Improving the Accessibility of Rural Areas

The Contribution of Transport to Rural Development

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1. Introduction

Many factors drive economic and social development in rural areas. A factor that is invariably crucial is the access of people living in rural areas to transport infrastructure and services. Without transport, goods and services cannot be brought in sufficient quantity to the people who need them, agricultural produce cannot be taken to market, children cannot attend school and those in need of medical attention cannot get to the nearest clinic. A diverse and vibrant exchange between rural areas and conurbations also depends on an effective transport system, as does participation in political and social life. Evaluating the part played by transport in rural development requires a broad perspective that does not merely focus on the rural road network and the accessibility of local markets and basic services but in addition considers the trans-regional links, including import and export corridors and hubs, that are also important for economic development.

This paper explores approaches to international cooperation from the perspectives of rural development and the transport system. The experience of numerous rural road-building projects has shown that, regrettably, close coordination between transport and rural development experts is rare. Transport promotion measures are not always integrated into the context of spatial or territorial development planning.

Yet inter-sectoral planning is also extremely important in connection with social infrastructure. For example, should planners with limited resources at their disposal aim to establish a denser network of health clinics, or should access to existing facilities be made easier by improving the mobility of people in rural areas, which would also have positive impacts on other aspects of life? Integrated planning of investment in rural development also needs to give greater weight to the medium- and long-term challenges. In the case of infrastructure measures, it is particularly important to consider how maintenance is to be financed. If mobility, with its potential for promoting development, is to be maintained it is certainly essential that new roads and tracks are built and existing ones repaired. However, in order to conserve the road infrastructure in the long term, appropriate additional maintenance must be carried out. In addition, the likely effects of climate change need to be taken into account in connection with both road building and maintenance.

The following chapters provide an overview of the subject of transport and rural development before outlining the action that international cooperation could take. A selection of relevant projects undertaken by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and KfW Bankengruppe in the field of German development cooperation is described in the appendix.
## 10 Relevant Facts and Figures

- **60 per cent** of the population in Africa live in rural areas (as at 2011); the worldwide average is about 48 per cent.  
  Source: United Nations, Department of Economic and Social Affairs 2011

- About **70 per cent** of the 1.4 billion people worldwide affected by extreme poverty live in rural regions (2005 figures)  
  Source: IFAD 2010

- **One billion** people worldwide do not live within 2 km or 30 minutes’ walk of an all-weather road.  

- Women in rural Tanzania spend **four times** as much time on mobility as men.  
  Source: IFRTD

- It is estimated that **75 per cent** of all maternal deaths in developing countries could be prevented by prompt access to qualified medical help.  
  Source: Babinard, Roberts 2006

- **75 per cent** of the daily mobility of many of the rural inhabitants of sub-Saharan Africa involves tracks and paths in the immediate vicinity of their village.  
  Source: Barwell, no year

- Only about **18 per cent** of funding for road transport in sub-Saharan Africa (32 countries) is spent on rural roads; six countries provide no funding for rural roads at all.  
  Source: Baril, Chamaro, Crispino 2013

- Recent studies in India show that school attendance rates rose by **22 per cent** as a result of a programme to expand the construction of all-weather roads in rural areas.  
  Source: Mukherjee 2011

- Corruption accounts for **29 per cent** of the costs of transporting a consignment of onions from Niger to Ghana.  
  Source: Bromley, Cook, Sing, Van Dusen 2011

- When a container has been unloaded from a ship in the ports of sub-Saharan Africa, it takes about **two weeks** before it leaves the port again. In most of the ports of Asia, Europe and Latin America this dwell time is less than a week.  
  Source: Raballand et al., 2012
Figure 2: Widely diverse forms of mobility in rural areas: tanker and donkey cart in Burkina Faso. © Florent-Dirk Thies, 2011
2. The links between mobility and rural development

2.1 Access to services and accessibility of the population

Success in tackling poverty depends to a crucial extent on the availability of basic services for the rural population. The principal benefit of improved rural transport infrastructure, and hence greater mobility, is that access to education, health care and agricultural advice services becomes possible or more affordable. Income-generating opportunities are opened up as a result of better access to markets where inputs such as fertiliser, seed and machines can be purchased and home-grown products – especially perishable goods such as fresh vegetables, fruit and milk – can be sold. It becomes possible to commute to jobs in rural centres that were previously out of reach. Transport therefore functions as a catalyst of economic and social development in rural areas, and it is closely linked to achievement of the Millennium Development Goals (see Table 1).

Education

There is extensive evidence of the importance of education in reducing poverty. In sparsely populated rural areas where getting to school – especially secondary school or college – involves travelling long distances, transport facilities and the costs of such transport are a crucial factor in school attendance. When plans are drawn up to improve access to schools, it is important to distinguish between different types of school. Primary schools have a relatively small catchment area: many pupils come on foot from the surrounding villages. In this case it is often more important to have safe paths that are usable all year round, and simple networks of paths, rather than a single high-quality paved road. At secondary and tertiary levels the situation is different: pupils usually travel far greater distances to get to secondary schools and colleges. Here not only the infrastructure but also the availability and affordability of means of transport are crucial. Buses and pickups often make infrequent journeys and frequent travel is unaffordable for poor households. In many cases bicycles, motorcycles and other intermediate means of transport (IMT) are very important.

Empirical studies have repeatedly shown that using transport interventions to make schools more accessible has a positive impact on school attendance rates. A study in Morocco in the 1990s found that providing a tarmac road increased school attendance from 21 to 48% for girls and from 58 to 76% for boys (Khandker, Lavy, Filmer 1994). As a result of KfW projects in Cambodia, girls benefited...
The links between mobility and rural development

particularly from the improved transport routes – the proportion of girls among school pupils rose considerably. It should be borne in mind that many other factors, including social status, affect school attendance, and that a high attendance rate is in itself no indicator of the quality of the education provided. But without a minimum level of accessibility any strategy to promote education in rural areas is bound to fail.

**Health**

Similar considerations apply to access to health care. The transport infrastructure and transport services operate here in three main ways (Downing, Dinesh 2001):

- They influence decisions about whether help for an individual can be accessed (as an alternative to self-treatment or no treatment at all).
- They define the maximum possible catchment area of a health clinic and hence the number, location and costs of such clinics.
- They determine the range of choice between different medical facilities and hence also influence the quality of health care.

In this context it is important to consider the relative merits of steadily increasing the number of rural health clinics as opposed to extending the catchment area of individual clinics. Making clinics more accessible may sometimes be more efficient than building additional facilities and maintaining the high staffing levels that they require.

Figure 4: Children in rural Bangladesh on the way to school. © Gutner Zietlow, 2005

Figure 5: An ambulance belonging to the state health service on the road in rural northern Namibia. © Dominik Schmid, 2007
Rapid access to medical assistance is particularly important in reducing perinatal maternal and infant mortality, which is especially high in sub-Saharan Africa. The risk of dying in childbirth is about 36 times higher for mothers in developing countries than for those in industrialised countries. Most developing countries lack both the necessary infrastructure and the means of transport to transfer pregnant women promptly to hospital or to enable a midwife to travel to the place where the woman is giving birth. The exact contribution of expansion of the rural transport infrastructure to a reduction in perinatal complications is hard to quantify since so many factors are involved (Babinard 2010). In general, though, interventions in the health sector should always take account of the accessibility aspect. In many cases this may result in expansion of the infrastructure; in others, the decision may be taken to provide simple means of transport for pregnant women or ambulances with a qualified crew (for which there is also an urgent need in connection with other types of medical emergency).

Figure 6: A bicycle with trailer as a cost-effective alternative to a motorised ambulance. © Jürgen Heyen-Perschon, Uganda, 1996

Figure 7: Farm worker on the way to work. © Olly Powell, Tonghai, China, 2004
The links between mobility and rural development

*Agricultural advisory services*

In any strategy for promoting the economic development of rural areas, the agricultural sector is particularly important. This is partly in view of the availability of land which is suitable for agriculture and partly because of the direct use of agricultural products for human nutrition. Agricultural inputs such as fertiliser and others are not the only means of boosting agricultural productivity; innovation and knowledge gained from experience are also important, and both can be passed on through agricultural advisory services. The accessibility of training, advice and information centres, and the costs of using such services, are important factors in the decision-making process for farmers who are considering whether to invest in training and advice.

Conversely, the accessibility of farms is a factor that influences the costs of providing advice when a visit to the farm is needed. Better accessibility also significantly increases an individual farmer’s prospects of being able to partner with research institutes in the innovation process. It has also been shown that mobility increases access to innovation, technology and knowledge through the sharing of experience.

*2.2 Economic perspectives*

Economic perspectives in rural areas cover not only agricultural production itself but also the supply chain and processing and sales opportunities through access to local, regional and international markets (value chains). Roads induce economic activity and a business dynamic along their length; – making use of such effects in economic planning is the major part of the concept of corridor development.

**2.2.1 The perspective of agricultural production: Access to inputs and markets**

*From the farm to the market: The perspective of agricultural production*

All over the world, agriculture in rural areas is a key provider of the population’s income and plays a vital part in regional development. In most African, Asian and Latin American countries, about 90% of rural households are involved in farming in one form or another. On average they obtain between 70% (Africa) and 50% (Asia, Latin America) of their household income from farming activities (Davis, Winters et al., 2010). To promote these income-earning opportunities, expansion of the rural transport infrastructure often focuses on developing small farmers’ access to the market, to improve their marketing opportunities and the supply of inputs. Where transport routes do not exist or roads are in poor condition, goods cannot always be transported; if transport is possible, the costs may be very high. Seasonal interruptions to transport links are common, for example as a result of seasonal floods.

<table>
<thead>
<tr>
<th>Table 1: Rural transport and the Millennium Development Goals</th>
</tr>
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<tbody>
<tr>
<td><strong>Goal</strong></td>
</tr>
<tr>
<td>1 Eradicating extreme poverty and hunger</td>
</tr>
<tr>
<td>2 Universal primary education</td>
</tr>
<tr>
<td>3 Gender equality</td>
</tr>
<tr>
<td>4 and 5 Reducing child mortality and improving maternal health</td>
</tr>
<tr>
<td>6 Combating HIV/AIDS, malaria and other serious diseases</td>
</tr>
<tr>
<td>7 Environmental sustainability</td>
</tr>
</tbody>
</table>
of flooding in the rainy season; if roads are impassable, goods cannot be transported. Important, yield-boosting inputs such as fertilisers, and farm machinery can be obtained more easily and more cheaply if there are good transport links to rural centres and markets. An example from Ethiopia shows that households with good access to roads do not necessarily use more fertiliser than the comparison group with less good access, but they pay about 17% less for it (Arethun, Bhatta 2012). Better infrastructure can improve the diversity and quality of the transport services on offer; it can also break up monopolies, thereby helping to redistribute traders’ profit margins to the benefit of agricultural producers. Roads enable families living close to them to boost their economy through processing and direct marketing: agricultural produce can be processed and sold to passing travellers (e.g. sesame biscuits in eastern Niger).

**Paths, tracks, roads:**

The different facets of relevant infrastructure

The need for improvements to the transport infrastructure varies according to local conditions. It is generally worthwhile to ensure that roads and tracks remain usable at all times of year and to adapt infrastructure to the potential impacts of climate change, especially if the major synergies for ensuring that the population has access to basic services are taken into account (see Section 2.1). However, priorities differ according to the overall situation: investment in the building and expansion of roads is particularly effective in rural areas where there is significant potential for increasing agricultural production and where cash crops can be grown.

A KfW project in Laos for renovating rural roads provides clear proof of this. Two to three years after the project ended, farmers who marketed at least some of their produce had increased the quantity they sold on the market by an average of...
about 200% (KfW/GITEC 2012, see also Section 4.2). Similar results were achieved by comparable projects in Cambodia: shortly after the roads were completed, a partial shift to higher value but perishable products was noticeable. Without improved transport facilities, such goods would not have been marketable.

In areas in which the agricultural potential is lower and in districts in which small-scale subsistence farming prevails with low levels of production for the market, it is often more worthwhile to construct paths and small-scale path networks rather than build more ambitious roads that also require extensive funding to maintain them. To transport their relatively small quantities of harvested produce (in sub-Saharan Africa not usually more than 100–200 kg per week (Raballand et al., 2010)), many farmers can easily use intermediate means of transport such as carts, bicycles and pack animals. An analysis of 47 minor rural roads in Burkina Faso found that 19 of them carried no four-wheeled motorised traffic at all although they were used by on average 250 bicycles, 100 motorcycles and 100 pedestrians per day (TRB 2012). Given such situations it may well be more appropriate to give priority to making paths and tracks safer and more usable and if necessary to promote IMTs (Intermediate Means of Transport) such as carts and cargo bicycles. The case for this is strengthened by the fact that these path networks are in addition widely used for other purposes such as collecting firewood.

![Figure 9: Even good-quality rural roads are often used mainly by pedestrians and cyclists.](image)

© Olly Powell, Luang Prabang, Laos, 2004

<table>
<thead>
<tr>
<th>Road types and characteristics in rural areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transport needs</strong></td>
</tr>
<tr>
<td>Village and its surrounding area</td>
</tr>
<tr>
<td>- Collecting firewood</td>
</tr>
<tr>
<td>- Working in fields</td>
</tr>
<tr>
<td>Village and minor centre</td>
</tr>
<tr>
<td>- Transport of goods from market</td>
</tr>
<tr>
<td>- Attending (primary) school</td>
</tr>
<tr>
<td>- Accessing medical services</td>
</tr>
<tr>
<td>Minor and Major Centre</td>
</tr>
<tr>
<td>- Attending further education</td>
</tr>
<tr>
<td>- Public services</td>
</tr>
<tr>
<td>- Market provisioning</td>
</tr>
</tbody>
</table>

Source: Olaf Meyer-Rühle, GTZ
and for establishing and maintaining social contact – aspects that are also important to rural development, especially when taking a gender perspective.

**Increasing production, preventing losses: The contribution of transport to food security**

The steadily rising world population, recurring famines and unrest as a result of the soaring prices of staple foods have drawn the world’s attention to the issue of food security. In keeping with this, the development of rural areas and their productivity, especially in relation to agriculture, is also becoming a topic of increasing interest once again. As so often, transport is a strategic aspect of this: it is one of a number of elements that play an important part in boosting agricultural production (see above) and also in preventing post-harvest losses, especially during transport. Post-harvest losses are the portion of the harvest that is taken from the field but is lost before it reaches the consumer via the market. Because the data is incomplete, the exact extent of such losses and the way they are distributed over the different stages of the processing and transport chain are unclear. The African Postharvest Losses Information System estimates that in sub-Saharan Africa between 10 and 20% of the grain harvest is lost already between harvesting and processing (i.e. during threshing, storage and transport) (Hoering 2012, p. 7). The loss is even higher for products that are more sensitive to impact and compression, such as many varieties of fresh fruit and vegetables. Post-harvest losses of vegetables and fruit in Bangladesh are put at between 20 and 25%; for easily perishable goods the figure may be as high as 40%. It is obvious that such losses can be significantly reduced by better transport infrastructure combined with additional investment in more efficient and less damaging transport facilities, modern (possibly chilled) storage facilities and modern markets organised on the basis of the appropriate logistics (APO 2006, p. 106). The impact on food security is twofold: on the one hand the products on the target markets contribute directly to the food security of the people who buy them, while on the other the sale of these products provides their producers with an income that can then be invested in the family’s nutrition.

**2.2.2 Rural-urban linkages**

Since 2009, for the first time in history there have been more people living in urban areas than in rural ones. The United Nations calculates that by 2050 about 70% of the world’s population will be living in cities. Urbanisation is rapidly increasing especially in newly industrialising and developing countries, with far-reaching consequences for the reciprocal relationships between rural and urban areas.

**The pulling power of the cities**

There is a steady growth in the exchange of information, capital, values, work, education and medical care between rural and urban areas. Many people spend several hours a day travelling to and from their place of work or education in the city. Some regularly spend several weeks or months in what are often better-paid jobs in the city. This need for mobility, which is often the result of economic forces, increases the demand for transport links between cities and the countryside.

![Figure 10: While bananas are relatively easy to transport in an open truck, many other types of fruit and vegetables need better packaging and chilling before being transported to the buyer. © Rainer Kuhnle, Tangail District, Bangladesh, 2001](image-url)
The links between mobility and rural development

Investment in rural areas by migrants

People who leave rural areas in order to earn money in the cities often invest at least some of their earnings in their home region – either by sending remittances or by transferring means of production (machinery and equipment) or consumer goods (such as electrical goods and household appliances). These investments are often the only way in which the rural area profits from innovation.

Endangering the food supply

Urbanisation also creates new challenges in connection with the transport of goods. As a result of the spread of cities and rapid population growth, the area of farmland available per person on the planet fell by 50% between 1961 and 2005 (UN 2012). The consequence of less farmland being available, along with the growth and concentration of the population and the rise in the demand for food per person that is being seen everywhere, is that an ever more efficient transport infrastructure is needed to transport goods over ever greater distances in order to maintain the food supply.

The population of Dhaka, the capital of Bangladesh, is increasing at a rate of about 500,000 people per year, and the demand for rice alone is rising by about 80,000 tonnes per year. To supply the city’s new inhabitants with rice, an additional 4,000 lorry-loads of rice per year must be brought in from the rice-growing districts, most of which are several hundred kilometres away, putting additional pressure on the transport infrastructure.

Importing food pushes up food prices

Many cities in developing and newly industrialising countries are now home to a relatively affluent middle class. This population group is pushing up the demand for highly perishable products, such as high-quality fruit and vegetables, and non-durable goods that are imported via sophisticated logistics chains from other regions with better infrastructure and better storage and packing facilities. There are often many reasons why supplies are not obtained from production in the surrounding countryside. Bulk buyers want to buy from large-scale producers in order to ensure that the required

Figure 11: Secondary centres often function as transhipment points for products from rural regions.
© Gerhard Metschies, Tibet, China, 2002
quantity is consistent in quality. As a result of transport costs, small-scale goods flows are usually more expensive than large deliveries. Frequently, too, the non-existent or very poor transport infrastructure makes it impossible for local producers to supply fresh produce to the urban markets or means that the goods that are supplied are of poor quality. The victims of this situation are both the local farmers, who find it very difficult to access attractive markets in growing cities, and consumers, who pay a premium for the more costly means of supply. Food that is transported over long distances instead of being supplied from surrounding areas is also less favourable when taking the perspective of environmental impact and climate change mitigation.

**Strengthening regional structures by improving urban-rural linkages**

Development cooperation can help the actors along value chains to get to know and understand each other better; by working together they can adjust and balance their interests for the benefit of all. Producers can form production and marketing cooperatives and thereby become potential partners for bulk buyers. By keeping in close touch with each other, public and private-sector stakeholders can devise well-thought-out ways of promoting business and encourage savings and loan schemes; they can also promote the establishment of processing businesses in the rural hinterland of cities.

If efforts of this sort are to bear fruit, there must be targeted investment in infrastructure. Improving transport links between rural and urban areas is particularly important for creating attractive business opportunities in rural areas and ensuring a reliable and low-cost supply of goods to the cities. With these improvements the relationship between the city and its hinterland can be characterised by attractive prices for producers, lower losses of produce, higher trade volumes and lower prices for the end consumer. Shorter transport chains and journeys also result in reduced emissions and lower energy consumption. The strengthening of regional economic structures also reduces dependency on individual large suppliers and so contributes to the long-term security of the food supply.

*Figure 12: A lorry on the road near Keba, Sierra Leone: products from rural areas are often transported long distances to buyers in the city or even abroad.*

© Alexander Czeh, 2013
2.2.3 Hubs and logistics: The role of trade in marketing rural products beyond regional and national borders

The sales markets for rural products vary considerably according to the country and product. In most of the Least Developed Countries (LDCs), trade beyond regional or national borders is relatively unimportant. In many emerging economies, on the other hand, and especially in Asia, the rural economy is very much oriented towards international markets. This applies both to agricultural products such as rice and fruits and to non-agricultural products of the rural non-farm economy (RNFE), such as textiles. Trade relations are usually characterised by two specific features. Firstly, export, or marketing outside the producer’s region, is rarely carried out by the producers themselves; it usually involves intermediaries or – in the case of suppliers and contract farming – the parent company. Secondly, goods are usually transported via hubs situated near cities.

A company survey conducted in seven rural provinces of Thailand and Vietnam highlights the importance of markets outside the home region for the economies of the two countries (see Table 3)\(^1\).

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\(^1\) Conducted by the University of Giessen as part of the DFG FOR 756 research project, 2007

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### Table 3: Sales markets of rural businesses: an example from Thailand and Vietnam

<table>
<thead>
<tr>
<th>Sector</th>
<th>Thailand</th>
<th>Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food</td>
<td>Textiles and clothing</td>
</tr>
<tr>
<td>Number of companies questioned</td>
<td>N</td>
<td>76</td>
</tr>
</tbody>
</table>

**Sales markets (as percentage of total sales)**

<table>
<thead>
<tr>
<th></th>
<th>Thailand</th>
<th>Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own province and neighbouring province</td>
<td>46.5</td>
<td>10.8</td>
</tr>
<tr>
<td>Other inland provinces</td>
<td>23.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Neighbouring countries</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td>High-income countries</td>
<td>12.8</td>
<td>53.5</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>16.4</td>
<td>7.7</td>
</tr>
<tr>
<td><strong>Export rate 2006</strong></td>
<td>30.4</td>
<td>61.7</td>
</tr>
</tbody>
</table>

Source: University of Giessen/DFG FOR 756, Company survey in the provinces of Korat, Ubon Ratchathani, Nakhon Phanom and Buriram (THA) and Dak Ḷk, TT Hué and Ha Tinh (VN), 2007. Taken from: Schmid 2011.
In particular, companies involved in processing agricultural products from the region have a relatively high export rate. In both Thailand (rice) and Vietnam (coffee), agriculture tends to focus on certain products for which there is strong demand abroad. The textile firms are frequently producing goods for foreign companies; this situation is influenced by the lower wage costs in rural provinces and the attempts being made to promote rural industrialisation.

Being connected to the road network is the most important location factor for companies in both countries. Companies in Thailand have the benefit of good-quality roads; in many parts of Vietnam, by contrast, the road system still needs to be improved. In both countries, though, there are long distances to be covered before goods can be exported. Exports usually pass through one of the major ports near Bangkok or along the Vietnamese coast. Where export is not arranged by the parent company, transport is usually organised by intermediaries. Agricultural products are typically exported only after further processing and not by the producers themselves.

Trade and transport: More than just infrastructure

The conditions for regional and international trade have only an indirect bearing on the rural economy. However, they can affect the sales potential of rural products and bring about structural change in rural areas. From the perspective of transport, important aspects of trade are not just the state
of the infrastructure and the existence of an advanced logistics sector: an even more significant factor is the influence of non-tariff trade barriers. For many developing and newly industrialising countries these include (illegal) roadside controls and charges and time-consuming border crossings. The regular surveys conducted by USAID in West Africa (UEMOA 2012) reveal the additional costs caused by such delays, using different goods chains as examples. For example, drivers transporting millet and sorghum along the corridor stretching 1 800 km from Koutiala (Mali) to Dakar (Senegal) must reckon not only with significant delays but also with the need to pay bribes totalling USD 467. These additional transport costs must ultimately be borne either by the consumer or by the rural producers.

In the port sector, too, slow clearance procedures, inefficient market structures and corruption are major obstacles to efficient logistics. In most developing and newly industrialising countries, exports (and also imports) are heavily dependent on ocean transport. Turnaround times for containers are particularly poor at ports in sub-Saharan Africa: in most European and Asian ports containers spend less than a week in port, but in Douala (Cameroon) the turnaround time is 19 days and in Dar es Salaam (Tanzania) it is 14 days (Raballand et al., 2012). This highlights the fact that in many places it is important to focus on sectoral reform and better cooperation between the public and private sectors rather than solely on investment in infrastructure. However, especially Africa’s busy ports are also hampered by a shortage of handling terminals and technology and poor links with the hinterland.

Monocultures, land grabbing, emissions: The downsides of export-oriented development of the rural economy

Opening up rural areas by improving the transport infrastructure and linking communities to hubs and trade corridors can boost the rural economy. At the same time, however, the possible economic gains must be weighed carefully against the social and environmental drawbacks. Export-oriented agriculture is frequently based on large-scale monocultures with their accompanying ecological problems. Contract farming that links small-holdings into larger plantation systems has the potential to boost development in rural areas, but the underlying contracts must be clearly worded and advantageous to both parties and must take account of both economic and social concerns. The transport of goods over long distances raises concerns from the perspective of climate change mitigation. The impacts of investment in transport infrastructure must therefore always be examined on a case-by-case basis (see also Section 2.3).

2.3 The environment and safety: Adverse effects of transport infrastructure

The Tanzanian government caused a furore when it announced its intention to drive a road through the unique Serengeti nature reserve. The planned east-west highway would divide the park into a northern and a southern half and the knock-on effects were cited as a particularly egregious example of the negative externalities of transport routes. According to some observers, the road could sever the routes taken by two million animals to their waterholes, with serious consequences for the ecological balance of the nature reserve (Bigurube, Borner, Sinclair).

Effects on the environment

The construction of transport routes in rural areas opens up access to previously remote ecosystems and thereby facilitates the clearance of forests, much of which is carried out illegally. Studies show that around two-thirds of all forest clearance are facilitated by the construction of transport infrastructure. Additional negative effects of increased transport activities include noise nuisance, air pollution and higher numbers of accidents.

In addition to facilitating illegal logging, the increased accessibility provided by transport routes and the accompanying reductions in transport times and costs also put indigenous peoples at risk, provide easier access for poachers and promote land speculation, the construction of illegal settlements and uncontrolled exploitation of minerals and natural resources (Geist, Lambin 2001). Illegal mining activities destroy farmland and create disorder in rural areas, disrupting both the physical and the social fabric of communities. In the southwest of Burkina Faso, for example, laboriously rehabilitated
farmland is being ruined again by unregulated gold mining. In this context it is also worth pointing out that the construction of transport routes can also change land-use conditions to the disadvantage of the resident rural population. For example, road building can provide momentum for negative impacts such as land grabbing or forced displacement of the resident population, perhaps to land that has not yet been used for agriculture before and may now be cleared for the first time.

**Spread of HIV**
Transport projects that connect corridors or countries also help to accelerate the spread of disease. Particularly noticeable is the spread of HIV as the virus is exchanged between local people and lorry drivers or construction workers, who often spend a long time living away from their families. For some poor rural dwellers, prostitution with the relatively affluent lorry drivers is an important source of income that enables them to feed their families. According to a study conducted by the World Bank in South-East Asia, up to 80% of long-distance lorry drivers regularly use the services of prostitutes (World Bank).

**Accidents**
Young and socially disadvantaged people have a higher than average risk of being involved in road accidents; where someone lives is also a key factor in their accident risk. Studies of the Bangalore area of India show the risk of being killed in a road accident is three to four times higher in rural areas than it is in urban districts. One reason for this is the tendency of drivers to over-estimate their skill and to drive excessively fast outside built-up areas.

*Figure 15: Road accidents are among the most serious impacts associated with increased traffic volumes: an accident involving two lorries in Bangladesh.*
© Rainer Kuhnle, 2001
When an accident occurs in a rural area, medical assistance is often a long way away and is rarely up to the standard available in towns and cities. Accessing medical care or paying for a funeral as a consequence of a traffic accident often plunges entire families in developing countries into significant financial dependency (WHO 2009).

**Conclusions**

The examples of negative external effects demonstrate that such effects must be considered right from the start when transport projects are being planned. The relevant impact assessments are standard especially in financial cooperation projects funding significant infrastructure improvements. Support measures should be offered, and the implementation process should include everyone affected or involved – the rural population, decision-makers at national and district level and local people, whether they be prostitutes, lorry drivers, schoolchildren or local businesspeople. Specific roles, responsibilities and tasks can be assigned and stakeholders can be supported through training and advice. For example, young people can act as school crossing patrols, workers can be responsible for the distribution of information materials at payment points and lorry drivers can help pass on these materials. Local and national government offices have a part to play in planning and implementing measures that affect land use, compliance with legislation, transport planning, capacity development of village and community structures and the use of natural resources.
3. Harnessing mobility for strengthened rural development

3.1 Rural transport and territorial development

3.1.1 Basic principles

Rural development is not limited to agricultural production: it is also concerned with value added based on agricultural production and the provision of basic social and economic services (see also Section 2.1). At local village level health and education facilities, supplies of means of production, alternative economic sectors and income-earning opportunities are often non-existent or very basic, making them very difficult to access.

Supra-regional links must therefore be improved or created in order to improve the socio-economic position of the rural population. Infrastructure measures make it easier for rural dwellers to link into regional and supra-regional economic life, and also facilitate access in the reverse direction. The previous local focus must therefore be replaced by greater territorial and even supra-territorial openness. Territorial development (GIZ 2012) therefore involves organising planning and construction processes according to the subsidiarity principle, with corresponding funding. This development can take place along one or more axes (country development axes) or corridors that are based on main transport arteries and use secondary transport routes as links.

3.1.2 Impacts of infrastructure measures

The positive impacts of infrastructure measures in the transport sector are therefore particularly large if they are embedded in a strategy of territorial development – that is, in a balanced development plan that involves the entire region. An important aspect of such plans is a functional and administratively well-organised division of labour between spatial centres, sub-centres and sparsely populated areas, and between different organisations and institutions. Despite being closely linked to other packages of measures, the impacts of investment in infrastructure as a component of spatial development and land-use planning are relatively easy to measure. These impacts include the following:

- Raw materials can be delivered both faster and more cheaply to distant markets, and can more readily be processed locally. This enables often sensitive products to be sold regionally and supra-regionally. Cash crops and locally produced food can more easily be taken to hubs and markets and transported onwards from there.
- Price fluctuations can be exploited more quickly and more promptly.
- It is easier for purchasers to access producers.
- It becomes easier to establish social services, such as health and education, and access to these services is therefore improved. Economic opportunities (jobs, markets) in urban areas benefit the rural population. Education opportunities are increased through improved access to institutions other than those located only at local level (primary education).
- The availability of means of production (tools, machinery, seed, fertiliser) is improved; at the same time this expands the opportunities for processing primary products. Farmers no longer need to obtain supplies via complicated routes.
- Professional advice services, including private ones, can more readily be provided in rural areas.
- The need of urban population groups for nearby recreational facilities opens up new development potentials and alternative income-generating opportunities, especially in scenically attractive areas.
- Transport costs are reduced; as a result, goods become cheaper for producers, traders and end consumers. Journeys become both shorter and faster.
- The risks arising from transport difficulties or failures are reduced. Transport materials are saved and there is less damage to goods.
Previous inaccessible markets in neighbouring regions and countries can now be accessed. Markets can be established at a decentralised level. Opportunities are created for export beyond the village, local or community level. Markets become diversified; opportunities are no longer restricted to one or a few markets. The micro level is incorporated into national and regional economic life. Dependencies – e.g. on monopolists – no longer arise.

Growth poles are created and regions are developed via these growth poles. Opportunities arise for creating alternative sources of income in rural areas (crafts, small-scale industry, processing). The establishment of small businesses is promoted.

There is greater scope for inter-municipal links and inter-municipal exchange. Contact between local government workers and the rural population is improved. The links between rural and urban communities, and exchange between them, are improved. Participation in political events beyond the local and municipal level can be promoted.

Construction projects commissioned by local authorities (e.g. erosion control measures, construction of markets, stores or grain banks) can be completed faster and at lower cost, because the investment risks for transport and construction companies are reduced.

The economic value of production improvements resulting from individual initiative or development measures can be harnessed, with consequent benefits for both producers and processing businesses (of any size).

Transport routes stimulate the migration of labour. Rural areas benefit from additional investment and innovation as a result of remittances and the return of migrants.

The main beneficiaries are often women who derive little added value from agricultural production in itself or are not involved in it economically, but depend on the processing of agricultural commodities and hence on their export out of the region. Local and national government bodies will also benefit through better implemented control mechanisms in forest management, more reliable collection of taxes and duties and better supervision.

Corridors that are initially established purely for transport purposes can also have a beneficial knock-on effect on territorial development, since they can be designed to link a number of territorial areas. Trunk roads typically lead from the capital city to a neighbouring country via another large city, passing through several rural communities on the way. By means of rural and inter-village paths, these communities link their territory to the trunk road and hence to larger cities and to neighbouring provinces and countries, as well as to neighbouring communities. The trunk roads are used as corridors, from which access is created at both local/community and national/international levels. For landlocked countries, corridors to free ports in coastal countries are important. The transport activities themselves create new economic opportunities, which open up along these corridors. These potentials also radiate into the hinterland. Corridors can thus become real axes of development.

In relation to future interventions it would be useful to clarify whether the establishment of corridors and the associated emergence of development axes has been specifically promoted or whether these axes have resulted from unplanned
and unmanaged development – e.g. because hauliers have chosen the route that is most favourable for them and in so doing have unintentionally initiated development in the area.

The impacts of course also include adverse effects and risks; such as those mentioned in Section 2.3.

Networking routes in Burkina Faso

In the southwest of Burkina Faso, funding provided by GIZ through the Programme for Agricultural Development (Programme de Développement de l’Agriculture, PDA) is helping to improve the economic potential of three water catchment areas with a total area of about 10,000 hectares. The development of a number of value chains is being promoted at the same time. In a parallel move, KfW is financing the protection and economic development of lowland meadows in these catchment areas. Another community development project (FICOD – KfW) is opening up rural areas, partly by constructing rural and inter-community paths. This is improving links between villages and links with municipalities and with trunk roads as corridors and means of access to neighbouring countries with free ports. This has a noticeably positive effect on the value creation initiated in the water catchment areas and lowland meadows. The economic value-adding process is also being improved through transport infrastructure and territorial linkages.

Figure 17: Advertisement for Ghanaian free ports on the Ghana – Burkina Faso – Mali corridor. © Mathias Bartholdi, 2013
3.1.3 Stakeholders, competencies and responsibilities

Transport routes link places in rural areas with each other, with other defined areas, with markets, with municipalities, with capital cities and with other countries. Such links include both terrestrial connections and waterways. Rural transport routes (such as rural paths and tracks) at local level connect to regional roads and onwards to national roads.

Infrastructure measures are the means whereby the political and administrative dimensions of territorial development are transformed into practice. It is therefore particularly important to promote specially designated and planned corridors that provide a channel for lucrative flows of goods and services or that link areas of economic potential with each other, in order to create the best possible linkages into the adjacent rural area. This can be achieved by improving links to existing rural route networks, for example, or by promoting better use of corridors to reach rural areas. All these aspects are the responsibility both of national governments and of the territorial authorities and structures that they support. Improving the accessibility of rural areas also imposes additional tasks, duties and responsibilities on municipalities and (decentralised/deconcentrated) state services.

Work on rural transport routes is usually commissioned by a municipality or other regional or local body that has a vested interest in improving the economy in its rural areas but also finds itself confronted with new challenges. In the first place, maintaining and repairing the infrastructure will give rise to significant costs. Secondly, adverse effects are also likely, particularly in relation to natural resources.

These issues are the responsibility of the municipalities and decentralised government bodies, which are therefore of prime importance in the list of stakeholders.

- The state is the highest planning authority (planning sovereignty; drawing up and implementing master plans) with ultimate financial authority over the national budget.

- State bodies as representatives of the state authority at decentralised level take on planning, training, instructional and monitoring tasks in connection with technical implementation of infrastructure measures.

- The territorial authorities (e.g. municipalities) or other local and regional bodies have initial jurisdiction for all development measures in rural areas, and as commissioners of the construction work they are responsible for the needs analysis, technical planning, invitations to tender, initiation of the measures and technical, financial and administrative management. Ensuring sustainability – for example through repair and maintenance work – is particularly important. Local and regional authorities should detail all development measures – especially those involving transport development – in their development plans or in local development strategies and take responsibility for implementing them. These measures should be coordinated and adapted at both local/municipal and national/transnational levels. Greater consideration should also be given to the possibility of cooperation between neighbouring districts (e.g. in West Africa often in the form of ‘local conventions’) on the design and implementation of transport infrastructure projects. District development plans must be used to improve connectivity and coordination with regional and national development plans.

- Local bodies such as village development committees play an active part in needs analysis, implementation and maintenance.

- Technical and financial partners support implementation by funding and supervising measures in the areas of capacity building, planning, implementation and management of construction measures and by supporting the economic development process.

- The same applies to projects that operate by arrangement with state bodies and local authorities and also to organisations such as NGOs, associations, societies and foundations.

- Private companies and private service providers work on a contract basis or are involved through PPPs.
3.1.4 Need for intervention

In many countries the decentralised government bodies at regional and local level are recently established, have poorly trained staff and are often not fully operational. Skills and capacities are often weak. Frequently no funds at all are available for ensuring sustainability, carrying out maintenance and repairs, commissioning private companies or maintaining political and administrative links with other local authorities.

The responsibilities and duties of these bodies (such as local community authorities) are being significantly increased: this entails major risks, since in rural areas responsibility often lies no longer with the state but with these very bodies and structures at regional and local level. The bodies concerned are often ill-matched to the workload and the degree of challenge and thus unable to carry out their duties in full. Since state services (even deconcentrated ones) are often very bureaucratic and slow to respond, it is important that tasks such as implementation and maintenance are
decentralised. If the regional aspect is not taken into account at planning level, it will be hard, if not impossible to implement at municipal and local level.

Purely technical expertise usually exists at national level but at regional level it is likely to be in short supply or difficult to access. Although the situation in this regard varies widely between countries and also regional structures and bodies may take different forms, the principal need for action (in addition to financial support) is for capacity development in the following areas:

- responsibilities – rights – duties,
- planning approval procedures – environmental assessments – development plans,
- administrative and financial procedures (tendering process),
- compensation,
- authority over transport routes,
- explanation of the applicable legal framework.

However, capacity development measures need to target not only the municipalities but a wider range of stakeholders such as technical services, users, construction companies, maintenance officials and village committees. The following questions should therefore be considered in connection with all measures that affect the territorial aspect:

- What legal rights does the state grant to regional and local bodies?
- Can they conclude contracts independently? Are they allowed their own bank accounts? Can they act in the name of the local population without restriction?
- How can the interaction between the macro, meso and micro levels be organised with regard to mobility?
- What right of input and what influence do state, national and regional authorities and bodies have in relation to municipal and village-level decision-making, and vice versa?

Territorial power structures must be clarified in order to permit more effective and speedy intervention in connection with maintenance measures, controls and sanctions, and decisions that directly affect the transport infrastructure.

Responsibilities should always be clarified with regard to the award of concessions, the award of contracts to private companies and the collection of tolls for road use. Likewise, responsibilities for checks and controls (e.g. rain barriers on paths in areas subject to heavy rainfall) must be defined. Questions need to be asked about responsibilities and the distribution of tasks relating to maintenance and repairs as well as about decision-making powers and ownership.

Planning sovereignty is another important aspect and it is necessary to clarify who makes plans in what area, who is involved, and for what purpose the plans are made. It is also necessary to identify whether applicable regulations already exist at regional, national or international level – for example, among communities of states such as ASEAN in south east Asia or ECOWAS in West Africa – and how they are implemented.
Improving the Accessibility of Rural Areas – The Contribution of Transport to Rural Development

3.2 Approaches in the transport sector

3.2.1 Planning at national and regional level (transport master plans)

National transport planning falls within the remit of national development strategies drawn up by governments (National Development Plans, Poverty Reduction Strategies (PRS), etc.). These plans define strategic goals, detailing how the transport sector can contribute to the country’s development. The ministry of transport usually draws up a national transport strategy (often termed as “White Paper on National Transport Policy” or “National Transport Policy and Strategy NTPS”) in which the strategic goals from the national development strategy are converted into a policy programme for the transport sector and targets for each transport sub-sector are laid down. Finally, a national transport master plan is drawn up; this puts the requirements coming from the transport strategy into practice, provides specific recommendations for action and sets priorities. The master plan is a guideline for the systematised long-term development of the transport sector and it defines the role of each mode of transport. It supports regional and sectoral development policy and plans trans-regional transport between the main centres.

Rural communities are particularly dependent on reliable transport routes and transport services to meet their everyday needs for water and firewood and provide access to their fields. Despite this, rural roads and tracks are often poorly planned and funds for building and maintaining the network of rural roads and tracks are often scarce or non-existent. Careful prioritisation is therefore needed, and regional development plans need to be drawn up to transfer the national strategies into regional level planning. This is usually the responsibility of regional and local governments. In practice it has proven to be useful to locate responsibility for the rural route network at regional or local level. This ensures that the needs of the local population may be properly considered and it increases a sense of ownership for the roads and tracks. However, it is essential that regional plans are taken into account at the level of national strategies and planning frameworks.

Liberia has defined five strategic targets for the roads sector in its PRS. One of these targets is to ensure that all primary roads are usable year-round and that secondary/feeder roads are opened throughout the country, so that all district capitals are linked to each other. In addition, in consultation with local communities, 400 miles of feeder roads will be constructed or renovated. However, the NTPS currently makes little mention of rural access roads.

The NTPS provides for year-round usability by introducing a road maintenance system, including performance targets in road maintenance contracts, carrying out regular surveys of the state of the country’s roads and setting out road-building standards. The national transport master plan describes the creation and introduction of a road maintenance system and a system for managing it which ensures that the targets laid down in the NTPS are met. GIZ has supported the Liberian Government both in the formulation of the NTPS and in drawing up the master plan; it remains involved in the establishment of the road maintenance and management system at national level and its implementation in a pilot region.

Regional plans often integrate the transport sector with other areas such as education, health, economic development, energy and water. The first step should be to assess the mobility needs of the rural population and to identify – in the light of geographic, climatic and socio-political conditions – what means of transport and what infrastructure are needed to meet these needs. A rural route network, which from the perspective of the country as a whole and the national economy is always secondary, should usually be viewed in the context of a primary national transport network. In rural areas, decisions about infrastructure development must be based not only on economic considerations; it is important that they also take account of social criteria (such as the poverty rate). Important routes in rural areas are pedestrian access to the
nearest school or health clinic, routes that enable smallholders and small-scale farmers to access the nearest market, at least with hand carts, and links that connect villages to the nearest road that is passable year-round for motor vehicles. Access to transport services should always be considered when setting up new health and education facilities. Similarly, water points or firewood plantations need to be located close to the consumer. When providing goods, it is important to ensure that they can be readily transported and are appropriate for the means of transport to be used (e.g. inputs such as fertiliser need to be packed in sizes that allow them to be taken to farms on foot).

One of the aims of integrated regional planning should be to ensure that infrastructure-related investment and running costs are manageable. Funds should thus go not only to routes for motorised, but also for non-motorised transport. Women benefit particularly from improved accessibility at local village level: they have little access to means of transport but at the same time they often bear the main burden of the family’s mobility needs.

A widely used approach has been developed by the International Labour Organization (ILO) under the name Integrated Rural Accessibility Planning, IRAP (Donnges 2003). IRAP aims to improve rural transport systems and the distribution of and access to facilities and services. As part of the scheme various instruments have been developed that can be adapted to the specific requirements of each country and region.

In Namibia, the construction of rural roads is financed with taxpayers’ money. Due to the importance of rural feeder roads for the local population, the causation (“user pays”) and efficiency principles are not applied. Prioritisation between different regions is done on the basis of the Rural Access Indicator (RAI) developed by the World Bank (proportion of rural habitable areas that are within 2 kilometres of all-weather roads). After the identification of regions in need, a master plan for the respective regions is drafted together with the local government.

As a basis for the consultation process with the local government a benefit analysis is required. It includes access to schools, hospitals and improvement of the RAI as indicators. The Ministry of Transport, the Highways Agency and the local government then decide every five years which roads should be included in the master plan for construction and maintenance activities.
3.2.2 Infrastructure

3.2.2.1 Appropriate methods of building rural roads

*Demand-oriented, labour-intensive, climate-resilient: Approaches to rural road-building*

Rural transport infrastructure takes many forms. In most countries trans-regional transport is catered for by well-built roads, and in some cases waterways and railways, which pass through rural regions, and this is supplemented by a frequently extensive network of secondary roads, tracks and paths. As has been described in Section 2.2.1, these secondary routes provide access to routes to cities and more distant regions, and they play a particularly important part in enabling the rural population to obtain everyday supplies. Development cooperation programmes therefore focus not only on developing main transport arteries but also on renewing and developing secondary roads and tracks, and to a lesser extent, too, on improving routes for non-motorised traffic for use by pedestrians or pack animals. These routes do not always appear on maps or in road classifications and they are usually used and maintained by the local population.

The type of route that is appropriate and the materials that should be used in building them depend in any specific case on many factors. If roads are used by heavy lorries or if heavy rainfall is frequent, asphalt roads are appropriate. Where routes carry little traffic or are used mainly by pedestrians and cyclists, work can focus on improving gravel and laterite tracks and simple field paths. Construction costs and the affordability of subsequent maintenance are important considerations here (see Section 3.2.2.2 and Table 4).

An example illustrates the figures involved. An analysis of 115 transport infrastructure projects in Africa funded by international donors found that the average cost of renewing asphalt roads or asphaltling existing gravel roads was about USD 300 000 per lane kilometre, and that regular maintenance cost roughly USD 150 000 on top of this. By contrast, the cost of re-gravelling a path was only about USD 16 000 per lane kilometre (AICD 2008).

**Direct contribution to poverty reduction:**

*Labour-intensive road and path construction*

Significant investment in rural transport infrastructure often has great potential for direct and short-term poverty reduction in the area in which the construction work is carried out. For many years, therefore, labour-intensive road-works has been the approach used. For each dollar of capital spent, this generates up to seven times as much employment as conventional road-building (McCucheon 2008). At the heart of this approach is the principle of involving the local population in construction and preparing them to take responsibility for road maintenance activities. Where possible, heavy machinery is not used, provided that this does not adversely affect the required construction quality and that the necessary construction standards can be met. This also reduces adverse environmental impacts during the construction.
phase. Where local resources so permit, construction materials from the region may be used. For example, a German cooperation project supported the construction of cobbled roads in Rwanda, where the economic situation and the tradition of skilled masonry work in natural stone made the use of natural stone cobbles for road-building entirely appropriate (see the Rwanda project example in the appendix).

The advantages of labour-intensive road- and path-building projects are now well documented. As a result of the greater emphasis on gender aspects, more women are now being employed in many programmes; this enables the women not only to earn an income for themselves and their families but ideally also to improve their standing in society (see also the Bangladesh project example in the appendix). At the same time, however, experience of labour-intensive projects also shows the utmost necessity for careful planning, thorough training of participants and a sound strategy for the funding of subsequent maintenance (see also Section 3.2.2.2). If these are covered, the sustainability of the initial investment and the development impacts above and beyond the short-term

Table 4: Commercial volumes of traffic and construction standards for different road types

<table>
<thead>
<tr>
<th>Road type</th>
<th>Commercial volume of traffic 1) (vehicles/day)</th>
<th>Maximum axle load (metric tons)</th>
<th>Road surface</th>
<th>Prevailing road standards by type of country</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 lane Expressway</td>
<td>&gt; 30 000</td>
<td>11.5 t</td>
<td>asphalt concrete 22 cm</td>
<td>X</td>
</tr>
<tr>
<td>European National Road</td>
<td>15 000–30 000</td>
<td>11.5 t</td>
<td>asphalt concrete 18 cm</td>
<td>X (X)</td>
</tr>
<tr>
<td>European Provincial Road</td>
<td>5 000–15 000</td>
<td>11.5 t</td>
<td>asphalt concrete 14 cm</td>
<td>X X (X)</td>
</tr>
<tr>
<td>European District Road</td>
<td>1 000–5 000</td>
<td>11.5 t</td>
<td>asphalt concrete 10 cm</td>
<td>X X X</td>
</tr>
<tr>
<td>European Local Road</td>
<td>400–1 000</td>
<td>11.5 t</td>
<td>asphalt concrete 8 cm</td>
<td>X X X X</td>
</tr>
<tr>
<td>Gravel road with double surface asphalt treatment</td>
<td>120–400</td>
<td>appr. 10 t</td>
<td>double surface treatment on gravel base</td>
<td>X X X X</td>
</tr>
<tr>
<td>Gravel Road</td>
<td>70–12</td>
<td>appr. 10 t</td>
<td>20 cm compacted gravel base (CBR2 &gt; 80)</td>
<td>X X X X</td>
</tr>
<tr>
<td>Gravelled Road</td>
<td>30–70</td>
<td>&lt; 5 t</td>
<td>30 cm gravel (CBR2 &gt; 30)</td>
<td>X X X</td>
</tr>
<tr>
<td>Dirt/Feeder Road</td>
<td>15–30</td>
<td>&lt; 1.5 t</td>
<td>Earth CBR2 &gt; 20</td>
<td>X X</td>
</tr>
<tr>
<td>Access Track</td>
<td>6–15</td>
<td>4 x 4 drive</td>
<td>Natural soil with some “Irish bridges”</td>
<td>X</td>
</tr>
<tr>
<td>Rural Track</td>
<td>&lt; 6</td>
<td>non-motorised transport</td>
<td>Natural soil</td>
<td></td>
</tr>
</tbody>
</table>

1) The ratio of road construction prices between neighbouring road classes is in general approximately 1:2.5
2) CBR = California Bearing Ratio; indicates the bearing capacity of road material in per cent relative to that of crushed rock (= 100).

Source: GTZ, Gerhard Metschies
employment effect is highly likely. In addition, possible disadvantages of labor-intensive road construction must be considered: Costs are usually higher than in conventional road construction, which may translate into less road kilometres constructed or rehabilitated within a given budget. Construction time may increase considerably, and the quality of the road can be inferior compared to conventional construction methods.

*Planning and building with an eye to the future: The challenges of climate change*

The rural transport infrastructure in many newly industrialising and developing countries is increasingly at risk from the impacts of climate change. More intensive and longer-lasting heat waves damage the materials used for road surfacing, while heavy rain and more frequent floods make many roads and tracks temporarily or even permanently impassable. These factors must be taken into account when investment in the rural transport network is being considered. A sound vulnerability analysis is a useful first step. Such an analysis shows which regions will be affected in the medium to long term by which impacts of climate change. This helps to identify the need for adaptation not only in relation to the rural infrastructure but also for the rural area and its inhabitants as a whole.

As a rule, higher design standards for roads and tracks usually involve higher costs and more elaborate construction measures. The latter, in particular, may sometimes conflict with the principles of labour-intensive work described above. Analysis of flood damage to rural paths in Cambodia after the devastating monsoon rains of 2011 has shown that tracks built using labour-intensive methods were particularly badly affected.

At the same time, it is necessary to set priorities. Not every road and path can be built or repaired to the highest standards in the short term. What is needed here is forward-looking planning that takes account of numerous considerations: How will rural communities in general be affected by climate change, and what changes in mobility behaviour are to be expected in consequence? What roads and paths are important during and after climate-induced events to ensure a minimum of access to basic services and to the workplaces? In the event of a disaster, what routes must be passable for purposes of evacuation or the deployment of aid forces, and what routes might fulfil an additional function, for example as a final refuge from floods (as in the case of elevated road embankments in Bangladesh)? Such considerations are important in order to set priorities for investment that take the impacts of extreme climate events into account.

### 3.2.2.2 Maintenance and financing of transport routes

Transport routes can only be of lasting benefit if they are preserved and maintained long-term. Otherwise, enormous economic assets may be lost, in which secondary rural roads often play a surprisingly important role (see Table 5). By comparison with new investment, the level of annual expenditure required for this is low (approx. 2.5% of the

![Figure 23: Road flooded after heavy rain.](image)
Harnessing mobility for strengthened rural development

German development cooperation projects in the area of road infrastructure should therefore focus primarily on effective maintenance of the road network. Using foreign finance to build new roads or extend existing ones should not be considered unless the sectoral and institutional conditions for effective road maintenance are in place (BMZ 2000).

Responsibility for maintaining the primary road network is usually located at national level, while secondary and rural roads are frequently the responsibility of the municipalities. Decentralisation of decision-making powers requires municipalities to have the necessary financial budgets permanently available; they also need technical support and help with maintenance planning from the government. Roads in rural areas are predominantly gravel and laterite roads or unpaved tracks. Regular maintenance is therefore usually feasible without major technology or use of machinery, and it can be quickly learned. The relevant training must be provided by the government. If high seasonal rainfall or extensive use by heavy lorries puts the road paving under severe strain, technical assistance as well as increased funding must be made available. In Costa Rica a German development cooperation project has supported a participatory model for renovating and maintaining roads. While government institutions such as the Ministry of Public Works and Transport and local authorities provide the necessary machines and materials, the civil population takes responsibility for the manual labour required for road maintenance. Citizens receive training in maintenance, take on road maintenance as their responsibility, help obtain funding and hence assume ownership for the rural roads.

The planning of maintenance programmes for little-used roads in rural areas requires the application of special models. Merely capturing the data relating to traffic volumes and road condition, as needed by widely used models for assessing maintenance methods (such as the World Bank’s Highway Development and Management Model, HDM) would overtax the available resources. Supporting decision-making in relation to maintenance of roads with low traffic volumes calls for models that use simplified means of measuring traffic volumes, vehicle operating costs and time costs and other appropriate replacement indicators such as traffic safety, benefits for non-motorised transport, social function and environmental effects (such as the World Bank’s Roads Economic Decision Model).

### Table 5: Road infrastructure and capital assets in Cameroon

<table>
<thead>
<tr>
<th>Road kilometres</th>
<th>Bridges (million Euro)</th>
<th>Water flows (million Euro)</th>
<th>Total (million Euro)</th>
<th>Proportion of new road price* (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 750 km asphalt</td>
<td>125</td>
<td>197</td>
<td>322</td>
<td>19</td>
</tr>
<tr>
<td>18 200 km non asphalt</td>
<td>340–680</td>
<td>1 000</td>
<td>1 310</td>
<td>57</td>
</tr>
<tr>
<td>22 000 km total</td>
<td>633</td>
<td>1 327</td>
<td>1 960</td>
<td>38</td>
</tr>
</tbody>
</table>

* Assumptions for new road prices: 3 750 km @ approx. € 452 000 = € 1 695 million, 18 200 km @ approx. € 180 800 = € 3 277 million, total 22 000 km = € 4 972 million. For information: GDP Cameroon: approx. € 9 831 million, i.e. the replacement value of the classified road system is about 50% of GDP.

Source: Olaf Meyer-Rühle, GTZ
Road maintenance is under-financed in most countries. The World Bank’s Road Maintenance Initiative (RMI) has established that national budgets for road maintenance and road-building in Africa rarely cover more than 30% of the need; in the case of rural roads, funding is usually even less adequate. The funding of maintenance is managed in different ways in developing countries. In recent years many countries have introduced road funds that are designed to enable funding to be more independent of national budgets, instead involving contributions from road users in the form of fuel surcharges (e.g. a share of 10% of fuel taxes permanently dedicated to road maintenance) or levies on heavy lorries. Only in exceptional cases can road-use charges be set so high that they cover the cost of maintaining and repairing the entire road network.

In addition, the maintenance of rural roads cannot be considered from a purely economic perspective, since on the basis of economic criteria alone such roads would often not be worth maintaining. This means that for little-used roads a policy of levies and charges on the ‘user pays’ principle is not feasible. As a result, the road funds often cover only the primary road network completely, while secondary and rural roads are cross-subsidised, with a certain proportion being provided from the road fund. In Namibia the charges paid by road users are used only for roads whose economic benefit can be demonstrated. ‘Social roads’ are still funded from the state budget. Overall, therefore, the importance of road funds for the maintenance and repair of rural roads is still rather small.

A performance-related contract system provides the state bodies that transfer funds for road maintenance to local governments with a degree of assurance that these funds are being used appropriately. Performance-related pay ensures that quality standards are complied with, and through flexible working practices it becomes easier for women to enter employment. For example, in Bangladesh, the jobs in maintenance created through the development scheme not only generated additional income for families but also enabled women in particular to be integrated into the labour market with a long term perspective. This boosted their self-confidence and their standing in the eyes of men.

Assuming responsibility for the road network provides municipalities with opportunities to use their limited funds for maintenance and repair in the ways that yield the greatest benefit for the district. It enables them to set their own priorities for maintenance or to reduce maintenance costs, for example by introducing locally adapted road-building standards (e.g. reduced carriageway width). Another option is to find local sources of funding for road maintenance (e.g. market charges). Mine owners and local businesses that generate high volumes of heavy traffic should make an appropriate contribution to the costs of road building and maintenance. This should apply not only to roads that the mines or businesses need in order to operate and in which the business owners therefore have a vested interest: other infrastructure commitments in the region should be included as preconditions of the concessions given to companies.

Figure 25: A rural road in the Koper municipality (Southwest Burkina Faso). Inadequate maintenance due to a lack of financial resources in the municipality has resulted in impairing traffic on this route.
© Matthias Bartholdi, 2013
3.2.3 Improving mobility services

Donkeys, oxen, pickups, minibuses: Transport services in rural areas

International development cooperation in the field of rural mobility has focused and continues to focus on the construction and maintenance of infrastructure. Far less attention has been paid to the provision of services for the transport of people and goods, and within official development cooperation there are relatively few examples of successful schemes for improving transport services themselves. It is often assumed that the relevant services will automatically come into being once a good-quality road is available thus lowering running costs of vehicles and increasing economic opportunities in transportation. In the more densely populated regions of Asia, in particular, this view is often confirmed. Two to three years after the end of a major German development cooperation project involving development of rural roads in some provinces of Laos, traffic censuses showed that motorised traffic on these routes had quadrupled – although non-motorised traffic continues to predominate. At the same time, tariffs for passenger transport fell by about 26% and tariffs for goods transport by about 32%. Transport providers who used the developed roads saw their annual operating costs fall by an average of about 73% (KfW/Gitec 2012). In this context public investment in the infrastructure was clearly sufficient to improve the mobility of the rural population, whose needs were being catered for by private providers.

The situation is more difficult in rural areas characterised by a combination of relatively low population density and very low incomes. In such places inadequate infrastructure is a major barrier to better mobility, but not the only one.

In many countries in sub-Saharan Africa the urgently needed provision of effective mobility services is hampered by the lack of potential for the transport of passengers and goods and by inefficient management and the formation of cartels among providers. A pickup in rural Thailand covers 61,000 km annually – twice the distance covered by a comparable vehicle in Ghana (Ellis, Hine 1998) – making the market significantly more lucrative for transport operators in Thailand. A study from Malawi, relating to passenger transport, illustrates the challenge. Without major subsidies, no bus operator would be able to provide a daily link between a group of five villages and the market some 17 km away: the costs are simply out of proportion as compared to the demand (Raballand et al., 2011). By contrast with many countries in Asia, sub-Saharan Africa is hindered not only by barriers of this type that arise from settlement patterns and institutional/organisational problems but also by the higher costs of vehicles and spare parts.

Some countries – such as Sri Lanka with its ‘Gami Saeriya’ programme – have developed schemes whereby bus transport in rural areas is put out to tender and subsidised for at least the initial few years (in the case of Sri Lanka subsidies cover up to 25% of operating costs in the first three years) (Kumarage et al., 2009). In such cases facilitating personal mobility is regarded as a public good – a
concept that is familiar from European countries and one that deserves to be more strongly applied in developing countries, despite the expense involved. This contrasts with the micro level of transport of people and goods to the nearest market, often on simple tracks and paths, where pioneering work has been done by non-governmental organisations – sometimes with the support of international donors. In connection with the transport of larger quantities or perishable goods, the use of information and communication technology and of freight brokers can increase the quantity of goods to be transported to a cost-effective level and prevent empty journeys. Where the private transport sector is itself a part of the problem as a result of cartels and mismanagement, the only solution lies in reform of the sector.

Table 6: Transport costs in rural Africa

<table>
<thead>
<tr>
<th>Transport mode</th>
<th>Cost per tonne kilometre (€/tkm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian transport (e.g. carrying goods on the head)</td>
<td>3.00 – 5.00</td>
</tr>
<tr>
<td>Use of pack animals (e.g. camels, donkeys)</td>
<td>1.50 – 2.00</td>
</tr>
<tr>
<td>Oxcart, horsecart, bicycle</td>
<td>0.60 – 0.85</td>
</tr>
<tr>
<td>Tractor with trailer, pick-up</td>
<td>0.40 – 0.60</td>
</tr>
<tr>
<td>Truck 5t load capacity on dirt or gravel road</td>
<td>0.20 – 0.35</td>
</tr>
<tr>
<td>Heavy truck on asphalt road</td>
<td>0.10 – 0.15</td>
</tr>
</tbody>
</table>

Source: GTZ survey in Kenya
Harnessing mobility for strengthened rural development

(which is often difficult to implement in rural areas) and in-depth discussions with operators and their associations and federations. Support and training in vehicle maintenance and more efficient management can help to overcome resistance and boost competition and professionalism in the transport sector.

The private sector’s domain: Trans-regional logistics

At the level of trans-regional transport the role of public institutions in connection with freight transport and the majority of passenger transport is largely limited to the creation of an enabling environment and – as described above – public policy measures designed to encourage deregulation and competition. Many of the options at this level can significantly assist economic development in rural areas, although the effects are mostly indirect. There is a major potential for governments to reform and professionalise police and customs agencies (see also Section 2.2.3), with the aim of reducing corruption and bureaucracy. In Nigeria, for example, German development cooperation is helping to establish an SMS-based information system about illegal road blocks and bribery payments. As with the system financed by USAID (Section 2.2.3) the ultimate aim of the scheme is to reduce costs for transport operators. International cooperation can also make an important contribution by helping state and private operators to improve the efficiency of major infrastructure facilities such as ports.

Figure 28: Ports as trading and transhipment stations.
© Bernd Brunnengräber, Malabo, Equatorial Guinea
4. Outlook

The preceding chapters have shown that mobility is a key element in the economic and social development of rural areas. Despite the steady progression of urbanisation in most of the partner countries of German development cooperation, rural areas still have an important part to play since they provide food and environmental services such as water for urban centres. Further urbanisation cannot take place without functioning and effective rural areas with active urban hubs for trade and transport. Issues such as food security and the continuing high levels of poverty in most rural regions further underline the importance of territorial development for a holistic approach to development. From the perspective of German development cooperation, the following points should be borne in mind if the vital role of transport and transport infrastructure is to be considered and its potential for development to be harnessed:

- **Rural development requires investment in many areas.** Close coordination of financial and technical cooperation boosts the effectiveness and impact of aid enormously, especially in the case of projects involving infrastructure improvements. Tried and tested instruments of financial cooperation, such as labour-intensive road-building, should ideally be complemented by policy advice and training courses in order to prepare for subsequent maintenance and embed the individual projects in a comprehensive strategy.

- **Experts in transport and agriculture can do more to work together on analysing the need for transport infrastructure and services, with a view to improving the productivity of farming as the engine of economic growth in many rural areas.**

- **It is also important to promote decentralisation, in both the use and the planning, as well as in financing and implementation of infrastructure measures.** Support must not be confined to the purely technical level but must respect the socio-political context and adopt a territorial perspective on development (see Section 3.1.1).

- **The pool of experts and sources of knowledge on the subject of rural transport has diminished steadily in recent years.** In view of this, it is important to join forces with other regional and international actors in order to benefit from synergies and supplement skills. German development cooperation should therefore encourage networking and engage actively with other international cooperation organisations, NGOs and not least technical experts in its partner countries. There is particularly significant potential for cooperation in the scaling-up of best practices.

- **There is a need for better integration of transport and development planning at different spatial levels.** Improved integration will also help to improve understanding of the links between rural mobility and urban/rural relationships, and between rural mobility and trans-regional freight transport flows. Realistic framework plans and efficient implementation are important foundations for economically promising development.

From the past experience of German development cooperation (see also the appendix) it is possible to identify the following objectives and approaches that – individually or in combination – could serve as guidelines for future involvement in the field of rural mobility:

- **Poverty reduction**: labour-intensive road-building with intensive involvement of the local population;
- **Boosting agricultural productivity**: interventions in infrastructure and transport services, specifically tailored to the needs of small-scale farmers;
- **Sustainability and decentralisation**: improving capacities for infrastructure maintenance, especially at regional and municipal level;
- **Rural-urban linkages**: Foster links between rural areas and cities, especially with regard to food security in cities;
- **Knowledge management**: encouraging international dialogue and the exchange of expertise and best practices relating to all aspects of rural mobility and access to transport.

Figure 29: Caught in the pothole: German development assistance will continue to support partner countries in improving rural mobility, to avoid such scenes in the future.

© Johannes Knapp, Liberia, 2010
Case studies
The experience of German development cooperation in the field of rural transport

Bangladesh

With Pakistan and Nepal, Bangladesh is among the poorest countries in Asia. Most of the population live in the rural areas, with agriculture being the predominant economic activity.

From 2003 to 2010 GIZ, the Asian Development Bank and KfW Development Bank, working with local decision-makers, implemented the Rural Infrastructure Improvement Project (RIIP-1) in the southwest of Bangladesh. The development of markets and transport routes and the provision of advice and training removed many obstacles to development. In the course of the project 1 325 km of roads, 85 boat landing stages, 68 markets and three ferry routes were established or restored. The institutional framework was improved by introducing a system of performance-related contracts for road maintenance and a road safety plan. Training in bookkeeping and human rights was provided to local governments.

![Figure 30: One of the new boat landing stages.](image)

© GIZ, 2010, Laos

### Bangladesh: facts and figures (UNDP 2011)

| Metric                                      | Value
|---------------------------------------------|-------
| Population in millions (2011)              | 150.5 |
| Position in HDI ranking                     | 146   |
| GDP per capita (2009) in USD                | 1 416 |
| Adult literacy rate                         | 56 %  |
| Share of population below the poverty line* | 50 %  |
| Share of rural population                   | 71 %  |

* Percentage of the population living on less than USD 1.25 per day (2000–2009).

### Wide range of effects

The improvements to infrastructure and institutional conditions increased economic activity in the markets, generated more than 82 000 new jobs in road-building and maintenance and so raised the income of poorer population groups. About 22.6 million people were reached by the project.

### Education and jobs for women

Bangladesh is a male-dominated society in which women are frequently subjected to violence, both at home and in public. Although the equality of men and women in the public arena is enshrined in the country’s constitution, women’s right to work is not accepted in many sectors of society. The jobs that have been created in maintenance (75 % of which are for women) and in the markets have improved women’s permanent integration into the labour market; this has boosted their self-confidence and their standing in the eyes of men. The position of women has also been improved through training in areas such as law, reading and writing and hygiene.
Laos

Road infrastructure projects increase educational opportunities

KfW Development Bank has been involved in infrastructure projects in Laos since 1994. Assistance has been provided to the Laotian Government in maintaining around 1,000 km of roads in predominantly rural regions; this has facilitated access to education, markets, health care and other public facilities, especially for poor population groups.

The improved road infrastructure in the provinces of Luang Namtha, Bokeo and Oudomxay[1] resulted in a triplication of the average speed of travel[2] and encouraged more people to take up work in the transport sector. The wider availability of transport, shorter travel times and lower travel costs[3] made it easier for children and young people to attend school. Pupil numbers at primary and junior secondary schools rose by 9–10% as a result. The percentage of over-18-year-olds who had never been to school fell from 26% to 17%. In addition, at many schools there was a rise in the percentage of girls among the pupils.

Improved mobility reduces poverty

The improved transport conditions also benefit farmers in the targeted provinces, who can now access a larger number of markets where they can sell their produce. As a result of the increased trading activity and the promotion of farming through technical cooperation measures, the poverty rate in the provinces concerned fell by 22% in two years. The infrastructure measures also enabled the availability of water and electricity to be improved.

Laos: facts and figures (UNDP 2011)

<table>
<thead>
<tr>
<th>Population in millions (2011)</th>
<th>6.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position in HDI ranking</td>
<td>138</td>
</tr>
<tr>
<td>GDP per capita (2009) in USD</td>
<td>2,255</td>
</tr>
<tr>
<td>Adult literacy rate</td>
<td>73%</td>
</tr>
<tr>
<td>Share of population below the poverty line*</td>
<td>34%</td>
</tr>
<tr>
<td>Share of rural population (%)</td>
<td>66%</td>
</tr>
</tbody>
</table>

* Percentage of the population living on less than USD 1.25 per day (2000–2009).

Adverse side effects of improved mobility

The increase in traffic volumes and traffic speeds[4] brings with it a heightened risk of road accidents, pressure on natural resources and environmental pollution, which poses new challenges for the provincial governments (see also Section 2.3).

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[1] The data is taken from the EX-POST SOCIO-ECONOMIC SURVEY REPORT, RIP Phase II, 04/2012 and relates to the project villages considered in that study; period: May 2007–March 2012.

[2] Increase from 11.3 km/h to 30.5 km/h.

[3] Passenger transport costs -26%, freight transport costs -32%.


Figure 31: The regions that are now more accessible are among the poorest in Laos.
© KfW
Improving the Accessibility of Rural Areas – The Contribution of Transport to Rural Development

**Namibia**

*Monitoring & evaluation process improves cooperation between parastatal transport institutions and the ministry*

When Namibia became independent of South Africa in 1990, the need to restructure its transport sector presented a major challenge.

*Establishment of parastatal institutions*

The Namibian Government set about increasing the efficiency of the transport sector through more competition. As part of the reform of the road transport sector in 1999 the remits for planning, construction, maintenance and road safety were transferred from the Ministry of Public Works and Transport to newly established parastatal institutions (PSIs). Road financing was restructured according to the “user pays” principle. Road fees in the form of fees for heavy goods transport, fuel surcharges and others are directly transferred to a road fund. Despite the reform, however, the results were unsatisfactory. Responsibilities were not clearly defined, cooperation between the PSIs and the ministry was poor, the staff lacked know-how and revenues were insufficient for maintaining the whole network.

*Introduction of monitoring and service agreements*

Through the project ‘Strengthening Institutional Development in the Road Transport Sector’ GIZ has since 2004 been supporting the Namibian Ministry of Public Works and Transport to improve institutional structures. An important reason for the inefficiency of the PSIs was found to be the ‘principal-agent problem’: the principal (the ministry) did not have the same level of knowledge as the PSI (the agent) and therefore had difficulty evaluating its performance. GIZ worked with the ministry to draw up monitoring and service agreements that included precise definitions of the PSI’s tasks. Detailed and clearly specified benchmarks enable the ministry to monitor and assess the work of the PSI.

The introduction of a semi-automated project cycle has facilitated reporting within the institutions and between institutions and the ministry. ‘Institutional memory’ ensures that the evaluation process functions independently of individuals and monitors compliance with deadlines and submission dates. Staff training helps improve the ability to interpret the newly created benchmarks.

*Training with the assistance of German universities*

Through cooperation between Namibian and German universities, staff have received additional instruction and new experts have been trained so that the M&E system can be implemented on the ground.

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**Namibia: facts and figures (UNDP 2011)**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population in millions (2011)</td>
<td>2.3</td>
</tr>
<tr>
<td>Position in HDI ranking</td>
<td>120</td>
</tr>
<tr>
<td>GDP per capita (2009) in USD</td>
<td>6,410</td>
</tr>
<tr>
<td>Adult literacy rate</td>
<td>89%</td>
</tr>
<tr>
<td>Share of rural population (%)</td>
<td>61%</td>
</tr>
</tbody>
</table>

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38
Nepal

‘Green roads’ permanently reduce hunger

In ‘the country on top of the world’, large sections of the population are undernourished. This is a consequence of the country’s political instability, exacerbated by its difficult topographical position. In the rural regions of Rukum and Rolpa, GIZ opened up mountainous regions using the ‘green roads’ concept.

Environmentally friendly road-building

One of the principles of the ‘green road’ concept is the utilisation of natural local conditions. For example, roads are oriented towards the sun in order to accelerate drying after showers and reduce the risk of frost. The risk of landslides is minimised with minimal impact on the countryside by avoiding the construction of roads along rain channels and using the insights of bioengineering to consolidate slopes with groundcover plants. The use of construction machinery and explosives is avoided to reduce the risk of soil erosion.

The ‘green roads’ concept depends on large-scale involvement of the population

An important part is played by people living near the proposed routes, who are involved in road planning from the start. The use of simple, labour-intensive construction methods means that local people can help build the roads, even if they have no previous experience, and can quickly acquire the relevant expertise. Dividing the work into small segments ensures that as many people as possible become involved with the construction work and identify with the project.

Financing with local resources

In the ‘green roads’ concept, 50 % of the costs of routine work and maintenance is financed through road use charges. The other half is obtained where possible from local, regional and national funds.

Nepal: facts and figures (UNDP 2011)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population in millions (2011)</td>
<td>30.5</td>
</tr>
<tr>
<td>Position in HDI ranking</td>
<td>157</td>
</tr>
<tr>
<td>GDP per capita (2009) in USD</td>
<td>1 155</td>
</tr>
<tr>
<td>Adult literacy rate</td>
<td>59 %</td>
</tr>
<tr>
<td>Share of population below the poverty line*</td>
<td>55 %</td>
</tr>
<tr>
<td>Share of rural population (%)</td>
<td>81 %</td>
</tr>
</tbody>
</table>

* Percentage of the population living on less than USD 1.25 per day (2000–2009).

Public monitoring of the funds ensures that the use of funds is transparent and open.

Reducing hunger

In Rukum and Rolpa, the ‘green roads’ concept has ensured that roads remain passable throughout the dry season. This has reduced transport costs, facilitated access to markets and improved the nutrition status of the population by 25 % (Methodfinder, no year).

Figure 32: The local population is closely involved in rural road construction.
© Thomas Lennartz
Improving the Accessibility of Rural Areas – The Contribution of Transport to Rural Development

**Mali**

*Irrigation facilities improve harvest reliability, roads enable farmers’ produce to be sold*

Climate change is caused mainly by the industrialised and emerging countries, but its adverse effects are felt most in the poorest countries of the world. In Mali there is potential for conflict as a result of the high population growth, shortages of drinking water, creeping desertification, wide variability in the timing and distribution of rainfall and the silt ing up of rivers.

*Farmers affected by water shortages*

The areas suitable for farming lie to the south of the deserts and along the 1,700-km stretch of the Niger that flows through Mali. As a result of climate change, fluctuations in the quantity of rain that falls in the rainy season between June and October are becoming more and more pronounced. Often farmers experience no rain at all for long periods; at other times the rain is so heavy that it washes the remaining traces of fertile soil from the fields.

![Figure 33: Small-scale irrigation systems benefit especially fields of small-scale farmers.](IPRO_DB, 2011)

**Mali: facts and figures (UNDP 2011)**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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<tbody>
<tr>
<td>Population in millions (2011)</td>
<td>15.8</td>
</tr>
<tr>
<td>Position in HDI ranking</td>
<td>175</td>
</tr>
<tr>
<td>GDP per capita (2009) in USD</td>
<td>1,185</td>
</tr>
<tr>
<td>Adult literacy rate</td>
<td>26%</td>
</tr>
<tr>
<td>Share of population below the poverty line*</td>
<td>51%</td>
</tr>
<tr>
<td>Share of rural population (%)</td>
<td>63%</td>
</tr>
</tbody>
</table>

* Percentage of the population living on less than USD 1.25 per day (2000–2009).

*Small dams ensure a reliable water supply*

To provide farmers with a constant water supply, KfW and GIZ are working closely with local partners on small-scale irrigation projects. Small dams are being built to store water in valleys where the flow of water is seasonal. During the dry period farmers withdraw water from the storage basins using pumps and buckets. In the Dogon country each small dam enables about 100 men and women to grow vegetables and cereals on plots of 540 m², thereby increasing their annual income by about 40%. As a result, eating three meals a day, having proper clothes and sending the children to school is no longer just a dream. A positive side effect of the small dams is the rise in the groundwater level, which facilitates access to drinking water.

*Developing irrigated agriculture*

KfW supports not only small-scale but also large-scale irrigation. In cooperation with other development organisations, 11,000 hectares of irrigated land in the Office du Niger region have been created or rehabilitated, virtually doubling the productivity of the land.

*Roads enable farmers’ produce to be sold*

A key aspect of improving people’s living conditions is ensuring access to markets, so that surplus produce can be sold. KfW and GIZ are therefore working together to help Mali repair the road between the plateau of the Dogon country, the
northern slope of the Bandiagara escarpment and the adjacent sand plain. This has involved renovating the road between Bankass and Bandiagara (39 km) and between Bandiagara and Kendié (41 km); village access tracks totalling about 142 km in length have also been repaired, and anti-erosion measures have been taken along 30 km of road. The tracks have been surfaced with laterite, stone cobbles or concrete – depending on the relief and the risk of erosion – to make them suitable for year-round use. The improved road conditions enable farmers to travel to the markets and ensure that schools and hospitals in the region can be accessed. The effects were vividly described by Souleymane Kassambara, assistant to the mayor of Borko in the Dogon country:

“Before the tracks were repaired we were really cut off. We had difficulty transporting our agricultural produce. You can’t carry much with a donkey, but thanks to the track lorries can now come into the village. When you consider what we earned for our produce before and after the track repair, you are struck by the big price difference. We used to get 1 500 francs for a sack of sweet potatoes, but now we get 5 000 francs. And transporting people to the hospital in the event of medical emergencies used to be very difficult. The journey to Bandiagara used to take at least two days: now we are there in a few hours.”
Rwanda

**Labour-intensive road-building with cobbles unites former enemies**

Cobbles have been used in Europe since ancient times, but in African countries they are largely unknown. In less developed resource-rich countries, building roads and bridges of natural stone has considerable advantages over asphalting, which is the traditionally used method. German development cooperation supported projects using natural stone in Rwanda between 2003 and 2006.

**Health care and the exchange of goods are affected by poor roads**

Just 7% of roads in Rwanda are asphalted: most of the rest are made of beaten earth. Many roads are passable year-round only with large all-terrain vehicles; because of collapsed bridges, some stretches are not passable at all. This particularly affects the 90% of the population who live in villages and often have no fixed employment. Health care and supplies of goods cannot reach the settlements and the rural dwellers lack access to the markets where they could sell their produce.

**Local resources, minimal technology**

The resources needed for cobbles are widely available in Rwanda. Much of the manufacturing and laying of stones can be carried out without the need to import expensive and high-maintenance technology.

**Work as a platform for reconciliation**

Both the mining and the laying of stones are very labour-intensive. This has the potential to give important impetus to the weak labour market, and in Rwanda’s strongly hierarchical society it not only provides jobs for former fighters, demobilised soldiers, widows and others injured in the war but also offers a platform for reconciliation. While the infrastructure measures are designed mainly to bring socio-economic benefits, a side effect of the communal work is that it can help to re-establish trust between former enemies.

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**Rwanda: facts and figures (UNDP 2011)**

<table>
<thead>
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<th>Metric</th>
<th>Value</th>
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<tr>
<td>Position in HDI ranking</td>
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</tr>
<tr>
<td>GDP per capita (2009) in USD</td>
<td>1 136</td>
</tr>
<tr>
<td>Adult literacy rate</td>
<td>71%</td>
</tr>
<tr>
<td>Share of population below the poverty line*</td>
<td>62%</td>
</tr>
<tr>
<td>Share of rural population (%)</td>
<td>81%</td>
</tr>
</tbody>
</table>

* Percentage of the population living on less than USD 1.25 per day (2000–2009).

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Figure 36: Building a cobbled road in Kigali. © Regina Poth
**Costa Rica**

**Successful model of participatory road maintenance**

In Costa Rica with its centrist government, the local development organisations known as Asociaciones de Desarrollo traditionally play a major part in the social, economic and cultural life of their districts. For example, they organise water supplies and health care for entire regions.

**A three-strand participatory approach**

This model for the renovation and maintenance of roads emphasises the involvement of the civilian population, many of whom are active in the development organisations with their roughly 400,000 members. While the state institutions in the form of the Ministry of Transport (Ministerio de Obras Públicas y Transporte) and local authorities provide the necessary machinery and materials, the civil population is involved mainly in the manual aspects of road maintenance.

**Identification through education, public relations work and participation**

With the help of specially developed teaching materials, the population was trained in the technical and social aspects of road maintenance; this increases their self-help potential. A variety of information materials such as radio plays, leaflets and videos were used to familiarise people all over the country with the concept of participatory road maintenance. The local population identified with their roads and came to take responsibility for their maintenance. As a result, a number of micro initiatives such as market gardens and a cheese cooperative were set up to raise money for repairs and maintenance.

**Changes in the law**

Important institutional factors in the success of the model were the establishment of a national road fund and the passing of a tax law that enshrines the expansion of participatory road maintenance by local authorities and the civil population in law.

**Expansion of the project**

In the immediate vicinity of the renovated roads, unemployment fell from 8.1% to 4.6%. As a result of its success the model has now been extended to about 60% of the country’s area and it has been adopted in Guatemala, Nicaragua, El Salvador and Colombia.

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**Costa Rica: facts and figures (UNDP 2011)**

<table>
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<td>Position in HDI ranking</td>
<td>69</td>
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<tr>
<td>GDP per capita (2009) in USD</td>
<td>11,106</td>
</tr>
<tr>
<td>Adult literacy rate</td>
<td>96%</td>
</tr>
<tr>
<td>Share of population below the poverty line*</td>
<td>22%</td>
</tr>
<tr>
<td>Share of rural population (%)</td>
<td>35%</td>
</tr>
</tbody>
</table>

* Percentage of the population below the national poverty line.

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Figure 37: Road works going on in the context of the project in Costa Rica, which is now supported by GIZ International Services.
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Model developed in cooperation with MOPT, local communities, local organisation and GIZ since 1990.
Improving the Accessibility of Rural Areas – The Contribution of Transport to Rural Development

Appendix

Regional development and access to transport at a glance

### Access – From Field to Farm
Agricultural goods need to be transported via paths, tracks and earth roads to the farm, and inputs such as fertilizer in the opposite direction. However:
- Inefficient transport operations and overpricing (cartels)
- Inefficient border procedures and corruption (illegal controls, bribes and enforced delays)
- Lack of equipment and lack of handling skills
- Slow administrative procedures

**Examples:**
- Average costs for container handling (ship-to-gate) in East Africa are US$35–75, compared to only US$80–154 in the rest of the world.
- 7.8% of total transport costs for getting a truckload of onions from Madaoua, Niger to Accra, Ghana are caused by corruption.

### Access – From Farm to Market
Significant post-harvest food losses occur due to the lack of refrigerated transport and storage facilities. An efficient distribution of staples to the urban population requires e.g.:
- Short distances to accessibility of food markets for the poor
- Efficient delivery chain to reduce losses and decrease polluting vehicle emissions

**Examples:**
- In India, at least 50% of the production of fruits and vegetables is lost due to wastage and value destruction, with lack of adequate transport being one among the multiple causes. Annual costs estimated at 5 billion US$.

### Access – From Small Towns to Rural Communities
Lack of transport options to markets and towns for villagers is a barrier to:
- Purchasing food not being produced in subsistence
- Getting to schools and hospitals

**Examples:**
- More than 900m people worldwide lack access to all-weather roads.
- The risk of death during giving birth is 36 times higher for women in developing countries, not least to the lack of access to medical treatment.

### Access – From Field to Market
Cities in developing regions will be home to 3 billion people by 2020, and depend heavily on an efficient food supply. Basic staples must usually be transported from rural areas. Also, cities serve as destinations for cash crops and rural non-farm goods. Related challenges include:
- Lack of maintenance & damage to the road surface due to lack of enforcement of axle load limits etc.
- Lack of adequate transport services for perishables
- Fragmented supply chains decrease efficiency of food transport to cities, and lead to high prices and food losses during handling and transport

### Trade Infrastructure
Efficient ports and – to a lesser extent – airports are vital for economic development, but also to allow rapid transport of food and other aid in case of disaster. However, ports in SSA and other developing countries suffer from:
- Poor equipment and lack of handling skills
- Slow administrative procedures

**Examples:**
- Average costs for container handling (ship-to-gate) in East Africa are US$35–75, compared to only US$80–154 in the rest of the world.
- In India, at least 50% of the production of fruits and vegetables is lost due to wastage and value destruction, with lack of adequate transport being one among the multiple causes. Annual costs estimated at 5 billion US$.

### Urban Logistics
An efficient distribution of staples to the urban population requires e.g.:
- Short distances to accessibility of food markets for the poor
- Efficient delivery chain to reduce losses and decrease polluting vehicle emissions

**Examples:**
- In India, at least 50% of the production of fruits and vegetables is lost due to wastage and value destruction, with lack of adequate transport being one among the multiple causes. Annual costs estimated at 5 billion US$.
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