funding instruments: PRONASAR/Ministry of Housing, Construction and Sanitation, the Rural Electrification Fund, the Ministry of Transport and Communications, and FITEL. Such incentives could include modification of prioritization criteria in order additional resources are granted to projects with interactions across sectors. However, there are important differences between the telecommunication and electricity funds and the resources for water/sanitation and roads, as the former are intra-sector and independent of fiscal support. Increased coordination of these sector-specific funding instruments should help identify complementary investment opportunities that could save costs and increase economic development impact—such as simultaneous investments in fiber optic and electricity distribution networks.

- **Put users at the core of the planning process and bridge knowledge gaps in order local planners can make rational choices** - This would require in the short/medium term the preparation of provincial participatory infrastructure plans based on local development plans. The provincial level has been chosen as the right institutional level for planning purpose because of its intermediary positioning between the regions – too large to be fully accountable to rural users – and the district municipalities – too small to have a sufficient technical capacity and to allow for economies of scale. While the province would be the key level of implementation for the rural infrastructure strategy, close coordination would be needed with the central government (technical assistance, monitoring, and institutional capacity assessment), the regions (rural electricity regional plans, on-grid electricity and ICT investments implementation), the districts (supervision of implementation and provision of technical assistance to communities), communities (supervision of implementation, operation and maintenance of rural water/sanitation systems), and local and national private sector stakeholders that would be the key investors and managers for telecommunication and electricity networks. In order to strengthen local governments' capacity to prioritize among infrastructure investments, central agencies (Vice-Ministry of Sanitation, DEP, PROVIAS Rural, OSIPTEL) would prepare a "toolbox", provide technical assistance and ensure that bottom-up planning is balanced with existing strategies of national infrastructure plans (PRONASAR planning methodology, National Plan for Rural Electrification, National Program for Rural Telecoms/FITEL, national road plans). In particular, central agencies – taking into account the demand for infrastructure services expressed by rural users through "bottom-up" participatory process – would provide provincial planners with a list of alternatives for rural infrastructure investments. The preparation of the provincial infrastructure plans would then allow local stakeholders to prioritize among these alternatives, taking into account rural needs and potentialities.

- **Develop a subsidy policy which is transparent, linked to results and kept to a minimum** – The failure of the incentive framework to promote higher levels of private sector participation suggests engaging in a deep evaluation of existing subsidy instruments, followed by a restructuring of the framework. In certain cases, subsidies have been insufficiently predictable, in some cases, they have excluded certain categories of operators and introduced distortions, in other cases, they failed to create sufficient incentive to attract the private sector and make services affordable enough to

reach the rural poor. In the short term, it is therefore necessary to review existing subsidy mechanisms within sectors and to put in place mechanisms to better coordinate sector-specific subsidy programs. In the medium term, such a review should help revamp subsidy policies for infrastructure services in rural areas. Ultimately, for all sectors except roads, the pricing policy should reflect the cost of capital, operating costs, maintenance, management, administration and security, and a reasonable profit. The Peruvian (FITEL) and international experiences in minimum subsidy concessions and output-based aid could provide a valuable ground to redesign the existing framework. Cross-subsidies may be justified in certain cases (eg. electricity). Indeed, while in an ideal world the best subsidy is clearly the targeted lump sum cash payment, in most Latin American countries, fiscal constraints impede the financing of many subsidies. Subsidies, where required to keep the service affordable, should be direct and transparent. When they exist, national regulators should monitor the application of subsidies and the pricing policies, in a manner that will not create disincentives for private sector investment.

- **Further delineate and facilitate private sector participation** – Private sector participation has already successfully occurred in each of the four infrastructure sectors. It needs to be further promoted as it can bring substantial benefits in terms of both efficiency (better use of resources) and effectiveness (creation of employment opportunities and of a local entrepreneurial capacity in rural areas). In the short/medium term, it is necessary to improve the business environment for private providers of infrastructure services, by revising and further developing the legal and regulatory framework. In particular, local authorities and technical staff should be trained to better understand their role (if any) in regulation and how to apply consistently the national regulatory framework. Local authorities should become facilitators that could bring together local entrepreneurs and NGOs to attract private investment, present multi-sectoral investment proposals to national authorities and/or rural investment funds, and do not impose unreasonable fees or technical requirements. To achieve that, the strategy recommends creating provincial infrastructure institutes—based on the experience of the Provincial Road Institutes— entrusting them with the planning of infrastructure interventions and contracting, when relevant, private entrepreneurs to implement the provincial infrastructure plans, under the authority of a provincial infrastructure board and with the technical support of central agencies. The mayors of all the municipalities in the province (district and provincial mayors) would be members of the provincial infrastructure board. The overall institutional environment should help identify and foster local entrepreneurs in rural areas that show the skills and may have some capital to invest in local infrastructure by providing training, matching grants, micro and SME-financing. In this regard, the micro-enterprises model could be valuably experimented in other sectors than rural roads.

- **Sustain a timely transfer of responsibilities** – A critical issue for a successful decentralization process is to ensure that responsibilities are transferred in a timely manner, consistent with the building of a local management and technical capacity and along with sufficient financial resources. The strategy proposes to design a list of minimum requirements to be fulfilled before local governments can assume rural

infrastructure responsibilities. These requirements should include capacity for policy coordination (e.g., creation of rural infrastructure boards), planning, management and contracting capacity (e.g. creation of provincial infrastructure institutes), and incentives for the promotion of private sector participation. They should also address the sustainability of rural infrastructure investment (e.g. is maintenance properly funded?), the capacity to deal with social, gender and environmental issues, as well as monitoring capacity (which could be performed by the regional level). National agencies should assess local governments' management capacity, evaluate local plans and provide customized and targeted technical assistance to low performers, in coordination with the CND. A comprehensive monitoring and evaluation mechanism should also be established, involving both the central and the local levels, in order to follow progress made in decentralizing responsibilities and fostering complementarities as well as to detect possible improvements to the proposed strategy and to deepen our knowledge of the interactions between rural infrastructure and local development.

Summary :
Proposed Responsibilities for the Various Levels of Government

Central Agencies	**-Provide knowledge and technical assistance to local governments** **-Asses if institutional capacity is sufficient** **-Monitor rural infrastructure development, outcomes and impact**
Regions	**-Prepare regional plans for rural electricity** **-Contract private providers to implement plans (on-grid)**
Provinces	**-Coordinate the planning process for rural infrastructure** **-Contract private providers to implement plans** **-Provide technical assistance to promote micro-enterprises**
Districts	**-Participate in planning process through provincial infra. boards** **-Supervise implementation** **-Provide technical assistance to communities**
Communities	**-Supervise implementation** **-Operate and maintain rural water/sanitation systems**

In addition to cross-sectoral implications, specific improvements should be pursued in each of the four infrastructure sectors, as detailed in the table below. Key among them are:

- In the **water sector**, efforts should focus in the medium term on clarifying the decentralized regulatory and institutional framework while building on the experience of the *Juntas Administradoras de Servicios de Saneamiento (*JASS). This could in particular be formalized within the revision of the existing water sector law and the associated regulations and bylaws. The guidelines proposed by the existing 2003-2012 Strategic Plan for water/sanitation services provide a good basis to engage the review of the existing subsidy schemes. The planning methodology could also be revised, taking

into account the role of the provincial government in coordinating access to different infrastructure services. Nonetheless, effective demand, as evidenced by the community's willingness to pay (at least 20% of the costs of new water/sanitation costs and 40% for improvement and rehabilitation works), should continue being the corner stone of the planning process for any investment in water/sanitation. Finally, institutional capacity needs to be strengthened at both central level (DNS planning, monitoring and evaluating capacity) and local level (JASS).

- In the **rural road sector**, responsibilities should be clarified between the various levels of government. Progressively, there should be a full devolution of responsibilities for rural roads' management at the local level while the role of the central agency, Provias Rural, should diminish and evolve. Planning could be improved to better take into account complementarities while building on the experience of the provincial road plans and the participatory prioritization workshops. The successful experience of the micro-enterprises should continue to be scaled up, by streamlining the introduction of competition with tendering of maintenance contracts. In the medium term, the provincial Road Institutes – about 25 have been created so far - should evolve towards provincial infrastructure institutes. The subsidy review should explore options with regard to facilitate the access of the poor to transport services. The Local Development Window, which has been successful in fostering inter-sector coordination and promoting synergies between infrastructure and economic opportunities, should be pursued and scaled up. Non-motorized tracks should continue to be addressed as one option for enhancing mobility in certain rural areas.

- In the **rural electricity sector**, there is an urgent need for a new legal and regulatory framework to mobilize resources for investment from national, regional and local governments, as well as public and private enterprises, including existing distributors. The review of existing subsidies should address the need to make these mechanisms predictable enough to create the right incentive for the private sector. This review should also address the fact that existing subsidies are not directly accessible to private providers, but only to DEP and ADINELSA. The role of ADINELSA would have to be reviewed to avoid potential conflicts of interests. The option of establishing a rural electrification fund independent from annual budgetary allocations should also be explored, along with the possible use of cross-subsidy schemes. The regulatory framework needs to be revised in order to incorporate the provision of minimum subsidy concessions or management contracts. The transition of EMSEMSA and EMSEUSA toward private-sector management should also be planned. There is a need for decentralization of planning and prioritization of projects to the regional and provincial levels. With regard to maintenance, the possible use of micro-enterprises could be valuably explored. Finally, the costs of service provision could be reduced through changes in standards, design, construction of grid-connected projects and off-grid service provision through cost-effective renewable energy. Further capacity building may be required in this area, particularly for the regulator.

- Finally, in the **rural telecommunication sector**, efforts should focus on decentralization and on promoting local private sector participation, since this is the

sector with the largest potential for private involvement. The review of the subsidy framework should focus on the sustainability of key institutions and programs (eg. the private sector companies that own the FITEL satellite community phones or the community Internet access centers) and on continuing the extension of services (eg. satellite community phones, Internet access centers) to highly isolated rural communities. If needed, for example to increase cellular coverage in rural areas, earmarking half of MTC's resources coming from licenses and fees' revenues, could bring additional funding for FITEL. In addition, in the shorter term, private sector participation could be promoted by lifting concession restrictions for small operators. Local governments' participation should be enhanced for both the prioritization of investment through the provincial infrastructure plans as well as plans to foster increased use or demand of ICT infrastructure, but also through representation in national coordination bodies (CODESI). CODESI needs institutional building to pursue its coordination role, develop common standards of solution designs and technology and develop strong monitoring and evaluation indicators. Finally, the various options to address Peru's national backbone gap (eg. PCEP) should be carefully assessed. National e-government initiatives such as the development of services for citizens (licenses, certificates) and businesses (registration, labor permits, export procedures) should be pursued and scaled up, with attention paid to bringing these services to rural areas. Similarly, e-business initiatives should be pursued in rural areas, possibly through the use of training and matching grants to help deepen e-business markets and through upgrading Peru's telecenter network, under private sector management, to provide support services to very low-income entrepreneurs. Initiatives to stimulate demand for ICT services by local communities, governments and educational centers will create a virtuous circle as it will not only contribute to economic development but it will also increase the commercial viability of the suppliers of ICT services which in turn will reduce the need for subsidies.

Several cross-cutting environmental and social challenges apply to the four sectors. These challenges focus on the consideration of environmental mitigation measures, consideration of gender equity, and the appropriate inclusion of indigenous peoples. While the four sectors have adequate regulations to address environmental impacts, those related to gender and indigenous peoples require strengthening, albeit substantial advances in their mainstreaming have already taken place in the rural roads sector. Recommended actions include training of the sector institutions on gender equity issues and inclusion of indigenous groups and women in the planning, management, and supervision of projects. The definition of specific quotas—such as percentage of women participation in planning workshops or in the management of relevant project activities—can help direct the efforts, even if those quota do not represent benchmarks for mandatory compliance. Monitoring and reporting of direct and indirect effects of rural infrastructure on those groups can further provide the mechanisms for making adjustments towards achieving greater equity and better distribution of benefits among all society groups.

The proposed agenda is neither over ambitious nor unrealistic. On the budgetary side, the additional proposed effort is incremental compared to the overall amount of public investment and it would just mean coming back to levels observed five years ago before the

fiscal situation imposed a dramatic decrease to public spending in infrastructure. On the institutional side, the strategy is aligned with Peru's decentralization agenda and it does not involve radical changes that may be conflicting with on-going reforms. On the contrary, the strategy proposes to deepen the decentralization process through the strengthening of local institutional capacities, the timely transfer of planning and operational assignments to local governments and the clarifications of responsibilities between the various levels of government. On the development side, the proposed approach would help enhance rural productivity and promote diversification outside the agriculture sector, in line with other existing rural development strategies for Peru. In addition, the territorial (provincial) approach to planning is expected to promote the emergence of productive poles in rural Peru as well as the strengthening of rural/urban linkages that could reinforce the network of Peruvian secondary cities.

Finally, some of the proposed recommendations have already been successfully experimented by some infrastructure sectors. In such cases, the strategy has tried to promote cross-fertilization across the various sectors and to build on these successful experiences. Progress already achieved provides strong evidence that the proposed institutional scheme is already working. In particular the provincial road institutes have proved to be an efficient mechanism for rural road management, and their success is a valuable argument that small and agile institutions such as the provincial infrastructure institutes could be successful in organizing planning, fostering private sector participation and providing technical and management expertise.

In sum, while ambitious, the proposed agenda is indeed achievable if building on both the momentum created by the on-going decentralization process and on the existing positive reforms implemented in each the four infrastructure sectors.

Summary of key sector-specific recommendations

Sector	Recommendations		
	Prioritization	Efficiency	Effectiveness
Water/sanitation	• Incorporate complementarities criteria • Strengthen planning capacity in the sector (including DNS) and involve local governments through project cycle • Use of provincial infrastructure plans (provincial infrastructure boards) to initiate promotion activities of centrally founded W&S projects • Build on the experience of existing *mesas de concertación* used by municipalities to determine the beneficiary communities, and the detailed design of water/sanitation projects (final decision is taken by the beneficiary community) • Community commitment to O&M of the systems, by the establishment of a JASS and payment of an up front cash contribution plus labor during construction to ensure sustainability	• Build capacity of JASS, with incorporation of "micro-enterprise" type of model • Adjust technical standards of water supply systems to respond to capacity of potential users using appropriate technologies and designs according to rural needs	• Clarify decentralized institutional and regulatory framework within the revision of the existing water law and the associated regulations and bylaws. • Provide adequate level of training to the JASS • Redesign subsidy policy, building on the guidelines proposed by the existing 2003-2012 strategic plan for water/sanitation • Stronger consideration of values and attitudes of indigenous populations
Rural Roads	• Strengthen the experience of the *talleres de priorizacion* and of the provincial participatory road plans • Revised definition of technical standards for rural roads (building upon the experience of the Rural Roads Program) • Revise prioritization methodology to include complementarities	• Clarify responsibilities between various levels of government, with an increasing devolution of responsibilities to local entities and the ensuing scaling down of attributions to central entity (Provias Rural) • Continued development of institutional capacities at the local level (through IVPs, becoming IIPs) • Continue scaling up, and incorporate competition in, the maintenance mechanism with micro-enterprises	• Explore alternative options for reaching areas in the Selva with consideration of indigenous people and environmental factors • Assess potentialities and financial implications of targeted subsidies for transport services in the most remote areas • Streamline the Local Development Window's model
Rural Electricity	• Prepare Regional Plans for Rural Electrification, aggregating demand expressed in provincial infrastructure plans, and based on decentralized planning and prioritization of projects at regional level • Develop planning methodology that ensures	• Implement a new legal and regulatory framework to mobilize investment resources (introduce rural concessions, tariffs, construction and operation standards) • Revamp incentive framework for private sector participation, rather than continuing the channeling of funds exclusively through	• Formalize FOSE over longer periods to reduce uncertainty and utilize the existing cross-subsidy mechanism to balance tariffs across regions • Implement rural electrification fund, without excluding cross-subsidies, and ensuring predictability of subsidies in order to reduce risks for private

	investments are integrated with local development strategies to ensure cost efficiency, given increasing marginal costs • Incorporate complementarities criteria and include willingness of community to contribute	ADINELSA and DEP (incorporate real costs of investment and future price of services); provide capital cost incentives (subsidies) to private and public enterprises to invest; introduce competition for the subsidy based on both contribution of enterprise and community/local government • Assess and clarify responsibilities of ADINELSA and DEP to avoid conflicts of interest • Replace electricity committees by participatory workshops for planning and monitoring purposes • Build on the experience of the *convenios de capacitacion y asistencia tecnica* already signed between the DEP and some local governments	sector participation • Revise technical norms to account for specific needs of rural populations and sustainability of rural systems, reducing costs of service provision, expanding use of renewable technologies for remote rural population • Undertake analytical work to explore the involvement of communities in routine maintenance of electricity infrastructure • The "network" nature of the facilities requires keeping specialized technical capabilities and coordination at the regional and national levels
Rural Telecom-municat-ions	• Involve local governments in planning investments and aggregating and stimulating demand for ICT services (i.e. e-government, tele-education, etc.) • Develop strategy for fostering backbone infrastructure development • Increase allocation of resources from licenses and fees to existing rural telecommunication programs such as FITEL, instead of creating competing programs within MTC • Incorporate complementarities criteria and include willingness of community and local business to contribute	• Scale up training programs for local governments building on the experience of FITEL and, possibly, INICTEL • Implement incentives to put private sector, including local entrepreneurs, at the core of the implementation strategy • Lift concession restrictions limiting the entrance of small enterprises in the market • Proactively identify opportunities to make simultaneous investments, using OBA mechanisms, in telecommunications, electricity and road projects (for instance, taking advantage of recently approved law on sharing the right of way)	• Support activities of CODESI to achieve coordination of efforts, incorporating representative from local governments • Clarify responsibilities of local governments in ICT • Continue support to the extension of FITEL programs to isolated rural communities and enable and facilitate FITEL's public telephone operators to invest in un-served areas • Put in place new FITEL programs aimed at extending cellular coverage in rural areas • Ensure financial sustainability of community internet access centers (see Box A.3.) • Develop ICT services building on the experience of the telecenters • The "network" nature of the facilities requires keeping specialized technical capabilities and coordination at the regional and national levels

TABLE

1. RURAL DEVELOPMENT AND DECENTRALIZATION IN PERU

1.1. INTRODUCTION

Peru's rural population lives in conditions and with opportunities that are constrained by their limited access to productive assets and markets. A recent World Bank report on inequality in Latin American and the Caribbean [10] highlights the pervasive effects of differential access to productive assets and institutions in restraining the prospects for economic growth and the positive effects of this growth on poverty reduction. That report advocates increasing equal access to infrastructure to achieve better inclusion of all members of the society and reduce their livelihood risks. [11] These proposals have particular relevance in the case of Peru where differential poverty rates between urban and rural areas are substantial, particularly affecting indigenous groups, and where indicators of access to infrastructure, such as water/sanitation, roads and telecommunications, tend to fall within the bottom third of the Latin-American countries.

Poverty rates in Peru have diminished in neither rural and urban areas since 1998, based on statistics compiled by the National Statistical Institute (INEI). They continue in spite of reasonable overall growth rates and investment in rural infrastructure that averaged US$97 per year over the period 1998-2002 (about 0.18% of GDP, albeit with a declining trend). [12] Though it is difficult to say with precision the extent to which interventions on rural infrastructure have hampered positive changes in poverty levels, it appears that a major shift in the provision of infrastructure facilities and services must take place in order to redress current inequalities in the access to services and increase opportunities in rural areas. This shift can currently be facilitated by the ongoing implementation of an ambitious decentralization framework that can help gradually transform the way in which rural infrastructure is planned, financed and managed.

1.2. KEY RURAL DEVELOPMENT TRAITS

Peru's rural areas are spread over three main macro regions, the so-called *Costa*, *Sierra* (highlands) and *Selva* (jungle). Although the productive activities of these areas have diversified, most of them still consist of a large percentage of agricultural activities and the

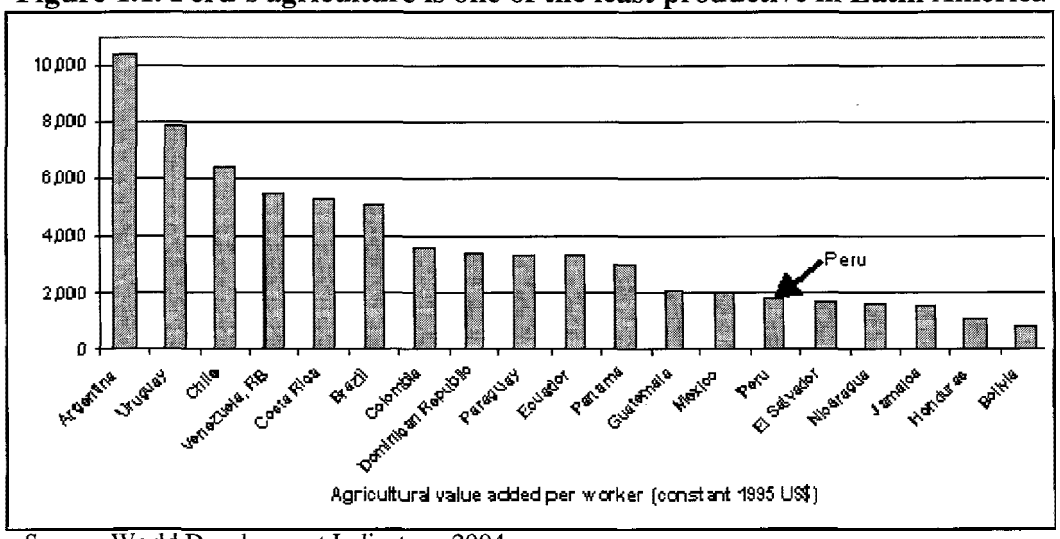
[10] World Bank, 2004, *Inequality in Latin America and the Caribbean: Breaking with History ?*

[11] The conclusions of the aforementioned report rest on several empirical studies that show that inequality with respect to access to water, sanitation, electricity or telephony are typically large and correlated with difference in income. Tackling the underlying sources of inequality involves broadening and equalizing the asset base—notably in infrastructure (and education). Further recent cross-country work (Calderon and Chong, 2003) shows that the more infrastructure a country has in place (including electric power, telecommunications, and roads) the less unequal it is. Given the limits on redistribution from taxes, especially in the short term, recommendations focus on the spending side of the equation to reverse a historical pattern of regressive provision of services that tend to reach the richer areas before they reach less endowed areas.

[12] By comparison, for instance, during the same period, Chile invested about 0.28% of GDP in rural infrastructure, with a lower percentage of rural population.

set of activities that derive from them. For the country as a whole, agriculture generates 7-9 percent of GDP and is very labor intensive, employing 20-25 percent of the labor force. The good performance of the sector in the 1990s (with agriculture GDP rising at a rate of 6.6% per year over a decade) masked strong disparities between the emergence of modern, often export-based, agriculture activities and the persistence of subsistence agriculture. In addition, relative to other Latin America countries, the productivity of the Peruvian agriculture remains among the lowest (Figure 1.1).

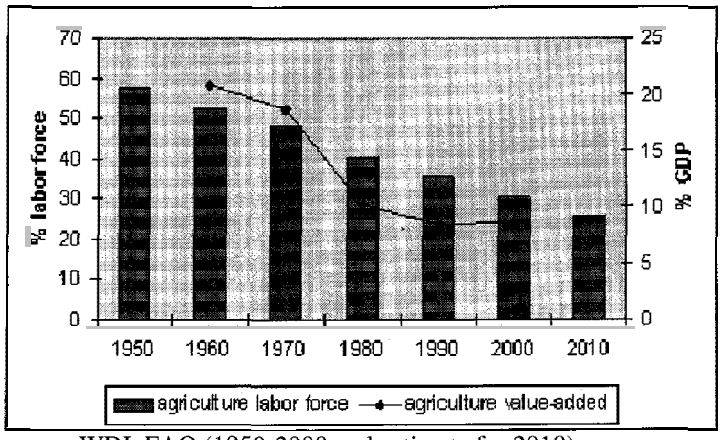
Figure 1.1. Peru's agriculture is one of the least productive in Latin America



Source: World Development Indicators, 2004.

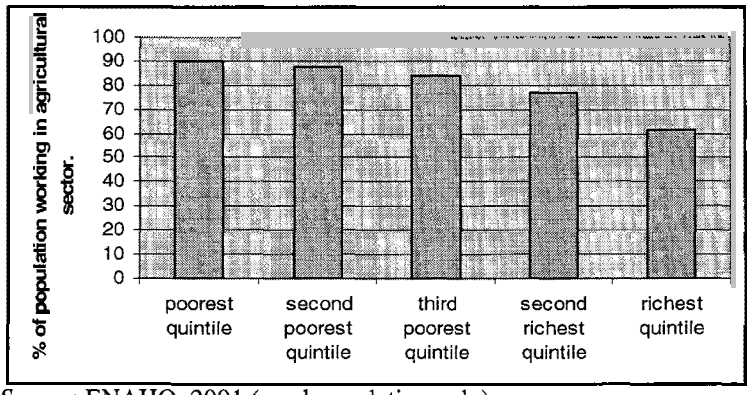
Diversification outside agriculture remains slower in rural Peru than in other South American countries (apart from Bolivia) as illustrated by comparing the share of the population living in rural areas and the share of the labor force working in agriculture (Figure 1.2). The economic importance of agricultural activities is higher for poorer households in rural areas: 90% of the lowest income quintile of the rural population works in agriculture.

Figure 1.2. Agriculture's contribution to employment and value-added has been falling ...



Sources: WDI, FAO (1950-2000 and estimate for 2010).

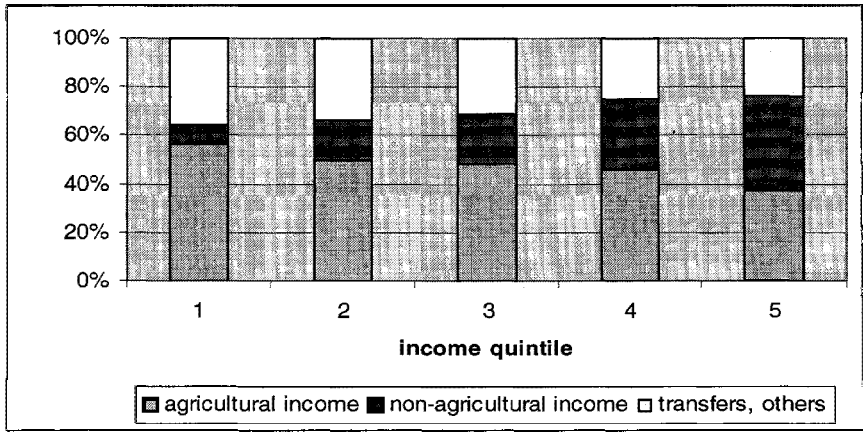
Figure 1.3. ... but, for the rural poor, agriculture remains the main source of employment ...



Source: ENAHO, 2001 (rural population only)..

However, estimates also show that incomes increasingly come from non-agricultural activities. In rural Peru, 38% of working time is dedicated to non-agricultural activities and yet these activities bring 56% of rural households' revenues (Figure 1.3). As illustrated by the composition of rural revenues by income groups (Figure 1.4), households with higher revenues diversified outside agricultural activities more. [13]

Figure 1.4. ... though less so with increasing income



Source: Escobal and Torero (2004).

In the three regions, rural economies have been affected by the limited performance and viability of the agriculture sector for those areas and households of lower incomes:

(i) In the *Costa,* agricultural production represents 60% of the country's agricultural GDP with only 21 percent of the cultivable land, but the profitability of 70% of the smaller units is often negative when taking into consideration the opportunity costs for land or

[13] There is a wide array of literature illustrating the increasing importance of non-salaried and non-agricultural activities and the implications for the improving livelihoods in rural areas and the definition of rural development strategies. More closely related to the Peru context the following can be singled out: Escobal, 2001; Reardon, Berdegue and Escobar, 2001; and Bebbington, 1999.

labor. [14] Thus, many small producers get less than the equivalent income from local labor markets from their work on the farm. Profitability is directly related to the size of the units (90% of them have less than 10 ha) and the type of management (entrepreneurial versus familial). It also depends on the type of products, where they are sold, and how they are produced. As we will see, these factors can be influenced by the opportunities that rural infrastructure can bring about.

(ii) In the *Sierra*, agriculture has a larger economic significance compared to the country as a whole [15] and it remains the main source of revenues and employment in rural areas. Production in the *Sierra* consists mainly of potatoes, corn, quinoa (a cereal) and livestock (cattle and llamas). Productivity is one-half that of Peru as a whole because of the lack of adequate economic infrastructure, the erratic climate, steep topography, irregular rainfall and traditional production technologies. With the exception of potatoes and white maize, the main products of the *Sierra* are highly tradable. However they have been affected by the long-term decline in world prices (-35 percent since 1970) and by increased competition on domestic markets from imported or locally-produced substitutes. [16] Average net rural household income is only $1.30 per day compared to $3.10 in Peru as a whole.

(iii) In the *Selva*, agriculture has a lower contribution to the regional GDP due to the weight of the oil extraction industry in the local economy (in the Iquitos-Putumayo-Yavari region, it amounted to 68% of GDP, compared to 13% for agriculture and 1% for fisheries). [17] However, agriculture—mostly subsistence—remains the major employer in the *Selva*'s rural areas, as it is in the Sierra. There exist a high—but still underdeveloped—economic potential for certain product niches with high added value such as medicinal plants or aquarium fish. Sustainable exploitation techniques will be critical to preserving the full economic potential of these natural resources.

The economic conditions correlate inversely with the main poverty statistics for the three regions. Across the macro regions of Peru, poverty is more acute in the *Selva* (58% of the population) and the *Sierra* (63%). The *Sierra* and *Selva* have poverty rates of nearly double that of the *Costa* (32%). More than half of the extremely poor population resides in the rural *Sierra,* though it has less than a quarter of the national population. The *Selva* region contains about 1.4 million poor and 0.8 million of the extreme poor. [18]

Although the country is rapidly urbanizing, its rural population remains significant. The share of the population living in rural areas has decreased from over 50% in 1960 to about 30% in 2000 and is expected to reach 27% in 2005. [19] Still, Peru's rural population

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[14] "*Estudio de la rentabilitad de la agricultura de la costa peruana y las inversiones para mejoramiento del riego*", World Bank/FAO/CEPES, 2002.

[15] In 1996, it accounted to some 25 percent of the region's GDP compared to less than 10% for Peru as a whole.

[16] *Peru's Rural Strategy*, World Bank, 2003.

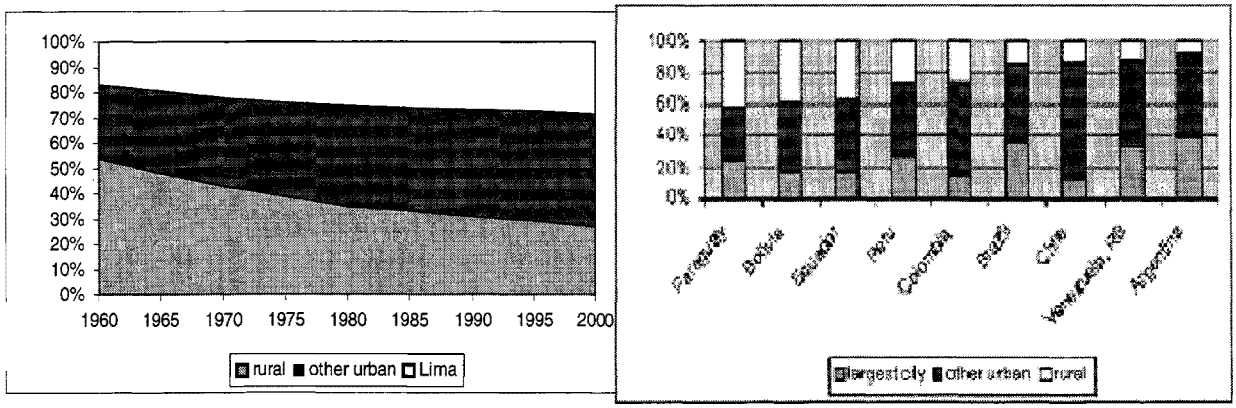
[17] *Plan de Desarrollo Sostenible de la Amazonia*, INADE, 2000.

[18] "Encuesta Nacional de Hogares 2001," Instituto Nacional de Estadística (INEI), Lima, Perú.

[19] INEI's definition sets two conditions for "rural areas": (1) "the area is not a district capital or it is a district capital with less than 3,000 people"; and (2) "the area has less than 100 households contiguous or there are more than 100 households but they are disperse and there are not an activity center".

remains in the average (in percentage of total population) in South America (Figure 1.4). Also, with the exception of Paraguay, Peru has the lowest proportion of people living in secondary cities in South America. However, there appears to have been some progress toward a more balanced urbanization phenomenon between the three macro-regions as urban population growth has been higher in the *Selva* and *Sierra*. In these regions, the stronger urbanization rates are likely to promote the emergence of secondary urban poles that could help reduce the primacy of the capital city.

Figure 1.5. Rural population has been decreasing proportionally to the total population ... but remains large compared to other South American countries



Source: World Development Indicators, 2004.

1.3. RURAL INFRASTRUCTURE AND RURAL INCOMES

Access to infrastructure assets influences the development of rural areas. Rural infrastructure can contribute to the diversification of economic activities: for example, infrastructure is essential to develop tourism activities, and improve access to regional markets. Infrastructure can also help increase the productive time: better roads means less time lost in transit, running water means less time fetching water, electricity can allow households to work longer, by extending the daily time when light is available. Finally, infrastructure can contribute to raise productivity: for example, electricity can allow some households to acquire fridges which are necessary to keep agricultural production fresh, and telecommunication services allows immediate access to crucial information (e.g., market prices of agricultural products). Annex 1 provides a summary of the key evidence from various studies and countries on the relevance of infrastructure in increasing economic and social well-being of rural populations.

In Peru, recent studies have shown the linkages that exist between infrastructure investment and productivity. [20] Comparing the evolution of total factor productivity with the evolution of the stock of infrastructure at the national level, the flow of private investment in infrastructure in the 90s has been shown to allow firms to reduce their operating costs and, thus, improve overall economic productivity. This is particularly critical in the *Selva* and

[20] IPE, 2003.

Sierra regions where, because of their lower stock of infrastructure assets, economic performance has remained lower than what is observed at the national level. [21]

Rural development is constrained by economic and social isolation. It is difficult for people to harness the economic and social opportunities within a wider geographic region, to take advantage of employment opportunities beyond their settlement—at least without disrupting their household livelihood through forced seasonal or permanent migration—or to expand their income generating activities through interactions with other rural and urban market centers. [22] Isolation slows down the diffusion of new technologies and technical assistance, which often are vital to the conversion of a local economy from one of subsistence to a more competitive one. [23] The heavy dependence of the rural poor on agriculture makes them particularly vulnerable to climate shocks like El Niño, droughts or mudslides (thirty percent of households report to have been subject to exogenous weather-related shock in 2000). [24] In addition, this further stresses the need to enhance access to and improve the condition of infrastructure to reduce vulnerabilities and facilitate the development of productive opportunities.

In Peru, strong linkages exist between available rural infrastructure services and rural economic activities and income. [25] Household surveys illustrate how rural infrastructure encourages income-generating activities in the non-agricultural sectors. The proportion of households involved in non-agriculture activities increases with the availability of infrastructure services (Figure 1.6). In addition, when more than two infrastructure services are available, households tend to participate more in salaried rather than non-salaried non-agriculture activities. This may illustrate a more radical diversification (salaried activities are usually more permanent than non-salaried ones which may be occasional, opportunistic and associated with the informal sector). Moreover, the proportion of work time dedicated by households to non-agricultural activities increases with the availability of infrastructure services. Almost half of the worked time of households with access to three or more infrastructure services is dedicated to non-agriculture activities, compared to 15% for households with access to none of these services (Figure 1.7).

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[21] The *Sierra* region represents about 22 percent of the national GDP (with about one third of the national population) and the *Selva* region contributes to 8% of the national GDP (with 15% of the population). Economic growth in these two regions has been low (an average annual 1.9 percent or 0.6 percent in per capita terms for the *Sierra*'s GDP over the period 1970-1996, close to zero in per capita terms for the *Selva*'s GDP over the period 1989-1995). If the people had not migrated, the Selva's per capita GDP would have fallen.

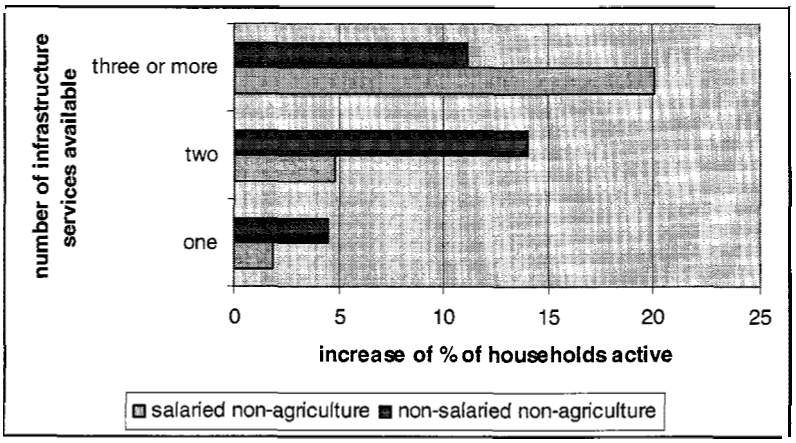
[22] The 2003 DFID-World Bank report "Peru: Voices of the Poor," highlights the priority given by the poor to infrastructure in their quest to improve their living conditions and opportunities and their perception of the need to boost the institutional response in the delivery of infrastructure services. Water and electricity services are singled out as critical as it is the need to reduce the times to bring their products to the market. The poor further express their willingness to contribute to the costs of implementing these proposals.

[23] *Source*: Peru, 2nd Rural Road Project, Project Appraisal Document, World Bank (2000).

[24] Source : 2001 ENAHO household survey.

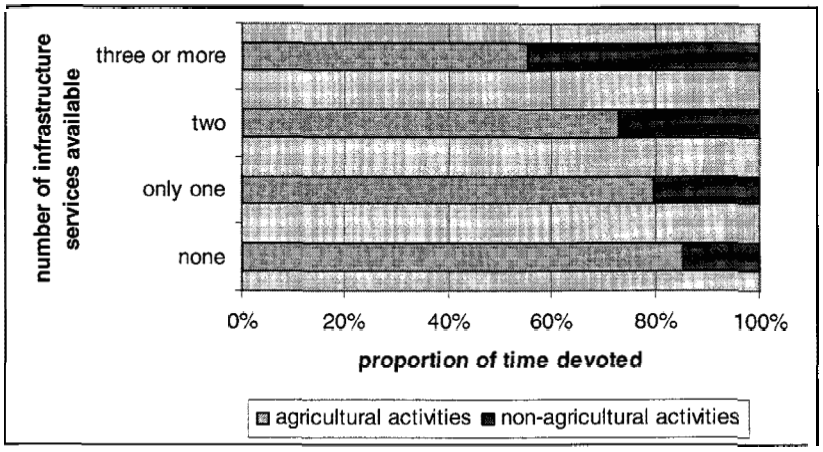
[25] Most of the quantitative results in the next paragraphs come from Escobal and Torero, 2004. The analysis of information is based on the use of the *Propensity Score Matching* methodology.

Figure 1.6. Access to infrastructure services promotes economic diversification ...



Source: Escobal and Torero (2004). Results present the increase of the percentage of rural households who become active (ie. spend time) in salaried or non-salaried non-agricultural activities when they are granted access to one or several infrastructure services.

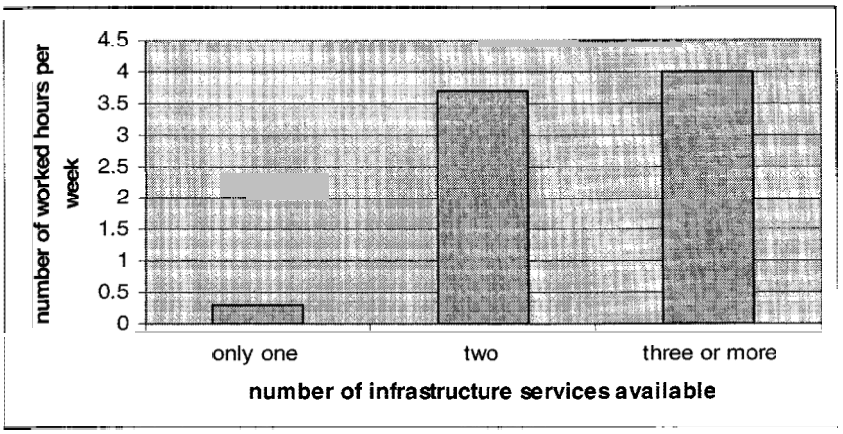
Figure 1.7. ... and the time dedicated to non-agricultural activities



Source: Escobal and Torero (2004).

More generally, access to infrastructure services increases time dedicated to income-generating activities. The results of a 2001 household survey shows that access to only one infrastructure service does not have any significant impact on the weekly working time (compared to households without access), but access to at least two services produces significant positive changes: access to two services raises the weekly working time by 4 hours and access to three or more raises it by 11 hours (see Figure 1.8).

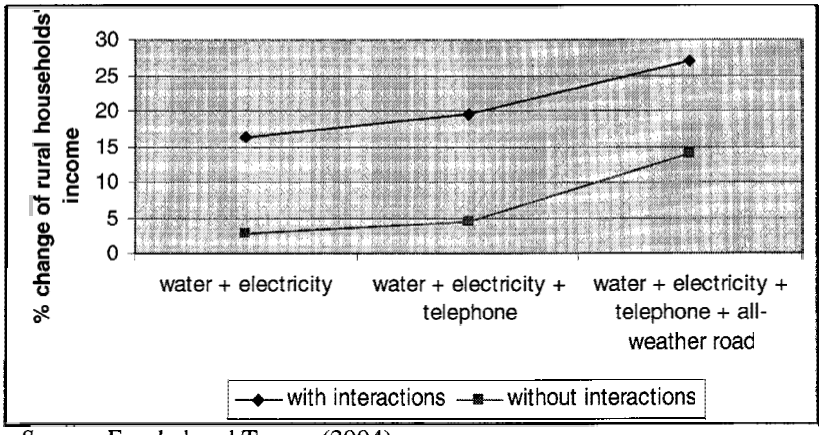
Figure 1.8. Access to infrastructure increases the number of worked hours per week.



Source: Escobal and Torero (2004).

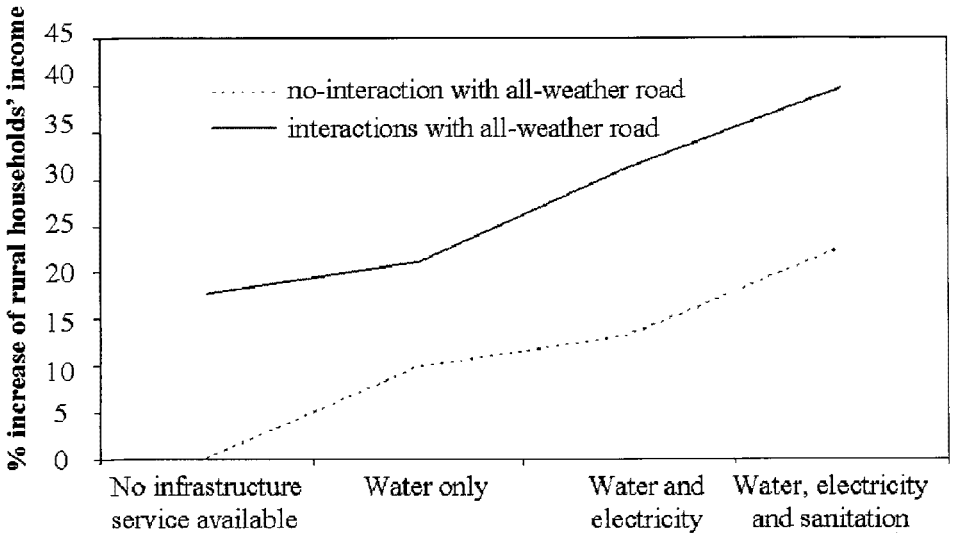
Ultimately, access to infrastructure services in rural Peru contributes to raising households' income and this impact increases with the availability of multiple infrastructure services. The analysis of the 2001 data illustrates the impact of availability of infrastructure services on rural households' income (Escobal and Torero, 2004). Single infrastructure services with larger impacts include water services (+9%) and all-weather roads (+9%). Access to only telephone services or only electricity services has a more modest impact but these two services exhibits higher impacts when combined with other infrastructure. Indeed, evidence shows that there exist significant cooperative interactions between the various services so that the impact of combined services is higher than the added effect of each of them taken individually (Figures 1.9 and 1.10).

Figure 1.9. Impact of availability of infrastructure services on rural households' income.



Source: Escobal and Torero (2004).

Figure 1.10. Interactions of all-weather roads with other infrastructure services enhance the positive impact on rural households' income.



Source: Escobal and Torero (2004).

To illustrate these interactions, let's assume a rural economy of four households with each an income of 100. If the first household is granted access to water services, the second household to electricity, the third to telephone and the last to an all-weather road, we can expect that the availability of these services will raise the rural economy's income to 414 (ie. a per capita income growth of 3.5%). On the other hand, if only one household is granted access to the four infrastructure services, the rural economy income would be expected to reach 427 (ie. a per capita income growth of 6.8%). Of course, this is a simple model and equity consideration would have to be taken into account (such as with the use of redistribution mechanisms), but this clearly shows the possible benefits arising from interactions across services. The next chapters will explore this idea more into details.

1.4. GOVERNMENT STRATEGIES

The figures and trends presented in the previous sections justify the efforts of the Government of Peru in attempting to define a rural development strategy that addresses the shifting social and economic conditions of rural areas and their surrounding space, the viability of their sustainable growth and the improvement of their livelihoods. Key plans and strategies that have been developed are:

(i) A *national strategy for poverty reduction and the development of economic opportunities for the poor* [26] puts emphasis on (1) broad-based economic growth; (2) decentralization; (3) participation and empowerment of the poor; and (4) an

[26] "*Bases para la estrategia de superación de la pobreza y oportunidades económicas para los pobres*", May 2002.

institutional framework promoting more coordinated and integrated approaches to growth. Poverty assessments have shown that extreme poverty in rural areas is linked to the lack of productive assets and to geographic isolation (lack of access to markets and to social services). In spite of their growing importance [27], existing social programs have had limited impact to reduce poverty due to (1) uncoordinated and untargeted sector approaches; (2) excessively centralized management and lack of empowerment of the poor; and (3) low quality of interventions with insufficient follow up and evaluation. The conclusions of this strategy suggest that increasing economic opportunities for the poor could be achieved through improved rural infrastructures capable of promoting, among other things, agricultural productivity. Reinforcing local capacities is proposed in order to identify local development opportunities, manage risks, reduce vulnerability (e.g. natural disasters), and promote active participation and empowerment of the poor.

(ii) A *Sierra rural development strategy*, focusing on (1) sustainable rural economic growth; (2) human development; and (3) institutions. The strategy—not yet official—acknowledges that sustainable rural growth and poverty reduction are most likely to originate from the pull effect of national and urban growth. Indeed, urban growth and migration phenomena are particularly high in the Sierra: most towns are growing fast with an average growth rate of 3.7%. This is nearly one point above the rate for non-Sierra towns. The problem of poverty in the Sierra is so large and pervasive, that poverty reduction programs alone do not provide the answer and must be complemented by a comprehensive national development policy capable of generating equitable growth. Economic growth opportunities in the Sierra include (1) larger-scale programs, covering certain sectors and geographic areas, requiring major investments, know-how and private sector participation (dairy and alpaca sectors, tourists circuits, agro-processing, commercial forestry, transport and commercial services); and (2) small, diversified opportunities located in specific areas, mostly of a niche type. To develop these opportunities, the strategy proposes to develop market links between urban areas and agriculture/livestock, as well as economic corridors, productive infrastructure and private investment. It recommends promoting partnerships between producers, processing and exports firms, and government. On the institutional side, building on the decentralization momentum is recommended with the creation of Local Development Councils. The strategy also acknowledges the relevance of the cultural dimension.

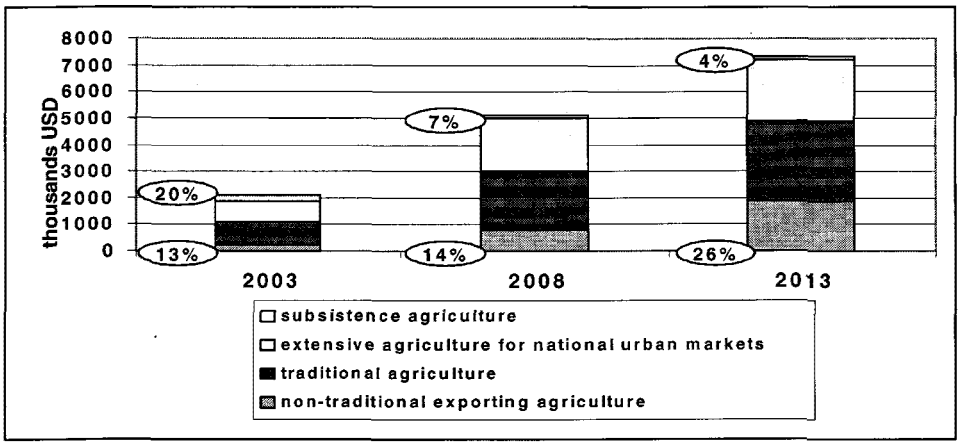
(iv) The *Plan for the Sustainable Development of the Amazonian region (PDSA)* gives priority to (1) valorization of resources and development of the productive sectors; (2) improvement of economic and social infrastructures; (3) territorial planning; and (4) promotion of the socio-cultural conditions of the populations. The plan identified and analyzed nine "geo-economic Development Units," including economic opportunities. The plan identified a variety of potential development projects, sorted according to the four strategic objectives. Of those assessed in detail, 35% are rural infrastructure

[27] Social expenditures have increased from 3.4% to 5.3% of GDP between 1990 and 2000, mostly due to specific poverty reduction programs whose resources have increased from 178 to 400 million USD between 1995 and 2001.

projects. [28] At the level of each unit, a development strategy has been designed, with an integrated approach combining social and economic infrastructure development as well as the reinforcement of the institutional framework.

(iii) A *National Plan for Territorial Development* [29] has been prepared for the period 2004-2013 by the National Decentralization Council (CND). It aims, among others, to (1) promote Peru's social and economic decentralization; (2) develop strong and sustainable regional economies; and (3) contribute to the preservation of the natural and human environment. To reach these goals, six objectives have been identified : (1) strengthen the emergence of secondary cities through better urban infrastructure and communication services; (2) decrease transport costs between regions; (3) improve access and affordability of transport, communication and energy services to the largest number of Peruvians; (4) develop trade flows with neighboring countries; (5) produce economies of scale through a cluster approach; and (6) socially integrate neighboring regions with common cultural backgrounds. The plan also sets objectives for productive sectors, including a shift from subsistence toward a more competitive agricultural sector (Figure 1.10). [30]

Figure 1.10. Proposed objectives of the National Plan for Territorial development for the agricultural sector (2004-2013)



Source: CND (2004)

These plans and strategies have each intrinsic value. However, they do not yet constitute a unified rural development strategy. Nonetheless, three recommendations emerge that should underpin efforts to strengthen the delivery of infrastructure services in rural areas.

[28] INADE, 2003.

[29] "*Plan Nacional de Desarrollo Territorial 2004-2013: Construyendo el Perú de la Próxima Década*", January 2004.

[30] The share of subsistence agriculture (with an average yield of US$500 per ha) should decrease from 20% in 2003 to 4% in 2004, while the share of non-traditional exported agricultural production (yield of US$6,200 per ha) would increase from 13% in 2003 to 26% in 2013. Some objectives have also been set for the fishing industry as well as for the forestry sector whose competitiveness remains very low (Brazil produces 600 m3 per ha with a processing plant located 15 km away, compared to 50m3/ha and 150 km for Peru).

First, resources should be focused on areas with stringer economic potential. Second, a territorial perspective should be adopted, linking rural economies to surrounding towns, in the context of a larger rural space. This perspective will help to avoid separate sectoral interventions planned with limited connection to the productive development of the rural territories. Finally, new approaches to the provision of infrastructure services must be developed. Stronger linkages to local realities and participation will increase the effectiveness of promoting a transition from subsistence to competitive agriculture, provide access to income-generating opportunities, and facilitate economic diversification.

Above those plans, the Government's overarching strategy focuses on the decentralization of responsibilities and resources to the regional and local levels. Since 2002, major laws have been passed regarding the creation of regional government levels, basic decentralization, fiscal responsibility, participatory budgeting, accreditation of sub-national governments, and public sector reform. The *Ley de Bases de Descentralización* approved in June 2002, defines three guiding principles for the decentralization process: it should (1) be fiscally neutral; (2) be gradual; and (3) enhance economic competitiveness. Box 1.1 highlights the main issues and challenges of the decentralization agenda.

Box 1.1. Main challenges for the decentralization process in Peru

(i) Increased autonomy of subnational governments. The higher the autonomy subnational governments enjoy, the higher the likelihood that the potential benefits of decentralization will be realized. But autonomy has its risks as well. Autonomous subnational governments may end up spending irresponsibly and accumulating unsustainable debts if they are not subject to stringent budget and indebtedness rules. In this regard, five issues deserve special attention : (a) the degree of autonomy to be given to the subnational governments in their future provision of local services; (b) the kind and extent of expenditure responsibilities to be transferred to the subnational governments; (c) the rules and institutional mechanisms for transferring resources from the CG to the subnational governments; (d) the allocation of taxing powers to the subnational governments ; and (e) the rules subnational governments must follow in contracting debt.

(ii) Markedly different degrees of administrative capability in the subnational governments. Transfer must be gradual in accordance with the strengthening of the subnational institutional capabilities. Assignment of responsibilities must be precise and clear between the central government, the regional governments, the provincial municipalities, and the district municipalities, in order to avoid situations of duplication and overlapping of effort, or to some public services being left unattended and underinvested.

(iii) Connection between the transfer of responsibilities and the transfer of resources. The transfer of resources must be accompanied by the transfer of responsibilities. Responsibilities must not be transferred unless an adequate level of resources to discharge them is available at the subnational level. While intergovernmental transfers must be set at an level consistent with the transfer of responsibilities, another critical goal of decentralization is to develop an increased local revenue-generating capacity, based on local governments' own tax systems.

(iv) Design of an incentive framework. Special incentives should be given to sub-national governments to encourage them to manage assets appropriately and contract out (to private enterprises), and discourage them from enlarging public employment. Emphasis should be paid not only to transparency and internal efficiency in the use of resources but also to results, performance and social accountability.

Source: *Restoring Fiscal Discipline for Poverty Reduction in Peru* – The World Bank, 2003

Decentralization is seen as an integral part of the modernization and democratization process as well as a way to reduce inequalities and increase responsiveness to local needs.

The transfer process will be carried out gradually over several years, in successive stages that initially affect sectors like transport and housing, and at a later stage education and health. [31] Fiscally, major modifications have occurred in 2004 with a significant transfer of responsibilities— and corresponding funding— to regional and local governments. Between 2003 and 2004, transfers to local governments will have increased by 31% to reach 2.8 billion *Nuevos Soles*. As a result, combined regional and local expenditures will have increased from 14% in 2002 to 23% of the national budget in 2004. In 2004, regional and local governments will handle 18% and 38% of public investments, respectively, as recorded in the National System of Public Investment. [32] A National Technical Assistance Plan for Local and regional Governments [33] has been prepared in order that sub-national governments can reach sufficient institutional capacity and obtain a certification to assume new responsibilities from the so-called National Accreditation System.

The evolving decentralization framework creates the basis for furthering the transfer of resources and responsibilities to local and regional entities. However, the process must take into account that the municipal sector in Peru is highly fragmented. In Peru, there are 194 provincial municipalities and 1,812 district municipalities (mostly rural). Each provincial municipality consists of a different number of districts. Districts can be quite small: according to the 1993 population and housing census, some, predominantly rural districts had less than 200 inhabitants. [34] Indeed, Peruvian municipalities are significantly smaller than their counterparts in neighbor countries (Table 1.4). This fragmentation of the municipal sector may increase the accountability of local governments to rural communities but, on the other hand, certain rural municipalities may not have reached the critical institutional mass to manage and implement local development policies. This is especially true in the infrastructure sectors where economies of scale are more likely to increase efficiency. Thus, cooperation between district municipalities— for example at the provincial level— becomes paramount to develop sufficient institutional capacity.

Table 1.4. Municipalities in Peru are smaller than in other Latin America countries.

	Peru	Argentina	Bolivia	Brazil	Chile	Mexico	Venezuela
Number of municipalities	2,006	1,100	308	5,500	335	2,397	282
Total population not living in capital city – million	15.8	23.3	6.0	148.0	8.8	73.5	20.5
Average population per municipality (except capital)	7,910	21,210	19,470	26,910	26,300	30,650	72,850

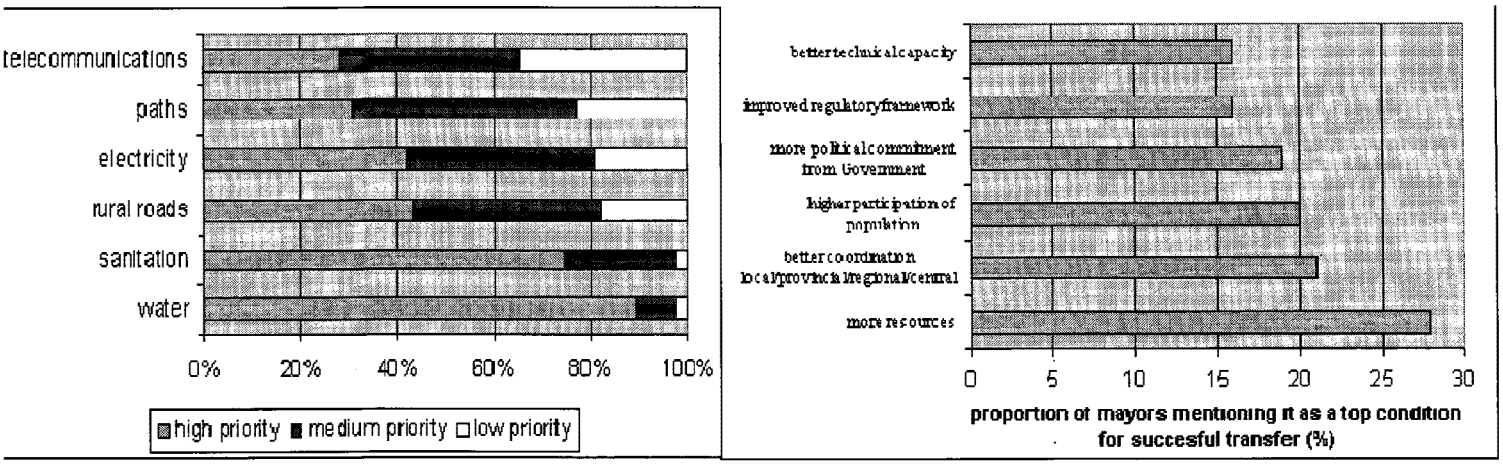
Source: Authors.

Municipalities are eager to take more responsibilities, yet they remain cautious and wary of the challenges ahead. A 2003 survey of 60 Peruvian municipalities (42 districts and 17 provinces, 83% rural and 17% urban) [35] has shown that three quarters of them think that the fact that municipalities take over new responsibilities will have a positive impact on local communities. In terms of infrastructure, in 90% of the cases, the highest priority is given to

[31] *Restoring Fiscal Discipline for Poverty Reduction in Peru* – The World Bank, 2003.
[32] CND, *Informe Anual 2003*.
[33] *Plan Nacional de Asistencia Técnica y Capacitación para Gobiernos Locales y regionales (PNCAT).*
[34] Schady, 1999. The smallest Peruvian district (*Cochas* in *Yauyos* province) has 145 inhabitants.
[35] Azcueta, 2003.

taking additional responsibilities in the water/sanitation sectors, then to rural roads and electricity, and to a lesser extent to telecommunications (figure 1.9). However, two district municipalities out of three think that they are not prepared to take over new responsibilities. The level of preparation varies significantly across sectors: in 2003, 42% of municipalities thought they were already fully prepared and had sufficient resources to take over social programs, but this proportion drops to 2% for infrastructure. The three main conditions identified for successful transfer of additional responsibilities are (1) increased resources (28% of respondents); (2) better cooperation between the various levels of government (21%); and (3) more participation from the population (20%).

Figure 1.11. Opinions of mayors regarding priorities and conditions for a successful transfer of responsibilities to municipalities.



Source: Azcueta, M., 2003

In sum, rural development in Peru aims at the diversification of production activities, strengthened linkages to surrounding urban centers, and policies geared to increased competitiveness for Peruvian products. In pursuing these objectives, rural infrastructure has a critical role to play.

The decentralization process—steadily advancing since 2002—represents a major opportunity to implement those principles and redesign the way infrastructure services are planned, developed and operated. Peruvian mayors are aware of the huge potential of the decentralization process for development but they are also aware of the difficulties associated with its implementation, particularly in the infrastructure sectors. Potential problems include insufficient technical expertise, limited financial resources, and the need for a cooperative framework between the various levels of government. The small size of many municipalities—and the concomitant limited technical capacity—is a reality that emphasizes the need for cooperation among neighboring municipalities in order to find the right balance between potential economies of scale and devolution of responsibilities at a level close to the rural infrastructure users and beneficiaries.

2. STATUS OF RURAL INFRASTRUCTURE

2.1. INTRODUCTION

Annex 2 presents the current conditions of each infrastructure sector, the institutional framework and the key issues and strategies for action. Each sector has been analyzed in the context of the three dimensions that underline the efforts of the Peruvian Government to reduce rural poverty: adequate prioritization, enhanced efficiency, and superior effectiveness in the delivery of public investment programs that have a direct impact on the productive lives of rural inhabitants. For infrastructure services, these dimensions refer specifically to: (a) *prioritization*: are infrastructure services properly aligned with the priorities set by the government for rural areas and the demand of the target population ? (b) *efficiency*: are infrastructure services provided in an efficient manner (cost-effectiveness with due attention paid to environmental, social and gender issues) ? and (c) *effectiveness*: does the provision of infrastructure services effectively contribute to increasing rural incomes, which is the ultimate effect sought for the long-term reduction of poverty in rural areas ?

This chapter describes the common or diverging conditions of each infrastructure sector. It concludes with the key issues along each one of the three dimensions as a preamble for the definition of the proposed strategic actions:

- *Prioritization*: What **prioritization and planning mechanisms** are currently used for each sector? What **resources are currently allocated to rural infrastructure** and to what extent is spending aligned with prioritization criteria?

- *Efficiency*: What is the current situation in terms of **coverage, quality and cost** for each sector? How does the situation of Peru compare with benchmark countries? What are the current **approaches to private sector participation**?

- *Effectiveness*: Taking into account complementarities across infrastructure services, what is the ultimate **contribution of rural infrastructure to increasing rural incomes**? To what extent do **evolving institutional roles** allow rural infrastructure investment to contribute to local development strategies?

Obviously, there is some overlap. For example, the situation of "evolving institutional roles" impacts the "prioritization" dimension as well as the "effectiveness" dimension,since planning mechanisms are increasingly decentralized. Similarly, the situation in terms of "coverage" also reflects Peru's current "prioritization" policy for rural infrastructure. The next chapter offers a more in depth explanation of the trade-offs that arise for some of these strategic issues with regards to the three dimensions of prioritization, efficiency and effectiveness.

2.2. PRIORITIZATION

Planning Mechanisms and Prioritization Methodologies

The institutional framework for each of the rural infrastructure sectors was highly centralized until 2002. Central institutions—Provias Rural, FONCODES, DEP, OSIPTEL—have been largely responsible for the planning, prioritization, and implementation of investment programs in each sector, following up in various degrees with the operation and maintenance of the services. This institutional framework is currently changing as the decentralization agenda of the Government of Peru progresses, and responsibilities are gradually transferred to the local level, along with the capacity building of local institutions.

Despite progress toward increased decentralization, each infrastructure sector has its own planning instruments and its own centrally-managed sources of funding (Table 2.3):

(i) *Water/Sanitation*: Over the period 1998-2002, a large proportion of rural water facilities were centrally planned and financed through FONCODES. In 2003, FONCODES was absorbed by the Ministry of Women and Social Development (MIMDES) and a decentralization process at the regional level has been scheduled to be completed by the end of 2004. In parallel and responding to the new decentralization process in Peru, the government designed a new strategy for the rural water/sanitation sectors. A new program, the National Rural Water Supply and Sanitation Program (or PRONASAR) was designed by the recently created Vice-Ministry for Construction and Sanitation to modify the centralized model, shifting the emphasis from construction to sustainability. PRONASAR pays FONCODES to perform fiduciary tasks and to contract private operators and NGOs for implementing and supervising the program. The main financing instrument for the period 2003-2008 is PRONASAR, which amounts to a total investment of US$80 million (including US$50 million from a World Bank loan). PRONASAR aims at providing new or rehabilitated drinking water and basic sanitation facilities to approximately 900,000 people in about 3,100 communities nationwide, and will promote the improvement of training and hygiene practices in approximately 1,000 communities to benefit some 400,000 people. The program also has a strong institutional component with the purpose of strengthening local and regional institutions. Other programs in the water/sanitation sector are also implemented through FONCODES (with support from the Inter-American Development Bank and JBIC) for a total investment of US$35-40 million for the next 4 years, following exactly the new project cycle introduced with PRONASAR. In comparison, level of investment observed during the period 1998-2002 in the sanitation sector reached an average of US$7 million per year.

(ii) *Electricity*. A plan for rural electrification has been prepared for 2003-2012. [36] It is expected to bring access to electricity services to 4.2 million people during that period, and to bring coverage to 91% of the population (from 73% in 2001). About 335 projects have been identified for a total investment of US$960.4 million. According to a

[36] *Plan de Electrificación Rural 2003-2012.*

2002 law, [37] a Rural Electrification Fund should have been created to finance the plan, but the law and the Fund were never implemented. The law also established that resources allocated to the fund could not be lower than 0.85% of the national budget, which would have brought around US$90 million annually over the next decade. [38] If this provision were applied, it would represent a substantial increase compared to the level of investment observed during the period 1998-2002 (about US$43 million per year).

(iii) *Transport.* Rural road planning is performed through district and provincial plans. In these plans, local governments must identify priority road segments to be rehabilitated and define the modalities of rehabilitation and maintenance. A specific project unit (PROVIAS Rural) in the Ministry of Transport and Communication manages the implementation of the road program defined by municipalities. Resources come from external financing, from the World Bank and the Inter-American Development Bank (IDB), and national counterpart funding. Although the annual amount has been varying significantly, total annual resources amounted an average of about US$36 million over the period 1998-2002.

(iv) *Telecommunications.* The program for rural telecommunication projects [39] aims to connect 5,000 villages to the national telephone network by the end of 2003, and to connect 500 of those with access to telephone services to the Internet. The program has been financed by a Telecommunication Investment Fund (FITEL), [40] whose resources come from 1% of the revenues of telecom operators (around US$10 to US$12 million per year). Between 1998-2002, an average of US$11 million was spent annually in rural telecommunications.

Table 2.3. Each rural infrastructure sector has its own planning and funding instrument

	Water/sanitation	Electricity	Roads	Telecommunications
Planning instrument	PRONASAR (National)	National Plan for Rural Electrification	Provincial and district road plans	National program for rural telecommunications
Period	2003-2009	2003-2012	2003-2005	2004-2008
Central funding instrument	FONCODES	National budget allocations	PROVIAS Rural	FITEL
Theoretical (statutory) annual funding	US$23 million (with WB/IDB support)	US$90 million	US$45 million (with WB/IDB support)	US$10-12 million
Annual funding observed in 1998-2002	US$7 million	US$43 million	US$36 million	US$11 million

Source: Rodriguez 2004, and World Bank files on Projects.

[37] Law No. 27744 of 31.05.2002 : *Ley de Electrificacion Rural y de Localidades Aisladas y de Frontera.*
[38] This statutory allocation level has remained in a new law passed by Congress on July 1, 2004.
[39] *Programa de Proyectos de Telecommunicaciones Rurales (PPR).*
[40] The *Fondo de Inversion de Telecomunicaciones* was created by the Telecommunications Law with the sole purpose of financing telecommunication services in rural areas or in places considered of priority social interest.

Local governments/communities have become increasingly more closely involved in the planning process of water/sanitation and rural roads (to a greater extent) and of rural telecommunications and electricity (to a lesser extent). In the water/sanitation sector, district municipalities with local communities' representatives are involved through their own participatory planning instruments (*mesas de concertación*) in the selection of the beneficiary communities, and later in the selection of level of services and detailed project design. Similarly, rural road planning is performed through district and provincial plans. In these plans, local government must define the modalities of construction, rehabilitation and maintenance of rural roads. For both sectors, central agencies review local planning instruments for compliance with a list of requirements which have been previously communicated to municipalities.

On the other hand, involvement of municipalities in the planning of electricity and telecommunications has been low. Municipalities participate in "Electrification Committees", whose role is to formalize the official request for access to electricity services for a specific village, but the Executive Direction of Projects (DEP) of the Ministry of Energy and Mines is the main institution in charge of planning investments. DEP has recently begun a process to transfer responsibilities and capacity for rural electrification planning to the regional governments. Similarly, in the case of telecommunications, communities and local governments prepare the formal request sent to FITEL to ask for access to telecom services. This request must demonstrate the existence of demand for such services, based on surveys. Planning is then performed by FITEL in three stages: First, villages are selected in order to maximize population in a 5 km radius. Second, the existence of public phones and telecom infrastructure as well as economic potential and (in theory) complementarities with other services (education, health, roads) are taken into account. Finally, detailed analysis of each possible investment is conducted, including cost analysis. At the end of this selection process, mayors are consulted during "prioritization workshops", though in fact, identified investments barely change.

Table 2.4. Local governments participate more in the planning process for water/sanitation and rural roads than for rural electricity and telecommunications

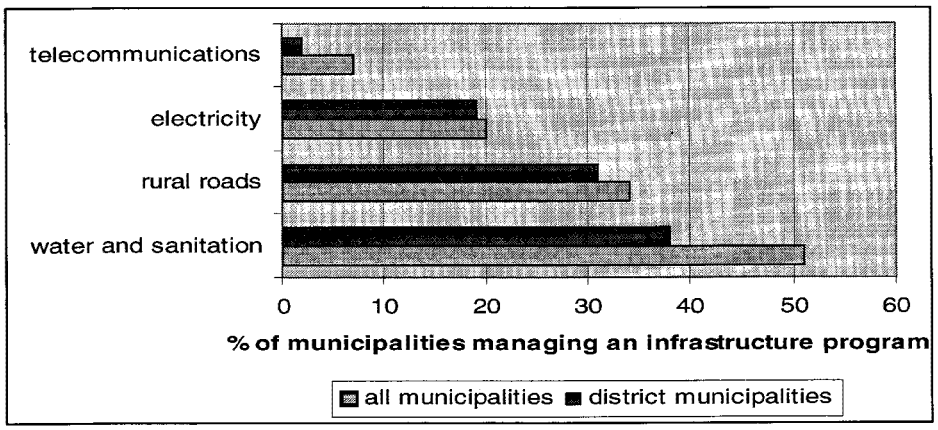
	Water/ sanitation	Rural electricity	Rural roads	Telecom-munications
Involvement of local actors in planning	Significant	Limited	Significant	Limited
Local actors which are the most involved	District municipalities	All municipalities	Provincial municipalities	All municipalities

Source: Dianderas (2004).

The degree of involvement of local governments in the implementation, operation and maintenance of rural infrastructure services also differs across sectors (see Figure 2.1). The water/sanitation sector is the sector where most municipalities declare to be involved: according to a 2003 survey of 60 Peruvian municipalities, about half of municipalities (but only 38% of district municipalities) declare to be in charge of a water/sanitation infrastructure program. Municipalities (including at the district level) are also somewhat active in rural roads (34% and 31%). In this regard, it should be noted that a

decentralization process is in place to transfer the maintenance of rural roads to municipalities and, so, their involvement is expected to grow (see section 2.3.). In the electricity sector, on the other hand, only a small minority (20%) of municipalities declare themselves to be in charge of a project. This involvement reflects, in a number of cases, the evolution of the "Electrification Committees" into "Administration Committees" which are occasionally—and with questionable success—involved in project's operation (e.g. relationship with the distribution enterprise and collection of user charges) or in construction (e.g. in-kind contribution like participation with transport costs) of electricity projects. Finally, the survey shows that involvement of municipalities in the telecommunication sector still remains anecdotal.

Figure 2.1. Municipalities are more involved in the management of water/sanitation and rural roads' programs than for rural electrification and telecommunications



Source: Azcueta (2003).

Variations in local governments' involvement reflect differences across infrastructure sectors in methodologies and criteria for prioritization. Two radically different approaches are used to prioritize infrastructure investments: one is territory-based and the other is project-based. In the territory-based approach, a list of criteria is used by central agencies to prioritize across territorial area in order to allocate funding within that area. In a second stage, this funding is used by local governments to finance the infrastructure projects that they consider to be the most relevant (after applying their own prioritization methodology, through their planning instruments). This approach is used for water/sanitation and rural roads. In contrast, in the project-based approach, central agencies directly prioritize infrastructure projects. This approach is used for electricity and telecommunications, largely because of their emphasis on each individual project's profitability.

In addition to these methodological differences, central agencies use different criteria to prioritize across territories or projects. In brief terms, the water/sanitation sector uses a combination of poverty and social-based criteria and technical and economic assessment, the road sector has adopted a combined list of social, economic and institutional criteria and the electricity sector uses a combination of social/economic/technical criteria (plus in theory, criteria measuring complementarities across sectors). Finally, the telecommunication sector does not use a standard list of criteria but rather, makes a

technical and economic assessment, taking into account (at least in theory) complementarities with other sectors. Table 2.5 summarizes the main criteria for each sector and the approximate weight given to each one of those criteria.

Table 2.5. Prioritization methodologies and criteria differ across sectors

	Water/ sanitation	Rural electricity	Rural roads	Telecom-munications
Central agencies prioritize across territories to allocate funding	YES	NO (they directly prioritize across projects)	YES	NO (they directly prioritize across projects)
Territories which are considered	Departments and districts		Departments and provinces	
Criteria used by central agencies to prioritize across territories	**For both departments and districts :** Coverage (40%) Poverty (30%) Acute diarrhea prevalence (30%) (only districts willing to co-finance investment and provide TA to the JASS are eligible)		**For departments :** Coverage (33%) Rural population (33%) Extreme poverty (22%) Non-extreme poverty (22%) **For provinces :** Coverage (27%) Rural population (27%) Extreme poverty (27%) Financial capacity (7%) Past involvement (7%) Management capacity (7%)	
Who prioritize across projects ?	Local governments	Central agencies	Local governments	Central agencies
Criteria used to prioritize across projects	Local participatory planning is used to prioritize beneficiaries and projects. However, eligible communities are self-elected, based on their commitment to O&M, establishing a JASS and paying an upfront contribution in cash and providing labor. Small communities without a minimum number of users or low density are ineligible.	Status of project development (5%) Existence of infrastructure (5%) Provincial coverage (50%) Project NPV (5%) Per capita investment (5%) Poverty (25%) Geographical location (5%) Complementarities (0%)	Social (65%) Demand for mobility (10%) Access to public services (5%) Access to villages (10%) Access to tourist zones (10%) Access to markets (10%)	No systematic list of criteria but comprehensive technical/economic assessment taking into account possible complementarities (with health, education and roads)

Source: Dianderas (2004).

To further confound the planning methodologies applied by each sector, the definition used for rural population is different for each one of them. For example, in the electricity sector, rural areas are defined according to their unattractiveness to private operators (i.e. financial profitability is not sufficient to attract private operators, and therefore, government intervention is required to obtain an acceptable degree of "social profitability"). In the telecommunication sector (which is similar to the electricity sector in the sense that private operators do not invest in rural areas because of their low profitability), the definition is based on the INEI definition. [41] In the water sector, rural areas refer to villages with less than 2,000 inhabitants. Finally, in the rural road sector, there is no explicit definition of rural area and instead, rural roads are identified based on the classification of the entire network among rural, departmental and national roads.

[41] The INEI definition is as follows: an area that is not a district capital or it is a district with less than 3,000 people, and has less than 100 households contiguous or there are more than 100 households but they are disperse and there are no activity centers.

Resources Allocated to Rural Infrastructure

Investments in rural infrastructure amounted to US$486 million over the period 1998-2002 an annual average of US$97 million, representing about 6% of Peru's average total capital expenditures and 0.18% of GDP during the same period. More than 80% was spent in rural roads and rural electricity. [42]

For the country as a whole, annual investment in infrastructure (roads, telecommunications, electricity distribution and water/sanitation) oscillated at around US$1.3 billion. [43] In per capita terms, this means that annual infrastructure investment in rural areas was around US$14 to US$19, compared to an average of US$57 for the entire country. Sectors which have focused the least on rural areas include telecommunications (only 2% of total investment went to rural areas), roads (12%) and water/sanitation (3 to 18% depending on the sources). On the other hand, half of total investment in electricity distribution is now focused on rural areas, where the main challenge is the extension of coverage.

Table 2.9. Except for electricity distribution, investment intensity per capita is lower in rural areas than for the country as a whole

	Roads	Telecoms	Electricity distribution	Water/sanitation Low case	Water/sanitation High case
Total investment (million USD)	297 *	656 ***	87 *	244 **	
Rural investment (million USD)	36	11	43	7	43 **
% rural	12%	2%	49%	3%	18%
Total investment per capita	13	29	4	11	
Rural investment per rural capita	5	2	6	1	6

* *Source*: IPE (2003) – average annual (1998-2001).
** *Source*: IPE (2003) – average annual (1990-1999).
*** *Source*: IPE (2003) – average annual (1994-2002).
NB : Other data come from Rodriguez 2004 and focus on period 1998-2002.

Since 1998, there has been a decreasing trend in rural infrastructure investments. Investments in rural electricity in 2002 represented about a third of what they did in 1998. Investments in roads in 2000 was about 40% of the level observed in 1998. In the water sector, investment levels plunged between 1999-2001 before recovering in 2002 to their 1998 level, as PRONASAR was implemented. [44] Although data are not available on it, the rural telecommunication sector is the only sector where an increasing trend may have been observed with the implementation of FITEL.

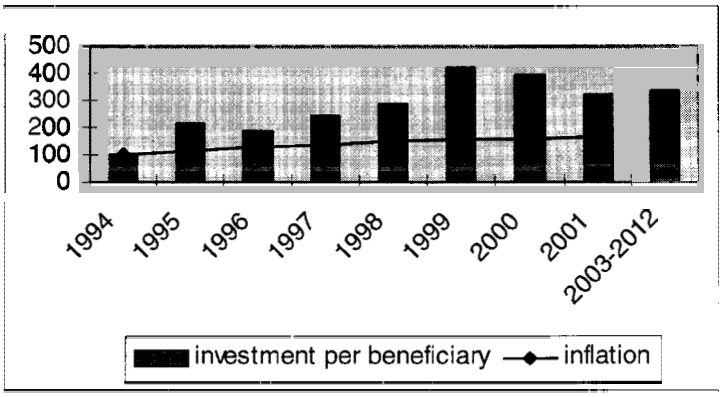
This overall negative trend illustrates the impact that fiscal constraints had on public infrastructure investment in rural areas during that same period. The extent to which compression of public investment in infrastructure was used in order to reduce public deficit has been documented in Peru and in other Latin America countries. [45] In the past, reduced levels of investment have strongly constrained the implementation of long-term

[42] Rodriguez, 2004.
[43] IPE, 2003.
[44] Rodriguez, 2004 (water/sanitation), Aragon, 2004 (electricity), MTC, 2004 (rural roads)
[45] Calderon, C., Easterly, W., and Serven, L. (2003).

plans to increase coverage of infrastructure services in rural areas: for example, during the period 1987-1988, investments in rural electrification were 33% of what was planned in the initial rural electrification plan, and, as a result, only 31% of the coverage expansion target could be achieved.

The problem of decreasing investment allocations is compounded by the increasing marginal cost of coverage expansion in rural areas, particularly for electricity, due to the lower-cost technology of interconnected systems. The experience of the past 10 year rural electricity plan is that the average investment required to bring electricity services to one beneficiary in rural areas has been increasing faster than inflation. This cost was US$30 in 1993 and US$225 in 2002. Over the 10 year period of the plan (1993-2002), the average marginal cost was US$119 compared to the US$229 estimated for the next plan (2003-2012). This feature is typical of infrastructure with network effects (i.e. it becomes increasingly expensive to reach the last isolated rural households). This implies that overall, electricity investment in rural electricity have followed an economically rational pattern (investment have been targeting in priority areas with higher urban density), although there are some exception (e.g. in 1999 and 2000 when the marginal costs have reached US$364 and US$314, respectively, per beneficiary).

Figure 2.4. Expanding coverage of electricity services in rural areas involves increasing marginal costs (3-year moving average, base 100 in 1994).



Source: Authors, based on data from Aragon (2004).

Reflecting the prioritization criteria discussed in the previous section, rural infrastructure investments have targeted regions not entirely in relation to their rural poverty rates. Cumulative investment in rural infrastructure per department over the period 1998-2002 ranges from US$9 to US$764 per rural inhabitant, or between US$31 and US$198 when taking out the departments with the lowest and the highest numbers. Some departments with high absolute and relative levels of rural poverty are in the upper range for per capita rural infrastructure investment: Huancavelica (US$123) or Ayacucho (US$145). However, others with very high levels of rural poverty are on the lower range, such as Loreto (US$31).

Figure 2.1. Investment intensity in rural infrastructure is aligned with departmental rural poverty rates for water/sanitation and roads but not for electricity and telecoms.

Department	Cumulative investment in rural infrastructure per rural capita (US$, 1998-2002)					% rural population in poverty
	Water/san.	Electr.	Roads	Telecoms	TOTAL	
La Libertad	0.0	0.9	0.0	7.9	8.8	84.3
Loreto	17.3	8.4	0.0	4.9	30.6	94.5
Puno	0.2	17.5	15.1	4.4	37.2	83.3
Ica	0.0	22.5	15.2	4.8	42.4	72.0
Piura	0.4	38.9	0.0	10.5	49.8	95.6
Junin	1.4	11.4	32.3	8.5	53.7	88.5
Cajamarca	2.3	20.5	24.1	9.1	56.1	89.1
Tacna	0.0	47.1	0.0	9.2	56.2	63.6
Lambayeque	0.0	51.8	0.0	5.6	57.4	77.7
Ucayali	33.8	12.6	3.9	8.4	58.8	93.6
Lima	0.0	53.8	0.0	11.1	64.9	82.6
Huanuco	1.0	8.3	48.3	9.9	67.5	94.8
Ancash	0.2	7.4	50.5	10.9	69.0	87.7
Cusco	12.6	39.1	30.8	5.0	87.5	95.5
Apurimac	0.3	17.8	72.8	6.2	97.1	92.7
Pasco	1.7	8.8	76.9	15.4	102.8	95.7
Huancavelica	2.2	55.4	59.6	5.4	122.6	96.1
Amazonas	55.7	51.3	0.0	17.5	124.5	89.9
Arequipa	0.9	117.1	0.0	8.2	126.2	81.7
Ayacucho	3.1	40.6	93.8	7.5	145.1	96.9
Moquegua	0.0	131.4	0.0	17.6	149.0	81.8
Madre de Dios	58.8	25.7	100.9	6.8	192.1	86.2
San Martin	3.5	147.0	39.6	7.8	197.9	94.0
Tumbes	0.4	732.3	0.0	31.6	764.2	89.5

Source: Authors, based on data from Rodríguez (2004) and INEI.

When the data is decomposed by sector, the average targeting over the period 1998-2002 appears to respond to poverty levels to a greater extent for investments in rural roads and water/sanitation than for those in rural telecommunications and rural electricity, in line with the prevailing prioritization methodology for each sector. The level of investment ranged from US$0 to US$60 per rural capita for water/sanitation and from US$0 to US$101 for rural roads (some departments did not receive any funding). In spite of the positive correlation, there are still significant inconsistencies between the investment intensity and the level of rural poverty (more for water/sanitation than for rural roads). In contrast, there seems to be no correlation between the investment intensity for rural telecommunications and the levels of rural poverty. For rural electrification, the correlation is actually negative. Investments in rural telecommunication range from US$4 to US$32 per rural capita and from US$7 to US$732 for rural electricity (to US$147 if the highest point is taken out).

2.3. EFFICIENCY

Coverage, Quality and Cost

In Peru, coverage of infrastructure services is comparatively low in rural areas. Table 2.1 shows figures comparing Peru with South-American countries and with countries of a similar level of development. In rural Peru, the electricity coverage was 30% in 1999 [46] while only 13% of households had access to a paved road and 28% to an unpaved road in good condition. Only 9% of rural villages had a public phone in 2003. [47] Access is highly dependent on the size of the rural communities: in communities of less than 500 people (where 2.7 million Peruvian live), only 44% of the population had access to drinking water services and 16% to sanitation in 2000. Similarly, only 3% of villages with less than 200 inhabitants (there are about 57,000 of them in Peru) had a public phone in 2003, compared to 28% for villages between 200 and 500 people and 93% for villages with a population exceeding 500 inhabitants. Furthermore, there are also large differences in terms of access to services between rural and urban areas. In 2000, 87% of the Peruvian urban population had access to water services, compared to 62% in rural areas. For sanitation services, estimations range from 69% [48] to 79% [49] in urban areas and 30% to 49% in rural areas.

Table 2.1. Except for water services, access to rural infrastructure is lower in Peru than in comparable countries

	Peru	South America	Countries with similar level of development *	
			Including China	Without China
WATER (2000)				
% of rural population with access	62	60	67	73
SANITATION (2000)				
% of rural population with access	49	52	29	71
ROADS				
% rural households w/ access to paved roads	13	NA	NA	
% rural households w/ access to unpaved but good condition road	28			
ELECTRICITY (1999)				
% of rural population with access	30	60	NA	
TELECOMMUNICATIONS (2003)				
% of villages with a public phone	9.3	NA	NA	

* i.e. with a per capita GDP PPP equal to +/- 1,000 USD to the figure of Peru in 2000.
Source: World Development Indicators, OLADE, INEI, OSIPTEL. Figures may not be strictly comparable since different definitions of "rural areas" might have been used for different sectors and/or countries.

Besides limited coverage, the quality of some infrastructure services (e.g. water quality, internet access, conditions of rural roads) remains low. Table 2.2 summarizes key indicators of the quality of services for the country as a whole, since quality indicators for rural areas only are not available. By sector, the figures indicate:

- In terms of transport infrastructure and services, firms rank Peru around average, compared to South America and to other countries with similar level of

[46] OLADE.
[47] INEI-OSIPTEL.
[48] Vice Ministry of Construction and Sanitation, 2002.
[49] World Development Indicators, 2000.

development. However, the situation may be less favorable in rural areas with only 8% of the tertiary roads considered as being in good or average conditions (1999) although 72% of rural users rate freight transport services average. [50]

- In the water sector, industrial water availability remains low compared to the rest of South America and the quality of tap water is considered lower than comparable countries. 95% of the water service providers had problems of continuity in providing services and, at the national level, water services were only available 17.4 hours a day in 2001. In rural areas, a 2000 study of 20 small and mid-size cities has shown that three quarters had discontinuous water service and that in half, water services were available less than 10 hours a day. [51]
- In the energy sector, rural households tend to use traditional fuels extensively as the main source of energy when electricity services are not available. In Peru, traditional fuel consumption rates (about 28% of total energy consumption in 1998) are among the highest in South America. Traditional fuels are not only less efficient than modern sources of energy such as electricity, they also require a significant amount of time to be collected (time which could be used for income-generating activities) and have negative health and environmental consequences.
- In the telecommunications sector, reforms and increased competition have contributed to enhanced service quality of telephone services. For example, between 1993 and 2002, the average waiting time to get a connection to the telephone network has fallen from 118 months to 1.2 months. Users also acknowledge that Internet access is easy to obtain; however, they remain dissatisfied by the quality and cost of Internet connections. Indeed, in spite of high levels of use, the characteristics of Internet access in Peru are not as favorable as in other South America countries: the proportion of Internet hosts is still very low (4 per 10,000 people in 2000, compared to 39 in Brazil) and the number of secure Internet servers is limited (35 in 2001).

Table 2.2. The quality of infrastructure services in Peru is lower (water, Internet, use of traditional fuels as a low quality alternative) or similar (roads, telephone) to comparable countries.

	Peru	Regional comparators	Income comparators
WATER			
Industrial water availability (2001) (1 : not available)	4.6	5.4	4.5
Tap water safety (2001) (1: unsafe)	3.7	5.1	4.0
ROADS			
Road quality outside major city (1: only allow low speed)	4.3	4.4	4.2
TELECOMMUNICATIONS			
Telephone/fax infrastructure quality (1 : low)	5.5	5.3	4.8
Speed and cost of Internet access (1 : slow and expensive)	3.4	3.8	3.6
ENERGY			
Traditional fuel consumption (% total energy cons., 1998)	28	20	NA

Source: WEF – Global Competitiveness Report 2001-2002, WDI (for traditional fuel consumption).

[50] Luna, 2004.
[51] *Diagnóstico de los servicios,* 2000.

Some infrastructure services (e.g., electricity and rural transport) remain expensive, particularly in rural areas. According to the WEF, [52] firms consider that electricity is more expensive in Peru than in the rest of South America or in countries with similar level of development. This is confirmed in part by a survey conducted by OLADE in June 2002: for residential consumers, the price of electricity in Peru is the second highest in South America (after Uruguay); for industrial consumers, it is the fourth highest after Guyana, Ecuador and Colombia. However, for commercial users, it remains among the cheapest in South America.

Electricity prices in Peru vary significantly across regions, reflecting the highest marginal costs of providing services in outlying areas or the off-grid characteristics of the connection. Service providers classify areas in four categories to account for higher transmission costs in less populated areas. As a result, prices can more than double with off-grid technologies in rural areas compared to on-grid alternatives in the capital city.

Table 2.3. Electricity services in rural areas can be twice as expensive as in Lima.

City	Type of area	Technology	Price of electricity (US ct/kWh)	Price relative to Lima
Lima	Capital city	National grid	8.25	100
Puno	Medium city	National grid	9.34	113
Antauta	Rural	National grid	11.87	144
Varios	Rural	Off-grid	16.73	203
Cusco	Medium city	National grid	8.70	105
Andahuaylas	Rural	National grid	11.90	144
Iñapari	Rural	Off-grid	17.87	217

Source: Aragon (2004).

Transport services are also perceived by rural users as being expensive: 51% of freight transport service users in rural areas think that services are expensive or very expensive (44% for passenger transport services). While in rural areas, about half of the people live with less than a dollar a day, the typical cost for a 25 km round trip for a passenger with 50 kg of merchandise, can be estimated to US$2-3, i.e. between a third and half of the passenger's weekly income.[53] The poor quality of tertiary roads is a major reason for expensive transport services in rural areas: the largest item that enters the operating costs of vehicle (aside from the cost of gasoline) is the replacement of tires (with 34% incidence in those costs).

In the rural water/sanitation sector, the situation is however different as service charges in Peru are well below the required levels to recover costs of adequate operation and maintenance, not to mention the reposition of electro-mechanic equipment (with an average life of 5 years). Although charges for water are low, many communities still believe that access to water is a right and a responsibility of the government to provide it, thus that they

[52] Global Competitiveness Report 2001-2002. The cost of electricity in Peru is rated 3.5 by firms (on a scale of 1 to 7, 1 being the most expensive) compared to 3.7 for comparable countries in the region and 3.6 for countries comparable by income.
[53] Authors based on data from Luna, 2004.

should not be charged for such an essential service. There is evidence that sustainability of rural water/sanitation systems is highly correlated to adequate cost recovery levels, as illustrated in Box 2.1. Another factor affecting charging for services in rural Peru is the current fiscal policy that prevents the JASS of using micro-meters to charge a tariff per cubic meter (because a VAT is assessed), thus a monthly fee is charged to circumvent the VAT. Un-ability to charge per consumption is a major disincentive for a rational use of water.

Box 2.1.: An insight to Sustainability Factors in Rural Water Supply and Sanitation Systems in Peru. Lessons from the PRONASAR Design Studies.

Even though sustainability measures can be elusive, a study in Peru applied a set of rules to link the degree of "sustainability" to specific actions taking during system construction. A field survey of 70 water/sanitation systems in rural areas, classified the systems according to their sustainability levels into sustainable, damaged, severely damaged and collapsed. *Sustainable systems* were those in adequate working condition in terms of coverage, service continuity and reliability, managed by a responsible, responsive and capable user association and whose users were satisfied with the overall service. *Damaged systems* were defined as those with minor flaws in terms of service quality, management or some dissatisfaction by users; but the situation could be reversed with minor investments in infrastructure or improving the capacity and skills for system management, operation and maintenance. *Severely Damaged systems* are those that will collapse before the useful life of the system if no action is taken and would require major investments in infrastructure and important intervention in capacity training for management, operation and maintenance to reverse the situation. *Collapsed systems* do not provide any service and are not currently being operated. The study developed a score structure to classify the systems into these four categories and analyzed which factors were predominantly present in each category. The findings showed that the fact that users were charged a tariff and that they participated in the decision making process and in system construction were important factors in the sustainability of the system. Equally important to ensure sustainability was training to the water user's association representatives and operators. The results are summarized in the table below.

ACTIONS DURING SYSTEM CONSTRUCTION*	System Condition			
	Sustainable	Damaged	Severely Damaged	Collapsed
Members of Water User's Association receiving training in administration and finance	61%	44%	0%	0%
Operators receiving training in O&M	70%	49%	20%	0%
Systems charging tariffs	91%	69%	20%	0%
Community participating in communal decision meetings	65%	27%	20%	0%
Community participating in labor/work	65%	41%	20%	0%

* Percentage of "system condition" category for which the action was undertaken

The lessons learned from this study underlined the importance community participation in the decision making process, in the construction of the system and post-construction by paying tariffs, During all the cycle, training is a Key factor to ensure system sustainability. These lessons were incorporated in the design of the National Rural Water Supply and Sanitation Program – PRONASAR, partially funded by the World Bank.

Source: Servicios de Consultoría para la Planificación del Proyecto Nacional de Agua y Saneamiento Rural (PRONASAR). Cowater International, 29 de agosto del 2001.

Regarding sanitation services, sewerage systems in rural areas present a number of difficulties: (i) low willingness to pay for sanitation services since a large proportion of benefits are positive externalities; (ii) sewerage systems require high levels of recurrent

costs; (iii) connection charges associated to conventional sewerage systems are high, not only because of the connection to the network but also due to the internal connection in the household; and (iv) in rural areas, which usually have very low population density, sewerage systems are not economically viable because of the costs to connect dispersed households. On-site sanitation is a preferable alternative and one that has proven more sustainable as no monthly fees are required and only an easier bi-annual maintenance is necessary. [54]

Current sector policy, supported by PRONASAR, aims at partly subsidizing the water/sanitation investment costs, but requires the community and the municipality to commit to sustainability by co-financing the investment. A pre-requirement for the construction or the rehabilitation of any water or sanitation system is the *demand* from the community which is elicited by (i) the creation of a JASS that will be responsible for O&M of the system; (ii) the commitment of users to full cost recovery of recurrent charges; (iii) the payment of an up-front cash contribution; and (iv) the provision of labor during construction/rehabilitation.

Approaches to Private Sector Participation

Rural infrastructure services are conducive to private sector participation in various forms. Those services that charge tariffs for their provision normally enjoy some level of private participation in their operation and management; in those without those tariffs (largely roads), private participation takes the form of contracts—within a wide spectrum of private sector involvement—with the public administration. This situation has taken place in the rural infrastructure sector in Peru, with a higher degree of involvement of private sector operation and financing in telecommunications, electrification and rural transport services, and lower in water/sanitation and roads.

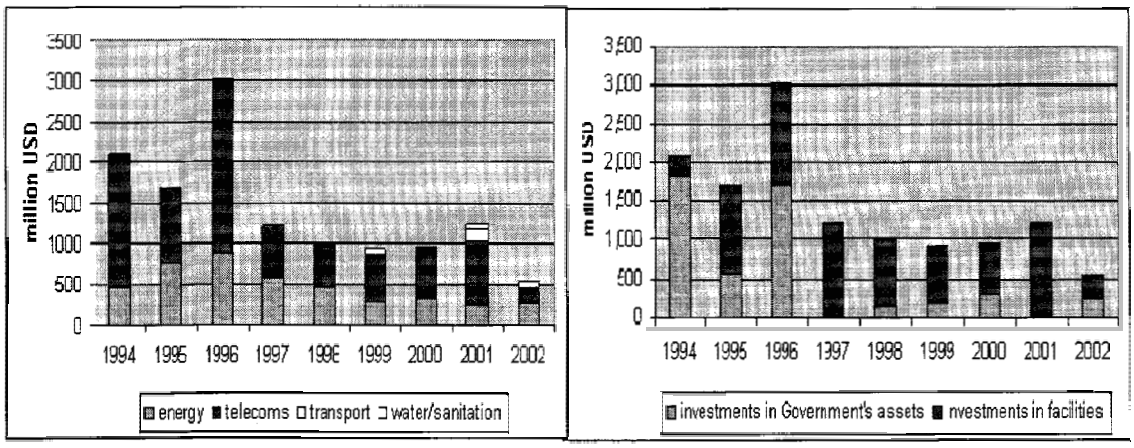
After the boom of private funding for infrastructure in the 1990s when the energy and telecommunication sectors were liberalized, private investment has been decreasing. Crucial pieces of legislation were passed in the early nineties to open these sectors to private participation. In particular, the 1992 Electricity Concession Law (LCE) opened the electricity market to private participation. The LCE imposed that generation, transmission and distribution activities would have to be developed by the private sector. The LCE also established a regime for hydroelectricity concessions exceeding 10 MW and a system of regulated prices for electricity public service (and deregulated prices for other customers). As a result of liberalization, there were significant private financing flows related to the privatization process in the energy and telecommunication sectors during the period 1994-1996. However, most of the regional electricity distribution enterprises have remained public (10 out of 13).

In addition, other types of investment (to expand or modernize private facilities) have been decreasing during the period 1994-2002: energy sector investment has decreased since 1998 (only 16 million USD were reported in 2002, compared to 547 in 1997). In the telecom sector, investments other than those in government assets have also been stable or

[54] *Source:* APOYO, *Estudio de sostenabilidad de FONCODES II.*

decreasing since 1998 (apart from a good performance in 2001). They reached 188 million USD in 2002 compared to 648 in 1997 (770 in 2001). Private investments in transport are more recent and modest (75 million USD in 2002). In water, they remain anecdotal (56 million USD in 2001). As in most of Latin America, the involvement of the private sector requires a reassessment as prospective investments are usually less attractive financially and the regulatory frameworks require strengthening, while social backlash also is a problem.

Figure 2.3. Private investment in infrastructure in Peru has followed a decreasing trend (1994-2002).



Source: World Bank, PPI database.

The private sector is involved in most segments of the management of rural infrastructure; however, funding still comes almost exclusively from public sources. There are examples of successful private sector involvement in the construction, operation, maintenance and supervision of rural infrastructure programs. These private operators are contracted by public institutions (sector ministries, central agencies, local governments and public enterprises) to execute rural infrastructure-related tasks. However, some caveats should be put to this apparently active involvement of private actors in rural infrastructure. In particular, in a number of cases, tasks are still performed "in-house" by public agencies. This is particularly common for the electricity sector where investments have been implemented mainly by the DEP of the Ministry of Energy and Mines. They plan and contract for construction of projects, and then transfers the assets to publicly owned distribution companies or a state-owned corporation, ADINELSA. This corporation then contracts out operation and maintenance to others (including private firms). There are a few examples of municipal institutions involved in distribution of electricity services (off-grid installations of EMSEMSA in Paramonga and EMSEUSA in Uctubamba). In addition, the fact that the main regional distribution companies remain state-owned is a significant caveat to private sector involvement in this sector. In the telecommunication sector, there are only two private operators active in rural areas. Finally, in spite of the relatively active involvement of private actors, almost all of the funding for rural infrastructure still comes from public sources, illustrating the fact that rural infrastructure remains largely unattractive for private investors. Over the period 1999-2002, private investment in rural

infrastructure represented less than 3% of the total funding flows (13 million USD out of 486). [55]

Table 2.7. Private sector participation in rural infrastructure is significant

	Water/sanitation	Rural roads	Rural electrification	Rural telecom-munications
Project preparation	Municipalities with private execution	MTC (*Provias Rural*) with private execution	MEM/DEP	OSIPTEL
Construction	Private with participation of municipalities	Private contracts for main rural roads, municipalities in exceptional cases	Private	Private
Control and supervision of construction	Private with participation of municipalities	MTC with participation of municipalities	Private with participation of municipalities	OSIPTEL directly or through private operators
Operation and maintenance	Communities through Users' Committees; technical assistance from district municipalities	MTC but transfer to provincial municipalities; maintenance performed by micro-enterprises	In theory, private operators but most distribution companies are state-owned ; "on-grid" facilities could be maintained by micro-enterprises	Private operators

Source: Dianderas (2004).

The use of micro-enterprises to perform the maintenance of rural roads has helped develop a local entrepreneurial capacity. Over the last decade, the maintenance of rural roads in Peru has moved from an "in-house" approach to the contracting of community-based private entities. These micro-enterprises are currently contracted by the Ministry of Transportation and Communication (MTC) but this responsibility is being transferred to the provincial road institutes, as part of the decentralization process. Micro-enterprises involve poor unskilled workers and have been successful in creating an entrepreneurial capacity in rural areas. (Box 2.1.) Support has been provided by central agencies and, increasingly, by local governments, to help strengthen these micro-enterprises by providing them with training and progressively introducing market-oriented approaches. At the end of 2003, the maintenance of the roads through 500 micro-enterprises had created an entrepreneurial spirit, for the benefit of both women and men from poor rural communities, and helped create about 4,800 permanent jobs. In the water sector, pilot projects involving small local enterprises in the operation and maintenance of facilities, have been launched in 11 Peruvian cities as part of the PRONASAR. In the energy sector, while large "on-grid" investments are better managed by regional distribution companies, the operation and maintenance of "on-grid" technologies ("mini-hydro power plants", solar cells) can be efficiently performed by local communities or small/micro-enterprises.

[55] *Source*: Rodríguez, 2004.

Box 2.2. A day with "Illari", a micro-enterprise for road maintenance.

The micro-enterprise *Comite Vial 'Illari'*—a name in *Quechua* which means "awakening"—*is* responsible for maintaining a stretch of about 43 km. The gravel road serves the villages of Talavera and Occobamba, and carries about 20 vehicles a day (*from* about 3 vehicles a day in 1995). Though it was rehabilitated in 1995, the road remained in good condition due to the permanent work done by the micro-enterprise to keep the drainage system working, fill potholes and improve the stability of lateral slopes, combined with periodic maintenance activities carried about by local contractors.

The micro-enterprise consists of 16 members who designate their president and determine how the monthly payment (about US$100 equivalent per km including VAT) is assigned; basically, about 80% of net payments is devoted to daily wages and the remaining 20% is allocated to various uses, including an investment fund (about 7%), an aid reserve fund (about 5%), and reserves for acquisition of tools (3%), travel expenditures (about 3%) and miscellaneous expenditures (2%). The micro-enterprise operates a saving account in *Banco de Credito* and owns a small place where members receive on-the-job training from two "monitors' (an engineer and an accountant) and keep their books and accounting records.

Source: World Bank, Peru – 2nd Rural Road Project (2001)

Incentive mechanisms (subsidies) have been implemented to make rural infrastructure more attractive to private actors but their overall impact has been limited so far. Subsidies are either demand-based (making infrastructure services more affordable to users) or supply-based (making rural infrastructure investment or operation more attractive to private operators). There are explicit or implicit subsidy mechanisms in all rural infrastructure sectors :

(i) *Electricity.* The are two subsidy mechanisms in effect for electricity: (a) a capital cost subsidy provided through the MEM/DEP, and (b) a cross-subsidy on the tariff for small consumers provided through the *Fondo de Compensación Social Eléctrica* (FOSE). MEM receives funds for the capital cost subsidy from the national budget on an annual basis for its rural electrification program.[56] Using these funds, rural electricity projects are to be constructed by DEP (with actual execution contracted to private firms) and then transferred to publicly-owned distributors or the *Empresa de Administración de Infraestructura Eléctrica S.A.*(ADINELSA). In the case of transfer to ADINELSA, this firm further contracts the operation and maintenance to distribution firms or municipalities. When ADINELSA does not manage to contract operation and maintenance services due to lack of interest, ADINELSA directly manages these responsibilities. This may raise some issues of conflict of interest. The capital cost subsidy mechanism is only available for projects carried out by the public sector (i.e., by the DEP of the MEM).

The FOSE is a "demand-based" cross-subsidy among customers created by Law No. 27510 of May 27, 2001. According to this law, consumers of less than 30 kWh/month (whether rural or urban), benefit from a price reduction of 25% for on-grid electricity services, and 50% for off-grid ones. The cost of the subsidy is paid for by all the other consumers. The total cost of the subsidy for 2002 amounted to S./ 3.6 million. [57] This mechanism results in a reduction of tariffs for 80% to 90% of rural users. The

[56] The Rural Electrification Law of 2002 proposed a Rural Electrification Fund to provide capital cost subsidies, but the law was never put in effect. Renewed legislation has been passed by Congress in July 2004 but its effective implementation is pending.

[57] Source : Dianderas, 2003.

FOSE was renewed in April 2004 but it is subject to periodic reviews which instill a level of uncertainty in its future funding levels.

(ii) *Telecommunications*: The *Fondo de Inversión de Telecommunicaciones* (FITEL) was created by the Telecommunications Law (Article 12) for the sole purpose of financing telecommunications services in rural areas or in places considered of priority social interest. Typical projects financed by FITEL include granting a 20-year concession to private operators for public telephony services, the selection of the operator being based on an international tender for the lowest subsidy requested from FITEL for the installation, operation and maintenance of these public services. Box 2.2 shows an example of a successful minimum concession model.

Box 2.3. An example of successful minimum subsidy concession model for rural telecommunication in Peru

In 1998 a rural telephony project FITEL (Fund for Investment in Rural Telecommunications) was executed, with the goal of increasing the rural population's access to telephone service by financing the connection to the national and international telephone system. The project beneficiaries were 213 rural communities belonging to border areas in the north of Peru, which had no telephone service at thattime and were not included in the obligations assumed by Telefónica del Perú (TdP) in its concession contract.

The project was executed by granting a 20-year concession to private operators for public telephony services. The selection of the operator would be based on an international tender for the lowest subsidy requested from FITEL for the installation, operation and maintenance of these public services. The selection of the rural communities to benefit from the project, was based on criteria of prioritization, to maximize the social profitability of the public investment, while minimizing the subsidy.

The Northern Border Project included the installation, operation and maintenance of one public telephone in 213 rural communities in the department of Tumbes and the border districts of the departments of Piura, Cajamarca and Amazonas. On April 13, the financial bids of the firms whose technical evaluation had qualified were opened. The companies where Global Village Telecom N.V and Telecomunicaciones y Representaciones S.A - TELEREP S.A. On May 7, the contract was awarded to Global Village Telecom N.V.

The successful bidder's amount was: for the cost of installation "Turnkey" (Item 1) US$3.727.379; cost of operating and maintaining the system for 20 years (Item 2) US$998.465; and the amount paid for the system the fifth year (Item 3) US$4.909.292. It should be noted that the amount requested for operation and maintenance of the system is disbursed in half-yearly installments for five years. Thus, the winning bid in real value amounts to US$1.661.563, 41% less than the US$4.053.000 budgeted, which meant a public investment of US$11 per capita.

To give an idea of the impact and benefit of the project, its execution reduced the distance to the nearest telephone considerably and increased the percentage of the population with access to the telephone in the project area dramatically from 48% to 88%.

In order to achieve an investment per inhabitant of only $11, Global Village Telecom (now "GVT del Perú") uses VSAT technology from Gilat Satellite Networks. GVT is implementing a star topology VSAT network with the HUB station in Lima, and a remote VSAT station in every town included in the project.

Source: ITU.

(iii) *Water/Sanitation*: Central government is partially financing the capital expenditure of rural water/sanitation programs but there are still some implicit subsidies for the operation and maintenance of facilities, especially those financed in the last decade without the specific requirement of creating JASS to become responsible for O&M. It

has been estimated that 70% of the cost of operation and maintenance of water facilities is subsidized, only 30% is being financed by user fees. The price of water services has increased by 40% over the period 1997-2000 (it decreased by 10% in 2001), [58] but local governments are reluctant to increase it to the level which would be required to cover operating costs. To respond to that reality, PRONASAR only invests in new or rehabilitation of infrastructure once there is an up-front commitment (and payment) from potential users. This up-front participation should show their commitment to the level of service and system design which they select in a participatory manner. The level of the participation is determined so that there is no need for explicit subsidies for O&M. Subsidies, however, will still be needed for the replacement of the infrastructure as there is currently no depreciation included in monthly water/sanitation charges.

(iv) *Transport*: PROVIAS Rural—with a contribution from municipalities—is financing the capital expenditure (cost of rehabilitation) and the current expenditure (maintenance) of rural roads programs. There are no demand-based subsidies since the use of rural roads is free of charge (though, indirectly, charges are levied on users through gasoline taxes and vehicle registration fees, beyond the overall value added taxes for other consumption goods).

Table 2.8. Subsidy mechanisms are used to increase the affordability of rural infrastructure services.

		Water/sanitation	Rural roads	Rural electrificatio n	Rural telecom-munications
Supply-based	Capital expenditures	MVCS / District municipalities / user contributions	PROVIAS Rural	Subsidy through MEM/DEP	FITEL
	Current expenditures	Currently 70% of recurrent costs subsidized No subsidy needed under PRONASAR. On-site sanitation does not require subsidizing current expenditures	PROVIAS Rural and municipalities (in short-term transfers to municipalities)	Guarantee mechanism to ensure profitability	Subsidy to guarantee profitability
Demand-based		Not applicable (water system design is chosen by the users to avoid the need of subsidizing current expenditures). On-site sanitation reduces subsidy needs	Not applicable	FOSE	

Source: Authors.

In a number of cases, the regulatory framework negatively affects possibilities for private sector participation. For instance, in the telecommunications market, concession restrictions limit the entrance of small enterprises as concessions at the provincial level require an extension of 5 to 10% of installed telephones, implying significant initial investments. In addition, small traffic volumes (27 minutes per day are needed to amortize

[58] Source : IPE, 2003.

the investment in a public phone, which is high in comparison to the existing demand in many rural areas) and interconnection costs remain significant barriers to the expansion of coverage. For rural electrification, there is currently no specific legal and regulatory framework. The 2002 Rural Electrification Law [59] (No. 27744 of May 31, 2002) has never come into force because it is in conflict with the decentralization law setting responsibilities to regional governments [60] and the 2003 finance law. In water/sanitation, if a JASS wants to introduce a water tariff (per cubic meter) it will automatically pay taxes (VAT). Therefore, many JASS chose charging a flat fee, hence without micro-metering it is impossible for users to respond to prices and there is a disincentive for rational water use. Private sector involvement is difficult to catalyze in the context of an unclear and unstable regulatory environment.

2.4. EFFECTIVENESS

Contribution to Increasing Rural Incomes

There is a significant correlation between the number of infrastructure services available to rural households and the average household's income per capita. Differences in prioritization criteria for the various sectors (i.e. the fact that certain sectors like water or rural roads will tend to focus on areas with high poverty rates while others like rural telecoms or rural electricity will focus on areas with higher likelihood of profitable tariffs) increase the chance of dispersion of resources and contribute to the low proportion of "combined" infrastructure services. Other factors may be at play, such as the fact that only the "richest" of the rural poor can afford several services (i.e., the service is available in the village but only the richest households' will be connected) but it could also be that increased access to infrastructure services brings more income-generating opportunities to the rural poor.

Differences in definition, methodology and prioritization criteria reduce opportunities for complementarities across sectors. Each sector balances the social and the economic potential dimensions differently to prioritize across territories and projects. Water/sanitation facilities are considered as social infrastructure, while telecommunications are mostly handled as economic infrastructure. In fact, complementarities only benefited a minority of the rural population: in 2001, three quarters of Peru's rural households had access to no or only one rural infrastructure service (see table 2.2.). This means that opportunities for combined effects from access to several infrastructure services may only happen—when they happen—for a quarter of Peru's rural population.

[59] *Ley de electrificacion rural y de zonas aisladas y de frontera.*
[60] *Ley Organica de Gobiernos Regionales*, promulgated on August 11, 2002.

Table 2.2. Only a quarter of rural households have access to two or more infrastructure services and access is correlated to households' income

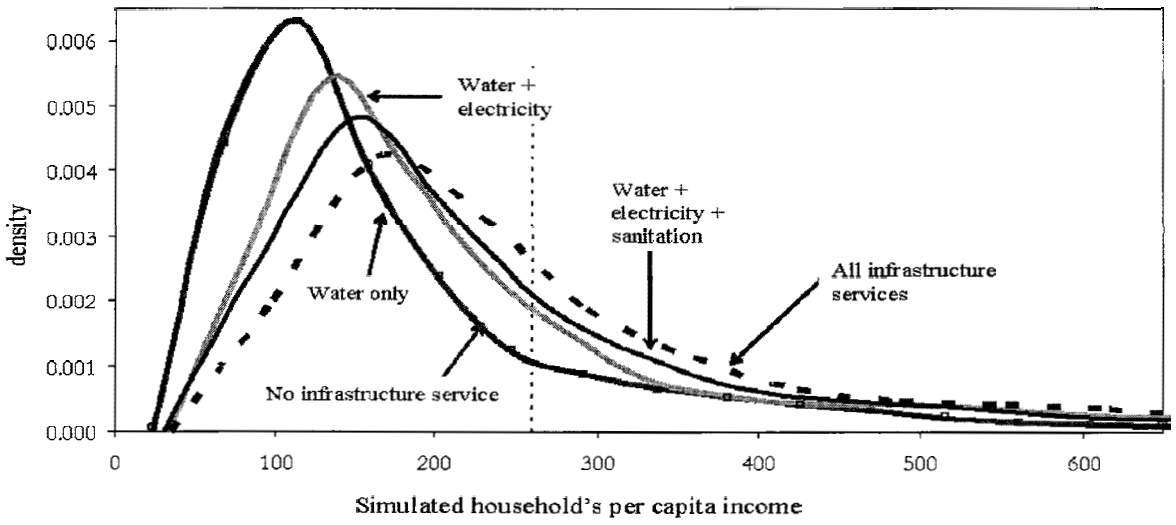
No. of available services	% of rural households	Average household's income per capita (Soles)
None	30	192
One	44	235
Two	13	253
Three	8	320
Four	5	379

Source: Escobal and Torero 2004 based on data from ENAHO 2001.

Complementarities (i.e. combined access) across infrastructure sectors can increase the impact on rural incomes significantly compared to when they are present in isolation, particularly for electricity and telecommunication services (see chapter 1). Thus, additional payment contributions that may arise from the existence of several services will be more than compensated by the increases in income. The longer term effect is to move incomes towards higher and more equitable distribution (Figure 3.7). Indeed, because of the missed opportunities for interactions, dispersion of rural infrastructure investments has a cost in terms of effectiveness.

Besides the direct impact on income, there is a potential resource saving impact for users when the administration, billing and fee collection for several infrastructure services is merged. Furthermore, merged units could potentially get associated with other localities in their province thus generating economies of scale that could reduce the monthly charges, not to mention potential resource savings in training and capacity-building.

Figure 3.7. Distribution of rural households' income moves towards higher incomes when a higher number of infrastructure services becomes available



Source: Escobal and Torero, 2004.

Evolving Institutional Roles

The process of decentralization to the municipal level has gained momentum since 2002 [61], with an increasing involvement of local governments in infrastructure planning and management. However, sufficient institutional capacity is an important condition in order to receive the full benefit of the decentralization of rural infrastructure. The 2002 World Bank CAS for Peru stressed that "a well-conceived decentralization policy could make a significant contribution to improving public sector performance, if accompanied with clear transfers of responsibilities and development of local management capacity." The CAS also reminded that decentralization measures had the inherent danger of "deteriorating the quality of public services, if sub-national governments are required to take over responsibilities for which they are either unprepared or unwilling to manage." Actions to avoid a deterioration of public services need to be taken when the policies, guidelines and the sequencing of decentralization are being designed. In the case of rural infrastructure, particular attention should be paid to: (1) planning capacity at the local level; (2) clear assignment of responsibilities among the various levels of government; (3) transfer of corresponding budgetary resources along with the new responsibilities; (4) securing resources for current expenditures (maintenance of infrastructure in particular); and (5) contracting procedures in order to involve the private sector in rural infrastructure. These elements are already been implemented in the various infrastructure sectors:

- **Rural Roads.** A decentralized management of rural roads' maintenance was first tested in 2001 in Arequipa and by the end of 2003, it had been implemented in 25 provinces. Under this approach, a provincial road board consisting of the provincial and district mayors of the province, oversees an administrative unit—the so-called Provincial Road Institute, or IVP for the Spanish acronym—that manages the planning and maintenance of rural roads. The IVP is a small and agile body which does not directly perform road management activities (maintenance in particular) but, rather, contracts private enterprises (contractors for rehabilitation works and micro-enterprises for maintenance) to execute these tasks. This model has proved to be effective in terms of efficiency and accountability to rural users and is currently being scaled up by the Provias Rural. Critical steps include securing financial resources for both road maintenance activities (specific financial procedures were designed and implemented for that purpose), a timely but effective devolution of responsibilities at the local level, and strong capacity building of local institutions.

  In addition to the 25 provinces, the Provias Rural has transferred resources to about 68 additional provinces and about 220 district municipalities, along with the commitments identified by that entity for the maintenance needs of the networks under the jurisdiction of those municipalities in the process of elaboration of provincial road

[61] The most important pieces of legislation on this topic include: *Decreto Supremo* no. 005-2001-PRES. which created the "Technical Secretariat for the decentralization Process", the Law no. 27680 "*Ley de Reforma Constitucional del Capitulo XIV del Titulo IV sobre descentralizacion*", the "decentralization core Law" ("*Ley de Bases de la Descentralización*" published on 07/20/2002), and the Law no. 27972 "*Ley Organiza de Municipalidades*" (published on 5/28/203).

plans. The assignment of responsibilities, however, is sometimes not precisely limited as to which roads correspond to the municipal level.

The capacity of the IVPs to produce coherent and incremental road plans is paramount to generate investment and maintenance programs that are commensurate with the criteria for the selection of options and the budget ceilings likely to be assigned by the central level to the municipalities. The IVPs must simultaneously—with support from Provias Rural—build up their management and administrative capacity to contract the investment and maintenance activities to achieve efficiencies in their implementation. In this respect, the maintenance mechanism through micro-enterprises—with their efficiency increasingly strengthened through competition for the contracts—have proved also an cost-effective manner of securing the proper upkeep of rural roads (in combination with periodic activities—every 4- to 5-year periods—that allow to restore largely initial road conditions).

- **Water/sanitation.** Planning for water/sanitation infrastructure is performed at the district level through participatory planning instruments.

  Operation and maintenance are performed by community organizations (Water User Associations for water and JASS [62] for sanitation). In the past, the FONCODES model was geared towards the construction of new systems, so the community was organized only for the construction phase in "Executing Units" – *núcleos ejecutores* – and not for the operation and maintenance. In many cases, those unist evolved into JASS, but they lacked proper training and technical knowledge to assume operation and maintenance tasks. This has largely contributed to the poor sustainability of water/sanitation investments. [63] In contrast, the new PRONASAR model is geared towards sustainability so that even though JASS participate in the construction phase, they are created to assume the responsibility of administration, operation and maintenance of the service. The project cycle includes extensive training capacity for the JASS before, during and a year after the construction of the system. Sewerage systems, because of their complexities and high costs in lower density areas, are no-longer financed. However, different options of on-site sanitation are offered to beneficiaries who select the best option according to their payment capacity. Users are trained to perform the O&M of their sanitation equipment, as well as in hygiene education.

  In the near future, budgetary resources for water/sanitation—which have been strongly decreasing since 1998—are expected to become less volatile, with the availability of funding from external partners (IDB, World Bank, CIDA). Moreover, higher contributions from communities and municipalities (at least 20% of the investment) are required, with the expectation that sustainability will improved (given the increased ownership from users). Finally, capacity building programs should allow for the enhancement of the efficiency of JASS responsible for the operation and maintenance of the systems.

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[62] *Juntas Administradoras de Servicios de Saneamiento.*

[63] Source: COWATER International, Inc. *Servicio de consultoría para la planificación del proyecto de agua y saneamiento rural (PRONASAR)*, Informe 2, Agosto 2001.

- **Rural electrification**. Planning for rural electrification investment is still mostly performed at the central level and aggregated in the 10-year National Plan for Rural Electrification. Although a decentralization process at the regional level is under way (and sanctioned with the recent approval of a new law), [64] local governments have been little involved in the planning process so far.

  In the electricity sector, electrification committees were originally created to contribute to the planning process, although only as originators of demand for the services. These committees have largely disappeared today but, in certain cases, they took over some tasks related to the operation of rural electricity services (e.g., fee collection). In the case of service provision from an interconnected grid, there are strong economies of scale that favor larger-scale enterprises. However, operation and maintenance of off-grid service provision on a smaller scale, for example using micro-hydro systems, could be implemented using community- or micro-enterprises-based approaches.

  In the future, a large part of the implementation of rural electrification programs may be handled at the regional level, which is the natural level for large "on-grid" capital investment due to economies of scale and since most distribution companies have a regional focus. The involvement of lower levels of governments is expected to be in identifying needs, potential demand, ability to pay and community contributions, as well as in the supervision of off-grid electricity systems (e.g., micro-hydro) which would need to be managed at the community level.

- **Rural telecommunications**. Planning for rural telecommunication investments and services is also essentially performed at the central level. Local governments are still not represented in the CODESI, [65] a national commission created to coordinate existing ICT initiatives. However, there is an attempt to build a local capacity in this area (e.g. through training programs for local governments).

  In the telecommunication sector, operation of *info-centros* and maintenance of public-phones could be also performed by small local enterprises.

The very low level of resources available to local governments (for rural municipalities total annual revenues per capita amounted to about US$46 over the period 1998-2000, compared to US$62 for urban provincial municipalities) [66] and the vertical imbalance (for rural municipalities, 62% of revenues come from transfers, compared to 33% for urban municipalities) further compounds the difficulties to proceed with transferring additional infrastructure responsibilities to rural municipalities (see Table 2.6 for a summary of the

[64] The Law to Regulate the Promotion of Private Investment in Rural Electrification, passed by Congress on July 1, 2004

[65] *Comisión de Desarrollo de la Sociedad de la Información.*

[66] Municipalities are defined as rural when more than half of the population live in rural areas (defined as (1) "the area is not a district capital or it is a district capital with less than 3,000 people"; and (2) "the area has less than 100 households contiguous or there are more than 100 households but they are disperse and there are no center"). Most district municipalities are considered "rural" while all provincial municipalities are "urban".

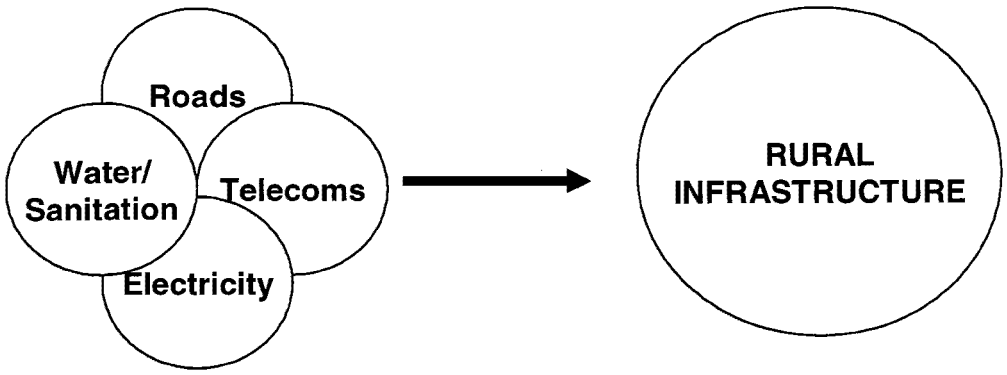
resources of municipalities). Increasing local revenues (by handing out some fiscal autonomy to local governments) may be particularly needed: rural municipalities' own revenues per capita amounted to US$12 per year over the period 1998-2000 compared to US$36 for urban provincial municipalities. Moreover, unlike urban municipalities, most rural municipalities cannot currently borrow more to finance their expenditures: the average debt service for rural municipalities amount to about 25% of current revenues, which is already the maximum allowed. Finally, it should be noted that some equalization is performed through the transfer mechanism: rural municipalities receive a per capita transfer of US$29 compared to US$20 for urban municipalities. In spite of lower revenues, rural municipalities' capital expenditures are about the same as for urban provincial municipalities relative to their population (US$20 and US$18), but these municipal investments include all sectors (i.e., also social and not only infrastructure).

Table 2.6. Rural municipalities have less revenues and are more dependent on transfers than urban provincial municipalities – Average 1998-2000

	Rural Municipalities			Urban Municipalities		
	Amount (US$ million)	Amount per capita (US$)	%	Amount (US$ million)	Amount per capita (US$)	%
Revenues	**330**	**46**	**100**	**1,172**	**62**	**100**
Local taxes and fees	87	12	26	674	36	58
Transfers	203	29	62	384	20	33
Loans	26	4	8	55	3	5
Others	13	2	4	58	3	5
Expenditures	**339**	**48**	**100**	**945**	**50**	**100**
Administrative costs	168	24	50	527	28	56
Debt service	22	3	6	58	3	6
Investments	142	20	42	346	18	37
Others	6	1	2	14	1	2

Source: Azcueta (2003).

3. STRATEGIC FRAMEWORK FOR RURAL INFRASTRUCTURE



3.1. STRATEGIC TRADE-OFFS AND RECOMMENDED ACTIONS

Despite Peru's rural infrastructure gap, there has been significant progress in the four rural infrastructure sectors over the last few years. Chapter 1 and 2 highlighted the various government initiatives in rural development and decentralization, as well as the approaches being implemented in each sector to respond to the requirements of the decentralization agenda and the need to enhance the access of rural populations to infrastructure assets in a sustainable manner. This bodes well for the future expansion and sustainable management of rural infrastructure. In the future, however, there needs to be a shift of the overall perspective of rural infrastructure towards a set of interconnected investments and services planned more directly in response to local rural development needs, and managed with due consideration to the strengthening of local capacities.

The strategy seeks to improve the rural population's access to infrastructure assets in three different dimensions: (1) alignment of investments with the priorities of rural areas; (2) efficiency of the sustainability and delivery of infrastructure services; and (3) effectiveness in achieving the expected impacts. These three dimensions provide a conceptual framework that makes the key tradeoffs/tensions involved in improving access to rural infrastructure and enhancing its provision explicit, namely:

- *Level of access versus availability of resources.* The goal of higher coverage rates must be weighed against the scope for budgetary increases and the limits for increases in the tariffs/fees collected from users.

- *Prioritization versus effectiveness.* The definition of the criteria for the prioritization of investments, with a greater emphasis on social or economic variables, must take into account the goal of greater sustainability of investments and higher increases in rural incomes.

- *Effectiveness versus efficiency.* The identification of the appropriate institutional level for the planning and/or implementation of rural infrastructure interventions with an aim at better reflecting rural users' needs must be balanced against the need for economies of scale, the network characteristics of the investments—particularly present in the

electrification and telecommunications sectors—and technological and management requirements of the infrastructure assets.

- *Affordability versus incentive framework.* The capacity of rural inhabitants to pay for infrastructure services or contribute to their implementation must be weighed against the incentive framework for the providing entities—either public or private—to perform in an efficient manner, with an aim at providing services at a quality commensurate with the tariffs and fees charged or the resources allocated for operation and maintenance.

- *In-house versus contracting.* Alternative mechanisms for engaging the private sector must be tailored to each particular sector seeking to establish regulatory or contracting conditions that promote that engagement and efficiency.

- *Transfers versus capabilities.* While local governments are eager to assume further responsibilities in the implementation and management of infrastructure assets, the timing of the transfer of those responsibilities must be pursued in an active and progressive manner as the related technical expertise is built up.

The proposed strategic framework attempts to address those six trade-offs. It aims at implementing a revamped, decentralized and market-friendly framework for rural infrastructure with six corresponding strategic actions: (1) allocating complementary resources to meet emerging principles of rural development policies and align Peru with countries in similar level of development; (2) focusing resources where they will have greater impact in advancing economic conditions of rural areas; (3) putting users at the core of the planning process and bridging knowledge gaps so that planners can make rational choices; (4) developing a subsidy policy that is transparent, linked to results and kept to a minimum; (5) enhancing the involvement of the private sector; and (6) ensuring a timely transfer of responsibilities and capacities to local governments. These actions are summarized in Table 4.2.

Table 4.2. Trade-offs and corresponding strategic actions

Trade-off	Strategic action
How much should be allocated to the provision of rural infrastructure ?	Increase funding levels to meet rural development objectives and align Peru with comparable countries
How should rural infrastructure investment be prioritized ?	Focus resources where they will be more likely to spur productive activities and increase rural incomes
Who should decide what infrastructure services must be developed in priority and from where budgetary resources for rural infrastructure should come?	Use decentralization to put rural infrastructure beneficiaries as key stakeholders in the planning process and bridge knowledge gaps in order that local planners can make rational choices and promote complementarities between infrastructure services
How much should rural households pay for the services?	Develop a subsidy policy which is transparent, linked to results and kept to a minimum
Who should operate and maintain the infrastructure services?	Facilitate and enhance the participation of the private sector in rural infrastructure
Should the transfer of responsibilities be conditioned to sufficient institutional capacity?	Ensure a transfer of responsibilities consistent with local institutional capacity, while building up this capacity

Level of resources to meet the needs of emerging rural development principles. Chapter 2 presented estimates on the interactive effects between infrastructure services to more effectively increase the potential to increase rural incomes. Simulations show that making all infrastructure services available to the rural population currently without access to any of these services, would reduce the poverty rate from 82.5% to 62.3% within that population (those who do not have any services at all)[67]. Since thirty percent of Peru's rural population do not have access to any infrastructure service, bringing all four infrastructure services to this entire population group would reduce the rural poverty rate by six percentage points, thus helping to lift, *ceteris paribus*, about half a million Peruvian (or 10% of the rural population living below the poverty line) out of poverty. Based on figures from Rodriguez (2004), this effort would require between US$0.7 billion (assuming constant marginal costs) and US$1.8 billion (taking as reference the highest marginal cost observed in each department). In comparison, ensuring universal access to all infrastructure services in rural Peru would cost between US$2.4 to $4.8 billion and, at current levels, could take up to 48 years!

An alternative approach to estimate the rural infrastructure needs would consist of aligning Peru with comparable countries (either South American countries or countries with similar level of development), which entails at least halving the rural infrastructure gap in the coming decade. (In reality, taking into account that comparable countries will also make progress in terms of coverage extension during that same period, Peru would have to increase availability of rural infrastructure services even faster in order to catch up with them). The table below shows these estimates. Depending on the sectors, Peru would need to immediately reduce the gap by 6% to 74% (with the exception of rural water where the situation in Peru is slightly better than for the rest of South America). The sectors where needs are higher are roads, electricity and sanitation.

[67] Simulations of poverty rates with availability of infrastructure services for population without any services yield the following results:

Infrastructure services available	Poverty rate	Average per capita income
None	82.5%	184
Just water	82.2%	186
Water and electricity	74.5%	234
Water, electricity and sanitation	69.9%	256
All infrastructure services	62.3%	294

Source: Escobal and Torero (2004).

Table 3.2. Requirements to bridge the rural infrastructure gap and align Peru with comparable countries

	Estimated change in number of people lacking access to infrastructure services to align Peru with :	
	South America average	Countries with similar level of development (excluding China)
Water		
- country as a whole	- 35%	- 30%
- rural areas	+ 5%	- 29%
Sanitation		
- country as a whole	- 24%	- 41%
- rural areas	- 6%	- 43%
Roads *		
- country as a whole	- 16%	- 74%
Electricity		
- country as a whole	- 59%	NA
- rural areas	- 43%	NA
Telecommunications		
- country as a whole	- 19%	- 7%

* Calculated, as proxy, as the % of unpaved roads needing to be paved to reach same paved road density.

Halving the number of people lacking access to rural infrastructure services in the coming decade would require doubling the annual investment levels observed during 1998-2002. Depending on the source, estimations to halve the rural population lacking access to infrastructure services range from US$121 to US$241 million per year during 10 years, compared to US$97 million spent annually during the period 1998-2002. It should be noted that the higher cost scenario is likely to be closer to actual needs since it is calculated on the cost of investment needed to increase electricity coverage from its current level (increasing marginal costs) while the low case scenario is based on average cost per connection observed during the period 1998-2002 (constant marginal costs). In this simulation, targeted subsidies to help finance current expenditures and make services more affordable are not taken into account (except for rural roads where maintenance costs are included). If a subsidy mechanism is needed to make services more affordable to a specific targeted population, the financing requirements would have to be raised accordingly.

A dynamic strategic plan assuming a probability of 0.25 for the low case scenario (marginal costs similar to those in 1998-2002) and 0.75 for the high case scenario (based on increasing marginal costs), allows us to estimate that sustaining current levels of investment observed in 1998-2002 will only reduce the infrastructure gap in rural Peru by 26% over the coming decade. On the other hand, halving the rural infrastructure gap would mean sustaining annual investment levels double those of the past 5 years (about US$200 million per year).

This estimate is based on halving the gap in all sectors in the same way. Since annual funding for rural infrastructure during the period 1998-2002 has been estimated to about US$100 million, Peru should therefore aim at sustaining US$200 million per year for the next decade (Figure 3.3). Although this seems to imply a major spending effort for the Peruvian Government, it should be noted that it can be achieved if: (1) bringing investments in water/sanitation and roads to levels observed in 1998, i.e., before the

economic slowdown impacted on infrastructure spending; (2) funding rural electrification by the effective implementation of a sector fund similar to FITEL, therefore limiting annual budgetary spending to no more than the 1998-2002 average for the sector, but bringing the total amount to the statutory objective established in the rural electrification law; and (3) bringing additional resources sufficient to double FITEL's statutory objective (that could come from the license and spectrum fees collected by MTC which represent about twice FITEL's current revenues).

Table 3.3. Financial requirements to halve the number of people in rural Peru lacking access to infrastructure services in 10 years.

	Rural roads	Water/ sanitation	Rural telecoms	Rural electricity High case *	Rural electricity Low case
Capital investment	400	155	150	1,500	300
Current expenditures	200	Assuming covered by user fees or cross subsidies			
TOTAL	600	155	150	1,500	300

* *Source*: Rural Electrification Plan NB : Other data come from Rodriguez (2004).

US$ million	High case	Low case
TOTAL for 10 years	2,405	1,205
TOTAL per year	241	121
Average annual expenditures 1998-2002	97	

Source: Authors.

In terms of budgetary efforts, an annual US$200 million investment in rural infrastructure would represent around 0.3% of GDP for Peru (compared to an average of 0.18% over the period 1998-2002). It would also represent about 2.0% of the Peruvian government's budget in 2003 or about 8.8% of the combined regional and local expenditures in 2003. As a comparison, over the period 1998-2002, Chile spent about 0.28% of GDP or 1.3% of government budget in rural infrastructure. However, when accounting for differences in percentages of rural population (14% in Chile compared to 27% in Peru in 2002), even with an annual US$200 million, the budgetary effort of Peru relative to its rural population would still be significantly lower than what Chile sustained over the past 5 years.

Table 4.1. Current funding levels for rural infrastructure

US$ million	Aver. annual spending 1998-2002	Spending in 1998	Statutory objective
Rural roads	36.2	60	none
Rural electricity	43.1	52	90 *
Rural water/sanitation	7.1	14.8	none
Rural telecoms	10.8	NA	11
TOTAL	97.2	NA	none

* From the Rural Electrification Law (pending implementation).

The budgetary effort implied by the strategy seems therefore modest and the experience of other countries shows that some of them have been able to grant such priority to rural infrastructure in their national budget's preparation. However, Peru's tight fiscal constraint may limit the capacity of the Government to bring additional fiscal resources to rural infrastructure. In the medium term, the fiscal decentralization process will decentralize part of the decision at the local level, since local governments will be in a position to decide

what share of their budget should be allocated to finance infrastructure investment (but the fiscal constraint is likely to be decentralized as well). Nevertheless, in the short term, the bulk of funding for rural infrastructure will be decided at the national level, within the preparation of the national budget.

In this context, some alternative sources of financing could be explored. Direct private financing for rural infrastructure can be encouraged by creating a favorable institutional and regulatory environment. Nevertheless, this participation is likely to vary significantly across sectors (there is currently more potential for it in the telecom sectors) and subsidies will still be required in a majority of cases to account for the higher risk and lower profitability associated with rural infrastructure investments. An alternative way to raise revenues within the sectors (ie. without contribution from the national or local budgets) could be through the implementation of cross-subsidy schemes. The FITEL model is already inspired by this approach: telecom operators pay a 1% tax on their revenues (ultimately, telecom users pay the incremental cost introduced by the tax) and revenues are earmarked to finance the extension of telecommunication services in rural areas. The Rural Electrification Fund - whose implementation is pending – could be financed under a similar cross-subsidy model. In the transport sector, some countries like Brazil or El Salvador, have used a different approach, based on users charges, to finance road maintenance expenditures. Under this model, transport-related user charges (such as gasoline tax, driving license fees or vehicle license fees) are earmarked in a road maintenance fund. While the resources generated in such a way do not necessarily involve cross-subsidy (charges are used to maintain the infrastructure used by payers not to expand access to different users), they are still generated and used within the sector. Ultimately, this can also free national budget resources which can be used to expand the road network to rural areas.

Whether Peru chooses to develop its rural infrastructure through direct budgetary allocation or through financing generated within the sector, is a question whose answer will depend on the fiscal constraint but also on a political economy decision of who should pay for it. Financing them from direct fiscal revenues would mean that the national government acknowledges the priority of rural infrastructure for the country's socio-economic development and decides that every taxable household should contribute to this priority. Implementing cross subsidies would mean that households who already benefit from infrastructure services should contribute to the development of these services to the one who do not have access yet. Users' charges for infrastructure maintenance would make users directly contribute to maintaining the infrastructure they are using (and possibly freeing budgetary resources to expand access).

Focus resources towards enhancing impact on economic development and rural incomes. Resources from the various existing national funds for rural infrastructure can be allocated in a variety of ways from a "first-comes-first-served" to a predefined allocation based on a number of criteria. As explained before, the choice among criteria is critical as it will define the ultimate effectiveness of the interventions. The right combination of social and economic criteria would ensure that resources are allocated where they will have the greatest impact, because the poor will benefit from the infrastructure services, and they will be able to better seize existing income-generating opportunities. The right mix between social/economic criteria must take the intrinsic characteristics of each infrastructure sectors

into consideration but it must also try to maximize opportunities for stimulating agricultural and non-agricultural productive activities and account for the (actual or planned) presence of other infrastructure services. Indeed, the marginal benefit of using criteria perfectly tailored for a particular sector can be significantly exceeded by the cooperative gains produced by complementarities across sectors.

The proposed criteria would be incorporated for its application to those resources currently being allocated to each sector. It would encompass a combination of social and economic criteria, with at least a 50% weight to economic criteria, including specific indicators that reflect the commitment of the beneficiaries to cover the maximum extent of the operation and maintenance of the services. This combination of criteria should allow reach those that fall outside the key economic corridors or growth areas but would still help to ensure appropriate levels of sustainability.

This combined methodology has already been applied successfully to the rural roads sector. For the water/sanitation sectors, given that the emphasis should be maintained in sustainability, technical and economic criteria should be maintained as first instance. However, the identification of relevant territories could be made at the provincial level and complementarities with other services could be included among prioritization criteria, based on the provincial infrastructure plans. A demand-driven approach should be the basis for the decision-making process. In the case of telecommunications and electricity incorporation of local economic variables and beneficiary participation complemented with leveraging financial resources coming from sector-specific funds with public funds, through output-based aid (OBA) or other subsidy mechanisms, will increase the impact of the interventions. For all sectors, the incorporation of the effects of complementarities can further strengthen the ultimate effectiveness of investments.

The proposed increased amount (double) for allocation to the sector would be allocated on the basis of the productive potential of a territory. It will require collecting data on specific indicators at the district and provincial level and the elaboration of development plans once specific territories are identified. This prioritization criteria should lead to the greater effectiveness of interventions and enhancements to the attractiveness of those territories with economic potential (in the context of a territorial planning approach), with likely higher impacts on the development of non-agricultural activities, facilitation of the potential for market exchanges with secondary cities, and ultimately higher income increases.

The detailed management scheme of the two financing windows for rural infrastructure (window 1: existing resources allocated based on both social and economic criteria; window 2: additional resources based on economic criteria only) will have to be determined by the Peruvian authorities. Window 1 would be likely to be close to the existing scheme, with the four different sources of financing for each sector. On the other hand, window 2 could either be itself split into the four sectors or be merged into a single fund whose objective would be to reinforce competitiveness in rural Peru by investing in rural infrastructure. For practical reason (higher compatibility with the existing framework), the first solution may be more feasible. One additional possibility could be

that window 1 is more "territory-based" (ie. based on the funding level allocated to a particular territory/province) while window 2 is more "project-based" (ie. all projects submitted to local governments compete at national level for funding). This would allow a rural infrastructure project with high productive potential but which is located in a province with little pre-allocation of resources for rural infrastructure, to be given a "second chance" to find financing at the national level. In both cases, infrastructure investments would be identified through participatory planning at the local level (provincial infrastructure plans).

While the methodology to assess the productive potential of a territory needs to be further refined, the application of the corresponding criteria will require additional efforts to collect the necessary data—particularly on economic potential—and the establishment of necessary monitoring indicators. The decentralization framework should allow the strengthening of these capacities at the local level (through entities such as the Provincial Road Institutes) as well as the development of benchmarks for measuring progress in the social and economic impacts of the infrastructure interventions.

Table 4.3. Cross-sector and sector-specific critical steps required to enhance impacts on rural incomes

Cross-sector	Sector-specific
• For the current level of resources, implement a consistent methodological approach to pre-allocate resources from the various infrastructure funds or budgetary resources considering a mix of economic and social criteria as well as the presence (actual or planned) of other infrastructure sectors, increasing the weight given to economic factors • Allocate the proposed increase in resources on the basis of economic considerations (productive potential) and presence of other infrastructure sectors • Enhance data collection and monitoring mechanisms and develop benchmarks for each sector	• (Water/Sanitation) Incorporate complementarities criteria • (Water/Sanitation) Community commitment to O&M of the systems, by the establishment of a JASS ad payment of an up front cash contribution plus labor during construction to ensure sustainability • (Roads) Revise prioritization methodology to include complementarities • (Electricity and Telecommunications) Incorporate complementarities criteria , and include willingness of community to contribute • (Telecoms) Proactively identify opportunities to make simultaneous investments, using OBA mechanisms, in telecommunications, electricity and road projects (for instance, taking advantage of recently approved law on sharing the right of way)

Incorporate beneficiaries of rural infrastructure as key stakeholders in the planning process and bridge knowledge gaps in order that local planners can make rational choices and promote complementarities between infrastructure services. The decentralization process initiated in Peru provides a unique opportunity to improve the effectiveness of rural infrastructure investments. The trade-off between the effectiveness of being close enough to rural users' needs and the efficiency of letting economies of scale play, should be solved differently across infrastructure sectors: capital and technology intensive sectors with higher network effects, such as rural electricity and telecommunications, are likely to be better managed at the regional level—with active participation of provincial municipalities in planning and monitoring—while other sectors would be better implemented at the provincial level, with active participation of district municipalities and communities. In the case of water/sanitation, communities should also

be involved since they select the level of service/technical designs, co-finance investment and are the ones operating and maintaining the constructed facilities.

The proposed scenario consists of giving a key role to the provincial level, which would in particular be responsible for the preparation of provincial infrastructure plans, in strong coordination with other stakeholders (district municipalities, communities). Planning and monitoring would be performed primarily at the provincial level (provincial infrastructure institutes, with oversight by all municipalities within a province) while implementation and operation and management would depend on the sector, with rural roads being assumed by the provincial level, rural electrification and telecommunications to be handled at the regional level, and, water/sanitation, stand-alone rural electrification, and non-motorized transport (NMT) tracks, by districts and/or communities, as pertinent, under the supervision and technical assistance of the provincial level. The provincial level then becomes the critical nexus for channeling requests to the specialized entities (particularly, in the case of electricity and telecommunications), undertaking the participatory prioritization, and supervising the implementation of the agreed plans, all in the context of the local (territorial) development plans.

In addition, central agencies would have to be reformed to reorient their activities towards providing provincial entities (and local governments) with the technical support they need to prioritize infrastructure investments, attending the needs of those without enough technical and managerial capacity, and monitoring the overall performance of the sectors. Indeed, in order to be efficient and effective, local planning requires that the decision-making process is based on sufficient and reliable information regarding investment alternatives. Central agencies should provide provincial entities with technical information about potential infrastructure projects (e.g., requirement for capital investment and current expenditures, expected economic and social benefits, environmental impact).

A "toolkit" including methodological advice could be developed and made available to those local entities. This toolkit would include infrastructure investment alternatives among which provincial entities would prioritize, based on the resources they have as well as local needs and priorities. These alternatives should be first elaborated by central agencies because they are the ones that have (at least in the short term) sufficient technical expertise to assess the implications of such investments. However, participatory processes should be implemented in order central agencies could prepare these alternatives, taking into account local demand from rural stakeholders. In a second stage, the preparation of the provincial infrastructure plans would be a major opportunity for local stakeholders to be involved – at the provincial level – in the selection of the alternatives with the most potential to foster local development and promote complementarities.

As far as resources are concerned, one option would be to merge existing funding instruments into a single "rural infrastructure fund", an alternative which, in order to be implemented, would have to overcome many institutional and regulatory obstacles. For example, merging FITEL would mean using the 1% contribution levied on telephone operators for infrastructure investments which are not necessarily in the telecommunications sector. This would imply changing the whole regulatory framework

for FITEL. Something similar could happen with FOSE or the proposed rural electrification fund. Furthermore, such an approach could undermine the technical expertise developed by the agencies responsible for managing these resources by forcing restructuring at a time when they have begun to put in place second-generation programs that build on lessons from the first generation, and would face opposition from the private sector which would likely oppose having funds generated by their industry be used for infrastructure development in other sectors.

A preferable and more realistic option consists of keeping separate funds for each infrastructure sector, but facilitating and rewarding projects or initiatives that are coordinated and that enjoy additional contributions from the communities, through the appropriate incorporation of indicators that reflect the presence of these characteristics, as explained earlier. Such an approach would be facilitated with adjustments to the project evaluation methodology at the Ministry of Economy and Finance (the so-called National System of Public Investment or SNIP for its Spanish acronym) in order to incorporate a territorial assessment of the investments within a certain municipality, vetting the benefits generated by the provision of the combined set of interventions of the local infrastructure plan, and balancing the combined needs at the national level for them to match the budgetary amounts allocated in the sectoral funds and distribute the resources to the entity entrusted with the implementation (either local, such as a provincial road institutes, or central or regional, such in the case of rural electrification). Table 4.4 provides other sector-specific actions in this respect.

Table 4.4. Cross-sector and sector-specific critical steps required to incorporate beneficiaries of rural infrastructure as key stakeholders in the planning process

Cross-sector	Sector-specific
• Provincial municipalities coordinate the preparation of provincial participatory infrastructure plans, consistent with local development plans and involving rural infrastructure stakeholders • Budgetary resources to be allocated between the various sectors on the basis of the provincial infrastructure plans and sector-specific funding available • Central agencies (Ministries of Health and Housing, DEP, Provias Rural, OSIPTEL) balance bottom-up planning with existing strategies of national infrastructure plans (PRONASAR planning methodology, National Plan for Rural Electrification, National Program for Rural Telecoms, national and regional road plans) • Central agencies prepare a "toolbox" explaining local governments how to balance incurred costs with benefits and impacts in order to prioritize among infrastructure investments • Ensure that the methodology, based on adjustments to that of the SNIP, promote	• (Water/Sanitation) Use of provincial infrastructure plans (provincial infrastructure boards) to initiate promotion activities of centrally founded W&S projects • (Water/Sanitation) Build on the experience of existing *mesas de concertación* used by municipalities to determine the beneficiary communities, and the detailed design of water/sanitation projects (final decision is taken by the beneficiary community). • (Water/Sanitation) Strengthen planning capacity in the sector (including DNS) and involve local governments through project cycle • (Water/Sanitation) provide adequate level of training to the JASS • (Water/Sanitation) Stronger consideration of values and attitudes of indigenous populations • (Roads) Strengthen the experience of the *talleres de priorizacion* and of the provincial participatory road plans • (Roads) Explore alternative options for reaching areas in the Selva with consideration of indigenous people and environmental factors • (Roads) Clarify responsibilities between various levels of government, with an increasing devolution of responsibilities to local entities and the ensuing scaling down of attributions to central entity (Provias Rural)

complementarities across infrastructure services • Training and technical assistance is also provided with the "toolbox" • Central agencies and local governments exchange information regarding rural infrastructure alternatives in order to enhance analytical base	• (Electricity) Prepare Regional Plans for Rural Electrification, aggregating demand expressed in provincial infrastructure plans, and based on decentralized planning and prioritization of projects at regional level • (Electricity) Develop planning methodology that ensures investments are integrated with local development strategies to ensure cost efficiency, given increasing marginal costs • (Telecoms) Support activities of CODESI to achieve coordination of efforts, incorporating representative from local governments • (Telecoms) Scale up training programs for local governments building on the experience of FITEL and, possibly, INICTEL

Develop subsidy policies that are transparent, linked to results and kept to a minimum. The Peruvian Government has already introduced several subsidy mechanisms to either attract private sector providers to rural areas with low profitability (guarantee mechanisms in particular) or to raise the affordability of some services in rural areas (discounted price). These instruments already comply with some of the requirements of a successful subsidy—transparency, appropriate targeting, and results-based incentives—but their ultimate effectiveness remains limited.

In the rural electricity sector in particular, the current capital cost subsidy is available only to the public sector operators, through the MEM. There is no mechanism to provide incentives to private or public companies to develop rural electrification projects. In addition, the current tariff structure and setting mechanism are inadequate for most rural electrification, resulting in electricity operations that are economically and financially unsustainable. However, full cost-recovery tariffs would be unaffordable to most of the rural population. Finally, funding for the FOSE remains uncertain, threatening the commercial sustainability of operations in rural areas and sending a wrong signal to private operators. In the water/sanitation sector, the strategy outlined in the existing national plans includes cost-recovery via tariffs and better subsidy-targeting. Although some concrete actions have already been identified (e.g., participation of communities and municipalities for at least 20% of investment, grants for villages of less than 500 inhabitants), the actual implementation of these principles has yet to be carried out.

In the water/sanitation sector, the strategy outlined in the existing program is based on upfront contributions from the community in cash and labor, as well as on cost-recovery of administration, operation and maintenance costs via users' charges.

The current central sector agencies need to review the direct and indirect subsidy mechanisms for rural infrastructure services, with an assessment of the total incurred cost (and who pays), the final beneficiaries (of the infrastructure services) and the direct and indirect incentives produced. Then, recommendations could be made to improve existing subsidy schemes, with due consideration of the new decentralized institutional framework and of the role of the independent regulators in setting the pricing policy. Box 4.2 presents two important objectives to be considered in order to make infrastructure "work" for the poor. The first one is promoting access which can entail relying on instruments requiring operators to promote access, reducing connection costs or increasing the number and types

of suppliers. The second one is the promotion of affordability which can entail reducing actual bills, service cost or facilitating payment.

Box 4.2. Making infrastructure work for the poor

Promoting access

- *Requiring operators to promote access.* This type of instrument is mostly used when the operator is a private one, and it becomes an integral part of its service obligation. It takes one of two forms: *universal service obligation* (USO) whereby there is a legal obligation to bring service to all households, or *connection targets.* USOs tend to be defined in general terms and require complementary specifications. of connection targets, access costs and sources of subsidy to be operational. Note that USO can be bi-directional in which case obligation is made to households to connect once the service is made available – making it all the more imperative to address affordability issues. As to connection targets, they are useful in that they entail clear obligations. The difficulty however is that their attainment requires that customers do pick up the service.
- *Reducing connection cost.* This can be done in a variety of ways. One is to allow for a combination of *technology choice and quality of service* that can allow for faster and cheaper service for the poor. Another important factor is to allow poor customers to spread the connection cost over time through the design of financing arrangements (usually provided by the operator). *Cross subsidies*, whereby the connected population contributed to a connection fund, tend to be quite well targeted towards the poor (who are typically the ones without connection) but are most suitable to cases where the unconnected population is small relative to the connected one. Finally, governments can also choose to provide connection subsidies – either general or targeted to specific components of the connection cost that customers find problematic. Connection subsidies are also administratively more cost-effective than recurring subsidies for the use of a service.
- *Increasing the number and type of suppliers.* Alternative network suppliers can provide competition as well as tailor services to the poor's needs. Promoting their existence in a way that is beneficial to the poor can entail providing a legitimate role for them, promoting cooperation between the dominant operator and alternative suppliers or requiring the utility to provide various types of services.

Ensuring consumption affordability

- *Reducing the cost of the bill.* One commonly used option is through *targeted subsidies*, which can be targeted on the basis of consumption levels, or income/needs or geographically. The former tends to be poorly targeted given the weak correlation between income and consumption, while the income/needs targeting requires a reliable poverty proxy and a relatively advanced administrative mechanism for screening individual households – this can be very costly unless it already exists as part of a broader platform for social protection. As to *rebalancing fixed and variable tariffs*, whereby most of the charges are recovered through the variable tariff, it is more attractive to small consumers. Finally, *voucher programs* are an option used in the US and Europe but so far never in Latin America. They rely on some form of means testing, and therefore suffer from the same types of advantages and inconvenience as the means based targeted subsidies.
- *Reducing the cost of the service.* This can be done either by letting consumers opt for a lower quality of service or by placing physical limits on the volume of consumption (eg. through telephone service that limits the volume of calls that can be made over a given period; or power limiters that allow a poor household to continue consuming a minimum of energy over a period of time rather than face disconnection.) Both are approaches that have been used in the US and Europe with success.
- *Facilitating payment.* Poor households with little or no liquid savings can find it difficult to pay relatively infrequent and unpredictable bills, or to cover them in periods of crisis (illness, loss of jobs). One approach is to allow for more frequent billings (although this does increase administrative costs) or prepayment meters. The latter functions best for telephones, while it still appears to be costly for water or electricity.

Source: Estache, Foster and Wodon (2002).

Well designed subsidy schemes can be very effective in sending the right incentives to the private sector at minimum cost for central and/or local governments. There is a wide international experience (particularly in Latin America) available in this area for all infrastructure sectors. In the telecommunications sector, the Peruvian experience with FITEL is often considered as a best practice. In the water/sanitation sector, the Paraguayan experience (Box 4.3) is a good example of successful output-based subsidy schemes. In the electricity sector, the Chilean experience (Box 4.4) with minimum subsidy concessions could provide a good ground to redesign Peru's rural electrification policy.

Box 4.3. Output-based aid for rural water in Paraguay

As part of the fourth Rural Water/sanitation Project partially financed by the World Bank in Paraguay, a pilot project has been implemented to promote the participation of local private sector in the construction of rural water supply systems. These local private sector actors generally are consortiums formed by a party specializing in system construction and other actors specializing on operating water systems. The incentive structure is designed in such a way that the private consortium receives a one-time payment (subsidy) from the National Rural Water and Sanitation Agency, SENASA, once it builds and connects the community to the water system. The private consortium is responsible for building the system and operating it for 10 years after construction, through an operating contract with the Water Users Association, recovering their costs from: the connection subsidy (paid by SENASA) and the connection charge and tariff (both paid by users).

Bidding Process and variable: SENASA invites private operators to bid on a specific design agreed with the Water User's Association (considering the resulting tariff). Operators are selected based on the minimum subsidy required from the government, given a tariff and connection charge agreed with the Water User Association.

Results: To date there are three systems already successfully operating in rural Paraguay under this scheme, a forth one is in construction phase. That first package included a small 200/connection system and two of about 800 connections, there's a larger one recently awarded of 2,000 connections. The community response to this approach has been overwhelmingly positive thanks to rapid progress from conception to construction, all without up-front cash contributions from the communities, as it is conventionally required by SENASA. Instead the community pays a connection charge once the system has been built. The selection criteria has allowed to drastically reducing connection subsidies given by SENASA from about US$ 400/connection to US$ 187/connection. Payment of subsidies against the output (water connections) means the involvement of the private sector in the financing of new systems in rural areas. There are currently other systems in bidding process under this modality.

Sources: Drees, Franz et al. Viewpoint Note No. 270, April 2004, The World Bank.

Box 4.4. Minimum subsidy concessions for electricity in Chile

Chile has had successful experiences with minimum subsidy concessions to expand electricity services to rural communities since 1994. Competition exists between regional governments for central government financing, between rural communities for regional government sponsorship, and between utility companies for concessions to serve particular communities. Concessions are awarded to the company offering the largest reduction to the maximum allowable subsidy stipulated for each contract.

Service expansion is co-financed by the state, the private sector, and rural consumers. State contributions are justified, because the projects identified have positive social returns, but negative private returns. Indeed, the differential defines the maximum allowable subsidy. However. The private operator finances a substantial part of the investment costs. Consumers are required to contribute the costs of the connection, the meter, and the in-house wiring, although this is typically spread over time. Consumers must also pay regulated service charges to cover the unsubsidized costs.

Concessionaires are free to choose the appropriate technology. Although the government makes certain assumptions about technology choices in computing the maximum allowable subsidy, the winning bidder is free to select a technological solution. For example, photovoltaic cells, micro-hydrolectric supply, and renewables may be used in addition to conventional grid extension.

The results of the programs have been encouraging. Coverage of electricity in rural areas increased from 53 to 76 percent during 1992-97. This progress was achieved at a cost of $1,000 per household. Unit costs have risen over the life of the programs, probably because later projects have been targeted toward more isolated communities that are more costly to serve.

Source: Estache, Foster, Wodon (2001).

Cross-subsidies schemes might be needed in some cases (in particular in the rural electricity sector, based on the experience of FOSE) because it is likely to be the best possible alternative to alleviate the high tariffs for poor consumers, and in effect, re-balance electricity prices among different geographic areas. In order to be fully effective in sending the right signal to private operators, these subsidy mechanisms have to be sustainable and predictable. Indeed, if private operators feel that the funding of subsidies is not predictable enough, they will ask for a risk premium which can ultimately offset the effectiveness of the instrument (this is an issue, in particular, for FOSE). In the transport sector, some subsidies mechanisms might be justified in order to bring transport services to and from the most remote areas. Some countries, like Chile have successfully implemented such subsidies, through in order to avoid distortions with existing markets, further analysis is needed to determine whether such subsidy mechanisms are adaptable to the situation of rural Peru.

Table 4.5. Cross-sector and sector-specific critical steps required to revamp subsidy mechanisms

Cross-sector	Sector-specific
• Review existing subsidy mechanisms within sectors and put in place mechanisms to better coordinate sector-specific subsidy programs • For all sectors except roads, target the pricing policy to reflect the cost of capital, operating costs, maintenance, management,	• (Water/Sanitation) Redesign subsidy policy and conditions • (Roads) Assess potentialities and financial implications of targeted subsidies for transport services in the most remote areas • (Electricity) Revamp incentive framework for private sector participation, rather than continuing the channeling of funds exclusively through ADINELSA and DEP (incorporating real costs of investment and future price of services); provide capital cost incentives (subsidies) to

administration and security, and a reasonable profit, with a discount when a direct subsidy is required to keep the service affordable • Review all sector-specific government fees and taxes gathered by line ministries and regulatory agencies to assess whether they are too high and the best mechanism to channel the related revenues • Ensure that national regulators set and monitor application of subsidies, common national regulations and procedures, tariff setting mechanisms and pricing policy, and adequate quality of infrastructure services, in a manner that will not create disincentives for private sector investment	private and public enterprises to invest; introduce competition for the subsidy based on both contribution of enterprise and community/local government; • (Electricity) Formalize FOSE over longer periods to reduce uncertainty and utilize the existing cross-subsidy mechanism to balance tariffs across regions • (Electricity) Implement rural electrification fund, without excluding cross-subsidies, and ensuring predictability of subsidies in order to reduce risks for private sector participation • (Telecoms) Increase allocation of resources from licences and fees to rural telecommunication programs such as FITEL, instead of creating competing programs within MTC • (Telecoms) Continue support to the extension of FITEL satellite phones to isolated rural communities and enable and facilitate FITEL's public telephone operators to move infrastructure to un-served areas • (Telecoms) Ensure financial sustainability of community internet access centers (see Box A.3.)

Stimulate the framework for participation of the private sector in rural infrastructure. Private sector involvement can bring greater efficiency in rural infrastructure construction, operation and maintenance. This requires that a business-friendly regulatory environment be implemented, in particular for the categories of private providers that could be active in rural areas (like SMEs or micro-enterprises). Pricing and subsidy policies are major issues in this regard (including predictability of tariff structure). Barriers to private sector involvement in rural infrastructure include: (1) lack of sufficient incentives (e.g., inefficient subsidy policy); (2) poor regulatory environment (e.g., concession requirements in the electricity sector); and (3) unfair competition with public operators. Hence, fair competition, result-based management of subsidies, and suitable pricing policies are needed to enhance the engagement of private operators. Both local (result assessment, contracting) and national actors (competition, pricing) should be involved in this regard.

As previously explained, there already exist successful examples of private sector involvement in rural infrastructure in Peru. In the rural telecommunication sector, FITEL is considered a best practice as a mechanism capable of fostering private involvement at a minimum cost for public finance. However, the regulatory framework could be improved in order to facilitate the entrance of small enterprises in the rural telecommunication market. The success of micro-enterprises' involvement in rural road maintenance suggests potential in other sectors (community-based operation and maintenance of water/sanitation services, management of off-grid electricity systems).

The proposed scenario would be to build on these successful examples of private sector involvement in rural infrastructure. Opportunities of using the FITEL model of output-based aid as well as similar experience in other sectors in other countries (e.g., water in Chile) could be explored in other sectors. Regulatory changes may help attract new actors in rural infrastructure (e.g. lift concession restrictions for small and middle-size enterprises in rural telecommunications and rural electricity for off-grid technologies, develop legal

and regulatory framework for public-private partnerships in rural electricity, including provision of minimum subsidy, modify national procurement rules to promote contracting of micro-enterprises). Capacity building will also be needed to strengthen regulatory capacity at both national and local level. Finally, community-based entrepreneurial initiatives to maintain and operate rural infrastructure—specifically, rural roads, non-motorized transport tracks, and water/sanitation facilities—such as the JASS and the road maintenance micro-enterprises should be strengthened and scaled up with continued technical assistance.

Table 4.6. Cross-sector and sector-specific critical steps required to enhance private sector participation

Cross-sector	Sector-specific
• Improve business environment for private providers of infrastructure services, by developing regulatory framework for private sector investment • Clarify and build up regulation capacity for rural infrastructure services at national level with a local presence; train regulators about ways to address the specificities of rural infrastructure; train local authorities and technical staff to better understand their role in regulation and to apply consistently the national regulatory frameworks • Experiment micro-enterprises' involvement in other sectors than roads • Identify and foster local entrepreneurs in rural areas that show the skills and may have some capital to invest in local infrastructure by providing training, matching grants, micro and SME-financing. • Educating local authorities on becoming facilitators to bring together local entrepreneurs and NGOs to attract private investment, present multi-sectoral investment proposals to national authorities and/or rural investment funds, such as FITEL, and not to impose unreasonable fees or technical requirements.	• (Water/Sanitation) Build capacity of JASS, with incorporation of "micro-enterprise" type of model • (Water/Sanitation) Adjust technical standards of water supply systems to respond to capacity of potential users using appropriate technologies and design according to rural needs • (Roads) Continue scaling up, and incorporate competition in, the maintenance mechanism with micro-enterprises • (Roads) Revise definition of technical standards for rural roads (building upon the experience of the Rural Roads program) • (Electricity) Implement a new legal and regulatory framework to mobilize investment resources (introduce rural concessions, tariffs, construction and operation standards) • (Electricity) Assess and clarify responsibilities of ADINELSA and DEP to avoid conflicts of interest • (Electricity) Revise technical norms to account for specific needs of rural populations and sustainability of rural systems, reducing costs of service provision, expanding use of renewable technologies for remote rural population • (Electricity) Undertake analytical work to explore the involvement of communities in routine maintenance of electricity infrastructure • (Telecoms) Lift concession restrictions limiting the entrance of small enterprises in the market • (Telecoms) Develop strategy for fostering backbone infrastructure development • (Telecoms) Implement incentives to put private sector at the core of the implementation strategy • (Telecoms) Develop ICT services building on the experience of the telecenters

Ensure a timely transfer of responsibilities, consistent with local institutional capacity. Institutional capacity is a critical factor for the success of transferring rural infrastructure-related responsibilities so that it brings the expected effectiveness and efficiency benefits. As previously explained, it is recommended that only local governments reaching a

minimum set of requirements be given such responsibilities. In addition, customized and targeted technical assistance should be provided to those local governments who do not meet these requirements. Particular attention should be paid to planning capacity and the design of a sound participatory framework allowing all major local stakeholders to be involved in the planning process (e.g. participatory workshops, creation of a "provincial rural infrastructure board" involving the provincial and district mayors). The creation of Provincial Infrastructure Institutes (PII)—based on the successful experience of the Provincial Road Institutes—could ensure the presence of a sound contracting and technical capacity.

In the water sector, the new decentralized institutional framework needs to be clarified since the active legislation is outdated [68] and does not address sustainability issues or decentralization. In the case of telecommunications and electricity, given their "network" nature and the required specialized technical capabilities, only partial responsibilities—focusing on planning, monitoring and, in some instances, specific tasks of the operation and maintenance— should be transferred to the proposed PII. Particular attention should be paid to existing local capacity to assess and mitigate social and environmental impacts associated with rural infrastructure. Sustainability will also have to be ensured (particularly regarding funding for current expenditures such as maintenance of rural infrastructure). Finally, monitoring capacity will be essential to follow up the implementation and impact of the new framework. It is recommended that this monitoring is handled by the central agencies, which will provide for a broader and more independent overview of the new policy's impact as well as benchmarking and experience-sharing across provinces and regions.

Customized and targeted technical assistance programs can help local governments with weak institutional capacity reach sufficient expertise. A minimum set of requirement—as currently envisioned under the accreditation program of the CND, including in particular participatory planning capacity, minimum financial management and contracting/procurement capacity—should be used to determine whether local government can handle the transfer of infrastructure services. [69]

The proposed scenario focuses on ensuring a timely transfer of rural infrastructure responsibilities to local governments (or communities in the case of water/sanitation), by using a list of minimum requirements and by providing technical assistance to help local governments reach these requirements. Core requirements should include (1) existence of a participatory plans for rural infrastructure; (2) secured financial contribution (commitment to contribute to capital investment up to a pre-defined level and to maintenance costs); (3)

[68] A Law for Basic Sanitation was passed in year 2000 but it was revoked, so that the previous Water Sector Law passed in 1994 is still being applied for the water/sanitation sectors.

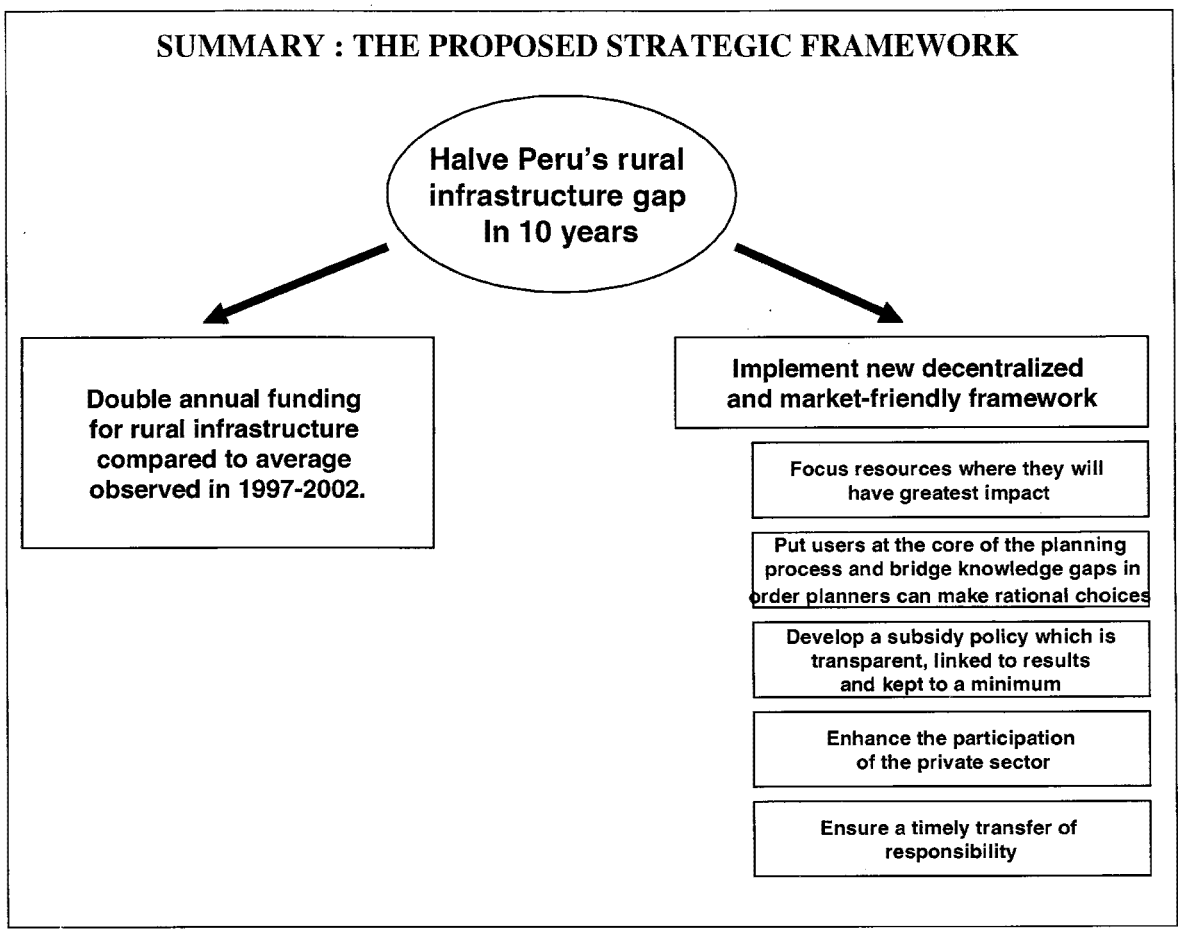
[69] Resources from the National Decentralization Council (CND) are committed to help build up the skills of regional and local leaders and its management teams (through the Technical Assistance Plan and Training for Local and Regional Governments—or PNCAT) and help achieve the required accreditation. The PNCAT also seeks to develop the statistical information at the regional level and incorporate information technologies in the administration of regional governments. Part of the process of accreditation includes the elaboration of the Participatory Regional Development Plans (PCDRs), with training to be given to the staff of the regional planning units. To date, the entirety of the 26 PCDRs are elaborated and approved—though not all of them are of the same quality and scope.

creation of a provincial infrastructure institute (approved by the provincial infrastructure board—see below) and designation of the managing director of this institute; and (4) minimum procurement capacity.

Finally, intensive training programs will be needed to ensure that sufficient technical skills and qualified people are available at the local level. The creation of specific multi-disciplinary rural development curriculums in engineering schools and universities may be helpful in this regards.

Table 4.7. Cross-sector and sector-specific critical steps required to ensure a timely transfer of responsibilities

Cross-sector	Sector-specific
• Design a list of minimum requirements necessary for local governments to qualify given rural infrastructure responsibilities • Ensure adequate minimum sectoral skills in provincial planning authorities, with respect to demand assessment, basic project design, engineering, economics, project development and assessment • Requirements should include planning capacity (e.g. creation of rural infrastructure boards involving provincial and district mayors), and management and contracting capacity (e.g. creation of provincial infrastructure institutes), and incentives for the promotion of private sector participation • Requirements should address sustainability of infrastructure investment (e.g. adequate provisions for the operation and maintenance of infrastructure in rural roads and cost-recovery level tariffs/user charges in other sectors), and capacity to deal with social, gender and environmental issues, as well as monitoring capacity (e.g. performed by regional level) • Sector-specialized national agencies should assess local governments' management capacity, evaluate local plans, and provide customized and targeted technical assistance to low-performers, in coordination with the CND	• (Water/sanitation) Clarify new decentralized institutional framework and proceed with the enactment and implementation of revised Water/sanitation Law • (Water/Sanitation) provide adequate level of training to the JASS • (Roads) Continued development of institutional capacities at the local level (through IVPs) • (Electricity) Replace electricity committees by participatory workshops for planning and monitoring purposes • (Electricity) Build on the experience of the *convenios de capacitacion y asistencia tecnica* already signed between the DEP and some local governments • (Telecoms) Clarify responsibilities of local governments in ICT • (Telecoms) Involve local governments in planning investments and designing applications and services, especially e-government initiatives • (Telecommunications and electricity) The 'network" nature of the facilities requires keeping specialized technical capabilities and coordination at the regional and national levels



3.2. INSTITUTIONAL AND FINANCIAL IMPLICATIONS

The new institutional framework will move from a "silo approach" to an integrated scheme allowing complementarities across sectors to take place. Figures 4.1 and 4.2 present a schematic representation of how the institutional framework would evolve. This integrated model seeks to maximize opportunities for complementarities at three levels: (1) planning; (2) funding; and (3) implementation. At the planning stage, the provincial participatory infrastructure plans will allow rural infrastructure users to determine what infrastructure investments are best aligned with their needs and, therefore, which are the most likely to promote rural development and poverty reduction. As to funding, a better coordination between existing rural infrastructure funds—provided they are funded to the appropriate level—will secure sustainable levels of funding for rural infrastructure and reduce transaction costs and rigidities caused by differing allocation methodologies. At the implementation stage, the local government's affiliated provincial infrastructure institutes and the regional governments (for rural electricity, including regional distribution companies), will ensure a more effective implementation of rural infrastructure interventions, in order that the desired combination of infrastructure services can be delivered when needed.

Figure 4.1. Current institutional framework

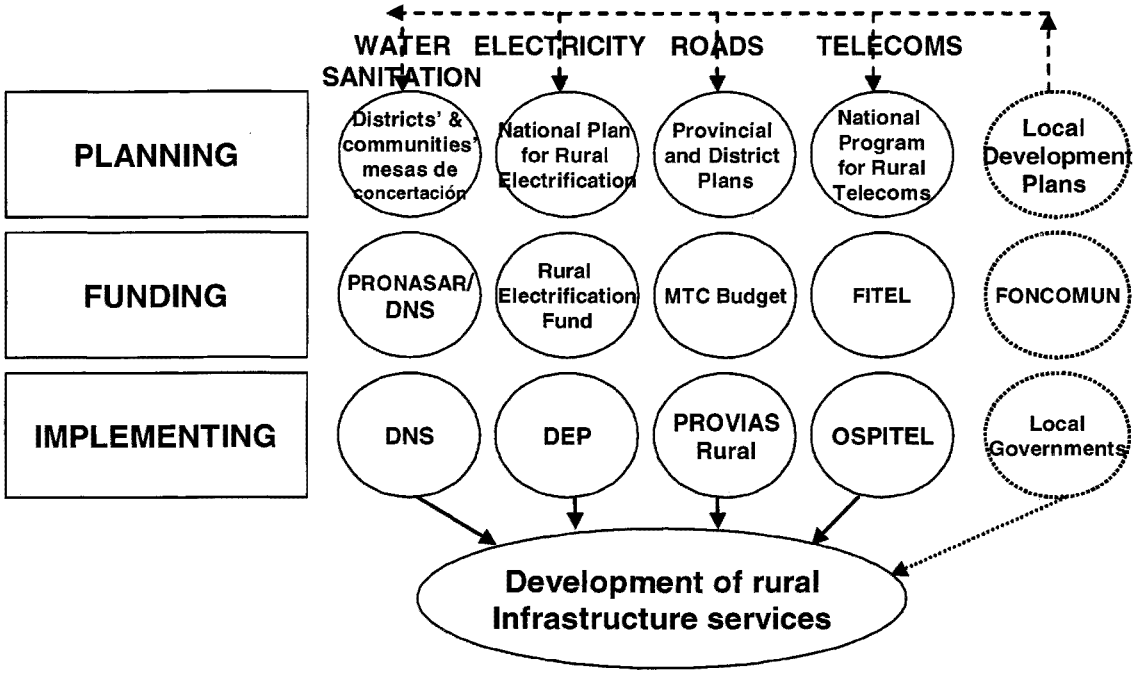
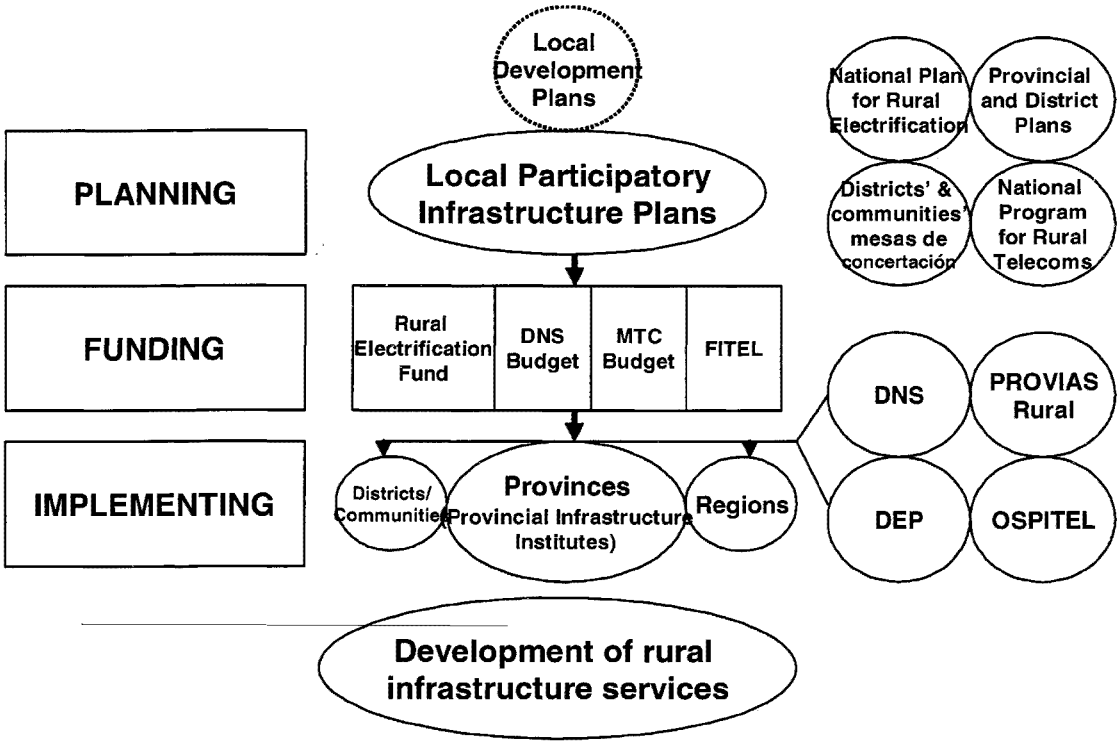


Figure 4.2. Proposed institutional framework



Although the proposed model will involve the various levels of local institutions (from communities to district municipalities, provincial municipalities and regional governments), a key role would be assigned to the provincial level. This seems to be the right balance between the necessity to be as close as possible to users' needs and keeping a sufficient institutional capacity and allowing economies of scale to take place. The provincial level is the natural level for rural roads, and it is a suitable level to identify needs for rural electricity services which would then be forwarded to the regional level. Due to the experience it can gain by operating in other sectors, the provincial level is also the right level to provide technical and management assistance to the water users' associations involved in the operation and maintenance of rural water/sanitation facilities.

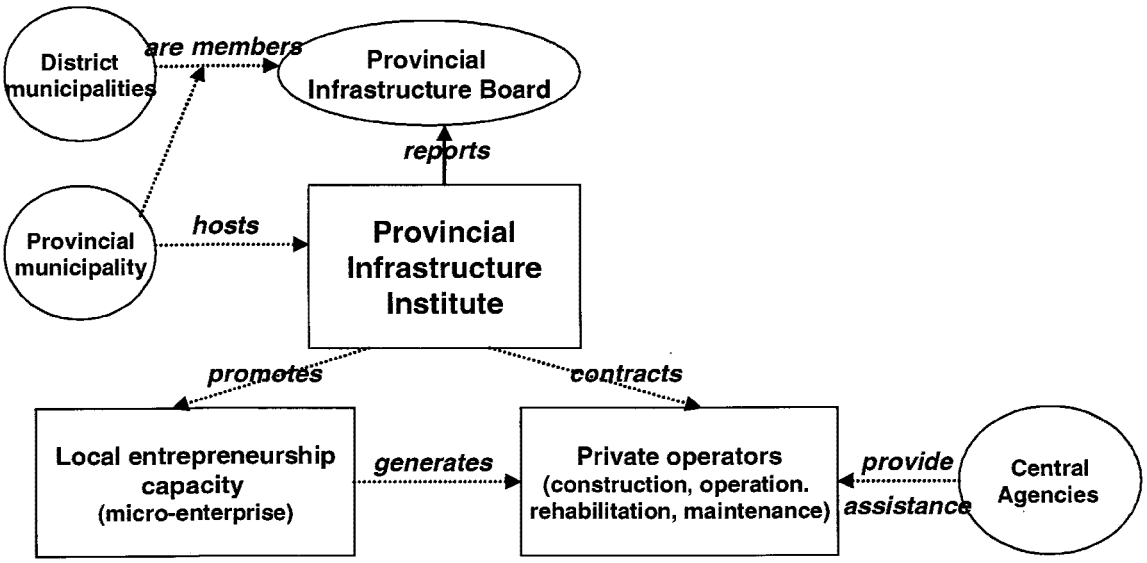
The proposed framework also recognizes that rural infrastructure services exhibit a spectrum of technical characteristics. Specifically, the level of network characteristics affects the appropriateness for management at the local level and the possibilities for economies of scale. At one end, interconnected electricity and telecommunication networks can enjoy high economies of scale and require their management as part of larger networks. At the other end, water/sanitation solutions, stand-alone electricity supply, or NMT tracks are often of a local nature and the possibilities for scale economies very limited. In between, rural roads present some network characteristics but these may not extend beyond territorial limits.

One of the key actors proposed to implement the strategy would be provincial infrastructure institutes whose main responsibilities will be to coordinate the planning process at the local level and promote local entrepreneurial capacity. Provincial infrastructure institutes (PIIs) should follow the successful experience of the provincial road institutes (see the experience of the RIPA). They should be agile and private-sector friendly administrative structures, with a strong contracting/procurement capacity. Provincial infrastructure institutes should promote the creation of micro-enterprises and their involvement in rural infrastructure-related activities. PIIs could start from the current responsibilities of the Provincial Road Institutes in terms of rural roads maintenance. In the case of the water/sanitation sector, the PIIs could participate in identifying the districts/municipalities to achieve the cross-sectorial approach, and provide technical assistance to community-based organization involved in operation/maintenance. In the case of rural electricity, they should coordinate with the competent institutions at the regional level (regional governments and regional distribution companies) in order to explore what would be the most relevant involvement of micro-enterprises in the sector (e.g. maintenance of mini-hydro and other off-grid technologies). Although each provincial infrastructure institute should be administratively hosted within the corresponding provincial government, it should report to a provincial infrastructure board consisting of the provincial and district mayors of the area where they are involved. Provincial and District municipalities benefiting from the institute's activities should contribute to its operating expenses.

The geographic coverage of the PIIs would vary depending on the size of population, land surface, number of municipalities, and infrastructure needs. Several provinces can together

constitute a single PII whereas one province may require two PIIs given its sheer size. In all, this initiative seeks to create a territorial perspective of infrastructure investments, and shift away from sectoral perspectives. [70]

Figure 4.3. Proposed organization of the provincial infrastructure institutes



3.3. INSTITUTIONAL APPROACHES: THE ROLES OF THE DIFFERENT STAKEHOLDERS

The participatory process. The success of decentralization reforms is highly correlated with the degree of participation and empowerment of local stakeholders. If local institutions are captured by a small group of individual interests, the potential gains in effectiveness from increased proximity with local users will not be achieved. The quality of the participatory process and the involvement of the poor rural communities are crucial to ensure that infrastructure-related needs in rural Peru are effectively expressed and taken into account when planning infrastructure investments. It also contributes decisively to the promotion of complementarities across infrastructure sectors.

In parallel with the decentralization reforms, the Peruvian governments has recently made significant progress towards successful participation of local stakeholders in public investment planning (participatory budgeting, *mesas de concertación*, see table 4.7.). In addition, two infrastructure sectors already have gained a significant experience in this regard: the water/sanitation sector through specific municipal and community participatory planning instruments, and the road sector through the organization of workshops to prioritize alternative investments (*talleres de priorizacion*). It is proposed that the favorable environment created by the recent reforms and the experienced gained in the water and

road sectors be used to create *rural infrastructure participatory workshops* allowing all major stakeholders to express their need and to prioritize among alternative investment options. A methodology for prioritization should be elaborated and provided—with related training, if needed—to help formalize the participatory process and help ensure alignment with other planning instruments (local development plans, national and regional infrastructure plans). These workshops should be an opportunity not only to identify priority infrastructure investments but also to design a local development strategy in which investments in rural infrastructure bring a maximized contribution.

Table 4.8. On-going initiatives to enhance participatory management and monitoring in Peru.

Initiative	Objective	Actions
Participatory Development Planning	Identify needs and priorities through participatory process that serves as the basis for budget decision-making	The *Mesas de Concertacion* produced Concerted Development Plans
Participatory Budget Formulation	Determine budget allocations as efficiently and transparently as possible by ensuring that budget decisions reflect consensus-determined priorities and removing information barriers between state and society	Budget allocations are based on Concerted Development Plans
Open Budget Information	Ease access and use of public information to enhance budget analysis by citizens and public officials alike, to enhance public knowledge and accountability	The Financial Integrated Monitoring System was modified to supply budget information for national, regional and local levels
Ensure Reliable Information	Improve quality and credibility of information systems by using autonomous and credible sources of information with external oversight.	INEI was regulated to ensure its independence and information reliability. A presidential decree was approved and enacted to standardize and centralize information produced and used by ministries through the Geographic Information System
Use-Feedback on services	Solicit opinions and feedback on efficiency and effectiveness of services and monitor transfers from central to local governments.	Report cards were used to solicit client feedback on the performance of public services
Measure Improvements in Transparency and Openness	Evaluate progress in levels of transparency and openness in policy processes.	A transparency module was included in the IV National Household Survey (ENAHO) to establish a baseline.

Source: World Bank *En Breve* (2004)

The provincial infrastructure boards. As previously explained, the provincial level appears to be the right compromise between sufficient institutional capacity and accountability to rural users, except for infrastructure investments where economies of scale become significant when dealt with at the regional level (eg. on-grid rural electricity investments). However, accountability can be increased if lower levels of government (district municipalities) and communities are also involved in the supervision process. To achieve this, it is proposed that a provincial infrastructure board is created in each province,

involved in rural infrastructure management. Members of the board should include the provincial mayor and the district mayors. The board's mission is to endorse the provincial participatory infrastructure plan, supervise its implementation, ensure the sustainability of infrastructure investment (in particular that maintenance is performed adequately), supervise the work of the Provincial Infrastructure Institute (in particular regarding private sector involvement in rural infrastructure) and ensure coordination with other levels of governments and communities. The board approves its internal operating rules and the distribution of the Provincial Infrastructure Institute's administrative costs across member municipalities.

Summary :
Proposed Responsibilities for the Various Levels of Government

Central Agencies	-Provide knowledge and technical assistance to local governments -Asses if institutional capacity is sufficient -Monitor rural infrastructure development, outcomes and impact
Regions	-Prepare regional plans for rural electricity -Contract private providers to implement plans (on-grid)
Provinces	-Coordinate the planning process for rural infrastructure -Contract private providers to implement plans -Provide technical assistance to promote micro-enterprises
Districts	-Participate in planning process through provincial infra. boards -Supervise implementation -Provide technical assistance to communities
Communities	-Supervise implementation -Operate and maintain rural water/sanitation systems

Coordination at the central level. Sector-specialized central agencies, including sector regulators when they exist, have a major role to play in ensuring a sound transfer of rural infrastructure responsibilities to local governments. However, the adequate level of regulation will vary across sectors and will require certain degree of flexibility to account for rural specificities (in particular in the water/sanitation sector). Critical tasks in this regard include: (1) setting regulations and standards to govern activities in the sectors (e.g., minimum design and construction standards, minimum operational standards, procedures for calculating tariffs); (2) designing the common economic and social criteria which will be used to allocate the resources from the various existing infrastructure funds, for each sector and for each province; (3) providing information and methodological guidance (e.g. the SNIP) regarding rural infrastructure investment alternatives in order to bridge local governments' knowledge gaps and allow them to make rational choices; (4) reviewing provincial infrastructure plans and balancing the regional plans with national infrastructure plans and budgets; (5) designing the minimum requirements that local governments have to meet in order to reach a sufficient institutional capacity to administer rural infrastructure

interventions by delegating them to private operators (in line with the accreditation process instituted by the CND); (6) assessing whether or not local governments meet these requirements; (7) providing local governments that do not meet these requirements with customized technical assistance allowing them to improve; and (8) monitoring progress made in the delivery of infrastructure services in rural Peru (by aggregating the work performed by the regions). The CND would be a natural candidate to be the national institution in charge of assessing the level of coordination and complementarities, along with the monitoring of the progress.

3.4. ENVIRONMENTAL, INDIGENOUS-PEOPLES AND GENDER FACTORS IN THE PROVISION OF INFRASTRUCTURE SERVICES

Environmental assessments. Rural infrastructure projects vary in their possible impacts on the natural environment. Electricity can replace low-efficiency traditional fuels for cooking and lighting and, ultimately, have a positive environmental and health impact (reduced in-house air pollution). On the other hand, improving rural roads' condition may facilitate access to fragile natural ecosystems. In certain cases, this access can allow the development of income-generating activities that may imply the exploitation of natural resources if not properly managed. In the *Selva*, there is a large potential for forestry activities but also high-value niche markets (flowers, exotic and medicinal plants) which could help diversify local economies outside subsistence agriculture. Sustainability has to be ensured in order to maintain the full benefits of such economic potential. Rural infrastructure investment thus requires looking beyond the direct physical interventions and into the possible spillover effects on the surrounding environment.

Local capacity to assess environmental impact and propose mitigation has to be developed and ensured in parallel with the transfer of rural infrastructure services to local governments. This means addressing the direct impact of rural infrastructure investments through environmental impact assessments but also including rural infrastructure planning in the broader context of local sustainable development. Some local or regional development plans (such as the Plan for the Sustainable Development of the Amazonian region) have already tried to adopt such a long-term integrated approach. The alignment of the provincial participatory rural infrastructure plans with existing plans for sustainable local development should be ensured in this regard, while including at the same time this sustainability dimension in the rural infrastructure planning process. It is recommended that environmental sustainability be included in the methodological guidance provided to the prioritization workshops and that provincial infrastructure institutes be trained to include this dimension in their operating procedures (e.g. contracting environmental impact assessments when needed).

Gender equity. Rural infrastructure investments also have direct and indirect effects on gender relations. Direct effects are linked with the respective access of men and women to rural infrastructure services, which results in differences in access to income-generating opportunities and welfare improvements. Indirect effects can include, for example, the way and extent to which men or women participate in activities induced by rural infrastructure investments (e.g., maintenance micro-enterprises). In all, the key element to address these

potential effects is the level of internalization of the gender dimension into the activities of the planning and implementing organizations responsible for rural infrastructure. In the case of water/sanitation services since women are the main users of the services (they wash, cook and take care of children's hygiene), most economic benefits are materialized through them (time saved fetching water could be used for other activities). Therefore, it is crucial that they are involved in the decision-making process at early stages, in particular to define project designs and the level of service, and that they participate actively in the JASS and in hygiene education activities to ensure maximization of economic and health benefits.

In 1999, an exploratory gender impact assessment was performed by the Provias Rural to analyze gender roles and attitudes, and the differential effects of rural roads on the lives of women and men, with respect to seven issues: access to services, women's mobility, time use in domestic activities, access to resources and benefits, participation in local markets, labor market dynamics, and women's leadership and participation in community organizations. On the whole, this assessment showed generally positive effects of improvement of the rural roads system: facilitation of mobility, communications, access to resources, and participation in the labor market for both women and men, with women reporting a high level of satisfaction with the improvements made. At the end of the first phase of the Rural Roads Program, low levels of participation of women in micro-enterprises was reported but, in the second phase, upon internalizing the results of the impact assessment, a gender action plan was designed and implemented, allowing significant progress to be achieved regarding a greater participation of women in rural roads' planning and management (see Box 4.4).

The experience from the rural road sector—achieved through the training of executing institutions in gender issues and equity actions, and the incorporation of specific targets for a set of activities (such as percentage of women and men participating in maintenance micro-enterprises)—should streamline the gender dimension in rural infrastructure planning and interventions. Particular attention should be paid to expression of women's needs in the participatory planning process for rural infrastructure. Comprehensive monitoring of direct and indirect effects of rural infrastructure services and induced economic activities on women's welfare and access to income-generating opportunities should also be performed. This monitoring would—if needed—help corrective actions to be designed and implemented, as illustrated in the particular case of micro-enterprises.

Box 4.4. Women's participation in rural roads' planning and management

The design and implementation of the gender action plan has increase the proportion of women among members of the cohort of micro-enterprises formed since the streamlining of gender into the activities of Provias Rural to 23%, which is significantly higher than the proportion of the micro-enterprises conformed in the first phase of the program (about 5%) and the target set for the end of the Second Rural Roads Project (10%). Other gender-related achievements have also been observed regarding the participation of women in the Rural Roads Committees (used for the planning of non-motorized transport roads) and in the activities of the Local Development Window (an instrument designed to develop productive activities that could benefit from the improvement of rural transport infrastructure).

Source: Peru Second Rural Roads Project – Project Status Report May 2004

Indigenous Peoples. In the national household survey of 2001 the indigenous population of Peru was estimated to represent 45.2% of the Peruvian population, around 12 million people. This survey also found that 63.8% of indigenous households are poor vis-à-vis 42% of non indigenous households, and 35.3% of the indigenous households are extremely poor vis-à-vis 16.6% of non-indigenous. The majority of the indigenous peoples of Peru live in the highlands and a small fraction in the Amazon region (around 300,000 out of 12 million).

As expressed in the indigenous consultations that the Bank has carried out in Peru and as reported in several studies[71], one of the most universally expressed desires of indigenous peoples is to gain access to the basic public and social services offered to other citizens, such as water/sanitation, electricity, health services, education and markets. Advancing the rural infrastructure strategy represents a major opportunity to implement a more socially inclusive approach for access to infrastructure services by indigenous peoples. This requires that representatives of indigenous peoples or grassroots organizations are fully included in the participatory planning process for rural infrastructure investments, taking active participation in the prioritization workshops. (In the context of the decentralization, the so-called regional and local coordination committees already include civil-society participants, but more should be done to include the above-mentioned representatives.)

Furthermore, attention should be paid to possible specificities of indigenous peoples in terms of rural infrastructure needs. For example, rural roads may not be the exclusive mean of transportation in the rural *Selva* where river transportation is more frequently used by most communities. Extending the scope of the strategy to specific transport infrastructures (small wharves) could enhance effectiveness in those rural areas, with high ultimate impact on some indigenous groups. In addition, because of the potential to develop an entrepreneurial capacity and offer income-generating activities, micro-enterprises should also pay attention to indigenous representation. Finally, monitoring capacity has to be built up in order to strengthen knowledge about how indigenous peoples access to rural infrastructure services and what the direct and indirect impacts of these services on communities' welfare and income are.

3.5. INDICATORS, BENCHMARKING AND MONITORING: TOWARDS AN INTEGRATED PROCESS FOR THE EVALUATION OF SECTOR PERFORMANCE

Finding the right mix of social and economic indicators for resource allocation. As previously explained, the right choice of social and economic potential criteria is key to allocate resources to fund the optimal balance. Building on the experience of the various sectors a list of possible core and non-core indicators is proposed in the table below. Further research should be performed to determine what the most reliable source for these indicators might be and whether they are available at the provincial level. Regarding economic potential indicators, a comprehensive review of existing local development plans

[71] *Peru Indigenous Peoples' Development Background, Policies and Program Strategy*, World Bank (1998).

could help determine whether the proposed indicators capture the complexity of the rural economies in Peru in a reasonable manner. Demand surveys are also required to establish payment capability and willingness to pay by rural inhabitants for rural infrastructure services.

Table 4.9. Examples of indicators to assess social conditions and economic potential in rural Peru

Social Indicators	
Output Indicators (coverage)	Impact Indicators
o Population lacking access to drinkable water o Population lacking access to sanitation o Population lacking access to electricity services o Population lacking access to telephone services o Percent of rural road network needing rehabilitation o Population more than 5 km away from an all-whether road (from household surveys)	o Rural population o Acute diarrhea prevalence rate o Extreme poverty rate o Poverty rate
Economic Potential Indicators	
Physical and revenue-based Indicators	Perception Indicators
o Stock of natural resources (forestry, fish) o Stock of mining resources o Tourism activity o Non-agricultural revenues o Number of firms incorporated o Number of exporting firms o Freight carried on transport infrastructure o Household incomes o population density	o Business community perception of the quality of infrastructure services (from investment climate surveys) o Regional, local government and community willingness to contribute to capital costs o Consumers ability to pay for operation and maintenance costs

Monitoring inputs, outputs, outcomes and impact. In order to fully monitor the performance of rural infrastructure sectors and their impact on poverty and rural income, it is proposed that an integrated monitoring methodology be prepared. The methodology should follow the logical flow of expected effects from inputs, to outputs, outcomes and, ultimately, impact (see Figure 4.4). Particular attention should be paid to building an efficient and reliable monitoring capacity, preferably at the regional level, and building on existing measuring instruments (e.g. household surveys). Experience gained by the National Statistics and Information Institute (INEI) could be useful in this regard, as well as successful monitoring initiatives such as the Citizen Report Cards (see Box 4.5).

Box 4.5. A participatory performance monitoring tool: report cards.

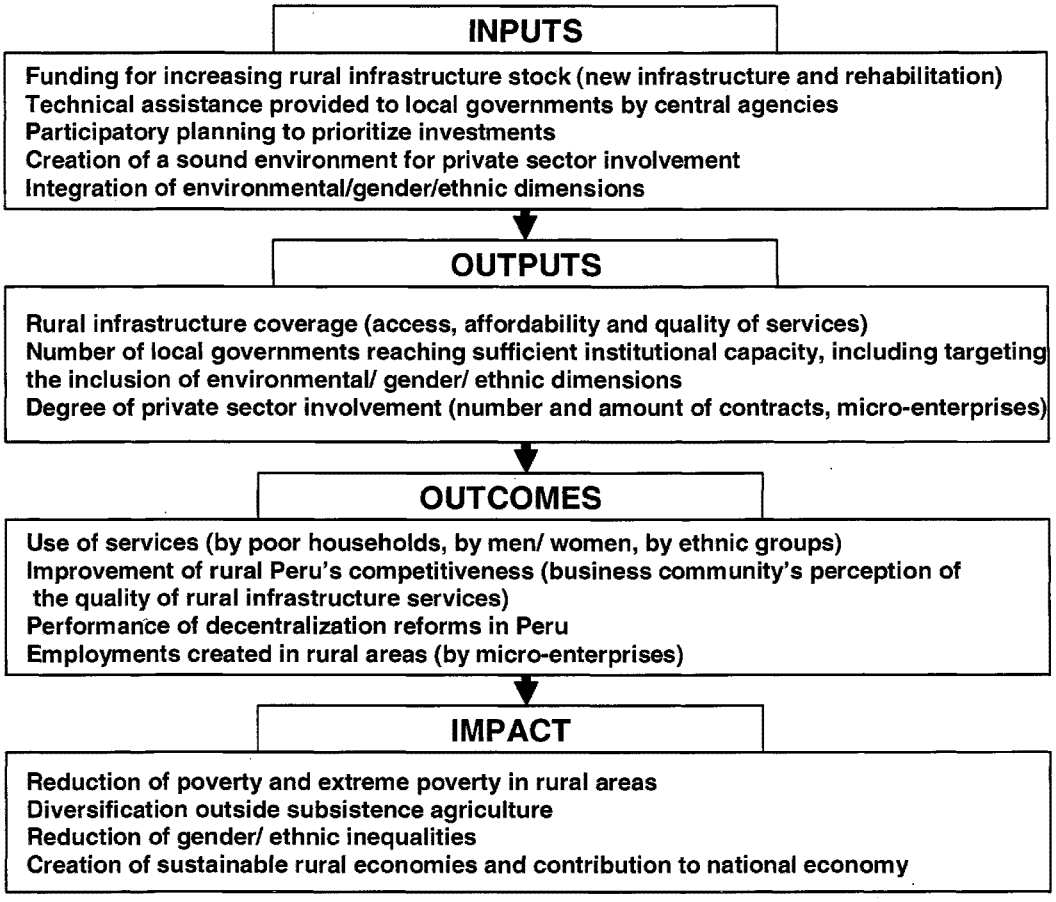
What are Citizen Report Cards? A participatory survey that solicits client feedback on the performance of public services, combining qualitative and quantitative methods to collect useful demand-side data that can help improve public services. They are also an instrument to exact social and public accountability, through accompanying media coverage and civil society advocacy.

When are they used? Citizen report Cards are sued where demand-side data, such as user perception on quality and satisfaction with public services, are absent. They enable citizens to signal key reform areas to public agencies and politicians, and also to cerate competition among state-owned monopolies. Some actual applications include: (i) basis for performance based budget allocations to pro-poor services (Philippines), (ii) cross-state comparisons on access, use, reliability and satisfaction with public services (India), (iii) supplement national service delivery surveys (Uganda), and (iv) governance reform projects (Ukraine and Sri Lanka).

What do they reveal? Citizen report Cards provide feedback from users of services on: (a) availability of services, (b) satisfaction with services, (c) reliability/quality of services and the indicators to measure these, (d) responsiveness of service providers, (e) hidden costs – corruption and support systems, (f) willingness to pay, and (g) quality of life.

Source: Singh, J. "Matrix Summarizing Citizen Report Cards and Community Scorecards"

Figure 4.4. Towards a comprehensive monitoring framework



3.6. CONCLUSION

The proposed agenda is neither over ambitious nor unrealistic. On the budgetary side, the additional proposed effort is incremental compared to the overall amount of public investment and it would just mean coming back to levels observed five years ago before the fiscal situation imposed a dramatic decrease to public spending in infrastructure. On the institutional side, the strategy is aligned with Peru's decentralization agenda and it is not involving radical changes that may be conflicting with on-going reforms. On the contrary, the strategy is expected to make a significant contribution to the decentralization process through the strengthening of local institutional capacities, the timely transfer of planning and operational assignments to local governments and the clarifications of responsibilities between the various levels of government. On the development side, the proposed approach

would help enhance rural productivity and promote diversification outside the agriculture sector, in line with other existing rural development strategies for Peru. In addition, the territorial approach to planning is expected to promote the emergence of productive poles in rural Peru as well as the strengthening of rural/urban linkages that could reinforce the network of Peruvian secondary cities.

Finally, some of the proposed recommendations have already been successfully experimented by some infrastructure sectors. In such cases, the strategy has tried to promote cross-fertilization across the various sectors and to build on these successful experiences. Progress already achieved provides strong evidence that the proposed institutional scheme is already working. In particular the provincial road institutes have proved to be an efficient mechanism for rural road management, and their success is a valuable argument that small and agile institutions such as the provincial infrastructure institutes could be successful in organizing planning, fostering private sector participation and providing technical and management expertise.

The strategy has also tried to keep some options opened and, in such cases, to describe the trade-offs involved and to propose a methodology to solve them out. The issue of subsidies is one of the areas where further analytical work will be needed in order to propose a revamped subsidy framework for rural infrastructure. Similarly, the approach to measuring the economic potential of a territory will also require further research.

In sum, while ambitious, the proposed agenda is indeed achievable if building on both the momentum created by the on-going decentralization process and on the existing positive reforms implemented in each the four infrastructure sectors. The proposed roadmap could have a major impact in bringing new opportunities and reduce poverty is rural Peru.

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ANNEX 1. THE CONTRIBUTION OF INFRASTRUCTURE TO INCREASING THE INCOME AND WELFARE OF RURAL POPULATIONS

Physical infrastructure has long been considered an important determinant of economic growth. [72] Aschauer (1989), for example, finds very large returns to public capital in the United States. Canning, Fay and Perotti (1992, 1994) estimate large growth effects of physical infrastructure. Easterly and Rebelo (1993) find that public investment in transportation and communication is consistently correlated with economic growth. Lee and Anas (1992) find lack of infrastructure, particularly lack of a consistent supply of electricity, to be a major constraint on firms in Nigeria. Antle (1983) finds a significant role for infrastructure in agricultural productivity in developing countries. The micro-economic impact resulting from infrastructure services' availability have been described in a number of studies. The availability of infrastructure services is generally correlated to an increase in household income. In rural areas, the bulk of infrastructure services' contribution to raising household income comes from three main effects: diversification of economic activities (in particular outside subsistence agriculture in rural areas), increase in working hours and improvement of productivity (e.g. by facilitating access to modern technologies such as fertilizers).

Table 1. Examples of Interactions between Rural Infrastructure and Economic Performance

Sector	Impact	Example
Transport	Greater productivity of businesses	A study of developing countries found that transportation costs account for 50% of marketing costs, which in turn account for 25-60% of the costs of agricultural products. Thus, agricultural products with higher transportation costs will be significantly less competitive
	Access to cheaper/better goods and services	In Ethiopia, a 1994 survey showed hat the probability of using fertilizer increased by 9 to 22% in seven regions because of cheaper costs if a farmer had access to an all-weather road.
	Increased household income	In the Philippines, after construction of rural roads, studies in affected villages showed that gross household income increased by 28%, largely due to a 54% reduction in the cost of transport.
	Higher fiscal returns	In Morocco, a 1985 study after a rural road project showed that tax revenues in the project zone had increased from Dh1,500 to Dh10,00 in 10 years
Energy	Greater productivity of businesses	In Peru, electrification allowed a dairy collective to increase the price per liter for milk from US$0.06 to 0.11 because of improvements in product reliability
	Economic diversification	Based on household surveys in Peru, access to electricity increases the share of ones income from self employed non-agricultural activities
Information and Com-munication technology	Increased per capita income	A study growth statistics between 1960 and 1989 for Sub-Saharian Africa and Latin America showed that telephone per worker was significantly correlated with real per capita GDP growth
Water/sanita tion	Increased household income	A 1998 survey in Honduras showed that families in the lowest income quintile that did not have access to water in the house could expect to see a 7% increase in income if they had access and a 11% increase for access to piped sanitation services.
	Economic diversification	A 1998 study in Nicaragua showed that access to clean water was strongly correlated with non-farm self employment.

[72] CANNING, David, World Bank 1998.

There is also large evidence of the contribution of infrastructure to poverty alleviation and welfare enhancement. [73] In addition to their direct effects on economic growth and income generating activities (and hence on poverty), infrastructure services have important consequences for households' welfare: better transport means easier access to social services (education and health), safer water means better health, electricity means longer time for children to study, cleaner fuel means less respiratory diseases, ICT means access to knowledge and education. In some cases, infrastructure also contributed to the empowerment of women.

Table 2. Examples of Positive Interactions between Infrastructure and Welfare

Sector	Impact	Example
Transport	Saves time and effort	In Nigeria, 2 studies showed that the average travel times from farms to village for farmers were 18 minutes without roads and 8 minutes with roads
	Improved safety	In 1991 in Eastern/Central Europe, the annual cost of traffic accidents was estimated to 1.5% of GDP
	Lower transportation costs	In Morocco, an improvement program of the quantity and quality of rural roads increased the percentage of trucks by 500%, resulting in a 50% decrease in transportation costs.
	Easier access to healthcare	In Morocco, after a road rehabilitation program, visits to hospitals by women increased from 1.1 to 2.3 and to health care centers from 2.4 to 3.1
	Less exposure to environmental/noise pollution	In Mexico city, 40% of lead accumulation in the blood of school children was attributed to their exposure to areas with heavy vehicle traffic
	Easier establishment of health centers	In Brazil, after the implementation of a feeder-roads project, the number of inhabitants per hospital bed decreased from 740 to 630 in one of the region
	Easier access to water	In a series of studies on a total of 769 households in Zambia, Ghana and Tanzania, surveys showed that when trips to collect water were only 5 or 15 minutes, 10.4 liters of water per day were consumed by each family member whereas, but when the walk was 33 minutes, daily consumption sunk to 7.9 liters
	Greater energy and time to channel to education and easier access to the school	In Bhutan, girls enrollment in schools is 3 times higher in villages which are 0 to 0.5 days walking time from a road than in villages which are 1 to 3 days walking time from a road.
	Easier establishment of schools	In Morocco, a rural road project produced an increase in the project zones from 3 to 13.5 (compared to 2 to 3 in "control" zones)
	Increased empowerment of women	Women located in a village on a main road in Cameroon were able to spend more time producing food to sell, and made an average income of 570USD, compared to 225USd for women in an isolated village, one and a half hours from the road.
Energy	Improved access to information	Based on a 1980 survey in Colombia, electrification allowed 43% of men and 44% of women to spend time watching TV compared to 0% before electrification when TV was unavailable
	Less respiratory illness because of cleaner fuel	It is estimated that exposure to wood smoke, usually from the use of biomass fuel for cooking and lighting accounts for one third of all nasopharynx and larynx cancer in South America

[73] An extensive literature review is presented in Brenneman, A. and Kerf, M. 2002. "Infrastructure and Poverty Linkages: A Literature Review," The World Bank, mimeo.

	Increased literacy and time for reading because of improved lighting	A 1980 survey in Colombia showed that 72% of children read in the evening if they had electricity compared to only 43% without electricity
	Increased educational performance due to improved school quality because of electrification	A 1986 survey in Honduras showed that there were a strong and positive correlation between the percentage of schools in a town with electricity and the educational attainment of its student.
	Increased empowerment of women	According to household surveys in Peru, the use of biomass fuel sources is strongly and negatively correlated with the portion of a woman's day that is devoted to self-employment, while being positively correlated with the portion of a woman's day devoted to housework
Information and Com-munication technology	Increased access to information, culture and entertainment	A 1999 study of 20 Latin American countries showed that internet usage was strongly and positively correlated with teledensity as expressed in main lines per 100 inhabitants
	Improved quality of education	In Bolivia, math students had pass rates of 35% with Interactive Radio Instruction, 22.5% without
	Improved access to education	In the Caribbean, use of a telephone-based conference system allowed an university to offer a conference at a cost of 10 times lower it would have cost if it had been held face-to-face
	Easier citizen participation	In a 2000 survey in Argentina, 15% of NGOs reported they use the Internet to gain access to municipal information
Water/sanita tion	Lower costs of water	In Paraguay, families connected to a piped-water system reported a 8% savings in family income as a result of not having to purchase bottled water from vendors
	Improved hygiene and health	A 1996 survey in Brazil has shown that 63% of the mortality gap between rich and impoverished people could be explained by the lack of access to sanitation and water services

Finally, Box A.1 presents the positive impacts of rural infrastructure along the dimensions of economic opportunities, capabilities, empowerment and vulnerability, all in an attempt to include rural inhabitants and economies into the overall functioning of the national economy by increasing opportunities for rural populations.

Box A.1. Impacts of Rural Infrastructure on Rural Livelihoods

Infrastructure stimulates economic opportunity and growth. While there is no consensus on the magnitude or the precise nature of the impact of infrastructure on growth, studies concur that infrastructure promotes growth with relatively high rates of return compared with other forms of investment (World Bank, 1994; Ahmed and Donovan, 1992). In the rural context, infrastructure contributes to both agricultural and non-farm growth, thereby generating economic opportunity for a broad range of rural inhabitants, but most importantly, the poor.

Infrastructure enhances capabilities. The provision of rural infrastructure services has important implications for the health and education of the rural poor. The most well-known link may be the impact of safe water/sanitation on reducing incidence of sickness and deaths from diarrhea. Improved access to infrastructure services can also free up significant amounts of time to rural households. Improved road access has been linked to higher levels and quality of education, reduced teacher absenteeism, and more reliable sources of school supplies. Likewise, electricity can build human assets by providing light in the evenings to study, or access to information and networks through use of radios, or improve health care by providing energy for lighting, diagnostic services and vaccine preservation in village hospitals and maternity clinics.

Infrastructure facilitates empowerment. Infrastructure can play an important role in empowering people and linking isolated communities to the rest of the world—giving poor communities greater access to and influence over political and local decision making processes. Another potentially significant contribution of infrastructure services to empowerment occurs in the process of delivery—by building capacity, introducing transparency and accountability, and promoting inclusiveness. The need for basic infrastructure in rural communities is a powerful tool for initiating collective action, mobilizing entire communities and in the process of consensus building and implementation, developing skills and building human assets and social capital.

Infrastructure reduces vulnerability. The provision of infrastructure can substantially reduce the vulnerability of poor people by helping them cope with natural disasters as well as assisting with relief and food redistribution efforts. By opening rural communities to the outside world and improving access to modern technologies, infrastructure can also indirectly serve to reduce weather related uncertainties (mainly rainfall), plant disease, pests and other harvest risks. Because of their employment-creation potential, infrastructure works programs can be important components of crisis mitigation packages during times of economic shock.

Unfortunately, during periods of economic shocks, budget cuts are often targeted at infrastructure without a full appreciation of what the long-term effects on the poor may be. When infrastructure maintenance is neglected, it leads to deterioration of existing assets that becomes costly to reverse. Secondary and tertiary infrastructure serving poor rural areas are particularly vulnerable because of the limited "voice" of the people served by this type of infrastructure.

Source: "Rural Infrastructure Services for Development and Poverty Reduction," by Christina Malmberg Calvo, Andrea Ryan, and Louis Pouliquen, World Bank, 2002

ANNEX 2.A. RURAL TRANSPORT

A - Status of rural transport infrastructure and services

Peru's road network consists of about 78,000 km, classified in three levels: national, regional and rural roads, with lengths of about 17,000 km, 14,000 km and 47,000 km, respectively. In addition, there is a large, unknown number of unclassified tracks that connect the dispersed population to the rural road network. The table in the next page provides a snapshot of the main characteristics and statistics of the Peruvian rural transport sector and their comparison to those in similar countries. The table shows that:

- Road density is lower in Peru compared to the compared to South American average or to countries with similar level of development. Whichever way density is calculated (relative to geographic area or to population), road coverage is significantly lower in Peru when compared to the South American average or to countries with similar level of development. The situation is even worse for paved roads which represent only 13% of the total network.

- A large portion of the rural road network is in bad condition and only 8% of the tertiary roads are in good or average condition. According to the 2002 Global Competitiveness Report, firms rank Peru 54th out of 75 countries (10th out of 17 in Latin America) for road quality.

- As a result, availability of roads in good condition is low in rural Peru: a year 2000 household survey shows that only 28% of the population had access to a road in good condition. [74]

Up to 1995, the rural road network, without a clear entity responsible for its management, was largely in poor condition, hampering the access for poor rural communities to the secondary and main networks, markets and social services. Acknowledging the importance of access to the reduction of poverty and improvement of the living standards of the rural populations, the Government of Peru initiated (with support from multilateral organizations) a major effort in 1995 ; upgrading the condition of the rural road network, through the rehabilitation of existing infrastructure, and establishing mechanisms for the maintenance of this infrastructure on a sustainable basis. This effort took the form of the so-called Program of Rural Roads (or PCR for its Spanish acronym, later renamed Provias Rural).

Since 1995, under the two phases of the above-mentioned Program, Provias Rural has undertaken the rehabilitation of about 9,000 km of rural roads (and another 2,700 kms of connecting departmental and national roads) and about 5,000 km of non-motorized (NMT) tracks, in the 12 departments that rank among the highest in rural poverty, most of them located in the highlands of the Peru Sierra. These lengths represent about 30 percent of the rural roads in those departments. The program further contributed to the sustainability of the rehabilitated network with the formation of about 500 maintenance micro-enterprises. The rehabilitation of the rural road network has impacted the lives of about 3 million rural people, of which about 82% were poor.

[74] Some recent work performed by the World Bank has shown that, on average, for a group of 24 IDA-only countries, 43% of rural dwellers had access to an all-season road. This percentage however is not directly comparable to the 28% reported in the text because "all-season" does not equate to "good condition."

INFRASTRUCTURE STOCK					
	Good condition	**Average condition**	**Bad condition**	**Paved**	**Total**
Primary road network (km) 1999	3,912	6,848	6,220	8,320	16,980
Secondary road network (km) 1999	2,156	634	11,461	1,136	14,250
Tertiary road network (km) 1999	282	3,593	43,095	940	46,970
Total road network (km) 1999	6,350	11,075	60,776	10,396	78,200
% paved road 1999	13				

INFRASTRUCTURE COVERAGE				
	Peru	**South America**	**Countries w/ similar level of development**	
			Including China	**Without China**
Road density (km per 1,000 people) 1999	2.8	7.1	1.6	3.9
Road density (km per km2) 1999	0.06	0.14	0.13	0.12
Paved road density (km per 1,000 people) 1999	0.37	0.76	0.59	2.17
Paved road density (km per km2) 1999	0.007	0.015	0.049	0.068
% rural hhds w/ access to good condition road	28	NA	NA	NA

USER'S PERCEPTION OF INFRASTRUCTURE QUALITY			
	Peru	**Regional comparators**	**Income comparators**
Road quality outside major city (1: only allow low speed)	4.3	4.4	4.2
Competition in transport sector (1: none)	3.7	3.9	3.7

FUNDING INFRASTRUCTURE	
Central funding instrument	PROVIAS Rural (on-going decentralization process)
Theoretical annual funding for rural roads (according to WB/IDB program)	45 million USD with WB/IDB support
Annual funding for rural roads observed in 1998-2002	36 million USD
Annual funding for entire road network in 1998-2001	297 million USD
Share of funding for rural infrastructure	12%
Annual funding required for the next 10 years to rehabilitate and maintain half of the rural road network	60 million USD

PLANNING INFRASTRUCTURE		
Planning instrument	Provincial and district plans	
Involvement of local actors in planning	Significant	
Local actors which are the most involved	Provincial municipalities	
% of municipalities involved in a rural road program	34%	
Central agencies prioritize territories to allocate funding	YES (at department and provincial levels)	
Criteria used by central agencies to prioritize across territories	**For departments :** Coverage (33%) Rural population (33%) Extreme poverty (22%) Non-extreme poverty (22%)	**For provinces :** Coverage (27%) Rural population (27%) Extreme poverty (27%) Financial capacity (7%) Past involvement (7%) Management capacity (7%)
Who prioritize across projects	Local governments	
Criteria used to prioritize across projects	Social (65%) Demand for mobility (10%) Access to public services (5%) Access to villages (10%) Access to tourist zones (10%) Access to markets (10%)	

PRIVATE SECTOR PARTICIPATION IN INFRASTRUCTURE	
Project preparation	MTC (PROVIAS Rural) with private execution
Construction	Private
Control and supervision of construction	MTC with participation of municipalities
Operation and maintenance	MTC but transfers to provincial municipalities; maintenance performed by micro-enterprises

The networks in the rest of the departments, however, have not had the same level of attention, if any. In the Selva, where natural rivers often constitute the main method of transport, Provias Rural initiated a pilot in 2004 in order to identify the specific transport needs of the Selva regions and advanced investment solutions. In addition, complementary investments and institutional building actions are being undertaken in other departments in the context of the decentralization of functions to the provincial and district municipalities. In this context five new departments have been incorporated in the program, with the rest to follow gradually, all following the decentralized methodology being implemented by Provias Rural in the section on "issues and strategies."

In rural Peru, transport services for both passengers and freight are provided by private local operators. The low levels of local (mostly agricultural) production and the often dispersed demographic distribution leads to relatively low supply of services. This supply is often more limited when the condition of the road is poor. The Rural Roads Program has shown that improvements of road conditions has an immediate positive impact in the reduction of transport costs and subsequently the availability and reliability of transport services (as measured by increase in traffic volumes and frequencies and decreases in freight tariffs) and better road conditions, with less road closures. In addition, when in poorly accessible villages where less than 20 percent of households' income comes from wage-earning activities, this percentage was observed to be between 45 and 50 percent once transport access was improved. Furthermore, the enhanced condition of vehicular traffic appears to lead to noticeable improvements in the access to social services. [75]

The table on the next page summarizes the figures that resulted from a survey of transport services in a sample of villages in the three regions of Peru—Costa, Sierra and Selva. [76] The table highlights that:

- In rural Peru, transport services are mostly used to trade goods and services locally. More than 60% of trips performed in rural areas aim at going to local markets or shops. Other motivations include access to public and social services. The most frequent length for rural trips ranges from 15 to 35 km which is a typical distance in Peru to access an urban center (e.g. district municipality [77]) from rural areas. Indeed, this type of trips is characteristic of rural-urban linkages.

- Transport is also key to access other infrastructure services. For example, the motivation of 15% of the people traveling by bus in rural areas is to go to a public phone (10% for minibus and 11% for automobile). This is a concrete illustration of the complementarities existing in the use of infrastructure services.

- Availability of transport services is often low or non-predictable, particularly for freight. For 60% of rural households, freight transport services are either available 1-3 times of week or not predictable (29%). The lack of predictability of transport services is a major source of inefficiency for the rural economy because it increases transaction/waiting times and threatens the quality of perishable goods. It can also be a major impediment to the development of non-agricultural economic activities (e.g. tourism).

[75] World Bank, "Implementation Completion Report for the Rural Roads Rehabilitation and Maintenance Project," Report No. 22094, June 25, 2001.
[76] Luna, 2004.
[77] The average size for a district municipality in Peru is 640 km2, i.e. a square of 25 km.

- Transport services are expensive. The poor density/quality of transport infrastructure translates into expensive transport services. The largest item that enters the operating costs of vehicles (aside from the cost of gasoline) is the replacement of tires (with 34% incidence in those costs). In addition, transporters tend to manage their fleet in order to use older, less reliable vehicles in rural areas with poor infrastructure. As a result, 51% of freight transport service users think that service is expensive or very expensive (44% for passenger transport services). While in rural areas, about half of the people live with less than one US$ per day, the typical cost for a "round-trip-25 km-one-way-passenger-with-50 kg-merchandise" can be estimated to US$2-3, i.e., between a third and half of their weekly income.

AVAILABILITY OF SERVICES					
	> once a day	once a day	4-6 times a week	1-3 times a week	Irregular frequency
Frequency of available passenger transport services 2003	44%	23%	2%	17%	14%
Frequency of available freight transport services 2003	18%	18%	6%	29%	29%

TYPE OF SERVICES				
	Truck	Minibus	Bus	Others
Freight transport services 2003	54%	9%	5%	32%
Passenger transport services 2003	10%	33%	26%	31%

	<15km	15-35 km	36-55 km	56-75 km	75-114 km	>114 km
Distribution of trips	11%	37%	22%	4%	16%	11%

PURPOSE OF SERVICE				
	Automobile	Truck	Minibus	Bus
Go to local shops/markets	31%	32%	46%	51%
Go to weekly agricultural market	37%	24%	22%	13%
Go to public registries	6%	4%	0%	1%
Go to public phone/post office	12%	6%	11%	16%
Go to police/judge	3%	2%	1%	1%
Access to water services	2%	0%	0%	0%
Other public transportation	10%	32%	20%	18%

COST OF SERVICE				
Passengers - USD/km	Automobile	Truck	Minibus	Bus
Distance < 20 km	0.110	0.143	0.071	0.122
Distance from 21 to 40 km	0.033	0.057	0.030	0.033
Distance from 41 to 60 km	0.035	0.042	0.025	0.027
Distance from 61 to 80 km	0.033	0.030	0.025	0.020

Freight – USD/ton/km	<0.12	0.12-0.38	0.37-0.64	0.64-1.16	>1.16
Distribution of trips	12%	40%	12%	19%	17%

	Tariff is fixed by transporters	Tariffs is fixed between transporters and users	Tariffs is negotiated on a case by case basis	Others
Distribution of tariffs	39%	18%	39%	4%

USER'S PERCEPTION OF QUALITY OF SERVICES					
Distribution of users' opinion	Very good	good	average	bad	Very bad
Freight	1%	20%	72%	7%	1%

Distribution of users' opinion	cheap	regular	expensive	Very expensive
Freight	1%	48%	46%	5%
Passengers	0%	55%	41%	3%

B - Institutional framework

In the past, the concurrence of responsibilities between the different levels of government generated confusion and hindered the development of institutional capacity in municipalities. While the Municipal Organic Law of 1984 required that municipalities (both provincial and district) maintain and manage the rural road network, the Transport Law of late 1999 extended such competencies to the Ministry of Transport. In this context, the municipalities were mere spectators of the activities on their road networks. In some cases, when municipalities owned heavy works equipment, they try to secure the complimentary resources from the national entities to undertake mechanized activities by force account. Often, they lacked the capacity to plan and manage the networks under their respective jurisdiction.

Since 1995 and up to December 31, 2002, all roads were under the jurisdiction of the national government and, particularly, the Ministry of Transport and Communications (formerly, the Ministry of Transport, Communications, Housing and Construction). Rural roads were managed through the now-renamed Provias Rural, a semi-autonomous implementing unit under the Ministry of Transport. Since end 2001, a second phase of the program has been underway, now with an additional mandate: to define and advance the framework for the decentralization to rural municipalities.

With this mandate, the Provias Rural has gradually transferred the responsibility for the management of rural road networks to the so-called Provincial Road Institutes (or IVPs, for its Spanish acronym). These entities—up to 24 by March 2004—have been built-up at the provincial level with a supervisory board that includes the mayors of the provincial municipality and of the district municipalities in the corresponding province, taking into account the need to pool technical skills, to develop road plans and programs and to manage the contracts for the maintenance of the networks. Increasingly, additional responsibilities for rehabilitation studies and works are being transferred to the IVPs.

Beyond physical infrastructure, the Directorate of Surface Transportation of the Ministry of Transport is responsible for the norms and regulations of the provision of transport services, both for passenger and freight transport, and for road safety. The norms and licensing regulations for local traffic are to be enforced by provincial municipalities (and for moto-cars—the so-called moto-taxis—and similar type of vehicles, by the district municipalities within which they operate). Both provincial and district municipalities are responsible for collecting tickets or fines from traffic infractions (with support from the National Police). Insurance and registration regulations are issued by the INDECOPI, and their enforcement is entrusted to the level where the particular passenger or freight transport service operates. Finally, technical norms for the design of roads are issued by the Ministry of Transport and Communications through its General Directorate of Roads.

Resources for investment in rural transport infrastructure have largely originated in the central level since, on the aggregate, municipal revenues come mostly from property taxes and cover only about 46% of their total expenditures. This situation has been more difficult in small and rural municipalities, as legislation precludes the imposition of levies on rural lands and property taxes thus limiting their revenue base to the amounts generated by the *alcabala tax* (a tax on property transactions). The resulting fiscal deficit has been covered through intergovernmental transfers, mostly from the *Fondo de Compensación Municipal* (FONCOMUN). In 2000, the use of FONCOMUN resources (limited until then to capital expenditures) was made more flexible to allow the use of them to cover certain recurrent costs and, in particular, those involved in the maintenance of road assets. With this, increasingly, provincial municipalities—almost the 100+

universe of those where the Provias Rural is supporting the rehabilitation of their networks—and the district municipalities within their jurisdictions are covering the upkeep of their rural road networks (with the total cost assumed by those municipalities when the responsibilities have been transferred to the IPVs—about 25% of that universe—and with 50% share in the remainder of the municipalities).

C - Key Issues and Strategies

C1 - Prioritization of interventions

Planning methodology. The current planning methodology emphasizes social criteria but the potential for local economic development is also taken into account. The planning of rural road rehabilitation and maintenance programs is performed in two stages: first, PROVIAS Rural pre-allocate funding at the department and provincial levels, then, within this given budgetary envelope, local governments select the projects to be financed. Criteria for pre-allocation and project prioritization are mostly social (coverage, poverty levels, rural population, access to public services) but institutional issues (local governments financial and management capacities) and economic potential (mostly those that stem from increased agricultural and livestock production and productivity) are also taken into account. The importance of social criteria in planning rural roads projects explains why per capita investment intensity is significantly aligned with rural poverty levels.

However the current evaluation methodology encounters difficulties in its application due to the lack of updated data on agricultural and non-agricultural production and the fact that a formal population census has not been undertaken since 1993. To compensate for this deficiency, the Provias Rural is expecting to carry out a sequence of baseline data gathering to track impacts in rural areas and compared them to a control sample. The results of these impacts should help better refine the evaluation methodology. Nonetheless, the Government should reinstate the population and production censuses to establish the information base to carry out formal evaluations of programs in rural areas.

Design of interventions on rural road infrastructure. The focus of the interventions has been on achieving a certain level of transitability/accessibility and reaching out to the largest number of beneficiaries through cost effective mechanisms for the rehabilitation and maintenance of the infrastructure. In this respect, the interventions under the rural roads program proved that low cost rehabilitation (without paving) can provide the improvement to the access necessary for facilitating trade and social relations as well as eliminate situations of isolation (when motorized traffic levels are below 50 vehicles per day). This rehabilitation requires sustained routine maintenance activities (those performed by the micro-enterprises) and periodic maintenance every 4 to 6 years depending on the climatic and topographic conditions of the road. This rigorous maintenance regime ensures accessibility at a fraction of the cost of paving.

To complement this technological perspective, the Government is also proceeding with the definition of new technical specifications for low-volume roads, in order to accommodate to the extent possible (since in mountainous terrain, widening the shoulders is often extremely expensive) those designs to areas with very low traffic and include non-motorized transport alternatives. (The latest geometric design norms were developed in 2001 but they did not incorporate those considerations). [78]

[78] For instance, the shoulders are up to 0.3 meters which would not allow NMT to circulate alongside motorized traffic of higher speeds. A compromise between the width of the main surface and the needs of

Funding levels. Current funding levels for rural roads are insufficient to fill the gap with comparable countries. During the period between 1998-2002, average annual funding for rural roads amounted to US$36 million (12% of total road expenditures), with a decreasing trend. Lack of counterpart funding under fiscal constraint has prevented the country to reach yearly funding levels of US$45 million as initially designed under a joint World Bank/IDB supported rural road program. In comparison, the rehabilitation and the maintenance of half of the rural road network in bad condition over the next decade would require an annual funding of about US$60 million.

C2 - Efficiency of operations and institutional framework

Operations and maintenance. Routine maintenance has been performed through the system of micro-enterprises. These micro-enterprises are a cost-effective maintenance system for the upkeep of the road network and have created employment opportunities for the rural populations involved (or about 4,800 jobs). In addition, the initiative of maintenance through micro-enterprises has created entrepreneurial capacity in the communities involved and acted as catalyst for other local development initiatives. The benefits, then, have gone beyond the up-keeping of roads.

This maintenance strategy has emphasized contracting out of maintenance activities (through the micro-enterprises) and phasing out of force-account by municipalities with their own staff and heavy equipment. The experience has been that, even for emergencies, it is more cost-effective to contract out the activities, than to hold a costly equipment pool that requires scare additional expertise, replacement parts that are often hard to find, and the proper upkeep of that equipment. (To reduce the burden of the equipment, municipalities sometimes rent the equipment to private contractors. These arrangements require rental agreements that are difficult to draft and costing procedures that often do not reflect the actual amortization and operating costs of that equipment.)

The current maintenance mechanisms should continue to be strengthened, keeping the elements that make the performance of micro-enterprises accountable to local authorities and communities. Specific actions include the increasing incorporation of competition after several years of experimentation with rotation of micro-enterprise staff among the members of the community. Provias Rural has recently initiated the tendering of maintenance contracts, allowing proposals from micro-enterprises and contractors alike—with apparent positive success as most of the selected proposals corresponded to micro-enterprises. In all, these actions should enhance maintenance activities and reduced their cost, more closely tailoring those activities to the specific conditions of the roads and the efficiency of the contracted party.

Institutional capacity at the provincial and district level. The proper management of the rural road network requires the strengthening of capacities at the local (municipal) level. The Rural Roads Program is leading an effort to build up institutional capacity at the local level, develop of knowledge at the municipalities on planning and budgeting systems, including participatory approaches, and use labor-based methods and contract arrangements, through the demonstration of the positive impacts of the components of the program itself. In addition, an analysis of the constrains that may prevent municipalities from assuming their responsibilities in rural road management and financing showed that they lack the financial capability to assume the full responsibility over the roads within their jurisdictions. The incorporation of flexibility in the use of the municipal compensation fund (the so-called FONCOMUN) has allowed municipalities to co-finance the maintenance costs and initiate the sharing of responsibility, representing an effective

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NMT must be reached to accommodate this type of traffic while avoiding a substantial increase in the investment costs.

step in the transition toward decentralization. This flexibility was incorporated by law in 2001 and currently municipalities co-financed (up to 43%) the costs of maintaining the roads within their jurisdictions. For those with anIVP, they have assumed 100% of the maintenance costs.

To further strengthen the capacity at the local level, and take the need to pool technical skills into account, the program has established provincial road entities (so called, Institutos Viales Provinciales) in a gradual manner. About 25 IVPs have been created over the last 12 months, encompassing about 28 provincial municipalities and 150 district municipalities. These entities are entrusted with full management responsibilities over the rural network within the province (covering the provincial municipality and the corresponding district municipalities) and receive technical assistance and financial support (to bridge the gap not covered with the municipal co-financing resources) from the Program of Rural Roads. These provincial entities are gradually becoming the decentralized agencies in the transport sector, with specific agreements made with the municipalities within the pertinent geographic area. In the cases where the IVPs have been created, these entities have become fully responsible for the financing of the management of the road networks, using the resources from the FONCOMUN and a portion of the transfers received under the annual budget.

Institutional framework. The decentralization to the provincial and district municipalities (specifically, to the IVPs) will require an evolving and diminishing role of the central entity—the Provias Rural—refocusing its role towards an emphasis on normative, technical assistance and monitoring activities, while municipalities assumed responsibilities for planning, contracting, and management of their rural networks.

Another element of this framework and of the capacity efforts is a need to focus on the regulatory functions of those municipalities (in tandem with those being assigned to Regional Governments on safety regulations and on passenger and freight services of a regional nature). Given the low levels of traffic on rural roads, the regulatory framework has not yet been an impediment to the provision of the limited amount of rural transport services. However, as traffic increases, the capacity of provincial and district municipalities to enforce those regulations requires strengthening.

C3 - Effectiveness to achieve impacts

Institutional build-up. The results of the Rural Roads Program show that a gradual decentralization strategy combined with efficient delivery and maintenance systems can provide substantial impacts in a cost-effective manner. This process requires two key elements: (a) a sustained and incremental process, to build up capacities at the local level in the context of the implementation of positive experiences and ensure the ownership of the transfer of responsibilities and the commitment to allocate resources to attend those responsibilities; and (b) development of accountability, benchmarking and reporting systems, towards monitoring performance and creating incentives to achieve comparative performance. These elements imply training and strengthening the organization of municipalities, developing skills and appropriate management tools, and channeling the voice of users appropriately (the latter to establish a constituency to whom the local entity becomes accountable).

In this respect, in the context of the suggested institutional framework described in the previous section, the sector must develop the monitoring and benchmark indicators that would allow for the observation of the progress in the decentralization as a whole and in municipalities (and regional governments). The National Decentralization Commission (or CND for its Spanish acronym) in coordination with the Ministry of Economy and Finance (MEF) has established an accreditation mechanism for the transfer of resources to regional and local governments (those for rural roads

rely on the process and procedures being followed by Provias Rural) and is expected to implement a mechanism of performance reporting to measure the mentioned progress—including that of the transport sector.

Inter-sectoral coordination. As reported in evaluations of rural roads interventions, development impacts can be maximize if, for an area with potential economic potential, a particular sector is complemented with interventions in other infrastructure sectors. In addition, the support to the identification and concept development (marketing) of the possible economic opportunities at the local level can further help the synergies among infrastructure and economic opportunities and lead to a sequential (if not simultaneous) coordinated strategies and actions that are territorially-based rather than defined from a sector perspective. Provias Rural has initiated this effort with the (technical assistance) support of the so-called "Local Development Window." The continued deepening—albeit gradual—of the decentralized framework should further help in this direction, as the identification of needs and the solutions to attend them will take place at the municipal level. The design of the planning and implementing structure to pursue this strategy is still pending.

Non-motorized tracks. Access to rural roads in good condition represents a necessary condition for enhancing the opportunities of rural areas. In some areas of the rural Peru, however, particularly in the Selva and Sierra, a scattered population live beyond the vicinities of those roads. For these inhabitants—largely very poor—access can be achieved with cost-effective interventions on the non-motorized tracks that connect their households to the rural roads. These tracks, exclusively used by pedestrian and animal passage—the so-called "caminos de herradura"—have been upgraded by the Provias Rural and proved to provide a high impact at low cost, with the participation of the communities along their alignment (who normally contribute their labor). These efforts should continue their mechanisms transferred to the local level provincial and district, and maintenance activities should be strengthened to preserve the rehabilitation investments.

Transport services . A final issue relates to the effective supply of transport services and the extent to which this supply meets demand, in light of the improvement to the transport infrastructure. The information collected through surveys appears to show that private providers respond quickly to enhancements of the infrastructure with increases in frequency and quality of services and reduction of costs. Nonetheless, prices remain high in relation to rural incomes and further research should shed light on the potential bottlenecks and avenues to overcome them. This issue also pertains with its particularities to the Selva region, where the only available access takes place often through rivers, with roads serving the function of feeding into the river ports. In all cases, specific analysis of safety conditions should also lead to address the reliability and security of the various modes of rural transport and the actions that should be implemented to reduce the potential adverse impacts on their users—mostly poor rural dwellers.

ANNEX 2.B. WATER/SANITATION

A - Status of rural water/sanitation sector

Peru has a population of 26.7 million (INEI, 2001), of whom about 70% live in urban areas and the remaining 30% in rural areas. A comparison of the coverage levels of the services in urban areas (82% with water and 69% with sanitation) with the coverage prevailing in rural areas (62% with water and 30% with sanitation) highlights the need for a sector investment strategy and policies that increases the priority given to service provision in the rural areas.

The table in the next page shows that Peru has relatively similar coverage levels in Rural Water Supply and Sanitation (RWSS) when compared to other countries in South America, but that there is a relative gap in coverage when compared to countries with similar level of development (excluding China). However, user's perception about tap water safety falls below countries of the same region and income.

Despite an impressive increase in coverage in recent years, from 42% in 1990 to 62% in 2000, water supply rural coverage remains at relatively low levels with poor service sustainability. The government faces important challenges in expanding (RWSS) coverage and improving service quality. During the decade of 1990 to 2000, its efforts focused on three main elements: i) allocating financial resources to increase coverage ($US 425 million dollars invested during the period 1990 – 1999); ii) promoting the updating of the Water/sanitation Law to include sustainability and efficiency concepts as basic funding criteria (however, the law was never implemented because of the lack of regulations and bylaws); and iii) strengthening the institutional framework (creation of a Vice-Ministry of Sanitation and a National Directorate for Sanitation (DNS)—however with insufficient funds to adequately staff it). Since 2000 the RWSS sector has changed its investment focus from the construction of new systems to the sustainable provision of services, and as a result, a new project, PRONASAR (National Project of Rural Water/sanitation) of the Vice-Ministry of Sanitation was developed with a different cycle and with emphasis in service sustainability. [79] The main component of this project is executed through FONCODES, but under the responsibility of DNS.

In terms of investment needs, Peru will need to funnel about US$16 million annually during the next 10 years, in order to achieve the Millennium Development Goals for the Water/sanitation Sector. The Vice-ministry of Sanitation, with the support from the PRONASAR project, is expected to fund about half of the investment needs; however a significant portion of the PRONASAR resources will be used for rehabilitation of existing systems to prevent the collapse of those systems and avoid investments later on that would demand higher costs.

[79] PRONASAR is a 7-year World Bank funded RWSS project, launched in 2003, with The World Bank contributing US$50M, the Government of Peru US$12.6M, Local Communities US$7.6M, the Canadian International Development Agency US$5M and local Municipalities US$4.8M. The project objective is to increase the sustainable use of new and rehabilitated water supply and sanitation facilities in rural areas and small towns while emphasizing improvement in hygiene practices and training in operation and maintenance. The project expects: i) to implement W&S services for 1.3 million people in rural communities through the construction and rehabilitation of infrastructure; ii) to strengthen the capacity of the local communities for services management; iii) to reinforce the municipal district role—provincial level capacity to plan and oversee W&S services in rural communities; and iv) to strengthen the DNS capacity to perform its supervisory role.

INFRASTRUCTURE COVERAGE				
2000	Peru	South America	Countries w/ similar level of development	
			Including China	Without China
% population with access to water services	80	87	77	86
% population with access to sanitation	71	78	46	83
% rural population with access to water services	62	60	67	73
% rural population with access to sanitation	49	52	29	71

USER'S PERCEPTION OF INFRASTRUCTURE QUALITY			
2001	Peru	Regional comparators	Income comparators
Industrial water availability (1 : not available)	4.6	5.4	4.5
Tap water safety (1 : unsafe)	3.7	5.1	4.0

FUNDING INFRASTRUCTURE	
Central funding instrument	VMCS / FONCODES
Theoretical annual funding for rural water/sanitation (according to WB program)	10 million USD with WB support
Annual funding for rural water/sanitation observed in 1998-2002	7 million USD
Annual funding for entire water/sanitation sector in 1998-2001	244 million USD
Share of funding for rural infrastructure	3%
Annual funding required for the next 10 years to halve the rural population lacking access to water/sanitation services	16 million USD/year

PLANNING INFRASTRUCTURE	
Planning instrument	PRONASAR (National)
Involvement of local actors in planning	Significant
Local actors which are the most involved	District municipalities / organized communities
% of municipalities involved in a water/sanitation program	52%
Central agencies prioritize territories to allocate funding	YES
Criteria used by central agencies to prioritize across territories	**For both departments and districts :** Coverage (40%) Poverty (30%) Acute diarrhea prevalence (30%)
Who prioritize across projects	Local governments / communities (mesas de concertación)
Criteria used to prioritize across projects	Local participatory planning is used to prioritize beneficiaries and projects

PRIVATE SECTOR PARTICIPATION IN INFRASTRUCTURE	
Project preparation	Municipalities/users' committees with private execution
Construction	Private with participation of municipalities/ users' committees
Control and supervision of construction	Private with participation of municipalities/ users' committees
Operation and maintenance	Communities through users' committees; technical assistance from district municipalities

Service coverage appears to be correlated with community size. According to the data presented in the table below for rural communities—defined as those with less than 2,000 inhabitants—the smaller the population, the less coverage level of water/sanitation services. If the size of the rural community is related to poverty, the poorest communities lack access to services more acutely. If access to rural water services is low, the access to sanitation services is even lower, being the variation between 16% and 44 %, which demonstrates the lower priority for investment sanitation and the associated lack of a coverage increase strategy.

Table: Relationship between Population Size and RWSS Service Coverage

Population Rank	Population (in millions)	Population with drinking water services		Population with sanitation services	
		Million of inhabitants	%	Million of inhabitants	%
From 500 to 2000	2.9	2.4	82	1.3	44
From 200 to 500	3.1	1.9	59	0.9	28
Less than 200	2.7	1.2	45	0.4	16
Total	**8.7**	**5.5**	**62**	**2.6**	**30**

Source: Strategic Plan of the Sanitation Sub sector 2002 – 2011. Vice ministry of Construction and Sanitation, 2002.

The average household expenditure for water services is very low: it is about 1.6% of household income. However, there are regional variations: water household expenditure is about 2.0% for the Coast region, 2.0% for the Jungle Region and 1.4% for the *Sierra* (Mountain) Region were gravity fed systems (lower O&M costs) are the norm – thus requiring a lower tariff. These figures are above the previously estimated by the World Health Organization (2001) of around 0.8% of household income that should be dedicated to water expenditures, but well below the benchmark for affordability of 5.0% for water/sanitation. In nominal terms, a survey implemented by the national government indicated a national average of US$ 0.77 per month per household for water services.

B - Institutional framework

The institutional framework for the water/sanitation sector in Peru has been characterized by overlapping of planning, policy and normative functions between different agencies: SUNASS (National Regulatory Agency for Sanitation Services), DNS (National Directorate for Sanitation) , MEF (Ministry of Economy and Finance), DIGESA (General Directorate of Environmental Sanitation) in the Ministry of Health, FONCODES in MIMDES (Ministry of Women and Social Development), and local governments at the regional/departmental, provincial and district levels. The recent creation of the Vice Ministry of Construction and Sanitation within the Ministry of Housing, Construction and Sanitation in 2002 was aimed at reorganizing the sector to fill institutional voids and preventing duplication of functions.

Policy making authority for the water/sanitation sector is vested in the Vice Ministry of Construction and Sanitation, which is within the Ministry of Housing, Construction and Sanitation. Policy formulation and planning is the responsibility of the National Directorate of Sanitation (DNS). The PRONASAR Project Management Unit (PMU) technical staff oversees issues related to RWSS. The Strategic Plan for 2002 – 2011 and the National Sanitation Plan are the guiding documents for the DNS.

The social investment fund—FONCODES—has been the main government agency involved in the provision of RWSS infrastructure. Between 1991 and 1999, FONCODES invested US$361 million representing about 85% of total investment in RWSS in the period, estimated at about US$425 million overall. Because of lack of financial resources in year 2002, the investment in RWSS services was reduced to US$39 million, down from the US$75 million annual average in the period 1997-1999. In addition, the Ministry of Health and NGOs with bilateral support have reduced their investment participation on RWSS infrastructure. During 1999, the RWSS investment by other institutions besides FONCODES (including NGOs) reached US$16 million. The table below illustrates the RWSS investment participation by different institutions during 1990-1999.

Table: Investment in RWSS in the period 1990-1999 by Institution

Rural Water Supply and Sanitation (RWSS) Investment by Institution - (In Thousand Dollars)												
1990-1999(*)												
INSTITUTION	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total 90-99	%
FONCODES	$0.00	0.48	11.26	29.85	22.15	24.58	47.04	69.91	78.69	77.52	**361.47**	*85%*
Other government institutions(**)	$0.57	0.29	0.44	0.16	0.25	4.67	7.00	10.00	4.89	13.50	**41.78**	*10%*
NGOs	$0.99	1.00	0.82	1.97	2.00	2.50	2.75	3.00	3.50	3.70	**22.23**	*5%*
TOTAL	**$1.56**	**1.78**	**12.52**	**31.99**	**24.40**	**31.74**	**56.79**	**82.91**	**87.08**	**94.72**	**425.48**	*100%*

SOURCE: National Sanitation Plan 2003-2012 - Viceministry of Construction and Sanitation

(*) Includes financial expenditures
(**) Prior to 1995 includes investment from the Health Ministry. On and after 1995 includes the Popular Cooperation System, and the PRONAMACHS, INADE and Frontier Projects

Notwithstanding the increasing levels of financing dedicated to the RWSS, investment in urban water/sanitation absorbed about 82% of the total resources dedicated to the water/sanitation sector in the period 1990-1999. [80]

Even though the execution model developed by FONCODES emphasized rapid construction of infrastructure, there was a high risk of low-sustainability because the local institutions better positioned to provide post-construction technical assistance were not involved from project onset, and the beneficiaries did not contribute to the co-financing, often were paid for their labor contributions, and Water User Associations—or "*Juntas Administradoras de Servicios de Saneamiento*" (JASS)—were not trained to manage, operate and maintain the systems.

Traditionally, FONCODES' criteria for prioritizing investments has not included demand for services. Water and service standards used imitate those used in the urban areas, creating higher financial demands for rural communities that usually were unable to operate or maintain the systems. All these factors likely contributed to low levels of sustainability. Within PROSANAR projects, different appropriate technologies water/sanitation systems and different levels of service will be offered to the communities so that they can select an option according to their needs and financial capabilities to ensure long-term sustainability of the investments. The table below summarizes the per-capita costs of some of the system components used in the rural areas.

Table: Per capita costs of different RWSS service levels in Peru

Options of Service Levels	Per Capita Cost (US$/person)
Water Supply System with household connections	77
Sanitation with Latrines	22
Public Standpipes	41
Water Supply System Rehabilitation with household connections	31

Source: National Sanitation Plan 2003-2012 - Vice ministry of Construction and Sanitation

[80] FONCODES' social investment in the poor areas of Peru is not limited to RWSS. In the 1990-1999 period, this institution invested about US$1,453M (25% dedicated to RWSS), from resources coming from the National budget (66%), external debt (30%) and donations and self-leveraged resources (4%).

To comply with the Decentralization Law, FONCODES was absorbed by MIMDES in 2003 and is in the process of transferring its institutional functions to the Regional Governments. This process is scheduled to be completed by December 2004. However, the specific functions for the provision of RWSS of the new Regional Governments are still to be defined, and the institutional capacity for this purpose have to be created and strengthened at the receiving end.

The District Municipalities work more closely with rural communities, thus they play a critical role in supporting communities receipt of co-financing for service construction, technical assistance for service management, and operation and maintenance once the construction of the service infrastructure is completed. Service delivery at the rural level is usually performed by community associations (JASS) and information on quality and financial indicators such as service continuity, metering, unaccounted for water, production, tariffs and water quality needs to be consolidated.

Additionally, a Coordination Group supported by the World Bank Water/sanitation Program (WSP), consisting of government institutions, NGO's, and bilateral agencies working for the rural water sub-sector, has become an important body for sector policy discussion, definition of issues for research, performing pilots of innovative models for water/sanitation service delivery, and sharing of knowledge. This coordination group could continue to play an important role supporting the water sector with proposals for the new Water/sanitation Law, working pilots in the new decentralized framework, and documenting best practices to have impact in national investments.

C – Key issues and strategies

C1 - Prioritization of interventions

Planning capacity. The policy making and funds channeling to decentralized units (at the regional and municipal level) will demand the strengthening of the DNS planning and monitoring and evaluating capacity. For this strengthening to be effective, it must have the political support of top sector authorities, thus facilitating a quick and timely availability of financial resources to increase coverage and rehabilitation, such as those of PRONASAR. DNS should be prepared to strengthen the planning capacity of the provincial infrastructure boards so that water/sanitation issues are adequately considered and reflected in the provincial infrastructure plans

Prioritization methodology. Traditionally, the criteria FONCODES has used for prioritizing investments did not include demand for services and emphasized social criteria without considering the potential for the sustainability of investments. Furthermore, water and service standards used in project design imitated those used in the urban areas, creating higher financial demands for rural communities that sometimes were unable to operate or maintain the systems. With PRONASAR, the Government changed that approach, introducing demand responsiveness criteria in the prioritization for new and rehabilitated systems. Although departments and districts are initially selected based on social and poverty criteria, the municipalities become self-elected based on economic criteria (co-finance investments and provider of TA for the JASS), final investment decision is made by the community, agreeing to follow PRONASAR's rules, creating a JASS contribution in cash and labor and committing to pay all O&M costs. Initial prioritization could include complementarities with other public services and initial selection could be done by the provincial infrastructure boards.

C2 - Efficiency of operations and institutional framework

Sustainability of constructed systems. It is estimated that only 30 % of the water services are sustainable, while the rest remains at risk of falling into disuse after construction. The main reasons for the lack of sustainability are i) projects are not based upon effective demand; ii) communities are not properly trained in management, operation and maintenance issues; and iii) the community does not receive support after the construction of the service is completed. [81]

Furthermore, the lack of sufficient resources to cover the sector needs underlines the need to shift the focus to the sustainability of services (through community involvement and O&M cost recovery via tariff) and appropriate technologies instead of the previous approach that emphasized urban standards in system construction and rehabilitation.

Provision for investment in rehabilitation and expansion. When communities are faced with failing systems, they have no clear options as to what to do, or who to go to for assistance. Municipalities do not take responsibility for works in which they had no part and communities do not have the capacity to fund and carry out major repairs. PRONASAR is designed to provide funding for the rehabilitation of systems; and preventing the need for early rehabilitation of infrastructure with central government support, by empowering the community through the JASS and making them responsible for their systems with the support of local governments as they are also involved during the whole project cycle (e.g. at the beginning by co-financing the works and at the end by providing post-construction technical assistance).

These principles of the sector policy were outlined in the 2003-2012 Strategic Plan for Water/sanitation Services, including cost-recovery via tariff and better subsidy targeting to the poor. Investment subsidies would also be linked to service efficacy. For the rural sector, the strategy outlined in the Plan includes contribution of the community and municipalities of at least 20% of investment, strengthening of community organizations (through the formation of Water User Associations or *Juntas Administradoras de Servicios de Saneamiento -JASS)* and capacity to cover recurrent costs, and increased participation of the municipalities in service provision. The strategy also calls for non-reimbursable grants and other donations to be the focus for populations of less that 500 inhabitants.

In the Strategic Plan, three broad guidelines are advanced for the design of a subsidy policy: i) tariffs should cover costs in order to eliminate dependency on the central governments, ii) subsidies should be targeted to the poorest population and iii) investment subsidies should be linked to service efficiency. In addition, for the rural areas, the Plan outlines three strategies:

- the community and the municipality participate in the design process and select the level of service according to their capacity and should contribute at least 20% of the costs of new water/sanitation works and 40% for improvement and rehabilitation works;
- user payments should cover at least operation and maintenance costs; and
- the establishment of Water User Associations (JASS) is a prerequisite for the execution of works.

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[81] COWATER. *Servicios de consultoría para la Planificación del Proyecto Nacional de Agua y Saneamiento Rural (PRONASAR)*, Informe No. 2 – 29 de Agosto del 2001.

Technical assistance to build up institutional capacity at the local level. Municipalities have not carried out their oversight responsibility for water/sanitation service to ensure that communities are adequately operating their facilities and the Ministry of Health has not been able to provide the long-term and permanent hygiene education required to internalize the health benefits of new water/sanitation systems. However, since 2003, DNS and PRONASAR have made efforts to involve local municipalities in the projects aiming at improving their capacity in providing post-project technical assistance. PRONASAR also works closely with Ministry of Health and is a partner of the Hand-washing Initiative for Peru.

Institutional framework. The institutional reform undertaken in 2002 helped reduce the numerous overlapping functions of the past. Further consolidation is required to adequately attend the demands of the evolving decentralization process. The experience of the Rural Roads Program with the Provincial Road Institutes are to be considered as possible units from where the technical expertise can be developed, the actions of municipalities can be monitored, and the training of the JASS can take place.

C3 - Effectiveness to achieve impacts

Completion and Updating of Legal framework to strengthen provision and sustainability of the RWSS services. Law 908 for Basic Sanitation passed in year 2000 has been revoked, and the previous Water Sector Law 26338 passed in 1994 is currently being applied for the W&S sector. This Law does not specifically address the sustainability of RWSS investments, and does not consider the new decentralized institutional framework and its functions. The regulations and bylaws of the existing Law are still pending. The DNS with the support of NGOs and multilaterals is considering the revision of the formulation of a new Water/sanitation Law.

High percentage of indigenous population in rural areas. The provision of RWSS services in Peru should take into account the high population of indigenous people living in rural areas. The understanding of their cultural values, perceptions and attitudes towards water and excreta disposal methods is critical for the delivery of sustainable projects. Similarly, hygiene education programs are paramount to ensure full beneficial impacts on health by the access of water/sanitation services.

Monitoring. The successful implementation of these actions and strategies will depend on the proper monitoring of their progress and ultimate impacts. To this end, it is critical to develop the monitoring mechanisms in collaboration with municipalities and emphasize sustainability and O&M indicators, along with those that would help tailor the institutional strengthening initiatives and measure the impacts on the rural poor.

ANNEX 2.C. RURAL ELECTRICITY

A - Status of rural electricity infrastructure and services

Peru's energy policy has addressed rural electrification since 1963 when a pilot program was launched in *Valle del Mantaro*. However, the topic received little attention from Peruvian policy makers until 1978 when rural electrification became a priority with "mini-hydro" (50 to 2000 kW) considered as the most relevant technology to extend coverage to rural areas. A significant step was taken in 1982 with the passing of the Electricity General Law and the creation of a specific division to promote electrification at the provincial, district and rural levels. In particular, a 25% tax was levied on large consumers (above 160 kWh per month) to finance rural electrification. However, little progress was observed before 1988: in 1983, only 16% of the Peruvian population had access to electricity services and this proportion was still less than 18% in 1988. The opening of the sector to private participation in 1992 with the passing of the Electricity Concession Law (LCE) did not address the issue of rural electrification but in 1993, the *Direccion Ejecutiva de Proyectos (DEP)* was created with the specific objective of increasing access to electricity services in rural areas. Finally, in 2002, a specific law (*Ley de Electrificacion Rural de Zonas Aisladas y de Frontera*) was promulgated in order to complement the LCE, focusing specifically on the particular problems of providing electricity service to the rural areas. In 2004, the implementation of this law has been delayed due to conflicts with later decentralization laws. [82]

Between 1993 and 2002, the DEP has invested around 560 million USD, providing 4.7 million people with access to electricity services. As a result, national coverage increased from 57% in 1993 to 75.3% in 2002. During these 10 years, the DEP built 2,447 km of transmission lines and 13,895 km of distribution lines. The generation capacity was increased by 39 MW through mini-hydro projects, 111 MW with thermal power plants and 0.8 MW with renewable energy technologies (solar and wind).

In spite of the progress achieved in the last 15 years, access to electricity services in rural Peru remains low according to South America's standards. In 1999, only 73% of the national population had access to electricity services (compared to an average of 89% in South America) and, in rural areas, this proportion fell to 30% (60% in South America). Low coverage of electricity services translates into low consumption levels of commercial energy services and higher consumption of low efficiency traditional fuels with adverse consequences for health and the environment.

In addition, electricity services remain expensive in Peru when compared to other Latin America countries (for residential consumers, it is the highest in South America after Uruguay). In rural areas with off-grid technologies, the provision of electricity services is likely to be more than twice as expensive as the interconnected urban areas.

An ambitious plan was designed to increase electricity coverage in rural Peru in the next decade (2003-2012). With a total investment of 960 million USD, this plan could help bring electricity services to 4.2 million Peruvian and reach a coverage ratio of 91% in 2012.

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[82] A new Law to Regulate the Promotion of Private Investment in Rural Electrification was passed by Congress on July 1, 2004. While it is too early to assess the full implications of the law, it contains a number of elements that would support the proposed strategic actions listed later for rural electrification, including incentives for private investment, decentralized planning, and the creation of a "renewed" Rural Electrification Fund. As it happened with the 2002 law, additional efforts will be needed to develop and implement the legal and regulatory regulations.

INFRASTRUCTURE STOCK				
	Projects financed by DEP 1993-2002		Rural electrification plan for 2003-2012	
	# of projects	Infrastructure stock	# of projects	Infrastructure stock
Transmission lines	42	2,447 km	33	2,928 km
Distribution lines	277	13,895 km	243	26,567 km
Small hydroelectricity plants	59	39.4 MW	60	7.3 MW
Thermal power plants	170	110.8 MW	NA	4.7 MW
Renewable energy (solar, wind)	38	0.8 MW	NA	12.3 MW
Total investment (million USD)	560		960	
Beneficiary population (million)	4.7		4.2	
Investment/beneficiary population	119 USD		229 USD	

INFRASTRUCTURE COVERAGE				
	Peru	South America	Countries w/ similar level of development	
			Including China	Without China
% of population with access 1999	73	89	NA	NA
% of rural population with access 1999	30	60	NA	NA
Commercial energy use (kg oil eq. / capita)	502	1,134	988	1,313

COST OF SERVICE			
June 2002 (US cents/kWh)	residential	commercial	industrial
Price of electricity in Peru	9.32	6.27	5.93
South America average	7.20	7.44	5.10
Users' perception of electricity cost	Peru	Regional comparators	Income comparators
(1=very expensive, 7=very cheap) 2001	3.5	3.7	3.6

FUNDING INFRASTRUCTURE	
Central funding instrument	Rural Electrification Fund
Theoretical annual funding for rural electrification (0.85% of national budget)	90 million USD
Annual funding for rural electrification observed in 1998-2002	43 million USD
Annual funding for the entire electricity sector in 1998-2001	87 million USD
Share of funding for rural infrastructure	49%
Annual funding required for the next 10 years (rural electrification plan)	150 million USD

PLANNING INFRASTRUCTURE	
Planning instrument	National Plan for Rural Electrification
Involvement of local actors in planning	Limited
Local actors which are the most involved	All municipalities
% of municipalities involved in a rural electricity program	20%
Central agencies prioritize territories to allocate funding	NO (they directly prioritize across projects)
Who prioritize across projects	Central agencies (MEM/DEP)
Criteria used to prioritize across projects	Status of project development (5%) Existence of infrastructure (5%) Provincial coverage (50%) Project NPV (5%) Per capita investment (5%) Poverty (25%) Geographical location (5%) Complementarities (0%)

PRIVATE SECTOR PARTICIPATION IN INFRASTRUCTURE	
Project preparation	MEM/DEP
Construction	Private
Control and supervision of construction	Private with participation of municipalities
Operation and maintenance	In theory private operators but most distribution companies are state-owned

A 2003 survey in three areas with rural electricity programs [83] (two in the Sierra and one in the Costa) has shown that electricity is mostly used for lighting, radio and—in certain cases—TV. In the rural Sierra, access to these new communication medias has encouraged the youngest generations to migrate to urban areas but productive use of electricity remains limited, possibly because of insufficient complementarities with other services. One example of productive use of electricity services is the case of the *Taquile* islands (see Box A.2.). A combination of infrastructure services (including electricity) has stimulated the development of tourism in these rural areas and brought significant additional income to poor households.

Box A.2. A successful example of rural electrification : the case of the *Taquile* Islands.

The island of *Taquile* is located in lake *Titicaca* (*Puno* department). It has a population of 1,400 (350 households) on a 5.7 km2 area. The main activity is agriculture and artisan works (textiles) but tourism has also developed recently.

Domestic Photovoltaic Sistems (SFD in Spanish) were experimented in 1996, based on a contract between MEM and the Renewable Energy Center of the National Engineering University (CER-UNI). During the first phase, 100 SFD were installed, with a self management approach including a strict control of equipments. Installation was financed by MEM but households had to buy equipments (US$150 down payment + monthly payments during three years. Payments were used to create a revolving fund (FONCER in Spanish) which provided for the financing of the installation of 72 other SFD in 1998 and to expand coverage to other *Titicaca* islands (*Uros* and *Soto*). In 1999, the CER-UNI decided to continue the project without the support of MEM and obtained a US$100,000 loan for the expansion of the project to three more islands, reaching a total of 421 SFD and bringing electricity services to 28% of the population).

6 years after implementation, the project has proved to be highly successful : there are no payment arrears from users and operation and maintenance costs are fully covered by users' fees. However, the economic potential of the islands and the existence of specific income-generating activities (tourism) may have been a crucial factor of success for this project and may be a strong limitation to a transfer of such experience to other areas of rural Peru.

Source: Aragon (2004), and World Bank (2003).

B – Institutional framework

Since 1993, the DEP has been the major actor in charge of rural electrification in Peru. Its responsibilities include promotion, planning (preparation of the 10 year Rural Electrification Plans), financing and procurement. The DEP contracts private consulting firms and construction companies to prepare technical studies, supervise and perform physical works. DEP resources come from the General Budget and from foreign financing (grants and loans).

Once the infrastructure is built, electricity assets are transferred to publicly owned distribution or the state-owned company ADINELSA (*Empresa de Administracion de Infraestructura Electrica S.A.*). ADINELSA contracts the operation and maintenance of rural systems to public or private electricity companies, under a concession model. When contracting fails, ADINELSA takes over the direct responsibility of operating and maintaining the infrastructure.

Twenty-one distribution companies operate/maintain the infrastructure and deliver electricity services to the population. According to the LCE, all of them should have been privatized. However, in 2004, only two enterprises operating in the Lima area are fully privately-owned.

[83] Aragon, Ismael - *Análisis de la Provisión de Servicios de Electrificacion en las Zonas Rurales del Peru* – World Bank, 2004.

Although the on-going decentralization process should ultimately lead to an increase in their involvement in rural electrification, local governments still are little involved in the planning, construction or operation of electricity infrastructure. Only 20% of Peruvian municipalities declare they are involved in one way or another in a rural electrification program. Some consultation of local governments is done by the DEP at early planning stage (such as through the "electrification committees") but, to a very large extent, prioritization across territories or projects remains the exclusive responsibility of the central level. In the construction phase, some municipalities and/or local communities have, in certain cases, contributed by providing materials, fuel or labor but this in-kind contribution remains informal. At operation stage, local government are generally not involved except in a very few cases (for example, two distribution enterprises – EMSEMSA and EMSEUSA – are owned by municipalities).

C – Key issues and strategies

C1 – Prioritization of interventions

Planning methodology: The current methodology includes a combination of economic and social criteria. However, the weight given to social criteria (poverty in particular) is lower than for other infrastructure sectors (water and rural roads). Ultimately, this has some consequences for the targeting of rural electricity investments: the investment level in rural electricity per rural capita is slightly negatively correlated to the rural poverty levels of the departments, while it is positively correlated for roads and water/sanitation. This reduces opportunities for complementarities across infrastructure services. For example, access to electricity services only is found to have a slightly negative impact on households' income while access to both electricity and water services has an effect on household income about twice as large as for access to water services only. [84] It is true that for the poorest segments of the rural population, electricity services may often be a second priority or even a luxury good compared to access to water/sanitation or to transportation services. However, even in the poorest areas, they can be a critical asset to seize income-generating opportunities (see the example of the *Taquile* Islands). The planning methodology should ensure that the development of electricity services in rural areas is integrated with local development strategies.

The planning process is also facing considerable challenges due to the lack of good quality, up-to-date, demographic and socio-economic data. Despite DEP's efforts to solicit relevant information through electrification applications from municipalities, the overall planning process is affected by out-dated demographic data (the last country-wide census took place in 1993), and socio-economic data for communities of questionable validity. It appears that this situation has resulted in faulty assumptions regarding demand projections and produced over-sized systems that render projects economically unworkable.

Increasing marginal cost to raise coverage in rural areas: The cost of bringing electricity services to an additional Peruvian has averaged US$119 during the last 10-year plan (1993-2002) but it has been estimated to US$229 for the next 10-year plan. Even when accounting for inflation, there is large evidence that expanding coverage becomes increasingly costly, particularly when coming to rural areas with low population density. Reasons for this include network effects - when on-grid technologies are used - and reduced opportunities for economies of scale because of the lower population density.

[84] Escobal and Torero, 2004.

These increasing marginal costs explain why allocation of resources should not be exclusively based on social criteria. Indeed, in rural Peru, extreme poverty rates will be the highest in the most isolated rural areas where providing electricity services will be the most costly. However, in order to improve the effectiveness of investments in rural electrification and have an impact on rural poverty, a prioritization methodology allowing both social and economic perspectives to be taken into account should be designed, in close cooperation with other infrastructure sectors to promote complementarities across sectors.

Funding levels. With an annual allocation of 43 million USD, investments in rural electricity have been the highest of all rural infrastructure sectors in the past 5 years. However, they remain largely insufficient to bridge the infrastructure gap in rural Peru (up to 150 million USD per year for the next 10 years is needed). Moreover, rural electrification in Peru is affected by irregular, and to a certain extent unpredictable, budgetary allocations. This uncertainty affects the planning and economic efficiency of system expansion, because it hinders the optimal design and execution of projects. In addition, due to the fluctuation of annual budgetary allocations, the financing system for rural electrification becomes vulnerable to political interference that tends to compromise the economic and financial viability of projects.

The lack of predictable financing for system expansion negatively affects the interests of the private sector for rural electrification. The extension and service of electricity system is a business that requires long-term perspective, and specialized personnel and equipment. Uncertainties regarding the availability of funds for the sector increase the risk perceptions for private investors, and keep them from engaging pro-actively in rural electrification projects.

The establishment of a rural electrification fund, independent from annual budgetary allocations, could resolve some of the above mentioned issues. This is the approach undertaken in the telecommunications sector of Peru, where the system expansion to rural areas is financed by ear-marked funds from 1% of the total telecommunications revenues (FITEL); these funds are managed by the telecommunications regulator (OSIPTEL). Similar funds for rural electrification, where resources are generated within the sector, independently from state budgets, are in place in Chile, managed by the National Commission of Energy, and in other countries of Latin America.

C2 – Efficiency of operations and institutional framework

Private sector participation in rural electrification. Although the sector was liberalized in 1992 with the Electricity Concession Law (LCE), private participation in rural electrification remains low: in particular, the majority of distribution enterprises remain state-owned (only the ones operating in the Lima area have been privatised). A new legal and regulatory framework, incorporating provision of minimum subsidies is required, such as that used in Chile. Private sector participation could be promoted through the use of well-designed concession models or management contracts. The specific case of the two existing municipal distribution enterprises—EMSEMSA and EMSEUSA—should be closely assessed in order to design the best transition toward private-sector management.

Incentive framework. As part of a new legal and regulatory framework, the incentive scheme should be redesigned (possibly with the use of output-based subsidies and least-cost auctions) to attract private investors and operators in electricity distribution to rural areas. At present, all capital cost subsidies for capital expenditures and systems operations are effectively directed to DEP and ADINELSA; there is no institutional framework to provide access to such incentives to potentially interested private providers of electricity services. Subsidies necessary to enlarge access to rural populations should be targeted to ensure that they benefit those who mostly need them and reach an

efficiency/effectiveness optimum. The role of ADINELSA should be assessed and clarified in order to avoid conflicts of interest that could penalize the entrance of private operators in the rural electricity market.

Involvement of local governments. DEP is now beginning to involve regional and local governments in the design and implementation of rural electricity programs. Participatory planning should be deepened in order to take the needs of rural population into account more and to better align rural electricity investments with local development strategies. Local governments – particularly municipalities - have a closer understanding of what the rural population needs are: they can prioritize what the highest welfare benefits triggered by access to electricity services would be, whether they would come from connecting individual households (see the example of *Taquile*), from public lighting, from connecting productive facilities (small industries, municipal markets) or from connecting social infrastructure (schools, health centers). The levels of governments most involved should take the technical capacity at the local level into account, as well as possible opportunities for economies of scale and the need to improve coordination with other infrastructure sectors.

C4 – Effectiveness to achieve impacts

Financial Viability of Rural Electrification Operations and Tariff Structure. Electricity tariffs established by the regulator are conceived and designed, under the Law for Electricity Concessions, mainly for areas with certain levels of consumer densities that primarily reflect the cost structures in urban, or peri-urban, areas. In such zones, the tariff level corresponds to an efficient economic cost for electricity provision, and allows for commercially viable distribution operations that are attractive to the private sector (indeed, private distributors in Lima have enjoyed high rates of returns). However, for rural zones, preliminary investigations indicate that the current tariff structure results in unsustainable economically and financially electricity services operations.

The cross-subsidies scheme established under the Social Fund for Electricity (Fondo Social de Electrificacion, FOSE) is a necessary mechanism to alleviate the high tariffs for poor consumers, and, in effect, re-balance electricity prices among different geographic areas. FOSE, however, is subject to reviews that instill a level of uncertainty for the commercial sustainability of operations in rural areas (which during the early years of electrification are usually characterized by low demand). This mechanism needs to be formalized for longer time periods and expanded appropriately to allow for the longer term sustainability of rural operations.

Employment generation. The development of infrastructure services in rural areas is an opportunity to create income-generating activities, by providing an adequate level of maintenance. In particular, some labor-intensive tasks related to the routine maintenance of electricity infrastructure could be performed by private SMEs or micro-enterprises. Further analytical work should be conducted to explore this possibility, including an assessment of the requirements in terms of technical capacity building at a local level. The successful experience of the micro-enterprises involved in the maintenance of rural roads could provide a basis for such an analysis. Employment opportunities could be generated for men and women.

Technology. The existing technical norms for systems design and the regulated requirements for quality of service probably exceed the practical needs of rural consumers and this imposes additional, unnecessary, costs for the operations of rural electricity systems. While the DEP has recently adopted standards more adequate for the rural electricity markets, further work needs to be done on the part of the regulator for the quality of service regulations to account for the specific needs of rural populations and the financial and economic sustainability of rural systems.

The initial strategy of the Peruvian government to develop rural electricity services relied significantly on the development of small hydroelectricity plants. The 1993-2002 rural electrification plan also illustrated the high potential of other renewable sources of electricity (solar, wind). In remote areas of rural Peru, off-grid technologies are the most cost-effective solutions to expand coverage. These technology choices have to be carefully assessed and cost/benefit evaluation tools designed in order to guide local and central planners in their investment choices.

Transfer of responsibilities to local governments. The current model of rural electrification policy relies heavily on a central agency—the DEP—which concentrates the whole technical and management expertise for planning and implementation. A transfer of planning responsibilities should be performed together with a transfer of corresponding budgetary resources and of the related technical and management expertise. A realistic capacity-building plan should be designed to allow knowledge diffusion at the local level, involving the DEP and specialized local institutions (preferably at the provincial level).

ANNEX 2.D. RURAL TELECOMMUNICATIONS

A – Status of rural telecommunications services

Concurrent with sector privatization and liberalization, the Peruvian government established an innovative universal access program in 1993 (known as the *Fondo de Inversion en las Telecomunicaciones* or FITEL) that dramatically increased access to ICT services – both phone and internet– to Peru's poorest and most isolated communities. This program has become a global best practice for output based aid (OBA) programs in telecommunications and other sectors. As a result of four FITEL-sponsored and subsidized tenders totaling US$58.6 million, private operators installed 6,517 public phones and 514 Internet centers that use satellite technologies in rural districts by the end of 2003, benefiting more than 6.74 million people living in rural areas and resulting in weighted average distance required to reach a public payphone to go from 40km to 5.8km. Internationally, an average distance of around 5 km is a relatively common Universal Access target. While many localities in rural areas are still not within 5 km of a FITEL payphone, FITEL has reached the vast majority of the places where operators can supply service in a commercially viable manner with the help of start-up subsidies. As a result of FITEL's public Internet projects and the pioneering work of *Red Cientifica Peruana* (RCP), a private sector company with an NGO, Peru has a very high level of community access to Internet, concentrated in urban areas, but with some presence in rural areas. The latest generation of FITEL and MTC initiatives will likely further increase this access.

Despite dramatically increasing access to fixed and mobile phones, Peru has far less coverage of telephone services compared to other countries in the region and of similar incomes. In 2000, the cumulative number of fixed and cellular phone lines was 117 per 1,000 inhabitants, compared to 294 for South America and 177 for countries with a similar level of development. In 2002, fixed line and cellular penetration levels of 78 and 86 per 1,000 people were still far less than those of other Latin American countries. Most notably, Peru's cellular penetration level of 78 per 1,000 people is the worst of 10 comparable Latin American countries as can be seen in Table 1.

Table 1: Peru's telecommunication infrastructure

Country	Pop 2002 (m)	% Rural 2001	Pop/km^2	GDP/capita (US$, 2002)	PSTN Lines/1000 Pops (2002)	Cellular Lines/1000 Pops (2002
Brazil	174.5	18.3	21	2,593	223	201
Mexico	100.9	25.4	51	6,315	147	255
Colombia	43.7	24.5	40	1,881	179	106
Peru	26.7	26.9	21	2,131	78	86
Venezuela	25.1	12.8	275	3,757	112	256
Chile	15.6	14.0	21	4,115	231	428
Ecuador	13.1	36.6	46	1,076	110	121
Bolivia	8.7	37.1	8	885	68	105
Paraguay	5.5	43.4	14	982	47	288
Uruguay	3.4	7.9	20	3,618	279	155

Source: World Bank.

Contrasting with the limited coverage, the quality of telecommunications services is slightly better ranked by users than in the rest of South America. The situation is also significantly less favorable in countries with a level of development similar to Peru's.

This availability/quality assessment differs for Internet and telephone services: while access to telephone services remains lower than in comparable countries, public access to the Internet is significantly better in Peru, as is the proportion of Internet users in the population. On the other hand, while users seem to be more satisfied by the quality of Peru's telephone/fax services, they rank Peru lower than comparable countries for speed and cost of Internet services.

According to the MTC, lack of sufficient and lower-priced terrestrial backbone infrastructure in Peru is severely hampering the ICT sector development. *Telefonica del Perú* (TdP) is the only company with any significant backbone network in the country, though nearly all of this is concentrated in the costal region and the prices it charges are very high. This lack of terrestrial backbone in Peru makes satellite the only choice for data or voice connectivity in most of the country. However, unlike terrestrial backbones, satellites exhibit low economies of scale and have significant low traffic restrictions.

INFRASTRUCTURE COVERAGE				
	Peru	**South America**	**Countries w/ similar level of development**	
			Including China	**Without China**
Fixed/mobile telephone lines/ 1,000 people 2000	117	294	178	177
Internet users per 1,000 people 2000	96	44	19	24
% villages with a public phone 2003	9.3	NA	NA	NA

USER'S PERCEPTION OF INFRASTRUCTURE QUALITY			
	Peru	**Regional comparators**	**Income comparators**
Telephone/fax infrastructure quality (1 : low)	5.5	5.3	4.8
Public access to Internet (1 : very limited)	5.2	3.8	3.2
Speed/cost of Internet access (1 : slow and expensive)	3.4	3.8	3.6

FUNDING INFRASTRUCTURE	
Central funding instrument	FITEL
Theoretical annual funding for rural telecommunications	10-12 million USD
Average annual public subsidies for rural telecommunications observed in 1998-2002	11 million USD
Annual funding for entire telecommunication sector in 1998-2001	656 million USD
Share of public subsidies for rural infrastructure	2%

PLANNING INFRASTRUCTURE	
Planning instrument	National program for rural telecommunications
Involvement of local actors in planning	Limited
Local actors which are the most involved	Private sector companies and local entrepreneurs. Efforts underway to work with municipal governments
Central agencies prioritize territories to allocate funding	NO (they directly prioritize across projects)
Who prioritize across projects	Central agencies (OSIPTEL and MTC)
Criteria used to prioritize across projects	OSIPTEL and MTC have published policy priorities and tender documents for FITEL project contain additional details

PRIVATE SECTOR PARTICIPATION IN INFRASTRUCTURE	
Project preparation	Private operators and for government-subsidized projects OSIPTEL-FITEL and beginning in 2004, MTC.
Construction	Private sector with limited public subsidies for capital investment in OSIPTEL-FITEL-funded projects
Control and supervision of construction	OSIPTEL-FITEL directly or through private operators.
Operation and maintenance	Private operators

B - Institutional Framework

Peru's 1991 Telecommunications Law established a competitive framework for the sector. An independent regulatory agency and a universal service fund were established in 1993. The incumbent operator was privatized in 1994, and the sector was fully liberalized in 1998 when TdP's fixed-line monopoly ended. Since 1998, the provision of ICT infrastructure has been fully open to competition, more than 53 concessions have been granted for local and long distance service, four companies compete to provide mobile telephone services, and hundreds of companies are registered to provide internet service provision (ISP) and a wide-range of ICT infrastructure and services.

In addition to legislation establishing a regulatory framework for private provision of telecom services, Peru has also implemented a basic framework comparable to other countries in the region for electronic transactions. Legislation to support e-signature (*Ley de Firmas y Certificados Digitales*) and address cybercrimes dealing with electronic fraud and child pornography have been passed (though regulations are still pending and expected within the coming six months). An electronic invoicing law is expected to be adopted in July and regulations completed before the end of the current calendar year. Data privacy and creation of a *Comisionado para la Proteccion de la Privacidad* remains, however, under a presidential directive and has not been legislated despite a draft prepared in 1999.

The lead government agencies responsible for ICT infrastructure and services development since the early-1990s have been the Ministry of Transport of Communications (MTC) as the government policy maker, OSIPTEL as the sector regulator, and OSIPTEL's FITEL as the universal service agency. Beginning in 2000, a growing number of other government agencies, notably the Ministries of Agriculture, Education, Economy and the Presidency of the *Consejo de Ministros* (PCM) began to develop ICT-related programs. Table 2 provides a non-exhaustive summary of some of these initiatives.

An institutional structure has evolved that can be characterized as largely fragmented, in which different entities administer mostly separate ICT initiatives that frequently have not been well coordinated, duplicate efforts and do not make the best use of resources and infrastructure. The government recognized this and in 2003 established the *Comisión Multisectorial para el Desarrollo de la Sociedad de la Información* (CODESI) presided over by the PCM and including all ministries and key agencies (CONCYTEC, OSIPTEL, INEI, INDECOPI). It has a short-term mandate, using resources and staff from line ministries, to take inventory of initiatives across the country, identify ways to improve coordination between initiatives and entities, and particularly to help the government develop and implement a more strategic approach to better employ ICT for economic and social development.

To date, CODESI has generated a draft e-Peru action plan [85] and orchestrated six working groups to help deepen and complete the plan. While the final report is scheduled for July 2004, draft documents reveal its emerging institutional and strategic direction. They highlight the role of the Government as promoter and facilitator of the development of the Information Society and propose a participative strategy (government, private sector and civil society) managed and coordinated by a centralized organization that designs, monitors and evaluates the evolution of the Information Society. The three top priorities reflected in the five-point plan (the other two are education and organization) are to develop an Information Society through: (1) ICT infrastructure initiatives that

[85] *"e-PERÚ: Propuestas para un Plan de Acción para el Acceso Democrático a la Sociedad Global de la Información y el Conocimiento", Comisión Multisectorial para Masificar el uso de Internet, Ministerio de Transportes, Comunicaciones, Vivienda y Construcción (MTC), 2003*

address perceived ICT infrastructure gaps and reach low-income segments of the country at an affordable price; (2) e-government, to foster transparency and efficiency within the government, improve working relations with citizens and businesses, reduce corruption risks and democratize decision-making processes; and (3) e-business, to improve industry economic competitiveness, create employment, and reach international markets.

FITEL is the major source of financing for rural telecommunications. Currently, FITEL raises approximately $12 million per year from a 1% tax on the revenues of telecommunications operators. On the other hand, the MTC raises approximately $20 million per year from license and spectrum fees but, until 2003, the MTC's funds were mostly returned to the general treasury. With the establishment of the MTC Project Office in 2003, the MTC has sought approval from the MEF to retain some of these funds for its ITC programs. FITEL's funds are required, under Peru's telecommunications law, to be used for ITC projects. FITEL has indicated that most of its existing funds that have and will be raised for the next several years have been allocated to cover the subsidies for on-going FITEL projects (FITEL I through IV) and to the newly unveiled FITEL V project.

Finally, the ICT sector is probably – even more than rural electricity – the least decentralized of all rural infrastructure sectors. In 2003, only 7% of all municipalities (2% of district municipalities) were reporting to be involved in the management of a telecommunications program. Planning and prioritization of investments remain almost exclusively managed at the central level although FITEL is developing its dialogue with local governments in particular through capacity-building initiatives.

Table 2: Government ICT initiatives

ENTITY	*INITIATIVE*
	Government Initiatives
Commision de Desarollo de la Sociedad de la Informacion (CODESI)	CODESI was established in 2003 to better coordinate the growing number of government ICT initiatives and to help the government develop and implement a more strategic approach for the ICT sector to foster economic and social development. All ministries participate in CODESI with MTC acting as the commission's secretary. CODESI held its first meetings in late 2003 and established six working groups charged with cataloguing and assessing the needs and challenges in the following areas: infrastructure for the information society (chaired by MTC), development of capacity/human resources (chaired by the Ministry of Education), applications (CONYCTEC), ICTs for productive uses and services (INDECOPI), e-government (Presidency of Ministries) and preparation for the 2005 World Summit on Information Society (Ministry of Foreign Affairs). CODESI will issue a report on the findings and recommendations of its six working groups in July 2004. Depending on the finding of the CODESI report, CODESI will either be dissolved or given a new mandate. Preliminary reports indicate that CODESI members are exploring financing options to enable CODESI to continue its work.
FITEL – OSIPTEL FITEL is the Investment Fund for Telecommunications established by the government to promote the development of	**(1) Public Telephones** Four FITEL-sponsored and subsidized tenders totaling US$58.6 million, enabled private operators to install 6,517 public satellite phones in rural areas. The programs serve more than 6.74 million people living in rural areas and resulted in a decrease in weighted average distance required to reach a public payphone from 40km to 5.8km. **(2) Internet Access** In 2003, two FITEL tenders included requirements that operators provide 514 community Internet access points in certain district capitals. In 2004, FITEL

ENTITY	*INITIATIVE*
ICTs in rural and low-income areas	obtained approval to launch FITEL V, a US$1.2 million pilot project aimed at providing both Internet access infrastructure and capacity-building in a more integrated manner (done in coordination with municipal governments, operators and NGOs) in 68 rural locations with a combined population of 144,535 or 2% of the rural population – 42 of which are provincial capitals and 26 district capitals. FITEL V, based on lessons learned from prior FITEL Internet projects is expected to be implemented in September 2004. Lessons learned will be used to expand the project to the remaining 818 district capitals. Commercial sustainability and local content development and capacity building are key components of FITEL V. **(3) Content-Development and Capacity-Building** FITEL has increasingly included components aimed at stimulating demand, developing local content and capacity-building with local governments and NGOs in areas where they have implemented their Internet project. Some of these initiatives include a US$515,000 Sistema de Información para el Desarrollo Rural that received support from the World Bank's Infodev; and Información Agraria Vía Internet para Agricultores de la Junta de Usuarios del Valle del río Chancay-Huaral. This project cost is US$212,153 and directly targets 6,000 inhabitants and indirectly 16,000 inhabitants. FITEL-OSIPTEL has also partnered with several institutions including the Peruvian center for Social Studies (CEPES), Estacion Experimental Donoso (INIA-MINAG), Technical Administration of Riego District (ATDR-Huaral-MINAG), General Secretariat for Agriculture information (DGIA-MINAG), and the Chancay-Huaral District Commission for Riego.
Ministry of Telecommunication and Transportation	**(1) Rural Internet.** $350,000 pilot in two of Peru's poorest regions – Huaraz and Ayacucho. This pilot is focused on providing Internet access and local content for economic development to 30 rural villages smaller than those served by FITEL's programs. If MEF approval is obtained for the overall project, the project seeks to serve 1,050 rural communities with an estimated budget of $14.25 million not including nearly $900,000 in satellite and Internet access costs which MTC indicates will be covered $36 in monthly fees that will be covered by provincial governments and $36 through user fees. **(2) Peruvian Government Communications Platform (PCEP per Spanish acronym).** The Ministry of Finance recently approved an MTC $10.5 million project to build and manage a government telecommunications network that will link all Ministries in Lima with their offices in Lima's 24 departments. The goal is to lower costs of government communications, to stimulate increased development and use of e-government applications and to aggregate e-government traffic. MTC is working out operational details including whether network management and operation will be outsourced or provided by the government. **(3) National Broadband Network (RNBA per Spanish acronym).** This initiative seeks to address a major bottleneck for telecommunications and Internet development in Peru – the lack of adequate and affordable backbone access, especially in areas other than the coast. The network would largely be a fiber-optic network that would use existing or new electric transmission and distribution towers. If the initiative simply builds a network that complements the existing, though limited, fiber optic networks, the MTC estimates the cost of 3,753 km network will be $55.6 million. If the goal is to build a national network to serve all 24 regions, the MTC estimates the 6,595 km network will cost $100.1 million. An in-depth options, demand and feasibility study will need to be carried out.
INICTEL (National Institute for Telecomm Training and Research)	***Programa Básico de Aplicación de Tecnologías de la Información y Comunicación para Zonas Rurales.***
Ministry of Education	**(1) Edured.** **(2) Proyecto Huascaran**

ENTITY	*INITIATIVE*
Instituto Nacional de Estadistica e Informatica	**Wiñay** This ambitious 2002 initiative seeks to help with Peru's decentralization plan by helping 1,634 municipal governments to develop and manage e-government information and application with special focus on gathering financial and statistical information though it also proposed to use ICTs for distance learning and e-health. A pilot project was planned in Junin.
Ministry of Economy PROMPYME	**(1) e-procurement** **(2) MyPymes Marketplace** **(3) Failed initiative to transform urban tele-centers into Business Centers (CABIPYMES)**
CONCYTEC (*Consejo Nacional de Ciencia y Tecnología*)	**(1) National Emergency Plan for ICT Development Innovation 2002-2006** – Proposal **(2) IADB-CONCYTEC – PRODUCE-MEF** – Multi-sectoral project that aims to design a mechanism for finance ICT projects to increase competitiveness in the country. This project is developed in collaboration with the IADB, through non-refundable funds from the Japanese Special Fund.
Private Sector and Non-Government Initiatives	
***Red Científica Peruana*(RCP)** RCP is a private company/NGO	RCP in 1994 became one of the first private companies in Latin America to launch a comprehensive program to establish "cabinas públicas de Internet" nationwide. RCP's campaign resulted in the establishment of more than 1,500 Internet public access points. RCP continues to carry out a wide-range of educational and capacity-building efforts to promote the use of Internet and to foster economic development. The World Bank has funded RCP as the Peru Country Gateway. RCP is the Peru's Development Gateway counterpart to the World Bank's Development Gateway.
Terra Inka	This initiative will help small tourism companies in Cusco to increase their competitiveness by helping them to establish a web presence, to conduct transactions online and to use e-commerce.

C - Key Issues and Strategies

A recent World Bank-sponsored study, concluded that Peru is probably one of the most challenging countries in the Andean region in which to develop commercially feasible ICT networks due to demographic, geographic, and income distribution factors. [86] Further improvements in access to ICTs will require a range of government incentives aimed at the private sector, including additional regulatory reforms and capital subsidies.

While FITEL's programs have been highly effective at dramatically increasing access to public payphones in Peru's most isolated and poor areas, Peru needs to further increase telecommunication infrastructure penetration levels, especially in rural areas, in order to reach the level of other Latin American countries. Failure to do so will hinder economic and social development of rural areas. Key elements to achieve this objective are: putting regulatory and other measures in place to ensure the commercially sustainability of the private sector companies that own the FITEL satellite community phones; continuing to support the extension of FITEL satellite phones on an ad-hoc basis to highly isolated rural communities; and beginning to explore ways to foster backbone infrastructure development. A full cellular expansion project has been identified for 175 cell sites and could benefit to more than 1.6 million people living in rural Peru.

[86] Dymond, Andrew. Final Report and Draft Strategy. Private sector provision of telecommunications services in rural and peri-urban areas in Peru. June, 2004.

C1 – Prioritization of interventions

Involve local governments in planning. Prioritization of investments could involve local governments. This involvement should be sought when planning infrastructure investments, since municipalities are more aware than central agencies of what rural users' needs actually are and what complementarities could be promoted with other services. Local governments should also be consulted when designing applications and services which could be relevant for rural users.

Solve backbone gap with attention paid to rural access. Further studies should be carried out to assess the existence and reasons for the alleged "national backbone" gap and to identify options to address it. This assessment should take the impact of the proposed national investments on rural access to telecommunication services into consideration. Preliminary estimates by the MTC of the cost of building a national backbone network, using in large measure existing or new electric transmission or distribution networks, range from US$53 million to as high as US$130 million. The MTC has indicated that private operators will not invest in any meaningful way in terrestrial backbones without significant aggregation and stimulation of demand by large users such as governments. In light of this, and given the growing government interest in using ICTs for economic development and improving governance, the MTC has proposed the building of a Peruvian Government Communications Platform (PCEP per Spanish acronyms) and a National Backbone Network. The PCEP, recently approved by the Ministry of Finance, is a $10.5 million project to build and manage a government telecommunications network that will link all Ministries in Lima with their offices in Lima's 24 departments. The goal is to lower costs of government communications, to stimulate increased development and use of e-government applications and to aggregate e-government traffic. MTC is working out operational details such as whether network management and operation will be outsourced or provided by the government. Involvement of local governments in this initiative should also be promoted.

Increase funding. Current funding levels of FITEL (US$ 10-12 million) are insufficient to match the sector's needs in rural areas. These levels are also significantly lower than the resources raised by MTC from license and spectrum fees (around US$ 20 million). In order to help halving Peru's rural infrastructure gap, an objective could be set in order to dedicate half of MTC's resources coming from licenses and fees' revenues to rural telecommunications programs.

C2 – Efficiency of operations and institutional framework

Implement incentives to put the private sector at the core of the rural telecommunications implementation strategy. Since the early 1990s, the government's approach to the ICT sector has been to remove the government from the provision of any ICT infrastructure and to foster private sector provision of ICT infrastructure and services through competition, open market entry and targeted subsidy programs for remote rural and low-income areas. Peru needs to continue to learn from this experience by encouraging the private sector to build out infrastructure in rural areas with the correct incentives and, where limits of this approach have been reached in some areas, to undertake more pro-active and well-coordinated initiatives and investments. Such a strategy could materialize through (1) building OSIPTEL capacity to increase cellular coverage in rural and peri-urban areas, potentially also by increasing funding for some of FITEL's OBA subsidies if OSIPTEL's planned cellular expansion pilots are carried out and are successful; (2) ensuring the success of the fourth cellular license's tender, which could include incentives to build out rural areas; and (3) developing other initiatives such as e-government and national backbone and broadband infrastructure initiatives to first use OBA-schemes and other incentives to foster private sector infrastructure build-out and increase competition instead of building government-owned or

managed infrastructure. There could be important synergies and cost-savings to building such networks in coordination with initiatives in the electric and gas sectors.

C3 – Effectiveness to achieve impacts

Improve coordination among institutions and initiatives. CODESI is an important first step to improve the coordination of a growing number of government ICT initiatives. The impending completion of the CODESI work provides an excellent opportunity to provide technical support on the operational implementation of the plan in the areas focusing on citizens and businesses in order to help ensure that it incorporates international best practices, has solid coordination in these areas and is a success. This component would in particular include institution-building to develop coherent government leadership of CODESI (or its successor organization) in cooperation with the private sector. The component would also consider common standards of solutions designs and technology, coordination of further ICT regulatory reforms between ministries and agencies, facilitation of decentralized programming and operation of programs, development of strong monitoring indicators, and evaluation of impacts. Finally, CEDESI could also valuably involve local governments.

Box A.3. Options for commercial sustainability of Internet access centers

A growing number of Peruvian government initiatives, similar to initiatives in other countries, are aimed at establishing Internet access centers in underserved areas, notably rural areas. A key challenge for these centers is their commercial sustainability. A recent World Bank study, based on a demand study of three rural communities in Peru with different geographic, social, economic profiles, identified the following three models that could be used to design new Internet access center pilots aimed at addressing the issue of commercial sustainability:

(1) **Community Infocenters**: These centers would be sponsored by an alliance between local government and community institutions and a large enterprise operating in the area – such a mine or other extractive industry. These centers would aim at providing information, training and other services that are associated and/or would enhance the operations of the large business. Initially the center would be largely subsidized by the large enterprise, but would gradually pay its own way. The study recommended Yauri, in the Cusco region, as one of the communities best suited for a pilot based on this model.

(2) **Franchise Infocenters**: These centers would emerge as a result of infocenter franchises established by a large, national firm. The study recommedend Mazan, in the Iquitos region, , as one of the communities best suited for a pilot based on this model.

(3) **Local Network of Infocenters**: These centers would be chain of local infocenters established by an alliance of small, local businesses working in close association with local schools or government institutions. The study recommedend Huarochiri, in the Lima region, ,as one of the communities best suited for a pilot based on this model.

Source: Tavara, Jose. *Estudio para la definición de una estrategia de fortalecimiento y expansión del programa de telecomunicaciones e info-centros en zonas rurales del Perú.* December 12, 2003. World Bank.

Ensure financial sustainability of community Internet access centers. The key challenge for these new generations of community Internet access centers is their providing for their financial sustainability, ensuring there is sufficient capacity-building and having local buy-in and use of them. A recent World Bank study found that the FITEL pilot project in this area is well-designed, although it still requires local buy-in from community leaders and municipalities. [87] The study, however, raised questions on the financial sustainability and demand estimates of the MTC project.

[87] Ibid, Dymond.

[88] The MTC has indicated it will carry out pilots in 2004 that will demonstrate the viability and economic development impact of its initiatives. Another option, as described in Box A.3, would be for FITEL and MTC, to carry out pilots to test the viability of implementing more carefully designed and targeted Internet access centers based on the geographic, social and economic profile of each rural community. A key finding of both recent World Bank studies of Peru (Tavara and Dymond) was that increased coordination between all Peruvian ministries and agencies with Internet access centers as well as tele-education project, is critical to ensure government resources are better-used and to ensure complementarity of initiatives.

Develop ICT services in rural areas, building on the experience of the tele-centers. In recent years, the Government has fostered the use of ICT to better deliver government services to citizens, improve interactions with business and industry, empower citizens through access to information, and generate more efficient government management. Numerous e-Government initiatives have been launched, including the Government's own portal, the economic transparency portal and the public procurement portal for SMEs, [89] to reduce corruption, increase transparency, increase public revenue growth, and/or reduce costs. The Government should build upon such initiatives through (1) process re-engineering and one-stop Internet enablement of a variety of services for citizens (licenses, certificates) and businesses (registration, labor permits, export procedures) that integrate and promotes cross-agency cooperation, and enables online access to legislation relevant to citizens and businesses which links to ongoing justice projects; and (2) integration of sub-national systems for financial management and property registration.

Promote e-business. Notwithstanding gains in national ICT infrastructure, e-business adoption rates in Peru are marginal among large business and especially low among smaller firms. Impact analyses show that productivity and competitiveness gains begin mainly once firms have passed the connectivity and web-enablement stages and reach online transactions and integration with business management practices. While the efficiency of ICT infrastructure and online security are commonly viewed as key barriers to adoption, surveys show that more formidable barriers are awareness of benefits, skills to assess and undertake e-business, and financing e-business development. Peru should build public-private partnerships and promote the adoption of e-business practices at the firm level via: (1) training and matching grants to help deepen e-business markets at regional and sectoral levels to promote awareness, skills upgrading and learning-by-doing, helping jump-start intermediary e-business services markets (consulting, training, trade associations); and (2) investing in e-business support services to very low-income entrepreneurs by upgrading Peru's telecenter network into high-value, sustainable networks under private sector management that embodies strong e-learning business skills programs, micro-business-appropriate applications and content.

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[88] Ibid, Dymond.

[89] www.peru.gob.pe, http://transparencia-economica.mef.gob.pe/), http://www.sunat.gob.pe/ and (http://www.prompyme.gob.pe/compras_estatales/).