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Provision of Basic Access for the Rural Populations of Developing Countries

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Key words: rural roads, basic access, cost-effectiveness

Abstract

Physical isolation is a strong contributor to poverty. Populations without reliable access to social and economic facilities are poorer than those with reliable access. Improving and maintaining rural networks at basic access level is one of the requirements for rural poverty alleviation. However, resource needs to achieve basic access for all are immense and resources are scarce. Therefore, cost effective strategies need to be applied to improve access for as many of the rural populations in developing countries as possible.

Provision of Basic Access for the Rural Populations of Developing Countries

The Extent of the Problem and Resource Need to Overcome it

Rural transport networks in most developing countries are underdeveloped and of poor quality. It is estimated that about 1.0 billion rural dwellers in developing countries (33% of their rural population) do not have reliable all-season access to main road networks (see table 1 below).

Table 1: Rural population without reliable access, world overall and in some sample countries

Country	GNI per capita	Total population	Of which rural	Rural Population without reliable access[1]	
Unit	$	million	%	%	million
Low income countries	**410**	**2460**	**68**	**40**	**669**
India	*450*	*1016*	*72*	*31*	*227*
Madagascar	*250*	*16*	*70*	*69*	*8*
Middle income countries	**1970**	**2695**	**50**	**25**	**337**
Brazil	*3580*	*170*	*19*	*47*	*15*
China	*840*	*1262*	*68*	*20*	*172*
High income countries	**27680**	**903**	**21**	**0.5**	**10**
Total World	**5170**	**6057**	**53**		**1016**

Source: World Bank Data Bank 2002; and World Bank Technical Paper no. 496

To improve physical access to the isolated rural populations an estimated 2 million kilometers of rural roads for a total cost of 40 billion US dollars[2] need to be rehabilitated, upgraded or built. An additional two billion dollars would be required annually for the maintenance of these roads[3]. However, resources are scarce and appropriate strategies are required to achieve basic access for as many of the isolated rural populations in developing countries as possible.

What is Basic Access and why is it Important?

Basic access means reliable motorized all-season access from villages to the main road networks for the prevailing means of transport[4] in rural areas. In most cases - where traffic is below 50 vehicles per day - this means spot improved earth roads provided with low-cost structures. Predictable interruptions of short duration during inclement whether are allowed.

[1] Percentage of rural population without a reliable road within 1-2 kilometers from households. Reliable access means all-season motorized access. Short, predictable interruptions during inclement whether are allowed.

[2] At an estimated average cost of U$20,000 per kilometer.

[3] 5% of the asset value per annum, much higher than what would be required for asphalt roads (1.5%) or gravel roads (3%).

[4] Prevailing means of transport in most cases are non-four-wheel drive pick-up trucks or trucks, and sometimes tractor-trailer combinations.

Basic access is an important element of rural poverty alleviation. Various studies have provided evidence that poverty is more pervasive in areas with no or unreliable motorized access. For example, in Nepal, where the percentage of people below the poverty line is as high as 42 percent, the incidence of poverty in areas with unreliable access is 70 percent. In Bhutan, the enrollment of girls in primary schools is three times as high in villages with reliable access compared to unconnected ones. In Andhra Pradesh, India, the female literacy rate is 60 percent higher in villages with all-season road access compared to those with unreliable access.

Socioeconomic benefits of improving an unreliable road (seasonal access only) to a reliable one are substantial, even if traffic levels are very low. The first vehicle that can reach a village - if a road is improved - and provides school books for the primary school[5], medicine for the health center and provision for the village store, is of immeasurable benefit to the villagers.

A Holistic Approach to the Provision of Basic Access

To ensure access of the rural population to social and economic activities, services and facilities the following complementary elements are required: (i) affordable transport services and intermediate means of transport; (ii) adequate location of services of reasonable quality; and (iii) appropriate transport infrastructure. Basic access therefore requires a holistic approach that may include interventions related to all the three elements of accessibility. This paper focuses on the latter.

Basic Access and Human Rights

Basic access is the minimum level of access required to sustain socioeconomic activity. Accordingly, the provision of basic access should be viewed as a basic human right, similar to the provision of basic health and basic education. Consistent with a basic needs approach, a basic access approach focuses on the provision of reliable, all-season access, to as many villages as possible. *A basic access intervention, in this context, can be defined as the least-cost (in terms of total life-cycle cost) intervention for ensuring reliable, all-season passability, with brief exceptions during inclement weather, for the locally prevailing means of transport.*

In a particular context or country, the ability to provide basic access is limited by resources. The question must be posed: what is affordable? Resources for rural transport infrastructure[6] (RTI) are typically scarce, with very limited support from the central government or other external sources. Affordability therefore will primarily be determined by the capacity of local governments and communities to maintain their basic

[5] Reliable access also in most cases is a precondition for a teacher to be willing to work in a village school at all.

[6] The term rural transport infrastructure (not just roads) is introduced to ensure that non-road infrastructure (such as paths, footbridges, jetties, rural railways, etc.) is considered as well. Rural transport infrastructure normally is owned by local governments and communities, and in most cased carries a traffic of less than 50 motorized four-wheeled vehicles per day, but often a considerable number of intermediate means of transport (IMT).

access infrastructure over the long term. In cases where motorized basic access is not affordable, improvements to the existing path network and the provision of footbridges may be the only affordable alternative.

Design for Basic Access

Basic access means providing reliable access at least total cost. A basic access intervention is the least life-cycle cost investment for ensuring reliable all-season access for the prevailing means of transport, with the exception of inclement weather[7]. In most cases, the least-cost solutions for RTI are single-lane, spot-improved earth roads provided with low-cost drainage structures, such as fords and submersible single-lane bridges.

The (trouble) spot improvement approach is the key to least-cost design. Cost savings of 50 to 90 percent can be achieved compared with fully engineered roads of equal standard throughout. However, to put this approach into practice, a variety of constraints, such as political pressure and road agency and donor preference for high-standard, high-cost roads need to be overcome. Furthermore, the trouble spot approach may not be feasible in many instances. For example, in flat terrain raising of the road above flood level might be required throughout the alignment to achieve all-year access. Sustainable basic access roads in mountainous areas may require non-erodable surfacing throughout. Alternative surfaces, such as stone or brick pavements, may be required were the in-situ material is weak and slopes are steep. As well, naturally occurring gravel of good quality is increasingly becoming scarce, and may not always be the best solution. Basic access roads are therefore not necessarily cheap. Cost may vary from between $5000 to $100,000 per kilometer. However, sections where the lower bracket applies are dominating and in most cases some investments have already been made. Therefore, the average cost of improving RTI to basic access level is estimated at $20,000 per kilometer[8].

Often, countries define standard cross-sections for the various types of main roads. Applying the same approach to RTI could lead to over design and huge waste of resources if applied to entire RTI networks[9]. The basic access approach will help to save resources that can be used to provide access to more, hitherto not connected villages. A requirement of the basic access approach is close observation of traffic growth on the network, and subsequent upgrading of links to higher than basic access, where justified.

[7] In India such interruptions are limited to a maximum of 12 hours per event and not more than 15 days per year in total.

[8] Also, as is shown later in this paper, using the cost-effectiveness criteria cost per populations served will ensure that in a first instance those links will be chosen that cost less and serve more people. In the case of Madagascar it was shown that 80% of the isolated population could be provided with reliable access with only 25% of the total resource need to de-isolate all rural people. That is so because the remaining 20% of the rural population lives in increasingly dispersed and more difficult to reach settlements.

[9] In terms of network length RTI represent often a multiple of the main road network. The inverse is true for their asset value.

Selection of Basic Access Interventions

Resources are scarce and needs are huge. A transparent, participatory selection method is required to prioritize interventions and to find a consensus amongst stakeholders. The core of this selection process is a map-based physical planning exercise. On regional or provincial level this can take the shape of a full regional planning process with all the stakeholders including particularly sectors with spatial implications (health, education, agriculture, mining, etc.). Transport, being a service that connects all these various activities, is well positioned to take the lead in this process. Simpler processes might be appropriate at local government and community level, however, they need to be, as well, participatory and transparent.

A key tool for the participatory planning process on local level is a local government or community transport plan. Local engineers or consultants, in consultation with communities, should conduct a low-cost inventory and condition survey of the local transport network, including roads, tracks, paths and footbridges, with a focus on existing obstacles. On the basis of the information generated, and additional economic, social and demographic information, an "as is" map should be produced. Based on such information, stakeholders can cooperatively decide upon desired improvements in the RTI network, taking into account objectives and available resources. A complementary planning tool at community level is the integrated rural accessibility planning (IRAP) approach developed by ILO[10].

Establishing the priorities of basic access interventions requires a selection process consisting of a combination of *screening* and *ranking* procedures. The screening process reduces the number of investment alternatives. This can be done, for example, through targeting of disadvantaged communities based on poverty indexes, or by eliminating low-priority links from the list according to agreed-on criteria[11]. The balance of the alternatives will need to be ranked according to priority.

For RTI, the majority of which carries less than 50 motorized four-wheeled vehicles per day, ranking is proposed based on a cost-effectiveness approach. An effectiveness indicator equal to the ratio of the total life-cycle cost of ensuring basic access divided by the population served per link is suggested, as follows:

$$\text{Cost-effectiveness indicator of link} = \frac{\text{Cost of upgrading of link to basic access standard}}{\text{Population served by link}}$$

For this approach engineering estimates for the upgrading of each link to basic access standard are required, as well as an estimate of the population served per link. The approach has been applied in a variety of World Bank financed rural transport projects in

[10] The main focus of IRAP is on reduction of time spent on transport activities.

[11] For example, it could be decided that each villages is only entitled to *one* all-season link to the main road network.

India (Andhra Pradesh), Vietnam[12], Bhutan and Madagascar. One problem that is posed by this approach is to determine a threshold value below which a link should not be considered for investment. In most cases such a threashold will be determined by the limits of the budget. Otherwise it is recommended to determine the threshold by a traditional cost-benefit analysis[13] on a sample link[14].

Conclusions

In order to complement poverty reduction strategies, rural transport interventions must be an integral part of rural development interventions focusing on the mobility and access needs of rural communities. Substantial gains in accessibility—for more communities, in more regions of a country—are possible if rural transport infrastructure interventions are designed in a least-cost, network-based manner focusing on eliminating trouble spots. In view of budget constraints, selecting interventions requires a participatory physical planning process undertaken jointly with concerned local governments and communities, supported and coordinated by regional or central government agencies. Simple screening methods facilitate the selection process, reducing the number of alternatives to a manageable level. Ranking is then applied to the remaining options, and in most cases (below 50 VPD) the use of cost-effectiveness methods is recommended.

[12] In Vietnam the approach was refined by introducing a higher weight for a poor person than for a non-poor.
[13] Taking into account vehicle operating cost and time savings.
[14] This was done in the case of the Bhutan Rural Access Project where social benefits (educational and health related) were included in the cost-benefit analysis.