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**The World Bank**

**Rural Infrastructure in Armenia: *Addressing Gaps in Service Delivery***

**Infrastructure and Energy Services Department  
Europe and Central Asia Region**

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## CONTENTS

<b>Abbreviations And Acronyms</b>	<b>vi</b>
<b>Acknowledgments</b>	<b>vii</b>
<b>Overview and Summary of Recommendations</b>	<b>1</b>
<b>Introduction</b>	<b>5</b>
Why did we do this Study? .....	5
What are the Specific Objectives of the Study? .....	6
What was the Approach? .....	6
<b>The Rural Environment in Armenia</b>	<b>8</b>
Why is Rural Infrastructure Important in Armenia? .....	8
What are the Characteristics of Rural Poverty? .....	10
Is the Institutional Context Supportive of The Rural Sector? .....	12
<b>The Lessons of Earlier Initiatives In Rural Infrastructure</b>	<b>15</b>
What were the Findings from Earlier Projects? .....	15
What are the Main Lessons from Earlier Studies? .....	19
What are the Key Points? .....	21
<b>The Main Findings from the Qualitative and Quantitative Surveys</b>	<b>22</b>
What did we Discover? .....	22
What is the Coverage, Condition and User Satisfaction with Existing Services? .....	22
What are the Preferences of Local Communities towards Infrastructure Investments? .....	35
What are the Factors that Influenced the Sustainability of Prior Investments? .....	42
<b>The Implications for the Development of Rural Infrastructure in Armenia</b>	<b>46</b>
A Coherent Rural Infrastructure Strategy for Armenia? .....	46
What are the Key Issues that A Rural Infrastructure Strategy should Address? .....	48
What can be done to make Rural Infrastructure Investments Sustainable? .....	53
How should Rural Infrastructure Investments be Prioritized? .....	58
How can the Action Plan be Financed? .....	62
<b>References</b>	<b>67</b>
<b>Annex A – The Methodology of the Study</b>	<b>69</b>
<b>Annex B - The Outcomes of the Pilot Interviews</b>	<b>71</b>
<b>Annex C – The Guidelines to interviewers and Questionnaires used in the study</b>	<b>75</b>
<b>Annex D – The Institutional Context of Service Delivery</b>	<b>92</b>
<b>Annex E - The Main Findings from Previous Programs/Studies</b>	<b>101</b>
<b>Annex F– The Coverage, Condition and User Satisfaction With the Existing Services</b>	<b>109</b>
<b>Annex G – The Decision Matrix</b>	<b>143</b>
<b>Annex H - The Cost Estimates in the Decision Matrix</b>	<b>145</b>
<b>Annex I – An Example of The Output from the Decision matrix</b>	<b>157</b>
<b>Annex J – The Sampling Strategy</b>	<b>158</b>
<b>Annex K – The Delphi Approach</b>	<b>160</b>
<b>Annex L – Universal Access in the Telecoms Sector</b>	<b>161</b>

## LIST OF TABLES AND FIGURES

Table 1 Real GDP Growth, Aggregate and by Sector (per cent change over previous year), 1998-2003	9
Table 2 A schematic representation of rural poverty	11
Table 3 Current Monetary Incomes of Households by Main Sources of Income (AMD) 1999-2002	11
Table 4 Summary of groups of communities with various levels of poverty	16
Table 5 The condition of the irrigation infrastructure (2003)	23
Table 6 The area of irrigated land (2003)	23
Table 7 A schematic representation of irrigation availability	24
Table 8 Respondent assertion of crop losses due to absent or inadequate irrigation	24
Table 9 Proportion of communities who had experienced output losses due to absent/inadequate road infrastructure	25
Table 10 The pavement of rural roads by ownership category	26
Table 11 The condition of the road infrastructure in the marzer (2003)	27
Table 12 Condition of drinking water infrastructure at marz level	29
Table 13 The condition of the drinking water infrastructure by ownership type	30
Table 14 Average annual electricity consumption per household, per community in Kwh (1999-2003)	31
Table 15 Respondent satisfaction with the provision of electricity	32
Table 16 A schematic representation of the distribution and number of subscribers for gas	33
Figure 1 The number of communities with telecoms in each marz	34
Table 17 Proportion of votes cast towards each infrastructure type	36
Table 18 Respondent satisfaction towards electricity supply (%)	40
Table 19 The sectoral share of the highest 50 interventions in the DM	61
Table 20 State allocations to public infrastructure sectors (US\$ Mill)	65
Table 21 Required allocations and sources to meet needs of rural infrastructure sectors (US\$ Mill)	66
Table 22 Structure of Central and Local Government in Armenia	92
Table 23 Selected Characteristics of Armenian Marzer	93
Table 24 Drinking water and sewerage tariffs (US cent/cubic meter)	96
Table 25 Wholesale irrigation tariffs (US cent/cubic meter)	97
Table 26 Wholesale irrigation tariffs (US cent/cubic meter)	98
Table 27 Gas tariffs (US cent/cubic meter)	98
Table 28 Telecom tariffs (US cent/minute)	99
Table 29 Summary of groups of communities with various levels of poverty	102
Table 30 The condition of the irrigation infrastructure (2003)	110
Table 31 The area of irrigated land (2003)	110
Table 32 A schematic representation of irrigation availability	111
Table 33 Community access to irrigated land (2003)	112
Table 34 Respondent assertion of crop losses due to absent or inadequate irrigation	112
Table 35 Respondent satisfaction with the quality of irrigation supply	113
Table 36 Proportion of irrigation season when water is supplied	113
Table 37 Proportion of communities who had experienced output losses due to absent/inadequate road infrastructure	115
Table 38 An indication of the relationship between poverty and community ‘remoteness’	116
Table 39 The pavement of rural roads by ownership category	117
Table 40 A schematic representation of the condition and type of the road network, by area	117
Table 41 Investments in Rural Roads, by Marz, over the period 1999-2003 (US\$)	118
Table 42 The condition of the road infrastructure in the marzer (2003)	119
Table 43 Condition of drinking water infrastructure at marz level	122
Table 44 Households with taps as a proportion of total households	123
Table 45 A schematic representation of the distribution of households with taps	123
Table 46 Proportion of communities, by marz, and hours of drinking water supply.	124
Table 47 Investment requirements of drinking water infrastructure by ownership type	125
Table 48 Source of community water supply, by provider category	125
Table 49 Average annual electricity consumption per household, per community in Kwh (1999-2003)	128
Table 50 The condition of the electricity infrastructure, by marz	128
Table 51 Respondent satisfaction with the provision of electricity	129
Table 52 A schematic representation of the distribution and number of subscribers for gas	131

Table 53 Availability and access to gas supply by marz	132
Table 54 Access to gas supply by rural households	132
Table 55 Average annual gas consumption by households, by marz (m <sup>3</sup> )	133
Table 56 The condition of the gas infrastructure in the rural communities	134
Table 57 Access to telecommunications services, by marz	136
Table 58 The percentage of households with telephone subscriptions as a proportion of total households	137
Table 59 The extent of the cellular network coverage in Armenia	138
Table 60 Proportion of rural respondents and time required to make a phone call	138
Table 61 The investment requirements of the telecommunication networks by marz	139
Table 62 The estimated investment costs of the provision of the gas supply network in Group 1 communities	149
Table 63 The estimated investment costs of the provision of the gas supply network in Group 2 communities	150
Table 64 Estimated total investment requirements, by marzer, (2004 prices)	150
Table 65 The estimated investment costs for the irrigation infrastructure	151
Table 66 The investment requirements in irrigation infrastructure for each Marz (2004 prices)	152
Table 67 The input variables in estimate of telecommunications investment costs	153
Table 68 The investment costs for telecommunications equipment by Marz	155
Table 69 Unit Costs of Major Investment Components	156
Table 70 Investment costs for drinking water provision by marz (2004 prices)	156

## ABBREVIATIONS AND ACRONYMS

AMD	Armenian Dram (548 AMD : 1US\$ as at 06/07/2004)
ASIF	Armenian Social Investment Fund
EBRD	European Bank for Reconstruction and Development
ECA	Europe and Central Asia (World Bank region)
EIB	European Investment Bank
FSU	Former Soviet Union
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GoA	Government of the Republic of Armenia
IBRD	International Bank for Reconstruction and Development; part of the World Bank Group
IDA	International Development Agency, part of the World Bank Group
IFAD	International Fund for Agricultural Development
IFI	International Financial Institutions
MTEF	Medium Term Expenditure Framework
PRSP	Poverty Reduction Strategy Program
PIU	Project Implementation Unit
RRIAT	Rapid Rural Infrastructure Assessment Toolkit
SADS	Sustainable Agricultural Development Strategy
SME	Small and Medium Enterprises

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## OVERVIEW AND SUMMARY OF RECOMMENDATIONS

**This report provides public policy makers with the information necessary to develop a rural infrastructure strategy, it was not intended to represent a strategy *per se*, merely to highlight the issues that need greater consideration in the definition of a strategy.** It starts with an inventory of existing rural infrastructure assets and a description of current institutional arrangements. It follows with a snapshot of local preferences and priorities for rural infrastructure development. It goes on to provide a provisional estimate of the costs of rehabilitating and maintaining a basic minimum level of infrastructure in all rural communities, and the incremental costs of enhanced levels, where economically justified. It concludes with a framework to assist in the setting of investment priorities and recommendations for the development of a rural strategy and action plan.

### Why this report?

**Improving rural infrastructure is a government priority.** The Government of Armenia considers rural infrastructure development as a cornerstone of its poverty reduction strategy. About one third (1.2 million people) of the Armenian population lives in rural areas, of which over 45 percent are poor. Out of a total of 934 communities, 871 are located in rural areas. Improving rural infrastructure can help maintain and improve living standards through the alleviation of poverty and, where suitable and economically justified, can serve as a catalyst for economic growth.

### What is the condition of rural infrastructure and institutions?

**The rural infrastructure network is severely degraded.** The report provides a complete inventory of transportation, gas, electricity, telecommunications, piped water, and sewerage infrastructure and condition in 871 rural communities in Armenia. In general, there is a large amount of infrastructure and most is severely degraded. This imposes high transaction costs on the rural population. For example, 61 percent of rural roads are in poor or very poor condition, of which only 16 percent are fully passable during the winter. Similarly, about 12 percent of communities do not have access to piped drinking water and only 51 percent of households have home taps, and water quality is alarmingly poor.

**Degradation is due to a combination of historical factors compounded by opaque institutional arrangements and lack of donor coordination.** The Soviet legacy left Armenia with an over supply of rural infrastructure, which was expensive to maintain. The collapse of the Soviet Union led to a fifteen-year break in maintenance. Compounding the problem are opaque institutional arrangements that complicate ownership and maintenance responsibilities for the local infrastructure, such as roads, water, and irrigation. More straightforward are electricity, gas, and telecommunications, which are operated by either state run companies or private operators. Despite receiving substantial financing from donors, there is a high rate of failure among rural infrastructure projects. This is because they are generally implemented at a local

level, independently from similar, or previous, initiatives in the same or other areas of the country.

### **What do people want and what are they willing to pay for?**

**People want better access to gas and piped water.** The report also provides a snapshot of priorities for infrastructure rehabilitation in a representative sample of rural communities. When participants in village meetings were asked to rank their preferences<sup>1</sup> for investing in infrastructure, 28 percent voted for gas service, 25 percent drinking water, and 17 percent for both irrigation and improved roads. Only 12% voted for telecoms and a lesser percentage for sewerage and electricity. The high ranking of gas is surprising since the government has not emphasized this and previous studies do not identify it as a high priority. During the community interviews respondents indicated that gas is the most desirable heating option because it is now less expensive than alternatives such as wood and electricity. People will pay for service so long as it is consistent with their priorities, reliable, and they can control how much they spend. Community discussions and individual interviews revealed that willingness to pay is closely related to the type of service, its reliability, and ability to meter and manage consumption. Consumers also expressed a desire for local ownership and management of simple infrastructure such as piped water and irrigation. More complicated infrastructure such as roads, gas, and electricity is best left to the state or private sector.

### **What will rehabilitation cost?**

**Addressing basic minimum infrastructure needs will require about US\$300 million.** Access to an inventory of rural infrastructure assets and their condition allows back of the envelope estimates of rehabilitation costs. Assuming universal access to a basic minimum level of infrastructure, based on simple technical standards and new cost effective technologies in all 871 rural communities, the total investment cost would be approximately US\$300 million. This would include US\$90 million for the rehabilitation of lifeline roads connecting communities with the core network, US\$50 million for gas supply, US\$42 million for telephony, US\$43 million for potable water, and US\$75 million for irrigation. Provisional estimates for maintaining and operating this infrastructure suggest an additional requirement of US\$25-30 million annually. For most of the infrastructure services these costs are already covered by existing tariffs. For irrigation and roads they need to be factored into the government budget.

### **What are the next steps?**

**Develop strategic objectives.** Armenia needs to develop a rural infrastructure strategy to ensure best use of the limited available resources. The first step in the development of such a strategy is identifying goals and objectives. For example, the goal might be to maintain basic services to all communities and try to increase services in those with the most growth potential. The implication is a strategy that provides communities with one of two infrastructure packages. Communities with little to no growth potential receive a basic minimum infrastructure package

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<sup>1</sup> Participants were asked to cast their vote after an explanation of the likely monthly bills associated with alternative infrastructure services based on cost-recovery tariffs).

that alleviates poverty, via allowing residents to maintain/improve their living standards, but little else. Communities with high potential receive a ‘complete package’, where economically justified, designed to improve participation in markets and reduce transaction costs.

**Set investment priorities across sectors, regions, and communities.** This is complicated and often requires difficult choices depending on policy objectives. To facilitate this process, the report includes a decision matrix that allows ranking of communities by different criteria, including poverty, potential for economic growth, cost effectiveness of investments, and community priorities, depending on policy objectives. Ultimately the specific investments will depend on the weight given to each criterion. For example, if equal weights are given to each criterion then the investment plan should place more focus on drinking water and roads. If the strategy is the cost effectiveness then the investment plan should emphasize roads and irrigation. Alternatively, if it is to target poor communities, then the investment plan should focus on gas and drinking water. Careful consideration must be given to the weight placed on community preferences. On the one hand it captures important issues related to sustainability and cost recovery, while on the other hand it may not necessarily represent the most efficient investment.

**Identify critical parts of the network to maintain.** Not all the infrastructure can, or should, be maintained. Therefore, in order to maximize the use of scarce resources careful attention needs to be paid to identifying the most critical parts of the network for maintenance and rehabilitation, without which the rest of the network will fail or which are essential for the socio-economic life of the community, or which offer the most potential for economic development. For example, the data compiled in this report suggests only 2700 km of the rural road network should receive primary attention.

**Align government and donor resources with the overall strategy and within the priorities.** Once objectives have been identified the government, particularly the line ministries and donors, need to coordinate their actions and policies. For example, the government might want to designate an institution to coordinate donor-funded activities. This will in turn lead to better coordination between the government and donors and more consistent and efficient interventions.

**Explore public-private partnership opportunities.** To ensure access to basic infrastructure services to all rural communities some form of public intervention might be necessary for those types of infrastructure which have positive externalities and have been traditionally neglected by the private sector. For example, the funding of connections and metering for the poor. Similarly, there is scope for private sector participation in the provision of public services, either through outsourcing of management and operations or through designing and implementation of universal access schemes.

**Clarify issues related to local ownership, maintenance, regulation and standards of infrastructure assets.** Roles and responsibilities for policy making, funding, regulating and maintaining rural infrastructure need to be identified based on the type of infrastructure and community preferences. For example, responsibility for piped water, sewerage, and irrigation might be devolved to local level institutions. At the same time a regulatory body must be

designated to develop service quality standards and sets tariffs for infrastructure services. For community owned infrastructure it provides guidelines and advice on these issues.

## INTRODUCTION

### WHY DID WE DO THIS STUDY?

- One of the legacies of the former Soviet Union (FSU) is an extensive, and now decaying, network of rural infrastructure, in the form of rural roads, telecommunications, water, and energy. These networks were previously the responsibility of the ‘Kholkhoz’ and ‘Sovkhoz’, the series of collective farms, that would have been responsible for all rural infrastructure within their domain.
- The collapse of the FSU, and the break-up of the ‘Kholkhoz’ and ‘Sovkhoz’ system, resulted in a break of nearly fifteen years in recurrent expenditure on the networks, with a deleterious impact on their condition. The problem has been compounded, as in many cases, there are no clear lines of ownership and hence responsibility for the different levels of networks. The outcome is a broad mix of network quality, ranging from a small proportion of networks in a reasonable condition, usually reflecting the capacity of the local community for self-governance, to those which are completely ineffectual.
- The improvement of the physical rural infrastructure is recognized explicitly by the Government of Armenia as a key element for rural poverty alleviation, acting as a catalyst for development and enhancing access for rural communities to a broad range of essential social and commercial services. According to Government strategies, over the period 2003-2015, agricultural production will remain the main factor in rural poverty reduction. It is expected that the growth in agricultural production will result mainly from improved productivity. The attainment of improved productivity will result, according to the GoA’s Poverty Reduction and Strategy Program (PRSP), from the implementation of a number of key measures focusing on: (i) the resolution of problems of irrigation and water use; and (ii) through encouraging opportunities for wider possibilities of non-farm employment. However, despite this recognition, there is, as yet, no clear strategy to facilitate provision. Although, this can be explained, at least partially, by the lack of reliable data and appropriate indicators to systematically identify the problems, assess their magnitude, evaluate alternatives, and identify priorities for sustainable, cost-effective investments.
- The main data gaps include the physical condition of infrastructure, the *de jure*, and *de facto*, institutional arrangements, the costs of the interventions, and, most importantly, the priorities and preferences of the communities. The result is a number of donors, each following their own objectives, pursuing unilateral initiatives, in particular sectors, or geographical regions, with little regard to the potential budgetary implications, at a local or state level, or the potential loss of synergy, in terms of economic development for the rural communities.

## WHAT ARE THE SPECIFIC OBJECTIVES OF THE STUDY?

- The overall objective of the study was to inform the development of a broad strategy, and more detailed action plan, for the development of the physical rural infrastructure in Armenia, with the intention that the findings could enhance a wider dialogue between the Government, key stakeholders, and the general public on the development of the prospective Rural Infrastructure Strategy.
- The following represent the more specific objectives to assist the GoA formulate a provisional strategy to develop sustainable rural infrastructure services as the basis for those discussions:
  - To determine the physical condition and quality of rural infrastructure services and identify gaps in service delivery;
  - To assess community perceptions and priorities for infrastructure investments;
  - To identify institutional, financial and other constraints to investment, operation and maintenance;
  - To estimate investment costs to improve the access and quality of infrastructure services; and
  - To combine the above information in a decision matrix to help identify priority investments for rural infrastructure.
- The primary emphasis in the study was on the physical infrastructure: roads, water, irrigation, electricity and gas supply. This restriction was made, primarily, in accordance of the wishes of the GoA, earlier research conducted by the World bank<sup>2</sup> and feedback in the design stage of the study. An additional benefit was the opportunity to focus the study in those infrastructure types of similar characteristics.

## WHAT WAS THE APPROACH?

- The approach adopted during the course of this study was multi-faceted, in the sense that it employed three approaches to the collection of quantitative and qualitative data to inform the work; Firstly, it undertook a quantitative survey of all rural communities to gain a reliable picture of the provision and condition of rural infrastructure across the country. Secondly, it constructed a stratified sample of 100 communities to investigate the community priorities, based on the following criteria: (a) territorial-administrative division (marz); (b) distance from the highway; (c) community altitude above the sea; (d) community size (number of households); (e) state of the infrastructure in the community; and (f) type of infrastructure ownership. Third, it selected a further 30 communities for a more detailed institutional assessment on the basis of three criteria: (a) territorial-administrative division (marz); (b) community size (number of households); (c) infrastructure quality.
- The actual approaches used to collect the qualitative data encompassed key informant interviews, focus group discussion and community meetings. There was a paucity of this

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<sup>2</sup> See World Bank (2001) for a discussion of the priorities of the poor and non-poor in respect of infrastructure types

type of work in Armenia. The results of this survey are presented in section 4, starting on page 15, and a fuller description of the study approach and the sampling methodology and copies of the questionnaires are provided in the relevant Annexes. The resulting data were collated and examined to reveal the condition of the infrastructure, respondent preferences, and a ‘decision-matrix’ was constructed to try to identify the optimal package of prospective investments, given the cost effectiveness, the poverty level in the hinterland and potential contribution to economic development.

## THE RURAL ENVIRONMENT IN ARMENIA

### WHY IS RURAL INFRASTRUCTURE IMPORTANT IN ARMENIA?

- The territory of the Republic of Armenia encompasses some 29,800 square kilometers, of which 90% is defined as upland or mountainous, lying over 1000 meters above sea level, and 72% lying over 1500 meters above sea level<sup>3</sup>. The altitude of the rural communities ranges from 450 meter (Haghtanak, Debetavan) to 2300 meters (Saragyugh, Verin Shorja) above the sea level, with the majority located over 1500 meters. The attitude and the continental climate of hot, dry summers and very cold winters, with considerable snowfall, makes these areas inhospitable places for human habitation, and makes the hinterland of many unsuitable for commercial agricultural production.
- Despite this, out of the total population of Armenia, which, as at January 1, 2003, amounted to some 3.2 million inhabitants, over one third (36%), nearly 1.2 million, were recorded as living in rural areas<sup>4</sup>, in many cases, relying on subsistence agriculture to supplement meager incomes from other sources. Out of a total of 934 communities, 871 are located in rural areas.
- There are also significant differences in the age structure of the rural and urban populations, with the proportion of children and the elderly substantially higher in the former *vis-à-vis* the latter, reflecting, at least partially, the economic migration of working age individuals. The 2001 population census notes that the “social burden”<sup>5</sup> per 100 people of working age is 76 in rural areas versus 55 in urban areas of the country.
- The average distance of rural communities from the center of the *Marz*, the regional administrative unit, is from 22.5 kilometers to 71.3 kilometers, whilst the average range from the lower administrative level of the *Raiyon*, is from 10.4 kilometers to 21.0 kilometers. The ‘administrative territory’ of all the rural communities of the country amounts to 1.6 million hectares, of which 860,000 hectares (54%) is used for agricultural purposes. This area is divided between approximately 335,000 households, with an average landholding of around 1.4 hectares.

### What are the Characteristics of the Rural Economy?

- The agricultural sector is the main source of income for rural livelihoods, with farm income accounting for some 51% of the total income of rural households, despite the fragility of the livelihood of many. The sector, whilst smaller in proportion terms than some of the other countries in the region, notably in Central Asia, is important for the national

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<sup>3</sup> FAO Aquastat – Study Database prepared by the Community Finance Officers Association

<sup>4</sup> NSSA, (2003)

<sup>5</sup> This represents people in “up to 16” and “61 and over” age bands

economy, accounting for 26% of total Gross Domestic Production (GDP) in 2002<sup>6</sup>. Together with the associated agro-processing, the sector accounts for much of the country's employment (34.7% in 2001<sup>7</sup>) and export earnings (12% in 2003<sup>8</sup>), despite the lack of natural endowments in many areas.

- The proportion of the population involved in agriculture increased to 32.5% in 2003<sup>9</sup>, after being broadly constant at approximately 30% in the 1990s, up from 20.9% prior to 1990. However, this growth reflects neither an increase in agricultural potential nor improved utilization of the land under cultivation, but rather a lack of available alternatives, with un, or under, employed, urban-rural migrants and/or internally displaced persons moving onto once marginal, or unviable, land. This suggests that the economic case for rehabilitating or extending the once extensive rural infrastructure networks managed by the 'Kholkhoz' and 'Sovkhoz', in these areas, is likely to be weak. In addition, the distribution of the original rural infrastructure networks, for 'political' rather than economic reasons, supports the need for a careful assessment of the economic case for rehabilitation of existing infrastructure in one area *vis-à-vis* another. Although, these conclusions do not apply to rehabilitation/investments for reasons of poverty alleviation, where shown to be cost effective.
- The suggested objective can be described as identifying those parts of the network which are considered to be offer the 'best return' from either an economic perspective or a poverty reduction perspective, and focus finite resources on those sections. One example of this targeting is the road sector, where a core network of 2700km of, what can be termed, 'lifeline' rural roads were identified during the course of the study. These roads were either considered essential to the economic development of a community or region, or represented the only cost effective link to a particular community or communities.
- Table 1 displays the growth in real GDP for the economy as a whole, and by sector, over the period 1998-2003. There are three points of significance; firstly, the strong performance of the national economy over the entire period, driven by growth in construction, industry and trade sectors, none of which are direct contributors to the alleviation of poverty in the rural communities. Secondly, the marked volatility of the growth in the agricultural sector, reflecting the vulnerability of the sector to exogenous events, e.g. the 1999/2000 draught and the 2003 and 2004 frosts, when in the case of the former, some 15% of farms lost their entire production, and a larger proportion suffered significant losses<sup>10</sup>. And finally, the slower growth of that sector *vis-à-vis* the growth in national GDP.

**Table 1 Real GDP Growth, Aggregate and by Sector (per cent change over previous year), 1998-2003**

	1998	1999	2000	2001	2002	2003 (prelim.)
<b>GDP</b>	7.2	3.3	6.0	9.6	12.9	13.9
Agriculture	12.9	1.3	-2.3	11.6	4.4	4.3

<sup>6</sup> World Bank (2004)

<sup>7</sup> NSSA (2001) Census

<sup>8</sup> NSSA (2001) Ibid

<sup>9</sup> NSSA (2001) Ibid

<sup>10</sup> Malmberg-Calvo *et al*, (2001)

Industry	-2.2	5.2	6.4	3.8	14.2	15.4
Construction	10.6	7.7	28.4	14.5	47.0	44.4
Transport & Communications	1.4	0.8	-0.6	16.0	6.0	8.2
Trade	6.7	9.8	8.3	15.5	15.2	14.5
Other services	2.6	4.5	9.1	5.3	7.2	7.6

Source: National Statistical Service of Armenia (2003)

- The small size of the rural farms means that few farmers are able to exploit potential economies of scale in agriculture, even if they are available. While farming provides the bulk of household income in rural areas, it is insufficient to allow most rural households to meet their needs, unless accompanied by other economic activities, i.e. on- and off-farm labor earnings. With little opportunity for off-farm work, the vulnerability of the rural household is heightened.

### WHAT ARE THE CHARACTERISTICS OF RURAL POVERTY?

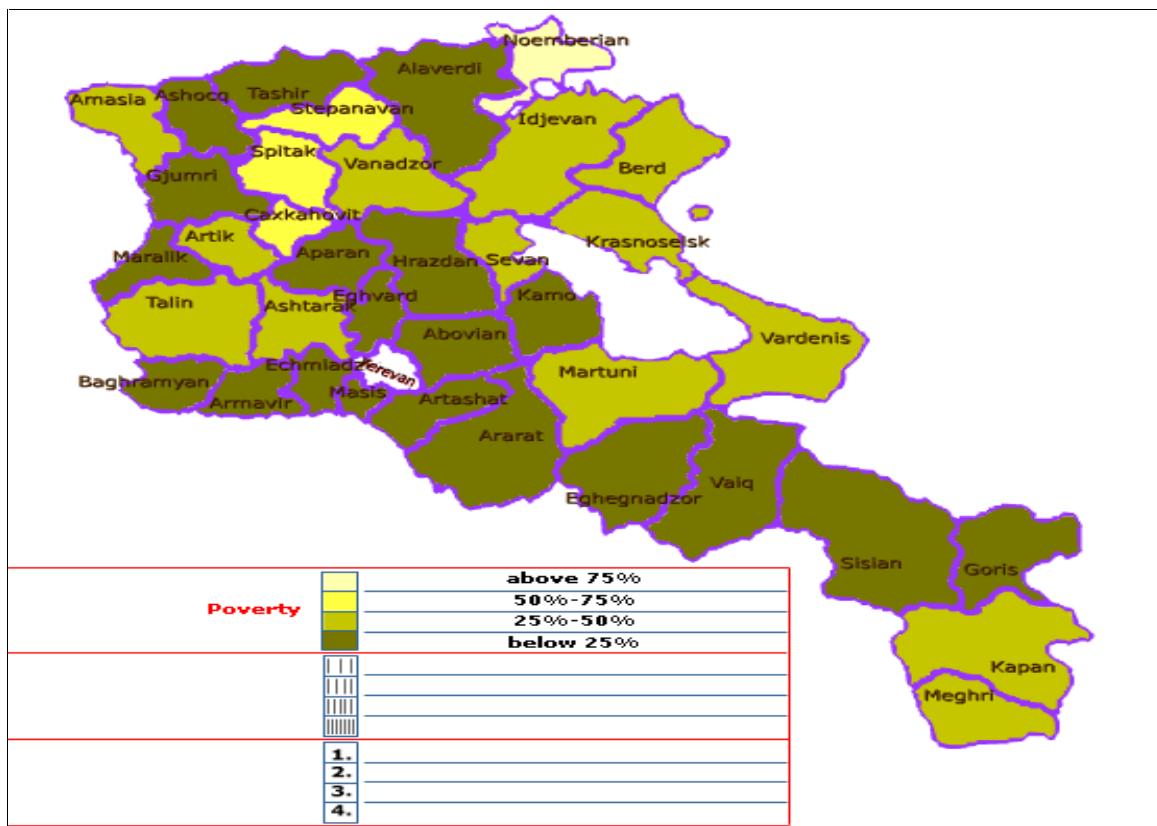
- The concomitant of a marginal, and often volatile, rural agriculture sector, with little opportunity for off-farm employment, is a high and resilient level of rural poverty. Average household consumption in rural areas fell by 12 per cent between 1998/99 and 2001, whereas the comparative figure for urban areas increased<sup>11</sup>. On average in 2001, 48 per cent of the rural population was categorized as poor, based on the definition of the GoA<sup>12</sup>, with 17 per cent being unable to meet their basic food consumption needs<sup>13</sup> (i.e. falling into the category of extremely poor).
- Over the period 1998/99 and 2001, the rural poverty headcount barely changed, even though urban poverty fell markedly over the same period. Table 2 provides a schematic representation of rural poverty, based on the share of rural population qualified for the family benefit plan (no regional poverty statistics are available), indicating that the distribution of poverty, broadly, reflects the geography and the remoteness of a marz.

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<sup>11</sup> World Bank (2001) Rural Development and Poverty, consumption expressed in spring 1999 prices.

<sup>12</sup> The complete poverty line comprises the food poverty line and a non-food allowance, which is 31.4% of the food line. The complete poverty in 2002 is estimated at 12,122 dram (US \$22).

<sup>13</sup> Extreme poverty line in estimated in Armenia is estimated based on the 2,100 calories consumption food basket. The 2002 extreme poverty line is estimated at 8,316 dram (US \$15.12) per adult equivalent per month.

**Table 2 A schematic representation of rural poverty**

- The incomes and expenditures of rural and urban households also demonstrate notable differences. Table 3 presents the main sources of urban and rural households monetary incomes, over the period 1999-2002.

**Table 3 Current Monetary Incomes of Households by Main Sources of Income (AMD) 1999-2002**

	1999	Total 2001	2002	Urban Areas			Rural Areas		
				1999	2001	2002	1999	2001	2002
<b>Total monetary income</b>	7929	11217	9781	7397	10913	11656	8636	11843	7027
of which:									
Hired jobs	1948	3431	3718	2814	4295	4983	796	1655	1860
Self-employment	842	1317	1486	796	1439	2077	903	1067	618
Sale of agricultural products and livestock	2546	1754	626	165	105	147	5715	5144	1329
Ownership (rent, interest income, shares)	7	95	12	12	53	10	-	182	14
State pensions and benefits	740	1078	1128	894	1145	1138	532	944	1113
Transfers	1532	2081	1829	2285	2110	1984	529	2020	1601
Other income	314	1461	982	431	1766	1317	161	831	492

Source: National Statistical Service of Armenia (2003)

- Table 3 indicates that whilst the monetary income of urban households has demonstrated a steady increase over the, admittedly short, period, the income of rural households has

declined. Although, much of the decline in these years would appear to be attributable to the drought of 1999/2000 and associated income volatility, which was mentioned earlier.

- There are also significant differences in the levels of rural poverty across the different regions, with the highest levels of rural poverty recorded in Shirak and Tavush. The latter is mountainous, remote and has little infrastructure. It is also isolated from its natural trading partners, in terms of the neighboring regions, because of the proximity of the Azeri border.
- These are also consistent correlates in the identification of poor communities in all marzes, with altitude, remoteness, and the size of the community, with very small communities being more prone to poverty than larger ones, even in the same marz, all contributing to the relative poverty of particular communities.
- The most recent Poverty Assessment<sup>14</sup> suggests that the unfavorable performance of the rural economy is associated with several factors: small, relatively unproductive landholdings, unfavorable farm input and output price developments, volatile weather conditions, and an absence of alternative employment opportunities outside agriculture. However, it should also be highlighted that surveys, generally, indicate a negative correlation between land holding and the incidence of poverty in rural areas.
- Further common indicators of rural poverty are large shares of refugees in the total population, with the proportion particularly high in the communities of Gegharkunik, Vayots Dzor, Tavush and Ararat marzes. Possibly not surprisingly, the representation of refugees in the poor and very poor categories in these communities, is higher than both the marz average and the average for non-poor communities.

## **IS THE INSTITUTIONAL CONTEXT SUPPORTIVE OF THE RURAL SECTOR?**

- This section presents a summary of the salient points from a review of the institutional framework. A more detailed section, from which this is drawn, which discusses the institutional context in more detail is presented in Annex D.

### **The Current Institutional Framework**

- Armenia is a unitary and indivisible state, which is reflected in the administrative structure within the country. The Armenian government has a two-tier structure, with most administrative powers exercised by the central government. Marzer, the regional units, are subdivisions of the central administration rather than a separate tier of the Government, as they lack any elected officials or body, or a separate budget.
- The Marzer are governed through the system of central administration, and the GoA appoints and dismisses regional governors (*marzpetner*) to undertake the defined duties, with the assistance of regional administrations (*marzpetaran*). These duties are primarily administrative, with no budgetary responsibilities, and include; the implementation of the

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<sup>14</sup> World Bank (2003)

GoA's regional policy; the coordination of the activities of regional agencies of state administration; the mediation of disputes between central and local governments; and the regulation of inter-community issues within their domain.

- Armenia is divided into ten regions (*marzer*) and the capital city of Yerevan, which is accorded regional status. Marzer are further divided into rural and urban communities (*hamainkner*), whilst Yerevan is sub-divided into districts. Marzer vary greatly in terms of their territory, population, number of communities and level of economic development. The largest region is Gegharkunik Marz, whose 5,348 square kilometers also includes Lake Sevan (1,256 square kilometers). Shirak Marz has the most communities, with a total of 119.
- The second formal governing level in Armenia are the local self-government bodies. The Constitution of the Republic of Armenia, adopted by referendum on 5 July 1995, explicitly addresses the issue of regional and local self-government<sup>15</sup>, at the community level, and clarifies the responsibilities between the two parties. According to Armenian law, the central government has the authority to decide on over twenty spheres of local government interest including the allocation of budgetary loans, credits and guarantees; establishing procedures for the collection and distribution of local taxes; and confirming community property.
- Local self-government in Armenia takes place only at the community level. Each urban or rural community consists of one or, occasionally, more than one, settlement; there are 1000 settlements in Armenia, but only 930 communities. These consist of 47 urban communities, 871 rural communities and 12 district communities in Yerevan. The responsibilities of the local governments include local initiatives, funded by the local budget, and responsibilities delegated and funded by the state.

### ***The inadequate resources of the communities***

- The Law on Local Self-Governments endows the local governments with the responsibility for the provision of public infrastructure. However, these responsibilities were disaggregated, without adequate provision to ensure the availability of suitable financial resources to fulfill them. In 2002, total rural community revenues comprised US\$10 million, or approximately US\$10,000 per community. The community budget is used, primarily, for current expenditures, and covers, mainly, administration, pre-school education, housing stock, and public utilities. In many rural communities, administration expenditures comprise the greatest part of budget expenditures, with capital expenditures forming only 2-3 per cent of the total budget.
- There are five potential sources of revenue for the community budget: centrally established taxes and duties; subsidies from the state budget; local duties and fees; land and property rent; and revenue from the sale of community property. But collection levels are low, so communities are heavily dependent on state budget transfers. These typically comprise over 50 per cent of local budget revenues, up from, approximately, 20 per cent in 1999.

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<sup>15</sup> GoA, (1995) Chapter 8, articles 104–110.

Of the two types of central government transfers, subventions, for specific projects, and subsidy, the latter, or what is known as the equalization subsidy, is by far the most important.

- In addition, many small rural communities are simply too small to be viable entities, and can barely pay salaries, let alone make the required recurrent allocations to ensure the adequate maintenance for key community assets. In many of these communities, there are very real limits to what can be generated through local taxes and fees, suggesting that consolidation of the administrative units is something that needs urgent political consideration.

### **The Gaps in the Policy Framework**

- The Government has embarked on a program to try and address the key rural issues within the PRSP framework<sup>16</sup>, while its objectives for the agricultural sector are specified in the recently adopted Sustainable Agricultural Development Strategy (SADS)<sup>17</sup>. The overall objectives of SADS are to promote sustainable agricultural development, to ensure greater food security, and to increase rural incomes. Sustainable economic growth and employment generation are recognized as important preconditions for poverty reduction. Major contributions to economic growth are expected to derive from the promotion of small business development and increased employment generation as well as improvements in the business environment.
- According to Government strategies, over the period 2003-2015, agricultural production will remain the main factor in rural poverty reduction. It is expected that the growth in agricultural production will result mainly from improved productivity. The attainment of improved productivity will result, according to the PRSP, from the implementation of a number of key measures focusing on: (i) the resolution of problems of irrigation and water use; and (ii) through encouraging opportunities for wider possibilities of non-farm employment.
- The PRSP provides a high role for investments in basic rural infrastructure, outlining the following priorities: the construction and rehabilitation of rural roads to increase the efficiency of the agriculture, provide access to markets, optimize the distribution of health and educational facilities; the enhancement of accessibility to drinking water for the population, ensuring 24 hour water supply and improving the quality of the water supply; and an irrigation program aimed at increasing the share of irrigated land and regulation of irrigation water supply systems.
- However, there is no separate Policy and Strategy for the development of the Rural Sector, and the Medium Term Expenditure Framework (MTEF) makes no specific allocation for increased capital or recurrent expenditures in this sector.

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<sup>16</sup> Government of Armenia, (2003) *Ibid*

<sup>17</sup> Government of Armenia, (2004)

## THE LESSONS OF EARLIER INITIATIVES IN RURAL INFRASTRUCTURE

- There have been a number of previous initiatives, in the form of both studies and projects, in rural infrastructure provision in Armenia. This section, through an examination of these earlier initiatives, identifies the most salient points *vis-à-vis* both the characteristics of rural communities, the distribution of poverty, and the initiatives, that contribute to the sustainability of the rural infrastructure investments.
- While the subsequent section provides a summary of, what might be termed, the key study findings to highlight the strength of the evidence as to whether, or not, infrastructure provision is the *sine quo non* of poverty reduction in rural areas, prior to identifying the current gaps in knowledge as a guide to policy in the sector.

### WHAT WERE THE FINDINGS FROM EARLIER PROJECTS?

#### The Combined Survey of the Poorest Communities in Armenia

- One recent study<sup>18</sup> undertook a Combined Survey of the Poorest Communities in Armenia, including: (i) a questionnaire on the characteristics of poverty in the communities, which was completed by the heads of the communities; (ii) an assessment of socio-economic conditions of communities in individual marzes by over 100 experts, and an identification of those communities which were regarded as most vulnerable to poverty, (iii) Poverty indicators collected from all communities throughout the country were analyzed and a method-approach for assessing the so called “community poverty predisposition” was developed, (iv) ten communities from each marz were selected for the combined survey that involved survey with two separate questionnaires for the heads of the communities and for the households.
- The main factors employed in the survey were, namely: (i) number of resident population; (ii) ratio of refugees, (iii) ratio of those living under the temporary shelter; (iv) altitude above sea level; (v) distance from regional capital; (vi) distance from the city capital; (vii) location in respect of the state border. The broad approach allocated a rank score, implying no weight on any indicator, from 0 (lowest impact on poverty) to 5 points (highest impact on poverty), based on its quantitative value. The arithmetical sum of the points ascribed to each of 7 indicators for a given community was interpreted as the “absolute value of poverty predisposition” for that community, allowing the communities to be ranked in relative terms.

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<sup>18</sup> UNDP (2002)

- The results of the Combined Survey, which are summarized in Table 4, suggest that the average distance from both the regional center and the capital are important pre-determinants of poverty, which, in turn, implies that the road network that reduces, what can be termed, the ‘economic distance’ to key markets, the sum of time and money costs, is of vital importance for the remote communities. This does not overlook the lower comparative advantage of agricultural activities in those areas, together with the lack of appropriate policy addressing the development of non-agricultural activities and/or migration, but acknowledges that even in those areas where there is potential comparative advantage, it is not being realized due to physical and institutional barriers. Other important factors, as revealed in the table, are altitude and, to a lesser extent, the proximity of the communities to the Azeri border.

**Table 4 Summary of groups of communities with various levels of poverty**

<b>Groups of poverty predisposition</b>	<b>Average number of population</b>	<b>Average distance from regional capital (km)</b>	<b>Average distance from Yerevan (km)</b>	<b>Average altitude above sea level (m)</b>	<b>Average representation* of refugees in the total population</b>	<b>Average representation* of those living under temporary shelter in the total population</b>	<b>Share of communities bordering Azerbaijan in the total number of communities</b>
Up to 20	7292	11.9	33.8	872.3	1.2	1.0	-
20-30	4717	20.9	46.2	1069.5	1.7	1.1	-
30-40	2974	33.7	109.2	1533.2	1.4	1.2	7.8
40-50	1271	-	162.9	1564.9	1.6	1.8	17.3
50-60	707	-	226.9	1632.8	2.5	1.2	36.8
60 and more	364	-	237.6	1772.8	3.6	1.2	80.4
<b>Average</b>	<b>2750</b>	<b>40.3</b>	<b>123.9</b>	<b>1428.2</b>	<b>1.7</b>	<b>1.3</b>	<b>15.0</b>

\* coefficient of representation computed according to the following scale: 1) under 1%, 2) 1-10%, 3) 10-25%, 4) 25-50%, 5) 50-75%, 6) 75% and higher

### **The Armenia Social Investment Fund (ASIF)**

- The ASIF project provides a good example on how a decentralized approach can contribute to the improved basic social and economic infrastructure sustained by capacity building. The ASIF program promotes institution building and social capital formation at the local level focusing on strengthening local governments and communities in decentralized management of basic public services. Thus, the findings of assessments carried out within the scope of the ASIF II and lessons learnt from ASIF I are particularly pertinent for the development of rural infrastructure strategy in Armenia.
- Overall, ASIF II assessments<sup>19</sup> conclude that the small-scale community infrastructure projects carried out under the ASIF II Project have generated a visible development impact in terms of social and economic benefits to the poor communities of Armenia. Building upon some 200 infrastructure projects completed under ASIF I Project, as of the end of April 2004, a total of 142 infrastructure projects were completed under ASIF II. The majority comprised school rehabilitation or construction (147), followed by water supply (59), benefiting 392,000 community members and creating nearly 112,000 man

<sup>19</sup> These include the most recent ASIF II Assessment, Social Capital Assessment, and Beneficiary Assessment.

days of short-term employment. In addition, school heating systems were constructed or repaired in a number of schools. These projects responded to the communities' priority needs and were carried out through self-help interventions promoted by the ASIF.

- The recently completed Social Capital Assessment concludes that an adequate institutional framework consisting of institutional arrangements, participatory methods, service delivery, and capacity building serves as an effective catalyst for institutional development and social capital formation. In addition, the recent Beneficiary Assessment found that partnership could be reinforced under the ASIF II Project as a result of: (i) requiring government officials to be part of the Implementing Agency; and (ii) establishing a closer link with Government officials through the local government training program. Social Capital and Beneficiary Assessments also found that local level institutional strengthening activities are instrumental for improving the quality and sustainability of service delivery and increasing civic participation in local development. Finally, the experience under the ASIF has shown that the active engagement of community members under the project's participatory framework yields positive results.
- Key lessons learnt from ASIF I and reflected in the design of ASIF II include:
  - a) need to **improve poverty targeting** in CDD projects to reach the poor more effectively and to better reflect the emerging community demands by revising methodology for regional allocation of funds<sup>20</sup>, refining the micro project approval criteria<sup>21</sup> and typology, and introducing monitoring and evaluation system for assessing poverty targeting;
  - b) need to **improve inter-sectoral and inter-agency coordination** to ensure that project activities are consistent with relevant sectoral policies and investment priorities. Measures designed to achieve this include the development of an effective public outreach strategy and establishment of regular consultations among the line ministries, NGOs, and donor agencies;
  - c) measures to **improve quality of works** to improve the overall quality of micro projects, involving improved procedures for technical specifications, bid selection, competitive contracting of design and supervision of micro projects, quality control monitoring techniques, etc;
  - d) critical need to **improve project sustainability** through a comprehensive framework encompassing strong institutional support from the ASIF office, effective systems and procedures, and greater involvement of the key stakeholders;
  - e) need to further **improve efforts in local capacity building** through training programs so that local government staff and communities can prepare and implement projects;
  - f) need to **place emphasis on monitoring mechanisms** such as beneficiary assessments, client satisfaction surveys, and other more directly participatory methods of client involvement in monitoring and evaluation to monitor outcomes

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<sup>20</sup> The formula for regional allocations under ASIF II is based on two factors: the share of population and the degree of a region's poverty.

<sup>21</sup> The micro project approval criteria are based on the needs and condition of infrastructure facilities, cost per beneficiary and the capacity of the implementing agency.

on the ground in order to set up a systematic approach to monitoring and evaluate the impact of development activities and adjusting related policies and programs on a continuing basis;

- g) need to **make community contribution criteria more flexible**<sup>22</sup> since otherwise a number of poor communities are not able to come up with the required contribution and projects with high potential benefits to the poor have to be dropped; and
- h) need to **intensify decentralized decision making** at the local level, which has proven to help make projects demand driven and to strengthen project ownership. This involves building partnerships and stakeholder participation at the local level through information dissemination and active involvement of stakeholders at all stages of the project cycle; enhancing project ownership through enforcement of maintenance agreements promoting the provision of line items in local government budgets for operations and maintenance of completed facilities, flexibility in generating community contributions based on capacity to pay, and monitoring of project sustainability; and progressively building local capacity with the objective of preparing communities towards direct contracting of works.

### **The Poverty Assessment, November 2003**

- o The report studies poverty in Armenia in 2001 and examines trends in poverty over the 1998/99 to 2001 period. It looks at the determinants of poverty and analyzes linkages between economic growth, sector policies and poverty. The findings are based on two rounds of the Armenia Integrated Living Conditions Survey (ILCS), one carried out in 1998/99 and the other in 2001. The key findings of the report include the following:
  - Poverty has declined urban area since 1998/99, but increased slightly, on average, in rural area;
  - The rural economy has not, so far, benefited from the growth in the national economy;
  - Agricultural production is a key component on the rural economy, but it is dependant on irrigation, and the systems are often rundown; and
  - Inadequate housing and public services (heating, water, waste disposal) is widespread and contributes to deteriorating living conditions for the poor.
- o The main policy recommendation of the report to contribute to the eradication of the rural poverty was the promotion of off-farm employment to complement rural household incomes, and to allow a gradual consolidation of farmland as families finding off-farm opportunities rescind marginal plots. Essential complementary policies recommended include the development of land markets to facilitate the process of land consolidation, and the rehabilitation of irrigation infrastructure.

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22 The principal forms of contributions under ASIF II include: (a) monetary contributions including allocations from local authorities, contributions from community members, and contributions from alternate sources; (b) labor contributions from community members; and (c) in-kind contributions, mainly construction materials.

## WHAT ARE THE MAIN LESSONS FROM EARLIER STUDIES?

- An earlier section noted that the improvement of the rural infrastructure is an explicit objective for the Government of the Republic of Armenia (GoA), and is clearly stated in the national Poverty Reduction Strategy Paper (PRSP). This predicates that rural infrastructure provision is a key element for rural poverty alleviation. This section provides a summary of, what might be termed, the main research literature to highlight the strength of the evidence as to whether, or not, infrastructure provision is the *sine quo non* of poverty reduction in rural areas, and identifying the current gaps in knowledge as a guide to policy in the sector.
- There are three main issues:
  - Links between agricultural growth and poverty reduction;
  - Links between infrastructure improvements and agricultural growth; and
  - Links between infrastructure improvements and poverty reduction.

### Agricultural Growth and Poverty Reduction

- A summary of earlier studies, presented in Annex E, reveals a consensus that although there are reasons to believe that agricultural growth relieves rural poverty and there is empirical evidence, including the above *inter alia*, of the positive link between agricultural growth and poverty reduction, both the robustness and the generality of this link is unclear. Specific factors that condition the sustainability of the outcomes, include the sources of growth (high-productivity or low productivity), the diversity of rural economy, access to broader than local markets. Different policies are designed to promote investment in high-productivity rural activities, to increase the diversity of rural economy by including agricultural processing, manufacturing and tourism in it, to liberalize markets and create mechanisms for engaging the rural population in the diversified and widened activities.

### Infrastructure Improvements and Agricultural Growth

- The general conclusion from this, admittedly brief, review of the literature is that infrastructure provision has a positive impact on rural economic growth through the following mechanisms: It broadens the output markets; It helps increase productivity of the traditional sector (farm activity) and to move it from subsistence agriculture to a higher-productivity farming; and, it helps diversify the rural economy. If traditional farming can survive (at a subsistence level though) without easily accessible and reliable infrastructure services, non-farm businesses are not viable without it.

### Infrastructure Improvements and Poverty Reduction

- There is increasing evidence that the benefits of infrastructure provision favor poor people by generating more equitable growth (see the review of the literature by Malmberg-Calvo *et al.*, 2001): investments in roads are twice as effective in targeting and reducing rural poverty as any other form of intervention; more equitable access to infrastructure services

encouraged growth with equity. Malmberg-Calvo *et al* (2001) conclude that infrastructure development enhances capabilities, facilitates empowerment and reduces vulnerability, this contributing to reducing not only income poverty, but no-income poverty as well.

- Brenneman and Kerf (2002) conducted an extensive literature review of the linkages between infrastructure provision and poverty alleviation. The evidence that emerged from this exercise was clear: The provision of reliable energy supply was a determining factor in the establishment of small businesses, and the latter were more productive in those communities with a reliable supply. In addition, the higher efficiency of modern energy sources can lead to significant financial savings for the poor, and engender health improvements due to the greater cleanliness of the fuels. An improvement in supply can also reduce current time expenditures in collecting alternative fuels and lead to a general improvement in the standard of living for a poor household.
- Improvements in the transport infrastructure of a country or a region can have a dramatic effect on the business environment, leading to a significant growth in the returns to small producers and traders and the number of small businesses. The concomitant, assuming appropriate competition and regulation, are increases in the choice and quality of produce, together with the returns to producers in the region. Improvements in transport are also likely to improve both access to, and the time spent in, educational establishments, as well as improving timely access to health facilities. Well designed transport infrastructure can also improve safety in poor communities, and reduce the amount of time spent in the pursuit of tasks.
- Improving the water supply, in the form of clean drinking water and improved sanitation, can also have indirect impacts on economic growth, through the attainment of improved health, thereby increasing the amount of working time, and reductions in the time expended in non-productive activities, such as collecting water. The provision of reliable water supply can also provide financial savings to households, in that they no longer have to purchase bottled water, fuel to boil water.
- The precise linkages between rural infrastructure investments and household welfare are examined in the WB Policy Research Paper “*Do Rural Infrastructure Investments Benefit the Poor?*” (Songco, 2002). The paper argues that the poor do benefit from infrastructure improvements, but in order to generate and maximize these benefits, it is critical to remove impediments and create a supportive environment for rural economic growth. The paper notes that combined interventions are important and the development of other services, such as micro enterprise advice is important. One of the most important conclusions of this paper is that the poverty reduction impact increases with the complementarity of the interventions (e.g., when the provision of roads is combined with provision of other necessary services).
- The importance of complimentarity of infrastructure interventions to achieve positive poverty outcomes is argued in the paper “Achieving the Millennium Development Goals: the Role of Infrastructure” (Leipziger *et al.*, 2003). A key argument in this paper is that some of the biggest improvements are likely to come from combined interventions: it is

well known that improved impact of water and sanitation is much greater when accompanied by information on hygiene practices. Another study supports the same argument: in India, child infection diseases are much less prevalent and severe in households with piped water, but this gain is largely by-passed by poor households especially when the mother is less educated (Jalan and Ravallion, 2001).

### WHAT ARE THE KEY POINTS?

- One of the main findings from the earlier initiatives was the importance of social capital in both determining the ability of communities to apply for and obtain ASIF micro-projects, and in the sustainability of the subsequent intervention. The implication is that some of the weakest and less articulate communities may not be able to access ASIF funds. It was therefore recommended that future initiatives undertake careful analysis of the effects of potential investments upon local social organization, as part of micro-project appraisal, to try and ensure that all households access micro-project benefits.
- A second key finding from the earlier interventions was the importance of the promotion of off-farm employment to complement rural household incomes, and to allow a gradual consolidation of farmland as families finding off-farm opportunities rescind marginal plots, in rural poverty alleviation. Essential complementary policies recommended included the development of land markets to facilitate the process of land consolidation, and the rehabilitation of irrigation infrastructure.
- However a number of important questions do not appear to have been addressed so far in previous studies. Specifically, the factors determining the sustainability of infrastructure investments have not been clearly identified. Furthermore, there has been no systematic attempt to analyze the state of the rural infrastructure and, particularly, to assess the investment needs, and preferences, of particular communities. Finally, while a number of donor funded initiatives have undertaken community outreach activities and have identified community priorities for social and economic infrastructure services, the approach employed for this study has been different trying to identify community preferences under real budget constraints thus attempting, at least to some extent, to ensure that these preferences involve affordability and sustainability considerations.

## THE MAIN FINDINGS FROM THE QUALITATIVE AND QUANTITATIVE SURVEYS

### WHAT DID WE DISCOVER?

- This chapter presents the main findings from the study, which are presented in three broad sections; Firstly, the empirical findings detailing the ownership, condition, coverage and earlier expenditures in rural infrastructures. Secondly, the qualitative findings from the survey, which represent respondent attitudes and perceptions towards rural infrastructure. The final section reveals the findings from a more detailed examination of a number of specific, earlier, initiatives in a limited number of communities to ascertain the key elements in ensuring sustainability. The detailed findings for all these sections are presented in Annex F and in the database.

### WHAT IS THE COVERAGE, CONDITION AND USER SATISFACTION WITH EXISTING SERVICES?

#### The Irrigation Sector

- Over 80% of total agricultural produce is grown on irrigated land. The main water structures together with the main and secondary canals are under state ownership, whereas the tertiary level irrigation system (the intra-community irrigation network) was transferred to community ownership with the establishment of the Local Self-Governments in 1997.
- There are no accurate statistics on the area of irrigated land in the country, as the GoA land stock-taking, undertaken in 1998, which estimated that irrigated land in the country amounted to 274 thousand hectares, included both the land actually being irrigated at that time and the land that had been irrigated prior to 1990.

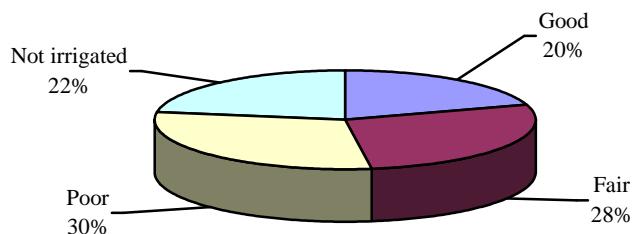
#### *The policy framework for the sector*

- The reform agenda, adopted by the GoA in the sector, promotes a participatory approach to the management of irrigation, with the basic intention of improving the accountability and reliability of irrigation services. A key component in that reform process is the establishment of Water User Associations (WUA), a form of water user groups, which have been formed to take over the operation and maintenance of the secondary and tertiary irrigation systems and collect service fees for the operation and maintenance of both “lower level” and “higher level” system facilities. Previous attempts by the Government to introduce participatory irrigation management practices in the country, have not been particularly successful due to a lack of thorough preparatory awareness raising among farmers and insufficient local capacity.

### ***The condition of the irrigation networks***

- The lack of recurrent expenditure, and maintenance, on the infrastructure over the last decade, has had a deleterious impact on the condition of the network. Table 5 reveals that, according to the World Bank and IFAD estimates<sup>23</sup> the irrigation infrastructure is in a poor state or entirely non-operational in over 52% of previously irrigated land. 20% of the total network is regarded as being in good condition, whilst 28% is regarded as being in fair condition.

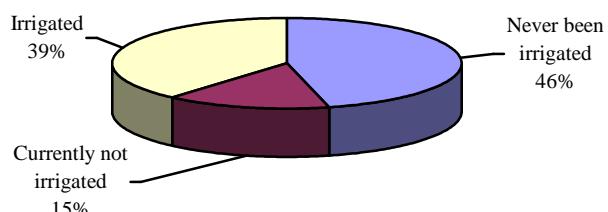
**Table 5 The condition of the irrigation infrastructure (2003)**



Source: Water sector development and institutional improvements PIU

- In addition, according to IFAD database<sup>24</sup>, only around 39% of the total arable area is being irrigated, down from 54% previously, as revealed in Table 6. Although this reduction reflects not only the deterioration in the infrastructure, but also the major increase in the electricity tariff, introduced over the period 1996-1999, which raised the cost of pumping a cubic meter of water threefold.

**Table 6 The area of irrigated land (2003)**



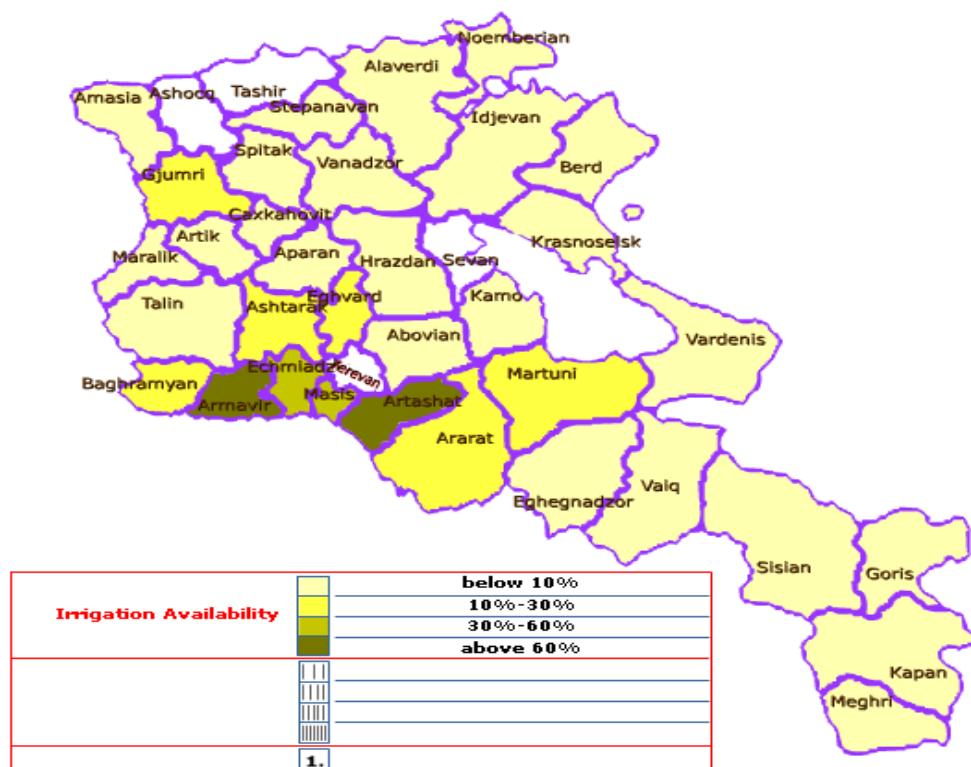
Source: IFAD database

- The geographical distribution of irrigation availability is illustrated in the following figure, with the majority of the country facing less than 10% availability except Ararat valley region where the situation is significantly better and the agricultural growth potential is much higher.

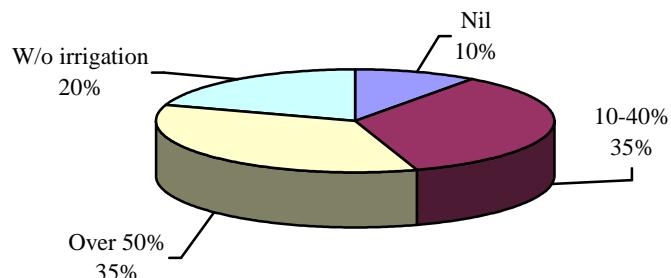
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<sup>23</sup> Water sector development and institutional improvements PIU

<sup>24</sup> Data were collected in 2003.

**Table 7 A schematic representation of irrigation availability**

- The recent increase in the electricity tariffs, together with the age and inefficiency of the majority of the existing pumps means that the gravity method of irrigation is now used for 69% of total irrigated land<sup>25</sup>.
- Table 8 provides an indication of the estimates of rural farmers, consulted during the study, as to the proportion of total crop production lost due to absent or inadequate irrigation. 10% of the sampled communities (n=100) suffered no losses, whereas 35% have suffered crop losses that exceed 50% of the value of their total production. The average value of crop losses, due to inadequate irrigation, was reported at approximately US \$150,000 per rural community.

**Table 8 Respondent assertion of crop losses due to absent or inadequate irrigation**

<sup>25</sup> IFAD database, 2003

- In addition, whilst 29% of the rural communities receive irrigation water for the whole growing season, approximately 50% reportedly receive irrigation water for only half of the growing season.

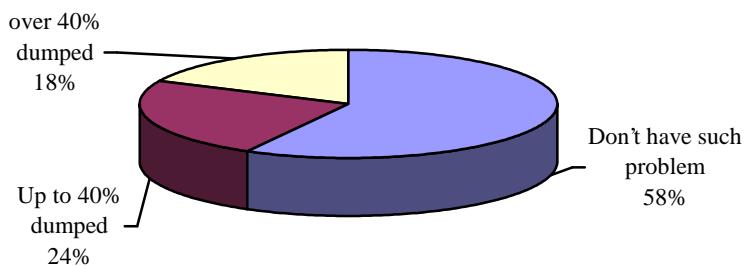
## The Rural Road Sector

- The importance of adequate road infrastructure to the economic development of a country or a region cannot be overstated, and a considerable amount of academic research has underlined the centrality of road infrastructure to regional economic development<sup>26</sup>. This link is even more pronounced in the rural context, where the provision of adequate road infrastructure is essential for the attainment of sustainable economic development, and hence poverty reduction, for the rural community. The following sections illustrate the current distribution of rural infrastructure, and provide an indication, where available, of the 'cost' of gaps in road provision.

### *The costs of poor access*

- The survey found that the poor condition of rural roads resulted in significant losses of produce in 42% of rural communities, with 18% of reporting communities reporting output losses of 40% or more, a further 24% reporting losses that exceeded 30%. In a small proportion of the communities, these losses, which result from the inability to get the crop to market in time, accounted for 70-80% of the total harvest of the community.

**Table 9 Proportion of communities who had experienced output losses due to absent/inadequate road infrastructure**



- The extent of these losses is supported, at least partially, by the data collected in the IFAD survey, which suggest that, approximately, only 50% of total rural produce<sup>27</sup> is actually traded, primarily through sale (which accounts for 92% of traded produce) and to a lesser extent, through barter (8% of traded produce). Of course, the portion of untraded produce also includes quantities for personal consumption and for informal exchange or gifts within the community.

<sup>26</sup> see WDR (1994) for a detailed discussion on the broad links between transport infrastructure and economic growth.

<sup>27</sup> Total produce includes agricultural products, cattle, fish, dairy products. See IFAD database.

### ***The extent and condition of the rural road network***

- The total length of the Armenian road network approximates 7,700 km (excluding 2,700 km of municipal streets). There are three categories of roads based on their functional purpose: (i) interstate highways, which comprise 1,561 km; (ii) republican roads, which comprise 1,800 km; and (iii) local roads, which comprise 4,342 km.
- The former two categories, interstate and republican roads, are under the ownership, administration and maintenance of the national road administration. The latter category, local roads, are further divided by the type of their ownership to marz owned (3,352 km), and community owned (990 km) roads, and the administration and maintenance of these roads is assigned to the respective administrative level.
- The following table illustrates the surface of the rural road network, depending on the administrative ownership of the roads. The majority are surfaced with asphalt or bitumen pavement, while a sizable share of the roads under community ownership are surfaced with earth or gravel (over 22%).

**Table 10 The pavement of rural roads by ownership category**

<b>Ownership Type</b>	<b>Total (km)</b>	<b>Type of Road Pavement</b>			
		<b>Asphalt (%)</b>	<b>Bitumen (%)</b>	<b>Gravel (%)</b>	<b>Earth (%)</b>
State	759	95%	1%	4%	-
Marz	1,943	77%	11%	10%	2%
Community	990	68%	9%	16%	6%
<b>Total</b>	<b>3,692</b>	<b>78%</b>	<b>8%</b>	<b>11%</b>	<b>3%</b>

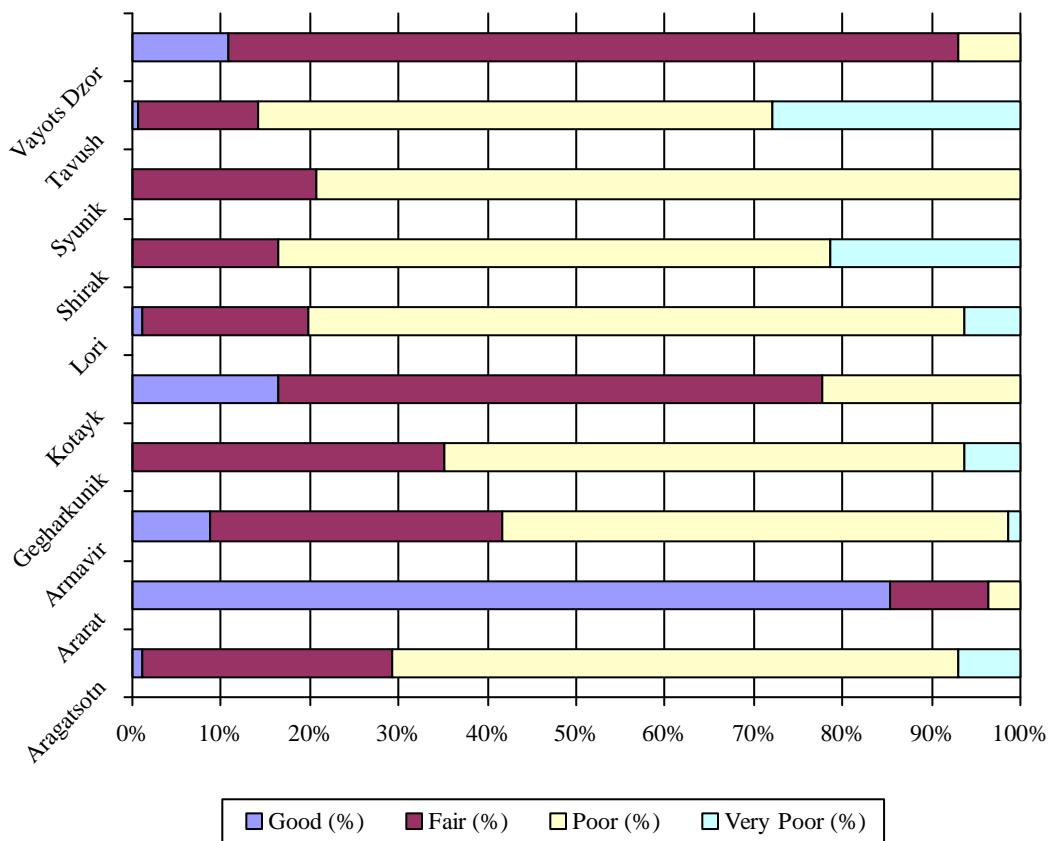
Source: study data

- The rural communities' connection with the marzes, and the capital, is provided by the interstate highways. The roads connecting rural communities to the interstate highways are of vital importance for the life of the community.
- This study proposes to focus on the '**lifeline roads**' defined as the most optimal road network connecting rural communities to the interstate highways. While the "lifeline" roads may not always represent the shortest route from an individual rural community perspective, at the network level the recommended approach would result in significant cost savings and thus better maintenance and condition for the "lifeline" roads.
- The "**lifeline network**" has been defined to include 2,702km of roads outside the community border (759km of state owned republican roads and 1,943km of marz owned local roads) and a fraction of the community owned local roads (total length of 990km).
- While the road network in Armenia has benefited from a significant injection of foreign funds during the past five years, these funds have been targeted to the rehabilitation of the main (mainly interstate) roads, with the intention of returning them to good condition.
- The secondary and local roads, which connect rural areas to the primary road network and to the main regional commercial centers, have received almost no capital or recurrent funding for the past decade. Similarly, this study estimates that total expenditures on

rural roads<sup>28</sup> have amounted to approximately US\$ 0.5 million over the last five years, with approximately half (US\$ 0.23 million) funded from the community budgets.

- The collected data reveal that from the total length of 3,692km of roads which connect rural communities with main roads, 2,250km (61%) are classified as poor or very poor<sup>29</sup>, with a further 1,033km (28%) in fair condition and only 406km (11%) in good condition . Furthermore, only 597km (16%) of these roads are fully passable during the winter time, while over 748km (20%) are completely impassable<sup>30</sup>. The following figure reveals the proportion of the road infrastructure in good, fair, poor and very poor in the marzer.

**Table 11 The condition of the road infrastructure in the marzer (2003)**



- Overall, rural inhabitants are dis-satisfied with the condition of the road network. This is especially true for inhabitants of remote villages since the poor condition of the rural

<sup>28</sup> The survey included only those roads connecting rural communities with the main road. The main roads are defined as those having regular transport service.

<sup>29</sup> The classification of the rural roads has been determined based on the maximum speed car can pass that road. The following range has been used in the Survey: (i) Good- 60km/h or above; (ii) Fair- 40-60km/h; (iii) Poor- 20-40km/h, and (iv) Very Poor- less than 20km/h.

<sup>30</sup> If the roads are closed only for a few days during the winter time then the passability has been considered as limited. This is typically the case for large communities that can open the roads through own resources. If the roads are closed for longer periods and the community is not able to open it through its own resources then the roads have been classified as impassable.

roads imposes large costs of time and money for the people. Besides these direct costs there also indirect costs associated with poor road infrastructure, such as wear and tear costs for the cars, which in turn result in excess transportation costs ranging between US \$1- US \$5.00 for a round-trip, depending on the particular journey. The recent Road Financing Study<sup>31</sup> estimates that, in some regions of the country, transportation costs have increased 2–3 times, leading to a 20-30% rise in the retail prices of goods and services.

### ***The availability of public transport***

- Without an adequate road network, provision of reliable and accessible transportation services is virtually impossible, especially since less than 10% of the rural communities have access to railway services<sup>32</sup>. The survey reveals that over a quarter of rural communities in Armenia do not have public bus or minibus service. Furthermore, the distance to the nearest bus station<sup>33</sup> was reported to be over 3 kilometers for one third of rural communities, extending to 20 kilometers for some of the most remote and isolated ones.

### **The Drinking Water Sector**

- Armenia enjoys relatively abundant water resources, with total water resources averaging 10.2 billion cubic meters ( $m^3$ ) annually, of which only about 2.4 billion  $m^3$  are used for drinking water. The drinking water infrastructure includes 123 water intakes, 176 ground water resources (artesian wells and tube wells), 29 river water in-takes, 4,820 km main canals, of which 700 km are in and around Yerevan, and the rest in the marzes. The total length of the local distribution networks is 8,020km, of which 1,900km is in Yerevan.
- The main canals and the distribution network are operated and maintained by the Yerevan Water Supply Company (YWSC) in Yerevan and some surrounding rural communities, and by the Armenia Water Supply Company (AWSC) in most other towns and 300 rural communities in Armenia. The remaining communities look after their own distribution networks.

### ***The condition of the supply networks***

- The location of drinking water reserves, in the majority of the communities, supports the use of the gravity method to supply water to the majority of communities.
- The data from the survey reveal<sup>34</sup> that only 2% of rural communities have drinking water infrastructure in good condition, while significant investments are regarded as necessary to return the network to good condition in over 60% of the communities.

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<sup>31</sup> Road Financing Study, December 2002 (undertaken within the scope of the current World Bank Transport Project)

<sup>32</sup> According to the data collected in this study only 85 rural communities have a railway station.

<sup>33</sup> This includes both bus and minibus station.

<sup>34</sup> The condition of the infrastructure is based on the assessment of community mayors.

- The following table provides the condition of the drinking water supply networks for the communities in the survey.

**Table 12 Condition of drinking water infrastructure at marz level**

Marz name	Number of communities	State of drinking water infrastructure		
		Good	Fair	Poor
Aragatsotn	111	5%	26%	68%
Ararat	93	1%	47%	52%
Armavir	94	2%	22%	76%
Gegharkunik	87	0%	14%	86%
Kotayk	30	3%	43%	53%
Lori	105	4%	30%	67%
Shirak	116	3%	29%	68%
Syunik	106	0%	69%	31%
Tavush	58	0%	40%	60%
Vayots Dzor	41	0%	20%	80%
<b>Total</b>	<b>871</b>	<b>2%</b>	<b>35%</b>	<b>63%</b>

Source: study data

### ***The earlier investments in the sector***

- The total investment in the rural drinking water infrastructure, over the last 5 years, has amounted to US\$ 6.4 million<sup>35</sup>, funded, primarily, by different international organizations (Save the Children, ASIF, KFW, and WFP). Approximately 8% of this sum (US\$ 0.5 million) has been funded through community budgets, with a further 1.5% being funded through the state budget (US\$ 0.1 million).
- There has also been significant variation in the distribution of that expenditure, with Tavush marz receiving nearly 50% of the total amount, followed by Lori marz which received approximately 17%.
- 20% of rural communities receiving no external funding (any funding other than that from the community budget) for the construction/rehabilitation of their drinking water infrastructure.
- The Survey reveals that 88% of rural communities have full, or partial, access to drinking water, with the remainder being dependent either on water vendors or on the water of neighboring villages.
- Only 51% of the rural households have access to home taps, compared to 87% of urban households. The operating connection for the rest of the rural households consists of boreholes and public standpipes.
- The responses to the survey suggests that approximately 10% of rural households incur significant monetary costs in the purchase of suitable water, paying between 100-1000 dram per bucket (US\$ 0.18 – 1.80).

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<sup>35</sup> The amounts have been provided by the community mayors and are acknowledged to be a significant underestimate of the true figure.

- While 86% of rural households expend 1 or more hours to collect drinking water, with 26% expending more than 4 hours per trip to collect drinking water. The burden of these time costs often fall disproportionately on females, implying that a solution to these problems can have real gender, as well as social, benefits for the communities.

### ***The quality and continuity of the service***

- The average water supply time across all the communities is 14 hours per day, with only 44% of rural communities enjoying round-the-clock service. This lack of continuity is a particular problem in Ararat, Shirak and Tavush marzes.
- There is low satisfaction with the quality of drinking water provision amongst the communities, with only 40% of rural communities reporting the provision of drinking water to be satisfactory or better.

**Table 13 The condition of the drinking water infrastructure by ownership type**

	Total number of communities*	Good (%)	Fair (%)	Poor (%)
Community	454	2%	43%	55%
Water Supply Co.	308	2%	33%	64%
Mixed	8	0%	25%	75%
Total	770	2%	39%	59%

Source: Study data

- A further concern for rural inhabitants, where supply is provided, reflects the absence or inadequacy of water treatment, as the quantity of chlorine injected is usually insufficient, particularly to protect against pollution in the distribution networks.

### **The Sewerage System**

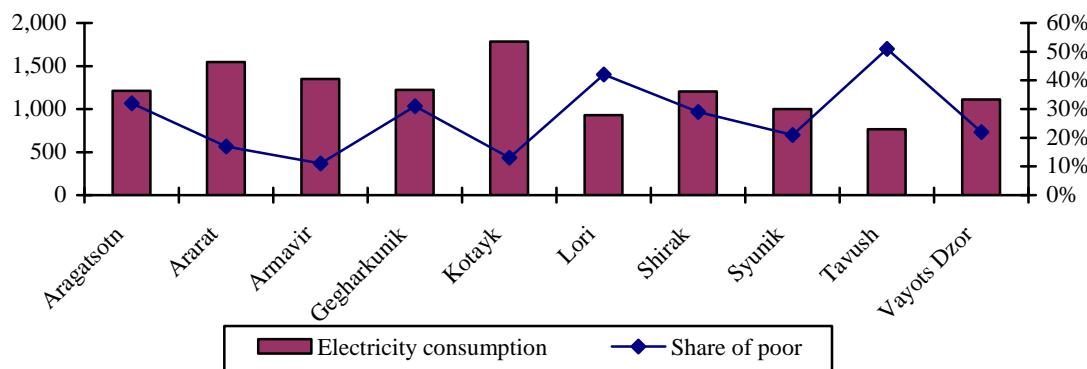
- The survey revealed that the centralized sewerage system in the majority of the communities is virtually non-existent, with only 11% of rural communities, on average, having access to a centralized sewerage system. The condition of centralized sewerage system is largely very poor which creates environmental and health hazards.
- Shirak and Ararat marzes are the best provisioned, with 205 of their communities having access to a mains sewerage system, whereas in Tavush and Vayots Dvor, the proportion of communities with access is in low single figure percentages. The remaining communities rely on private arrangements of doubtful quality to dispose of sewerage.

### **The Electricity Sector**

- The survey data reveals that rural households consume 410 million kwh of electricity, which is roughly one-third of the country's total residential electricity consumption. The average annual electricity consumption per rural household is 1,276 kwh.
- The electricity distribution network in Armenia is owned, operated and maintained by the privately owned joint stock company, Electrical Network of Armenia CJSC. The payment for electricity forms a sizable amount of the total expenditure of households,

amounting to approximately 5% of total household expenses<sup>36</sup>, or 87% of expenditures for utility services.

**Table 14 Average annual electricity consumption per household, per community in Kwh (1999-2003)**

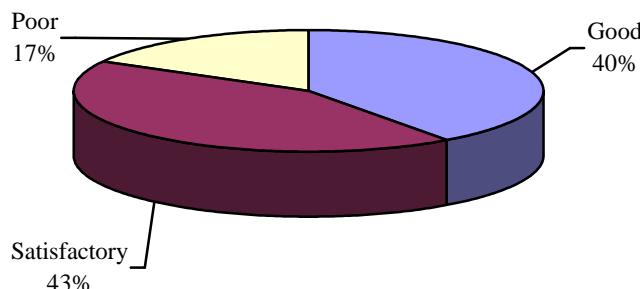


### The condition of the infrastructure

- The electricity network in rural areas is extremely (in most cases over 40 years) old and does not comply with the latest technical standards for safety and reliability. The Survey data suggest that the infrastructure is in good condition in less than 11% of communities, it is in a fair condition in 76% of communities, and in poor condition in the remaining 13%<sup>37</sup>.
- The impact of inadequate maintenance is seen in the frequent interruptions in electricity supply, even when timely payments are made. These interruptions average 20-25 hours per month.
- Despite the poor overall quality of the network, and the limited amount of recurrent expenditure on the network, public satisfaction, as expressed by rural residents in the survey, is high, with 83% being satisfied with the provision of electricity, out of which 40% think that the provision is ‘good’, as displayed in the following figure.

<sup>36</sup> “Social Snapshot and Poverty in Armenia”, Statistical Analytical Report, Yerevan 2003

<sup>37</sup> Although these assessments are based on the community mayor assessments and one might expect a degree of bias in the response.

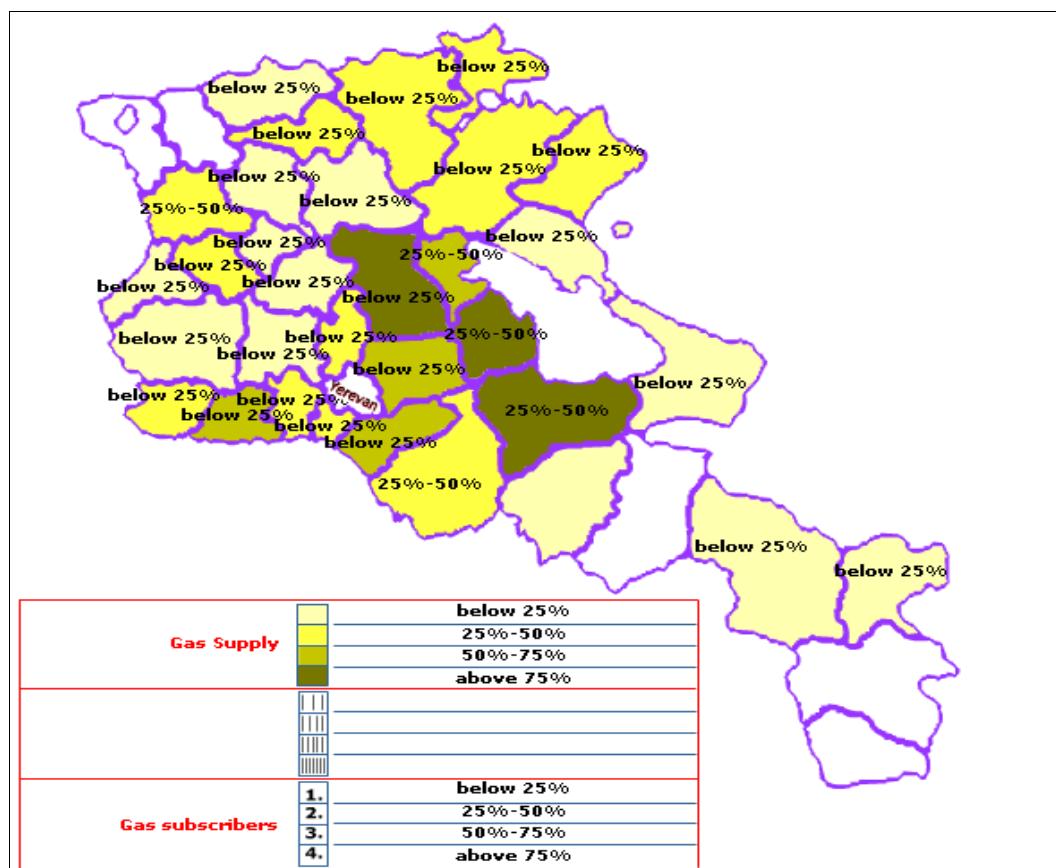
**Table 15 Respondent satisfaction with the provision of electricity**

Source: study data

- The total investment in the electricity network, funded from the community budgets over the last five years (1999-2003), has amounted to US\$ 0.06 million. Although this is a conservative estimate of the true costs, as it excludes the provision of community labor and other in-kind contributions used in parallel to any contribution from the community budget.

### **The Gas Sector**

- The gas distribution infrastructure was, prior to 1991, supporting gas supply to 480 thousand subscribers, covering 42 cities and towns and 365 villages.
- However, this extensive system began to breakdown following the atomization of the FSU, and gas supply to residential customers was gradually disconnected over the period 1991-97, reflecting problems with the supply of gas, at a national level.
- The following figure displays the distribution of gas supply, together with an indication of the number of subscribers, as a percentage of total number of households, in each of the marz that has a supply.

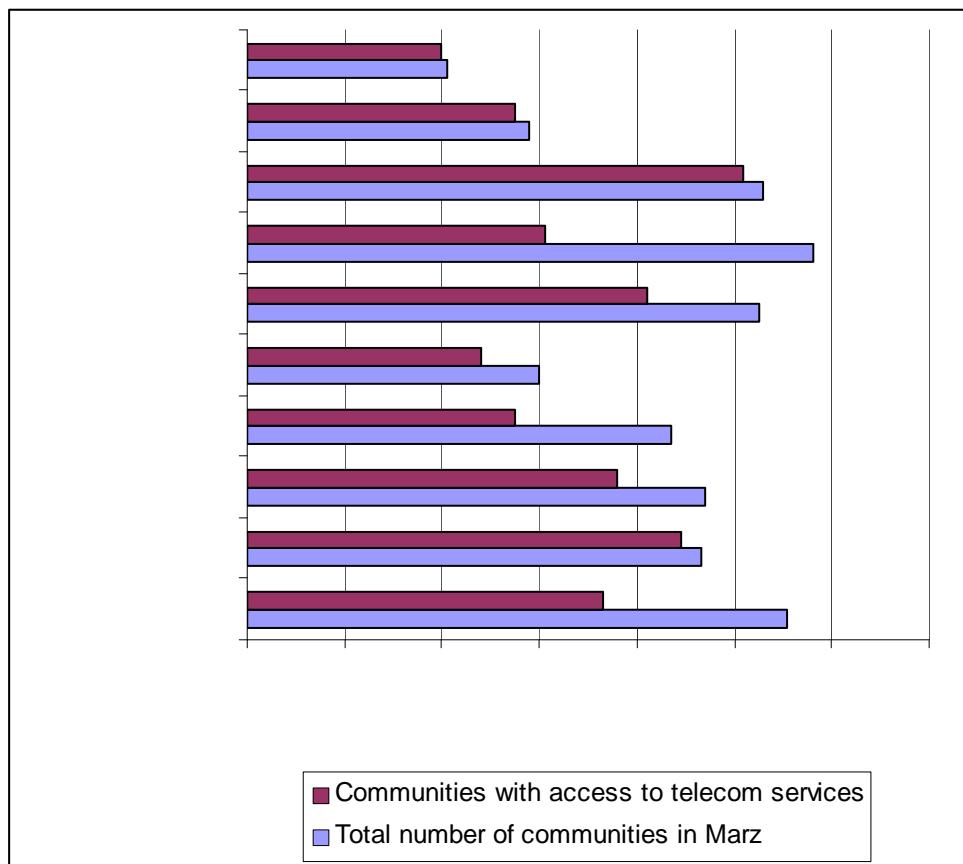
**Table 16 A schematic representation of the distribution and number of subscribers for gas**

- The reconnection of gas supply to the rural areas is still at a very low level, and the survey data reveals that gas infrastructure is available in only 37% of all rural communities. Of this proportion, only 78% of communities that have gas supply infrastructure receive a supply of gas (29% of total communities), as a number of communities have the supply facilities (8% of total communities) but do not receive gas, reflecting the poor condition of the infrastructure, which renders it unsuitable for use.
- The access of rural households to gas supply is even lower, reaching approximately 18% of total rural households. This is related, primarily, to the inability of poor households to pay the necessary amount to gain the connection of the gas to their respective houses.
- The data collected during the course of this study suggests that over 50% of households in those rural communities that have a gas supply, do not have access to gas supply in the homes. Similarly, the proportion of households within a community with access to gas supply is higher in marzes with a lower share of poor.
- Generally, those rural communities that receive gas supply consider the quality of the service as satisfactory. The gas supply is mostly continuous and any interruptions are mainly related to accidents resulting from the poor state of the infrastructure.

## The Telecommunication Sector

- The telecommunication infrastructure is owned, operated and maintained by ArmenTel, which is a wholly owned subsidiary of a private Greek telephone company OTE. Superficially, access to the system appears acceptable in rural areas, with 79% of rural communities having access to telecommunication services.

**Figure 1 The number of communities with telecoms in each marz**



- However, this figure overstates the actual access, as in many cases it consists of a single telephone, available either in the mayor's office or in the post office of the community. Moreover, in the majority of cases, the quality of service is extremely poor and round-the-clock service is available only in very few communities.
- The problem of limited access to land based telecommunication services is exacerbated by the fact that over 68% of rural communities are outside the mobile phone coverage area, and even in those areas where there is coverage, the signal is weak and unreliable. Possibly not surprisingly, access to the internet is also very low with only 7% of rural communities having access.

### **The level of respondent satisfaction**

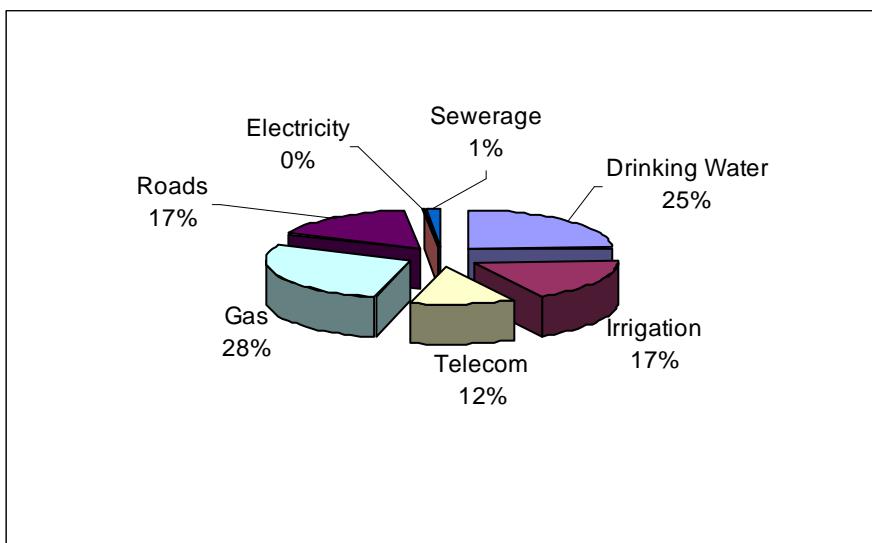
- The quality of the telecommunication service is generally regarded as low and unsatisfactory, by 70% of rural residents, with 19% regarding the service as satisfactory and 11% regarding the service as good. The quality of long distance communication is noted to be especially poor. There are frequently long delays in getting a connection to the marz center, or the capital, if possible at all. It was reported that long distance calls were impossible in 20% of all rural communities, and can only be achieved with difficulty in another 50%.

### **WHAT ARE THE PREFERENCES OF LOCAL COMMUNITIES TOWARDS INFRASTRUCTURE INVESTMENTS?**

- This section reports community level data on access to, and the quality of, infrastructure services in rural communities and on community preferences in respect of future investment in infrastructure. These data were collected during the key informant interviews, focus group discussions and community meetings in 130 communities, which were selected to be representative of rural settlements throughout the country (a detailed description of the methodology and sampling strategy can be found in Annex C). This information offers a valuable insight into the perspective of the communities, but one limitation with the use of individual or community preferences is that they do not necessarily reflect actual choices, as respondents may have limited information about certain aspects, may be undervaluing external issues, or externalities, in their *ex ante* assessment of their preferences, and thus should not be used as the only driver for policy choices.

### **What are people's preferences for infrastructure rehabilitation?**

- When asked, most people in community meetings voted for investments in gas and piped drinking water, with the former winning slightly more votes than the latter. The provision of improved irrigation and roads shared second place, with the former winning slightly more votes than road improvements. The number of votes for improvements to the telephone service was comparatively small, with electricity and sewerage rarely selected. The results are presented in the following figure:

**Table 17 Proportion of votes cast towards each infrastructure type**

Source: study data

- The preferences of men and women were quite similar with men giving slightly higher priority to road and irrigation, whilst women prioritized gas, water and the telephone. While no statistically representative data are available on the distribution of preferences between poor and non-poor, the qualitative data collected during the focus groups and community meetings show that although there are no significant differences in preference between the two categories, the poor prefer a lower quality service, using scarce resources to access additional services, rather than raising the quality of existing services. By contrast, the poor would not give preference to drinking water, if they have access to water, even if the latter is of poor quality and require more effort to get.
- The findings demonstrate that the preferences of the poor, in a number of cases, differ from the majority of the community. This is illustrated by the fact that, in many cases, the poor considered gas as their highest priority for rehabilitation/investment, while the majority of the community opted for drinking water or irrigation. This can be explained by three facts: (1) a clear preference by the poor of household-related as opposed to production-related infrastructure, (2) the poor are willing to accept lower standards for existing infrastructure, if in so doing, they gain access to new service(s); and (3) a higher need for them than for the rest of households to have access to gas for heating. Gas access is more important for the poor because poverty often reflects either disability in a family or incomplete families with no working age healthy males present, which makes collecting wood (a common fuel source in rural areas) more difficult for the poor than for other households.
- According to the study, the rural poor, as a group, are characterized by lower average levels of participation in community projects, and are less able to contribute financially to the projects. In cases when the household's financial contribution is a condition for individual access (e.g., when gas pipes from the community network to the house are paid for by the household), the houses of the poor might not receive access. The poor

households are also less able to participate in community works as it requires the physical constitution of working age male adults, who are usually not present in poor families.

- An additional problem is that the growing social differentiation also reduces the chances of the poor to receive help from the more affluent members of the communities, in the form of either lending or gifts. Thus a traditional source of social protection – community network – is becoming less accessible and the poor feel isolated and excluded. Some respondents complained that only poor households help each other and lend to each other. In some communities in the study, the poor said that social assistance is not provided and distribution of social assistance is not transparent.
- What could be a solution for the problem? In some communities, when individual household financial participation is required for the infrastructure renovation, a soft approach is taken towards the poor. If they can, they invest their labor not money. In other cases, the neighbors would pay for them. Whilst, in the more affluent communities, the administration takes measures to subsidize the poor from the community budget.
- To understand the meaning of these votes, three approaches were employed in the study: (1) direct questions during the community meetings, which asked meeting participants to explain the reasons for their choices; (2) an evaluation of the quality of service and of the quality of good the service delivers (water, gas, etc.) by the respondents; and (3), when possible, differences in preferences within the community. In addition, all the choices were made, after an explanation had been given of the likely cost of the investment to the respondents, in terms of capital, or in-kind, investment or recurrent costs. In this way, the choices were considered to be indicative of ‘real’ choices under a real budget constraint. The following sections describe the resulting data by type of infrastructure.

### ***Why do people want gas ?***

- The most surprising outcome of the survey is the high number of votes given to the gas infrastructure. One third of the communities indicated that access to gas was the most important priority, in contrast to the two previous surveys which indicated a high interest by the community in gas. Such a significant change in the preferences of the communities can be explained by the following factors: (i) reforms in the power sector have significantly reduced the possibility of illegal connections to the power grid, thus using electricity for cooking and heating has become unaffordable (the price of electricity is as much as four times higher than the price of gas); (ii) price of wood has significantly increased buying it is very expensive for the most of households, (the price of wood is about twice higher than the price of gas); (iii) rural population has become aware of the environmental impact of illegal collection of timber in the hinterland of some communities.
- Even when wood is available, a substantial effort, both physical and temporal, is required to collect sufficient amounts. This can prove difficult for some households, especially those with no young adults; (iv) in people’s opinion gas can boost economic activities in rural areas, e.g. green houses, agro-processing in some regions; and (v) while rural communities extensively used dung for heating and cooking purposes during the 1990’s,

a number of residents reported that they do not want to use it for heating and cooking for reasons of hygiene. Also, while dung might be free and easily available in some communities where cattle are being raised, individuals are aware of the opportunity cost, especially for those who cultivate land and use it as a fertilizer.

### ***Why do people want drinking water ?***

- Despite the fact that a significant part of prior investments in rural areas have been used to rehabilitate the water supply, it remains one of the top priorities of rural communities. As with irrigation, many communities that currently have water, and where the water supply was recently rehabilitated, still voted for it because they were dissatisfied with the quality of water and services.
- A number of specific reasons were mentioned by respondents when asked why they chose drinking water as an investment priority, although the study found that in the same communities (with the same quality of service provision) women more often prioritize investment in drinking water than men. Also, the extreme poor sometimes have different preferences. For example, for them, sometimes the availability of low-quality water is sufficient:
  - (1) Most importantly, drinking water was chosen because the availability of clean water is regarded as essential for health. Low quality of water was perceived as leading to quite negative health consequences;
  - (2) Another major factor was the opportunity cost (in money or time), which was cited as a reason by a number of respondents. With no drinking water available through a pipeline, people often have to buy water from trucks for a high price, or spend quite a considerable amount of time collecting water from an, often, remote spring and carrying it back to the community; and
  - (3) A third commonly mentioned reason is that it is important for local economic development. One example of such a community is in Gegharkunik Marz, where one of the major activities of the population is fish farming, which requires a constant supply of high quality water.

### ***Why do people want irrigation?***

- The primary reason for the selection of irrigation as an investment priority in the communities is economic, as respondents recognize the explicit link, often through bitter experience, that sporadic or absent irrigation has a direct impact on agricultural production, and hence their incomes. The concomitant is that irrigation is perceived as being the basis of economic development for the majority of rural communities, although whether the viability of infrastructure provision in all cases is considered, or the need for parallel rural infrastructure investments, such as roads to fully realize the benefits of increased output, is uncertain. Many communities that gave the preference to irrigation do not have land suitable for commercial agriculture. Also, in many communities with irrigated land residents still voted for irrigation because they were not satisfied with the quality of service.

***Why do people want roads?***

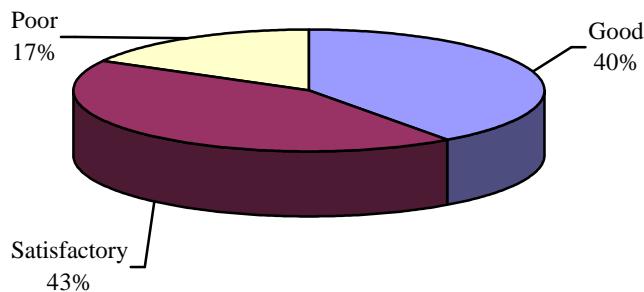
- The two main reasons mentioned by respondents in their selection of roads as an investment priority are the following: Firstly, roads are extremely important for agricultural business and for any other business in the community. Respondents also mentioned that the delivery of agricultural produce to market is more efficient with good quality roads. It will also reduce the transportation costs and hence cost of goods as damage to the vehicles from pot holes and flooded roads will be decreased. Secondly, road condition is an important component of social development and of the quality of rural life: it provides access to the outside world including hospitals in case of emergency as well as non-emergency access to other settlements, the regional center.

***Why do (don't?) people want telecommunications?***

- Only three respondents in the community meetings perceived a telephone service as a priority, and the reasons given included the following:
  - (1) It provides communication in a case of emergency; and
  - (2) It allows communication with relatives who work/live abroad.
- Many people don't find necessary to have private phones especially if they would have to pay monthly fees for that. Often, a limited number of people in the village have telephones, and those are usually the village "VIPs." In some villages, where coverage allows, a limited group of residents have cellular phones that are used by their neighbors in emergencies. In some communities, certain households have telephones with urban numbers, however the majority use the local telephone line and have to call the regional center by dialing "9", and waiting for a connection. There are many communities, where telephone lines exist, but up to 50% of the telephone lines are disconnected due to non-payment.

***Why do (don't ) people want electricity and sewerage?***

- Electricity was selected as a priority by very few community meeting participants, as most of the rural population have access to service. However, it doesn't mean that respondents are pleased with the condition of the network or with the service quality, as revealed in the following figure.

**Table 18 Respondent satisfaction towards electricity supply (%)**

Source: study data

- The network is privately owned, therefore financing its renovation by any source except from the resources of the owner is not an option that is acceptable to the majority of respondents.
- Similar to electricity, sewerage was not in the list of priorities mainly because people managed to cope with the current lack of provision. However, no reliable information is available about contamination of the environment and underground water due to the lack of proper sewerage.

### **What do people think about ownership?**

- The general preference of the communities towards the ownership of the rural infrastructure, within their domain, is clearly split depending on the type of infrastructure. In the case of electricity, gas and roads, a number of respondents were in favor of private or state ownership, because they perceived that communities do not have the resources and/or the capacity to maintain the assets. However, there was also explicit recognition that the condition of the assets in those sectors, owned by private sector or large public sector companies, was poor, and that it was difficult to communicate complaints to the owners and demand repairs.
- In the case of the supply of water, both drinking water and irrigation water, the preference was clearly the opposite with strong support for community ownership of the intra-community networks.

*"I do not accept private ownership, and I don't count on state ownership either. We are left with Village Council and the Head. If we want to have a proper "master,"-infrastructures should belong to us."*

**Interview with Noratus Village Council member**

- There appear to be a number of reasons for the preference for community ownership: Firstly, there is the reality that a community is more likely to look after an asset that it owns, even if ownership is *de facto*, rather than *de jure*. Although, a related issue is the former

case is that the actual owner, the company, is receiving a subsidy from the community in the form of labor to maintain the network. Secondly, there is the perception, borne out by experience, that the village authorities are likely to take a more compassionate attitude to non-payment by individuals within a community. And finally, villagers are able to communicate directly to the village authorities, who are then more likely to act promptly when a problem emerges. The following comment epitomizes these views:

*"We do the repairs of the drinking water pipeline. This year the central water pipeline froze, and all the villagers went to that site. In December, the tractor-drivers of our village dig the soil, and the villagers carried tires and burnt them to keep the pipeline warm. By the time people from the Water Company arrived from Yeghegnadzor, we had done everything. We succeeded in opening our pipeline with great difficulty, and prevented further damage. All the costs were covered by the Village Administration, and the villagers did the works."*

#### **Interview with the Meghrashen Village Council Head**

- A further reason for the preference for local ownership for the applicable types of infrastructure is the negative attitude of the majority of rural inhabitants to state, or private, ownership. The responses suggest a lack of trust that outside owners, both the state and the private sector, will act in the interests of the community. The main area of concern here is the poor interface between service providers and rural consumers. Consumers reportedly suffer from poor communication with providers and from lack of response to maintenance requests.
- The straightforward solution would be to ensure that utilities be made financially responsible for not responding to customer complaints, especially when complaints are related to consumer safety (e.g., electric poles and wiring on the ground as well as drinking water that is not safe for internal use), but also when it relates to reduced availability and low quality of service and of the good delivered (e.g., irrigation starting substantially later than the irrigation season, low availability of electricity service due to long delays with repairs). The utilities should also create a system of communication with consumers, which would provide an efficient way of collecting complaints/requests for maintenance, responding to them, and collecting data about customer satisfaction with the response.
- Whilst attractive in principle, community ownership is also likely to raise transactions costs across the network, and over time require some consolidation to try and realize economies of scale in maintenance interventions<sup>38</sup>. A second issue in the call for community ownership is the affordability issue, with many inhabitants calling for community ownership because the perception is that the community would be more tolerant on non-payment.

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<sup>38</sup> For a fuller discussion of this issue in the road sector see Sirvio & Talvitie, (2004)

## WHAT ARE THE FACTORS THAT INFLUENCED THE SUSTAINABILITY OF PRIOR INVESTMENTS?

- There has been a significant number of rural infrastructure investments in Armenia over the last decade, funded both by the World Bank and other donors, including the United Nations, IFAD, OXFAM, DFID, Save the Children, Action against Hunger. The most recent, significant, investment was the US\$ 29 million Second Armenia Social Investment Fund (ASIF II) project, which started in October 2000, and is ongoing.
- Investments are made on the basis of community preferences and are mostly in drinking water, sewerage, irrigation, roads, schools and local health care facilities. The results have been generally positive and some success has been achieved in creating mechanisms for project sustainability. However, an examination of these initiatives, involving a comparison of both successful<sup>39</sup> and less successful (the selected communities had investments five year ago or earlier) investments, within individual projects, highlights a number of key issues that contribute to sustainability.

### A lack of coordination and good planning

- The examination reveals that one of the main reasons for rural infrastructure project failure is the lack of consistent coordination among the donors and the government and lack of comprehensive planning. In recent years, Armenia has received substantial financing for rural infrastructure from a number of different sources. However, the projects were generally implemented at a local level, independently from similar, or previous, initiatives in the same or other areas of the country.
- In a context where there are a significant number of current and prospective projects in the sector, from numerous donors, there is a concern that the full economic development benefits of these initiatives may not be realized for the following reasons:
  - The lack of national sector policy and strategy could lead to the implementation of projects that are inconsistent with the economic and financial requirements of the country. The result could be unbalanced sector development, and imbalances between capital and recurrent budgets both within and across the different national sectors, at a national level, and more importantly, for the sustainability of the projects, at a local level;
  - A second concern is that the development of ‘self-standing’ managerial modalities by different donors, in the form of Project Implementation Units (PIU), often supported with international consultants, does little to develop domestic capacity in the planning or management of interventions in the rural infrastructure sector; and
- A final concern is that the unilateral financing of projects in one sector, by one donor, could fail to attain the full benefits of the intervention for the country, if greater synergy with other sector interventions with other donors was encouraged within a national strategy for the development of the sector.

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<sup>39</sup> The intervention is considered successful if the community still have the service operational and of good quality at after a five year period

- There are two implications from this ‘piecemeal’ approach; firstly, separate parts of the infrastructure network were either rehabilitated at different times, or one part would be rehabilitated and another not, curtailing the benefits of the actual investment. A number of examples were discovered in the qualitative research, involving investment in the inter-community drinking water network by one donor, but no concurrent repair on the local (community) network. The end result is substantial leakage from the local pipes, and, often, contamination with sewerage in the community.

### **Lack of attention to maintenance arrangements**

- Another major problem is the lack of attention given to long-term maintenance arrangements at the time of project implementation. The result is a short-term service improvement, but poor sustainability, with the renovated assets deteriorating quickly. One example relates to the provision of pumps to irrigate the crops; but as ownership of the actual pump house was not clear, when the roof collapsed, no one responded, and the pumps stopped working.
- One reason for the lack of emphasis on maintenance is often donors and implementing agencies do not have sector specific expertise and appropriate skills to assist the communities in developing appropriate maintenance plans. Any plans, if prepared at all, are often not realistic, or unaffordable, and the communities may not have appropriate technical and organizational capacity to implement them.
- However, there are numerous positive examples of communities maintaining their assets: In Lori region, one project invested in the renovation of the road connecting a community to the main highway. The arrangements for the maintenance of the asset was also organized at the time of the investment, and is implemented on a regular basis by the community under the supervision of the community head. The result is a sustainable investment, which has enhanced off-farm employment in the community.

### **A lack of finance for infrastructure maintenance**

- A further problem in rural infrastructure investment project failure is the lack of financing for subsequent infrastructure maintenance. In those cases when infrastructure maintenance requires substantial resources and the community does not have these resources, the rehabilitated assets deteriorate. For example, in the Debedavan community a *UN FFW* project invested in the cleaning of water supply system. However, since the continuity of these activities required use of expensive equipment, which the community was unable to purchase, the system operated for one season only.
- One example of a successful project is in the Meghrashen community, where *Save the Children*, together with *Caritas*, invested in the construction of a drinking water network. The community undertakes the maintenance of the system, and as part of that pays security guards to ensure the ‘safety’ of the pumping station, thereby ensuring the continued functioning of the system.

*“Maintenance of the pump station is our responsibility, although this is not reflected in our budget. We employed a security guard who is paid from the community budget and whose*

*responsibility is to guard the station. The water company is quite happy - they save the money at our expense. If we didn't guard the pump station, it would likely be robbed and dismantled. We consider community property our property and try to avoid damage to it".*

**Megharshen, from interview with community head**

### **A lack of adequate supervision and monitoring**

- In some cases, either the quality of system design or construction quality is sub-standard. This reflects the lack of control in project implementation at a local level. One irrigation pipeline construction in the Ararat region was implemented during the term of the previous community head, and the new community head was unaware of the required financial participation of the community. This led to the selected construction company choosing a cheap engineering design, below the minimum quality requirements. The constructed pipe was of such low quality that it was effective for only a few months.
- In Arevadasht community, donors funded construction of an irrigation system and a pump station, but due to an engineering mistake (instead of building it through the upper level of lands, it was passed through the middle of it), the lands above the pipeline cannot be irrigated. Last year the pump was renovated from the resources of the community head (he slaughtered his own animal stock), but currently the pump is not operational again.

### **The Importance of the Social Characteristics of the Communities**

- The review also revealed that in those communities where the community was informed about the project, participated in implementation, the investments were more sustainable than where it was not. Whilst this increases the cost of preparing the investments, the resulting project are more sustainable. This can be illustrated by the following example:
- In Gyulibulakh and Hayrenyats, a earlier project only envisaged rehabilitation of the main water pipeline, and not the pipes for connection to individual houses. While most households were able to raise the money to pay for connection to the main water pipe, some of the poorest households could not afford to purchase pipes. There were about six to seven families in each village that did not receive water in their homes. These families were not deprived of water as such. They had the possibility of bringing water from their neighbors or several water wells built within the village area. However, these residents were upset that that their expectation to receive water as a result of the project was not fulfilled and they were unable to benefit equally with the rest of the community.
- The poorest of the poor were not able to access the services provided by the program in some of the communities. In some cases, they were unable to raise funds to pay for pipes to connect the water network with their house. This is a negative outcome as these families not only didn't benefit from the project, but even became more deprived as compared to others. If certain mitigation measures were taken on time, funds might have been raised to build network connection to poor households and to avoid the situation of increased deprivation of the poor. Armenian rural communities have high level of integrity and in many cases the neighbors or the community leaders will be willing to raise these funds.

Making inclusion of the poor as investment beneficiaries a condition for investment could reduce this problem.

### **The need for a Champion of Reform**

- The initiation and formulation of any Community Driven Development (CDD) project is usually the responsibility of the community leader, who has to find financing, communicate with program managers, provide guidance to the community, organize work, communicate with the contractors and organize maintenance. The breadth and importance of their role reinforces one of the main issues to emerge from the examination of the previous initiatives, and which also emerged in the qualitative data collection, the centrality of a strong community leader in project sustainability.
- The importance of championship carried out by individual(s) with incentives to push the infrastructure investment projects through all stages from financing to day-to day maintenance of assets cannot be overstated. It is clear from past experience with rural investments in Armenia that communities with strong leaders, especially those with the support of the full community (which creates incentives for them to act), who play the role of a champion, are much more likely to succeed in project implementation than the average community.
- The process of creating clear procedures for all stages of these projects, including fundraising, tendering, supervising construction, maintaining assets, at very early stages of development and the presence of a champion, who would be able to overcome all barriers, is, with no exaggeration, a key condition for success. Another case of success is when an outside investor (a former community resident living abroad and willing to help the community with infrastructure) takes care of the project.
- However, recognition of this fact creates a policy dilemma; what to do in those communities where such a figure is absent, but which may be the most appropriate places for rural infrastructure investment, based on any assessment of cost effectiveness, or need. Local leadership and participation in decision process is important and therefore some public money needs to be put aside for community mobilization as part of strategy. This is particularly important in places where inequality is large.

### **A misperception of the role of the public sector?**

- One of the main problems is the misperception of the role of the public sector after privatization of the service providers. The fact that the ownership and management functions have been transferred to the private sector should not mean that all responsibilities for taking care of poor and deprived have also been transferred. On the contrary, since the main objective of the private sector is the maximization of profit, rather than the maximization of social welfare, one would logically expect the private sector operator to neglect those individuals/communities where the financial costs of service provision, outweigh the financial benefits of subsequent use.

## THE IMPLICATIONS FOR THE DEVELOPMENT OF RURAL INFRASTRUCTURE IN ARMENIA

### A COHERENT RURAL INFRASTRUCTURE STRATEGY FOR ARMENIA?

- The cornerstone of any serious attempt to address the issues of the Rural Sector in Armenia will require the development of an comprehensive, coherent, country-level strategy, together with an action plan, for a program of rural infrastructure rehabilitation that is based on broad based consultation with key stakeholders and the general public. This should specify the types of infrastructure, whether basic needs provision is sufficient, or whether more expensive technical designs are appropriate to try and facilitate broader economic development, and in which locations, all within a long term strategy for the development, or maintenance of the rural communities in Armenia.
- Within such a strategy and action plan, the institutional and operational ownership of the infrastructure would need to be clarified to ensure appropriate maintenance of the infrastructure, ensuring that where a private, or public, sector organization is endowed with the responsibility for service provision and/or maintenance, the incentives, positive and/or negative, are sufficient to ensure that the task is fulfilled and sustained. This implies that when a particular intervention is designed, consideration needs to be given to its fit within the national strategy framework, the appropriate institutional framework for service delivery, and local needs and resources, to ensure that it will be sustainable.
- The GoA has good experience in developing a strategic framework and coordinating donor activities, as revealed by the recent example of the urban heating strategy which was developed and approved in 2002. Now all donors involved in supporting the urban heating sector in Armenia follow the recommendations of the strategy, with the work coordinated by an inter-agency management board.
- The defined Rural Infrastructure Development strategy and action plan would also need to be accompanied by an expenditure plan, consistent with the GoA's MTEF, the PRSP and the wider macroeconomic framework. This would need to clearly indicate the portion to be provided by the GoA, and the proportion, and type, of contribution required from the communities, possibly leveraged from the private sector, where feasible, and the portion of the funding sought from donors, to allow the latter to contribute, within the framework defined by the GoA, which needs to consider the following points in the definition:
  - The relationships between rural infrastructure and current/potential agricultural growth including non-farm growth;
  - Possible delineation of rural communities into communities with low potential for growth and therefore with basic infrastructure requirements to provide their

subsistence needs *vis-à-vis* those communities with high economic development potential, as a way of defining the appropriate design and cost of particular interventions, and focusing limited resources in those areas where it is most deserved;

- Maximizing complementarity between different infrastructure services, such as roads and irrigation, to maximize benefits. Often little effect can be achieved by increasing crop yield, if the increase would have to be dumped due to poor roads;
- Clear delineation of ownership, and responsibilities for administration, operation and maintenance for all rural infrastructure services, particularly those where different types of ownership currently exist; and
- Linkages with other rural development issues: Rural infrastructure is necessary but often not sufficient for facilitating the agricultural growth and increasing market access. Other issues such as increasing productivity, making financing available, supporting in marketing , building capacity, etc should be addressed first. Thus, the rural infrastructure interventions, beyond addressing basic needs of population, should be synchronized with and often preceded by above mentioned interventions.

### **The need for adequate monitoring of strategy implementation and infrastructure condition**

- The implementation of the strategy and the action plan and the condition of rural infrastructure services should be periodically monitored. It would appear prudent that, if the GoA decides to follow this recommendation, then suitable questions are included in the annual Household Survey, undertaken by the National Statistical Office of Armenia, to assess respondent perception of infrastructure quality in their communities.
- This could be done at relatively little cost, which could then be incorporated into a broader, more systematic, assessment of strategy implementation. The tools and methods developed and applied during this study can be used for that purpose, with the results providing a baseline against which improvement could be measured.

### **The Potential of a GIS Based Approach**

- Geographic Information Systems (GIS) are used to visually represent large amounts of geo-referenced data and to conduct statistical analysis on this data. In the case of rural infrastructure in Armenia, through linking census and economic data to the data collected on the different rural infrastructure networks (Road, Irrigation, Electricity, Gas, Drinking Water), a GIS based system can be used both to indicate, in a visual format, the condition of the different infrastructure networks in Armenia, and, hence, used for network management.
- GIS could also, potentially, have a significant impact on the identification of linkages between the different sectors of rural infrastructure. By combining information on all the infrastructure networks, GIS can be used to identify areas were synergies in infrastructure development can be exploited as well as areas that are just missing “one small piece of

the puzzle.” When combined with external information sources from census data and economic data the potential of this analysis is even more significant.

- The most significant contribution of a GIS based system, is that it can combine network management, identification of linkages and the prioritization of maintenance and future investments,, by incorporating the decision matrix within the GIS system, thus providing a powerful tool for the GoA.

### ***The adoption of GIS tools and implementation at project level***

- It was not possible to develop a GIS based decision matrix during the course of this study for a number of reasons:
  1. Cost: Commercial GIS packages are priced at around US\$10000 per one seat license
  2. Training: While GIS is very powerful, a certain level of training is required to take advantage of it.
  3. Data Availability: In order to fully leverage the potential of GIS a number of datasets must be obtained.
- However, in order to address these issues and contribute to GIS capacity building, the World Bank is developing a program that will allow it to offer the following services to Armenian Government agencies and other institutions:
  1. An open source alternative to proprietary GIS software packages that has the same functionality. The end user will not pay any software or licensing fees and the software can be installed in an unlimited number of computers.
  2. Package this software and all relevant country datasets on a simple to use CD-ROM.
  3. Provide a large collection of tutorials and manuals for common infrastructure related GIS operations.
  4. Provide e-learning services for GIS.
  5. Develop a web community to share best practices in the use of GIS for infrastructure development.
- If the GoA is interested in pursuing this option, this could be installed, and appropriate training provided, within 6-9 months.

## **WHAT ARE THE KEY ISSUES THAT A RURAL INFRASTRUCTURE STRATEGY SHOULD ADDRESS?**

### **The need for greater co-ordination between donors under GoA ownership**

- The recommendation is that the GoA should exercise greater ownership of the different initiatives within the sector, with the agreement of all stakeholders, and enhance the co-ordination between the donor community, within the context of a defined sector strategy, action plan, and expenditure plan for the rural infrastructure sector. This aspiration underlines the importance of the development of these instruments to guide all interventions in the sector.

- **The GoA should designate a government institution to coordinate donor-funded activities in the rural infrastructure.** There is a clear need for one of the existing ministries/agencies to take a central role in the coordination of donor-funded activities as well a role of defining, implementing and monitoring the strategy for the sector.

### **What is an appropriate level of access?**

- One main finding from this study is that rural residents want inexpensive, reliable, appropriate access to rural infrastructure, which implies a policy trade-off between access and quality, which was made explicitly by a number of respondents. The issue, and there are significant cost implications in the decision, is what the appropriate scale and scope of access should be in the different sectors, and across the communities. These issues are key policy questions to be considered in the development of the strategy.
- The concept of **Universal Access** originated in the telecommunication sector, and can be explained by the desire to ensure the provision of telephone access to all individuals in a society. The concept has, subsequently, been suitably interpreted, and applied, in the other rural infrastructure sectors for three main reasons: Firstly, the consumption of utility services of this sort are considered to be potential sources of positive externalities<sup>40</sup>, in the sense that the benefits of having access to a telephone grow with the number of other people that have one. Secondly, utility services can be regarded as a form of “merit good”, i.e. the goods that fall into the category of basic needs everyone should have. Finally, the provision of goods of this nature to the rural population might be a part of the countries development strategy, reflecting a desire to attain greater cohesion in a society.<sup>41</sup>
- The provision of rural infrastructure in Armenia displays many of these characteristics. But despite this, there is no clearly formulated policy regarding the concept of universal access to rural infrastructure, with one exception, the power sector. This is the only sector where the concept has been specified in the legislation<sup>42</sup>. But what are the alternative choices in respect of the concept of universal access that the GoA might want to consider for a strategy? Different strategies have different cost implications and they need to balance universal access with alternatives, based on cost implications as well as other considerations that were articulated in earlier sections. A number of different strategies were identified during the course of the study, although it was not possible to include all of them in the decision matrix. A more detailed discussion on the applicability of the issue in the telecom sector in Armenia is provided in Annex L.

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<sup>40</sup> See Newbery (2002) for a detailed discussion on the economics of utility networks

<sup>41</sup> Clarke & Wallsten, (2002)

<sup>42</sup> Energy Law, (2002) The concept was included prior to the privatization of the electricity distribution network, when the new energy law was adopted, according to which, the electricity distribution licensee should provide electricity access to all those residents that do not have it. However, in reality, the inclusion of the concept is symbolic, as 100 percent of the population, both urban and rural areas, currently have access to electricity supply, even if it is not always reliable

***What should be done to improve the situation?***

- **Define the concept of universal service in the legislation for all sectors**<sup>43</sup> - the universal service concept has two main components, namely universal access and tariff. The universal access concept should not necessarily mean private access to all services, as was mentioned earlier in the case of telecom, the majority of people in the rural communities would prefer to have reliable payphones, rather than individual telephones in each household. An analogy can be drawn with water supply; while people might prefer to have individual taps, given the cost differential, they are likely to be satisfied with good quality water from boreholes or standpipes. The key issue is rather than impose a solution on the rural communities, which may be non-optimal and therefore unlikely to be sustainable, it is important to allow the people to choose the quality and price of services they can afford.
- **In regard to road infrastructure, we recommend that the GoA should consider focusing interventions on a defined “lifeline” road network** (i.e. the most optimal routes connecting rural communities to the interstate roads or to the main commercial centers). The “lifeline” network was identified in the course of this study and constitutes only 2700 km of local and republican roads that provide access to the rural communities. This significant reduction of the “core” rural network would allow the GoA to increase its allocation per kilometer for rehabilitation and maintenance, thus improving the condition of the network.
- **Develop a mechanism to finance universal access** - There appear to be three possible options:
  - To finance universal access through **implicit cross-subsidization**, as is currently the case in the electricity sector. This means that some users will be charged higher prices in order to provide access to others. It is an adaptation of the concept of Ramsey Pricing<sup>44</sup>, tailoring the tariff to reflect the ability to pay of different market segments. Unfortunately, the resulting implicit cross-subsidization is not only inefficient from allocation perspective, due to the limited transparency, but it also provides no incentive to the service providers to extend access. What is needed is a way of making the cross-subsidy explicit, a public service contract that provides appropriate incentives and rewards to ensure that the service provider is compensated for extending the service to non-commercial communities.
  - **Direct subsidies from the state budget** to the operator targeted at providing access to a particular group of beneficiaries. This approach is more transparent and might be more efficient especially if there are competing service providers. The problems are scarce public funds and also targeting. Although, the latter might be a problem in the case of other schemes as well. The donor funding might be used to supplement scarce public resources. One way around these

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<sup>43</sup> This should include amendments in the water code, the laws on electronic communication, energy, automobile roads.

<sup>44</sup> Ramsey, (1927)

problems is for an explicit **Public Service Contract**, drawn up between the GoA and a private sector provider, which specifies the required levels of service provision and quality, and the resulting compensation. Contracts such as these are used to deliver socially necessary train services in EU countries;

- Establishment of special **universal access funds**, whereby the service providers are required to contribute a defined amounts, in the form of a levy, which can then be used to pay for the service of remote areas and poor residents. This is another form of cross-subsidy; however, it does not have some short-comings of traditional implicit cross-subsidization. Namely, it is transparent and specifically designed to encourage investments in remote areas as well as for the application in an environment with multiple service providers. The draft electronic communication law proposes to establish such a fund for providing the universal access for fixed line telephones.
- The overall recommendation is to go for prices at cost recovery with a subsidy to increase access in poor underserved areas. So long as the service is metered, it may be more expensive but people will pay for it because they can manage their individual expenditures better.

### **What could be done to improve the quality of service delivery?**

- There is a clear need to establish improved monitoring of service delivery in rural areas. The recent transformation of the independent energy regulatory commission, into the Public Services Regulatory Commission (PSRC), to oversee water and telecom sectors in addition to energy, provides an interesting template to follow. In April, 2004, the PSRC set minimum service quality standards for the water supply in Yerevan, for the first time, including the minimum hours for supply during day hours, time allowed for responding to accidents, etc.
- This approach could be extended to cover service delivery in rural areas. The need for such an approach is illustrated by the fact that even in those communities that have mains water, according to the national epidemiological service, out of 3843 samples taken during the 2002, about 29% did not meet the micro-biological standards. The latter should be monitored by the Ministry of Health; however, given the close link between the quality of water and the condition of the network there should be close coordination between the two entities.
- The specific recommendations comprise the following:
  - ③ The PSRC should develop or revise standards and service rules for utilities in rural areas to make them SMART, Specific, Measurable, Affordable, Realistic and Timely;
  - ③ The PSRC should develop comprehensive service quality monitoring mechanisms for rural utilities;
  - ③ The PSRC should ensure that service providers have appropriate incentives to respond promptly to community complaint's and resolve problems, such as outages, establish mechanisms to record the complaint, and the delay until correction; and

- ③ The PSRC should take steps to inform the rural communities of their rights *vis-à-vis* the service providers; and
- ③ The PSRC should develop guidelines on service quality and monitoring standards and provide on-going advice to those communities where the infrastructure is the community owned and not regulated by PSRC.
- To ensure acceptable quality and reliability of the service the PSRC should strengthen its monitoring capabilities and increase the awareness about itself and its responsibilities among the rural residents

### **The need to introduce new technologies and new standards**

- One concomitant to the definition of universal access for each infrastructure service is that the government needs to revise, where necessary, current norms and standards and introduce new technologies to meet the requirements implied by the interpretation. There is a clear trade-off between service quality and cost, and this needs to be reflected in the strategy for the sector, allowing more cost effective technologies to be employed in those communities with low potential for growth.

#### **The need for new standards and technologies in the road sector**

The existing standards in the road sector, inherited from the Soviet Union, for the rehabilitation and maintenance of rural roads appear excessive, when considering the traffic volumes on these roads. The introduction of 4.5 meters roads in mountainous areas, or gravel roads, with no shoulders, and appropriate new technologies could realize unit cost savings of 40-50% in rehabilitation activities.

Current technologies are too expensive, and more appropriate technologies such as concrete or bitumen stabilization, using bitumen emulsion, or slurry seal, could be used in many cases. We recommend that these technologies are piloted in Armenia as soon as possible. The World Bank financed Georgian local and secondary roads project, which has been just approved, may provide useful knowledge in this regard.

- A general recommendation is that the defined strategy and policy should seek to maximize the use of new technologies and more appropriate standards that are likely to reduce capital and maintenance cost and/or improve quality of rural infrastructure services. This will have two main benefits; firstly, it will allow a better use of limited resources, thereby allowing a scaling up of interventions for a given budget; and secondly, it will enhance the sustainability of the interventions by more closely linking identified need with design.

### **The need to maximize the contribution of private sector**

- The capital costs of access to infrastructure services should be funded by the private sector to the extent that these costs are financially viable while the central and local governments should bear the access costs for all of the rural communities and individual connection costs of poor households where the marginal costs of connection outweigh marginal revenues, where connection is considered socially desirable. The appropriate level of access funded through the government funds should be determined based on the universal access concept as was explained earlier.

- The study has revealed that there are opportunities for private sector contributions in the provision of rural infrastructure services. Some opportunities have been already utilized, including the contracting out of construction, rehabilitation and, to a certain degree, the maintenance of the physical infrastructure. There are a number of other areas, where private sector involvement should be considered : (i) outsourcing management of community owned utilities, particularly drinking water; (ii) outsourcing operation, including maintenance, billing and collection of irrigation Water User Associations; (iii) designing and implementing credit (micro) financing schemes for communities as well as individual community members to improve infrastructure services, e.g. gas, water, communications (discussed in more details above); and (iv) cooperation in providing universal access as described above.
- The connection of individual households in rural communities that are receiving a gas supply is also an issue. Roughly 50% of households are not able to pay for the connection of the gas to their houses (intra-house network, and prepayment for the gas meter). Micro financing facilities could be made available for these households. In a similar way as in the telephone sector, and with any network good, it is not profitable for the gas company to provide a gas supply to all rural settlements.
- The gas company is planning to focus the provision of new supply infrastructure on 133 villages in the upcoming two year period. These are more affluent villages located nearby the main gas pipeline that are densely populated and where majority of the population can afford the initial connection costs. For the remainder of the rural areas, the marginal cost of reconnection far outweigh the marginal revenues, and some form of public intervention is necessary to ensure supply is provided to these areas.
- **There is a need to encourage public-private partnerships in funding capital investments for the installation of internal transmission network**, specifically encourage donors engaged in Community Driven Development (**including ASIF**), rural development activities to consider funding this portion of capital costs for the private infrastructure service providers (particularly for the telephone and gas companies).

## WHAT CAN BE DONE TO MAKE RURAL INFRASTRUCTURE INVESTMENTS SUSTAINABLE?

### What are affordable services?

- A considerable quantity of information was collected in the survey to identify the key factors impacting on the affordability of payments for utility services. This analysis indicates that the payment collection level *vis-à-vis* the charged amounts for the different utility services is, approximately, 100% for electricity and gas, falling to a range of 60-70% for drinking water and irrigation services. This is despite the fact that electricity and gas tariffs are close to cost-recovery levels and consume a sizable portion of the rural household budget, whereas both drinking water and irrigation services are subsidized by the government and have tariffs below cost-recovery level. Furthermore, there would appear to be few substitutes for drinking water, whereas there are a number of reported substitutes for gas, including wood, dung and electricity.

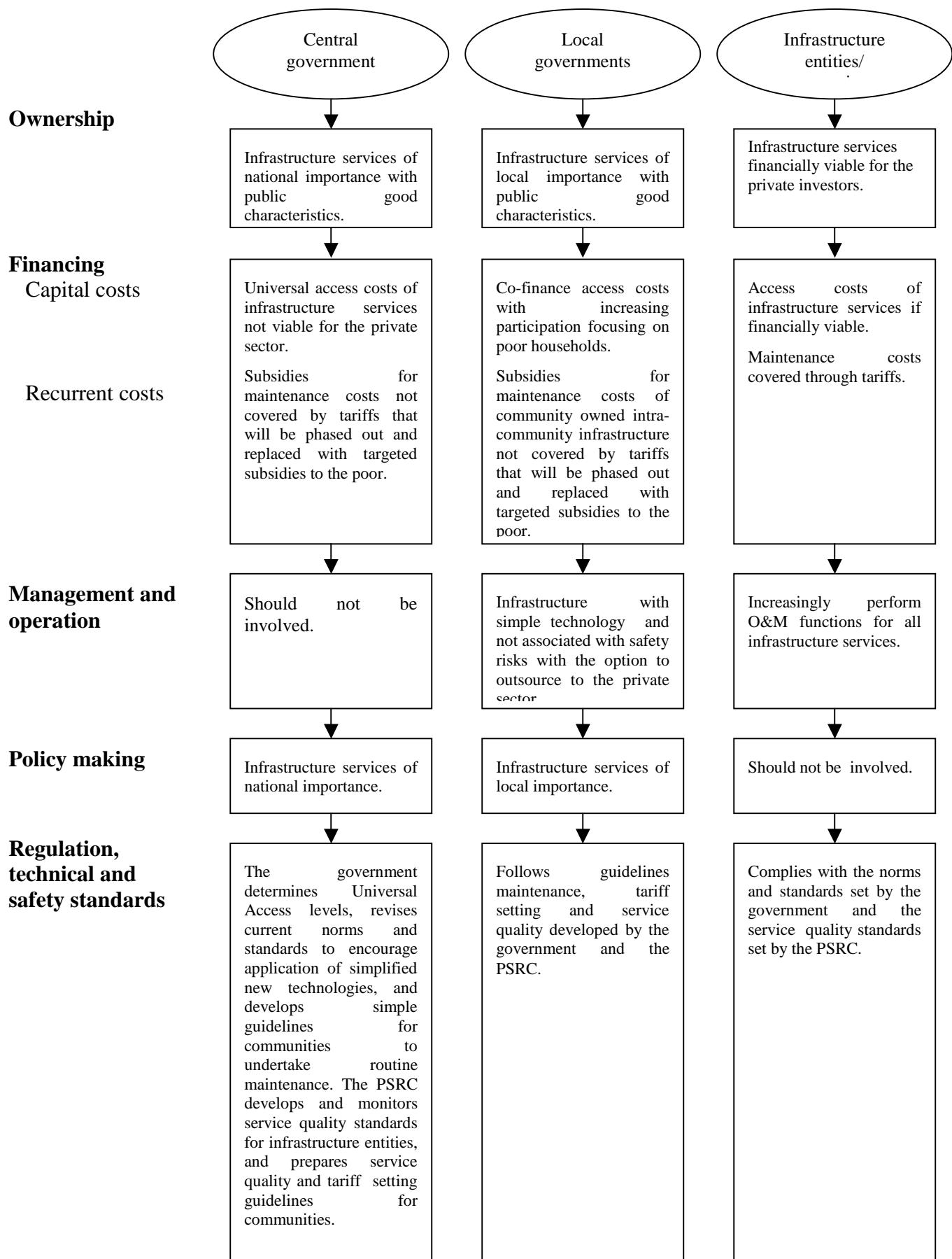
- The implication, which was supported by qualitative data, is that affordability is closely linked to the degree of community ownership, the respondent's perception of the service and whether consumption is measured at the household level. If households receive a quality service, with effective monitoring, so that they can define their consumption levels, the tariff level, within reasonable bounds, does not appear to be a key parameter.

### **How to encourage people to pay?**

- One implication of the previous section is that the billing and metering systems need to be improved and managed efficiently, as they create disincentives to pay as many of the household customers decide not to pay for poor quality services or when they expect to be disconnected for non-payment by others.
- The farmers pay by hectares or by hours. The insufficient water flow or the inaccurate calculations cause significant disparities between water charges and usage, leading to widespread criticism.
- A further problem is that farmers are, currently, required to pay the fee for irrigation at the start of the season, which is the time when they need to invest in their business, rather than at the end when they have funds from the sale of their harvest. Although, there was some suggestion that the *a priori* fee, was in fact the *ex post* fee for the previous year. In addition, it is technically not possible to disconnect on the individual basis. Also, disconnections happen as a result of the poor organization of the payment arrangements.

### **There is a need for greater clarity of ownership and responsibilities between levels of government**

- The study findings indicate that clear delineation of infrastructure ownership, and roles and responsibilities for funding, service delivery, operation/maintenance and technical oversight between central and local governments and infrastructure entities is critical for the sustainable development of rural infrastructure services. This delineation should take into account the type of the infrastructure and the preferences of the communities. The following chart below summarizes the recommended delineation based on the complexity of the technology, the costs involved, and associated safety and security risks.



- The ownership of the rural infrastructure should be delineated based on the type of infrastructure, with government ownership preferred in those cases where the infrastructure services have significant private good characteristics and therefore these services would not be financially viable, reflecting the fact that the private sector is unlikely to consider the associated externalities. The government ownership should be further delineated between the central and local governments contingent on the extent the infrastructure serves national vs. local needs. Thus, community ownership should be preferred for the infrastructure serving only local community needs while central government ownership would be appropriate in the case of common infrastructure serving several communities.
- Based on the aforementioned delineation principle it is specifically recommended that the ownership of marz roads, and transit roads, which are currently administered by the marz and the communities, respectively, are transferred to the Road Administration of the Ministry of Transport and Communications. Marzes are not local government bodies and therefore do not have own financial resources and budgets, and neither they nor the communities have the technical capacity to administer and maintain roads.
- The central government should not have infrastructure operation and management responsibilities. These responsibilities should be shared between communities and the private sector with communities assuming operation and management of infrastructure involving low technology and low costs, such as in the case of water and irrigation. Whilst more complex infrastructures, involving greater costs, technical abilities, such as with roads, or where there is a greater safety risks, such as with electricity and gas, the network provider should remain responsible. Communities should have the flexibility of outsourcing their operations and management (O&M) functions to the private sector.
- The following represent the specific recommendations in respect of the operation and management of the infrastructure:
  - To transfer the operation and administration of the water network to communities. The study has found that currently, irrespective of actual operation, communities and rural residents take care of maintenance. Thus, the Armenia water supply and Yerevan water supply state-owned companies enjoy the indirect advantage of receiving “free” O&M, which is, in parallel, being subsidized from the state budget. It is recommended that the payment of subsidy is made to beneficiaries, i.e. communities, and not specific companies. In this case, communities would receive their subsidies and would have a choice on how to organize operations. One way for the Government to define the equalization subsidies for rural communities is to factor in the ownership, management and maintenance of the water into the amount of the subsidy. This would ensure that communities with community maintained water networks have adequate financial resources for O&M;
  - While the tertiary irrigation network has been transferred to the newly established Water User Associations (WUAs), according to the interviews with rural population, the perception is that the WUAs is just another state institution It is recommended that the WUAs should be established on the bottom-up principle rather than top-down

as it is currently done. This lack of ownership by the rural population undermines the GoA's and the donors' efforts in reforming the irrigation sector; and

- To transfer the operation and administration responsibilities for marz and transit roads to the Road Administration. Communities may retain the O&M responsibilities for the intra-community roads provided that they build adequate capacity and skills. Particularly, it is recommended that the Road Administration develops simplified guidelines for the maintenance of roads by communities.
- To ensure that the O&M, of the entire gas network, both inter- and intra-communities, is retained by the gas company to ensure the security and safety issues are adequately addressed.

### **The need for appropriate maintenance arrangements**

- The construction, rehabilitation and, to some extent, the maintenance of some of the rural infrastructure has already been out-sourced to the private sector: In the cases of gas, telecom and electricity all responsibilities have been transferred to the private sector, although they may not be fulfilling their mandate.
- The communities should be familiarized with the low cost technologies that can be applied to those types of rural infrastructure, which would remain under community ownership. In the case of the road infrastructure, cost sharing arrangements between Armenian Roads and the communities could be established for the routine maintenance of the intra-community roads and roads connecting communities to the main network.
- Most of the communities have adequate tools, equipment and human resources to carry out routine maintenance. With some additional guidance, these communities could contribute to cost effective maintenance of these roads. The study has found that the communities are willing to provide in-kind contribution to supplement the funding received from the state.
- Some general recommendations in this respect are:
  - that the technical, financial and managerial capacity of WUAs be strengthened to ensure that they can adequately perform their responsibilities for the O&M and administration of the irrigation network;
  - that Armenian Road develop simple guidelines, and training if necessary, to assist suitable communities undertake routine maintenance;
  - that the GoA consider outsourcing certain management and operation functions to the private sector; and
  - that a community may choose to out-source management to another entity, if they choose so.

### The need for a champion of reform

- Recognition of this fact creates a policy dilemma; what to do in those communities where such a figure is absent, but which may be the most appropriate places for rural infrastructure investment, based on any assessment of cost effectiveness, or need. One option might be to use strong leadership, however defined, as a sifting device in the early stages of project preparation, with 'needy' communities without strong leadership, that are sifted out of the first tranche of interventions within a program, either provided with appropriate support to try and attain such a point, **before any investments** in rural infrastructure are made in those communities. The defined communities could then receive technical assistance to try and develop their capacities. An alternative option, which would have other advantages beyond infrastructure service, is the consolidation of administration for several, particularly small rural communities. As was described in the text, often major part of the community budgets is spent for funding the administration cost. The consolidation may free up additional resources which can be redirected to improving infrastructure as well as other social services. In addition, this economies of scale may allow the attraction of more qualified staff and result in more competent budget administration.
- It is recommended that the GoA support local leadership and participation in the decision process and, therefore, set aside some public money for community mobilization and technical assistance as part of the developed strategy. This is particularly important in places where inequality is large, or where the lack of leadership is an issue.

### The need for community coherence

- The earlier section noted the importance of community coherence for project sustainability, and revealed a number of different aspects of such coherence. One of the aspects raised related to those communities, where significant disparities of income, might lead to polarization problems that are enhanced by the project.
- There are two main recommendations; firstly, in the provision of any form of rural infrastructure, where household affordability to access the service is an issue, a portion of the capital investment budget should be set aside to provide connection to 'qualifying' households, the latter in this sense comprising the poorest households in a community. Alternatively, an additional subvention, to meet the investment requirements for the qualifying households, could be made to the community budget from the national budget, which could then ensure that the poorer households are provided with access to the service.

## HOW SHOULD RURAL INFRASTRUCTURE INVESTMENTS BE PRIORITIZED?

- This section describes the development of the 'decision matrix' methodology (which has been given the acronym Rapid Rural Infrastructure Assessment Toolkit, RRIAT), which has been developed to assist the GoA in prioritizing between different infrastructure interventions across sectors, across regions and differing rural communities. The RRIAT approach provides a multi-sectoral assessment tool, that with the proposed strengthening

with GIS software, provide a way for Governments to highlight and support linkages between sectors, manage network condition and prioritize investments in the rural areas.

- The broad approach can be considered as a form of stylized multi-criteria analysis, where all potential investments are assessed, and provided with a normalized score, against a number of pre-defined criteria. These scores are then aggregated to facilitate the ranking of the investments, and provide a measure of the relative ‘value’ of each against all other prospective investments.
- The criteria included in the decision matrix were explicitly selected to reflect both the long and short term strategic objectives of the government, such as poverty alleviation, economic growth and the cost effectiveness in the use of scarce public resources. In addition, the decision matrix also incorporates the preferences of communities thus, to some extent, also addressing affordability and sustainability issues. The community preference is based on the votes cast for a particular investment during the community meetings, as a percentage of all votes cast.
- The number of people eligible for the poverty benefit plan is used as a proxy for poverty due to the paucity of poverty data at the community or raiyon level. The formula used to calculate cost-effectiveness is bulleted below, and was selected to try and alleviate potential distortions where the size of the population was small, but the absolute number of poor households was large, relative to comparative communities:
  - number of people /cost of intervention + number of poor/cost of intervention
- The intervention cost for all communities and types of infrastructure has been estimated in the course of this study (see Annex H for more details). It is important to mention that these costs are based on the current technologies, standards, and unit prices prevailing in Armenia. Also, the interventions are based on the principles of universal access, although not explicitly defined by the government of Armenia. In some cases, significant cost reductions could be realized as a result of introducing more cost-effective technologies, streamlining excessive standards and formulating concept of more realistic and affordable universal service.
- Finally, the potential for growth for each rayon has been estimated by a number of national experts, using the Delphi method, which is discussed in Annex L. The intention of the exercise was to use their expertise to make sure that those areas that are considered to have the highest growth potential, are represented additionally in the Decision matrix, to provide the Government with the option to focus interventions in areas of highest economic potential.

### **How to use the Decision Matrix?**

- There are a number of different ways to use the Decision matrix; firstly, the GoA may decide to retain the broad approach, and try to balance investments to impact on all the criteria. Alternatively, the GoA may wish to focus a finite budget one or more of the criteria, for example on poverty alleviation, in which case the DM can be set up to reflect

this desire. The differences in the output for the different possibilities are reported in the following section, whereas the actual output from the DM in tabular form, are presented in Annex I.

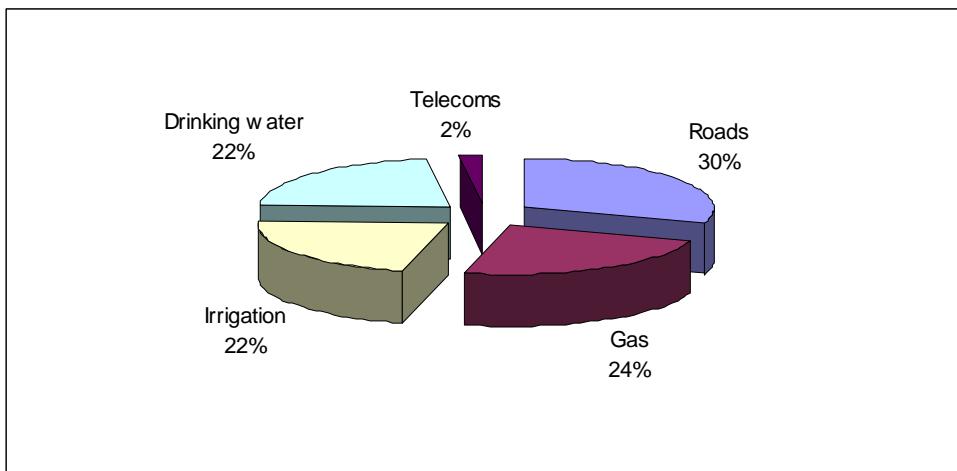
### ***The potential addition of GIS to the Matrix***

- This Geographic Information Systems (GIS) are used to visually represent large amounts of geo-referenced data and to conduct statistical analysis on this data. In the case of rural infrastructure in Armenia, through linking census and economic data to the data collected on the different rural infrastructure networks (Road, Irrigation, Electricity, Gas, Drinking Water), a GIS based system can be used both to indicate, in a visual format, the condition of the different infrastructure networks in Armenia, and, hence, used for network management.
- GIS could also, potentially, have a significant impact on the identification of linkages between the different sectors of rural infrastructure. By combining information on all the infrastructure networks, GIS can be used to identify areas where synergies in infrastructure development can be exploited as well as areas that are just missing “one small piece of the puzzle.” When combined with external information sources from census data and economic data the potential of this analysis is even more significant.
- The most significant contribution of a GIS based system, is that it can combine network management, identification of linkages and the prioritization of maintenance and future investments, by incorporating the decision matrix within the GIS system, thus providing a powerful tool for the GoA.

## The Output from the Decision Matrix

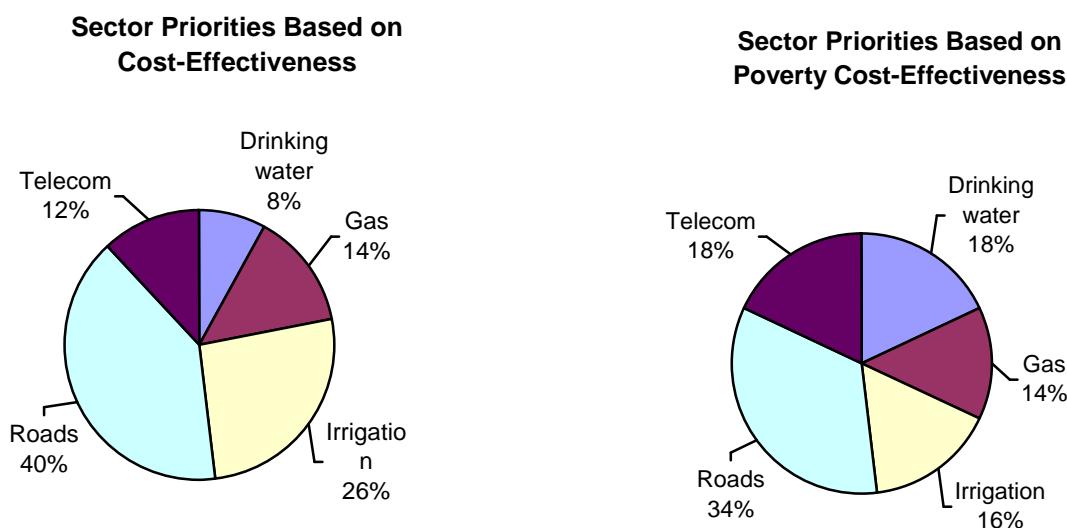
- Within the highest scoring fifty investments, roads and drinking water are the most dominant infrastructure interventions, accounting for 30% and 22% of the total, respectively, as revealed in the following figure. Gas accounts for 24% and irrigation for 22%.

**Table 19 The sectoral share of the highest 50 interventions in the DM**



Source study data

- If the primary emphasis is placed on cost effectiveness, then roads rank the highest, representing 40% of the sector priorities in the top fifty ranked interventions. Although, this can be partly explained by the regional nature of roads *vis-à-vis* the other interventions, and the fact that total costs are divided amongst a larger population. However, roads again come top of the share of priorities within the top fifty ranked interventions, when the emphasis is placed on poverty alleviation and cost effectiveness, accounting for 34%.



- Whereas, the sector prioritization changes significantly if the decision matrix is run based on the poverty criteria only or economic growth potential criteria. In both cases the drinking water, gas and irrigation are the dominant infrastructures accounting for 20-25% of the top fifty ranked interventions.
- The geographical dominance also very much depends on the criteria selection. Thus, for all three criteria of cost efficiency, economic potential and community preferences the marzes of Ararat, Gegharkunik and Kotayk are dominant and account for over half of the highest scoring 50 interventions identified by the matrix. Similarly, the bottom 50 scoring entries are also dominated by three marzes, those are Shirak, Aragatsotn and Lori.
- It should be noted that if the matrix is run based on the poverty criteria only then two of these “worse-off” marzes of Aragatsotn and Shirak become dominant marzes, in terms of their share of interventions, within the 50 highest scoring marzes. The implication is that poverty has a minor impact in the matrix, if emphasis is not given to one of the three criteria.

### ***The Policy Implications of the Output from the Decision Matrix***

- The implication of the output from the decision matrix is that if there is a desire on the part of the GoA to focus exclusively on economic growth, then the primary emphasis in any action plan, or component therein, for rural infrastructure investments would be on the provision of improved roads and irrigation. If the emphasis was placed on poverty alleviation, then the focus would be on the provision of gas and drinking water.
- Similarly, if the emphasis in any action plan or component of any plan, is placed on cost effectiveness or economic growth, the majority of the interventions would be focused in the marzes of Ararat, Gegharkunik and Kotayk. Whereas, if there is a poverty alleviation component in the prospective action plan, then interventions should be focused in the “worse-off” marzes of Aragatsotn and Shirak.

### **HOW CAN THE ACTION PLAN BE FINANCED?**

- It is recommended that the GoA define a financing plan for the sector consistent with the MTEF. The resulting plan needs to be realistic, clearly indicating the portion to be provided by the GoA, and the proportion, and type, of contribution required from the communities, together with firm possibilities of private sector contribution, where feasible. It would also need to indicate the portion of the funding sought from donors, to allow the latter to contribute, within the framework defined by the GoA.

### **How much would it cost?**

- The actual costing would very much depend on: (i) the policy choices, or trade-offs, that are made in respect of universal access; (ii) the technologies that are used for the rehabilitation and development of the infrastructure; and (iii) the level or quality of the infrastructure services to be provided.

- The estimate of this study is that approximately US\$250-350 million is required to address the basic needs of rural population in respect of rural infrastructure. This range includes about US\$90 million for the rehabilitation of “lifeline” roads, connecting rural communities with the core network, US\$50 million for the supply of gas to the majority of rural communities, about US\$35–90 million for telephony, depending on the assumed sophistication of the required telecommunication, about US\$43 million for potable water and US\$75 million for irrigation.
- It should be stressed that these figures are intended to be indicative of the likely costs of these initiatives as the cost estimates are based, largely, on current prices, which predicate current standards, conventional technologies, and the universal access principles implicitly assumed by the government. For example in the case of potable water and telecommunication, the assumption is that each rural household would have an individual tap and telephone, but that quality would be sacrificed to gain coverage. For example, one trade-off might be that the water supply would not be 24 hour.
- The introduction of new technologies, and more appropriate standards, something that this paper suggests, are essential to the development of a sustainable, affordable strategy, would be expected to reduce these amounts, significantly in some cases.

***Can the Action Plan be financed from the local budget?***

- The rural communities are heavily dependent on transfers from the central budget, which typically comprise over fifty percent of local budget revenue, as noted earlier. Other sources of revenue for the community budget are property and land taxes (assigned to and collected by the local governments), certain types of state duties, local duties and other non-tax revenues (rent, fines and penalties, sale of community owned property, etc).
- The earlier section noted that there were real limits as to what can be raised from local taxes, implying that if a program of rural infrastructure investments was to be undertaken in whatever form, there would need to be a significant transfer of capital expenditure to the local communities, together with increased provision of recurrent expenditure to ensure the distribution and sustainability of any investments.
- In addition, there is a need to ensure that both current, and future, funding is used efficiently and effectively, and, in certain cases, the policy of consolidation of the administrative units would appear to be a key requirement.

***What can the private sector do?***

- While it is unrealistic to expect that the private sector will finance universal access for all rural residents (and as discussed earlier in the text in that regard significant policy changes have to occur) the private sector can play an important role in financing the provision of rural infrastructure services.
- The private sector, if necessary with the support from the public sector, can design or extend the existing credit and/or micro-financing schemes for communities, as well as individual community members, to improve infrastructure services, e.g. gas, water,

communications. These schemes, in particular, can finance connections of individual households to gas, telecom and water network. As indicated earlier, approximately 50% of households in the communities that have gas infrastructure, do not have gas. This is because they can not afford to pay the large fee for the connection to the gas network. A similar situation can be found in the telecom and water sectors.

- Also private sector will be expected to contribute, through a universal access fund or other mechanism, in the manner described earlier, to the provision of universal access.
- Finally, private utilities are often willing to finance the extension of the infrastructure to a particular community, if there is a parallel commitment from the community, or the government, on the intra-community network and individual household connections. This provides an opportunity for public-private partnership in the provision of some of the services.

### ***What can the donors contribute?***

- While the GoA does not have complete information about the scale and scope of potential donor support, some data about planned activities of the large donors are available. For example, the WB plans to allocate or has already allocated over US\$100 million for rural development and infrastructure sectors within the next four years; the KFW has already allocated about US\$40 million for investment for potable water rehabilitation in three regions; IFAD plans to allocate finances for the rehabilitation of irrigation system. In addition, the Armenian government is currently negotiating with the Millennium Challenge Corporation, funded by the US government and the Lincy foundation, the Armenian Diaspora funded charity organization, about additional support which can also, at least partially, be directed to the rehabilitation and development of rural infrastructure.
- It is important that the donors, even if the amount concerned is very small, design prospective interventions in close coordination with the government and within the strategic framework designed by the GoA. In addition, the donors should extend their support to those other types of infrastructure (e.g. gas), which have been traditionally neglected, due to the fact that the main service providers are in the private sector. However, as this study has shown, even when the main network is in private hands, there is market failure, and hence a role for public sector/donor assistance, in the intra-community networks and the provision of market connections.

### ***Can the existing national budget meet the challenge?***

- From the perspective of the national budget, there are two main issues to consider in the identification of a ‘package’ of rural infrastructure investments; the required capital expenditures, and the required recurrent expenditures over the life of the asset.
- In respect of the former; the recent Public Expenditure Review<sup>45</sup> (PER) identified an imbalance, currently, between relatively high infrastructure investments, mostly donor funded, and the insufficient budget allocations for the required maintenance of these

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<sup>45</sup> World Bank, (2003b)

facilities. The percentage of GDP that is expended on capital investment from domestic sources across all sectors was 3.5% in 2001, down from 4.74% in 1999. The respective share of transport and energy is 0.56% and 0.52% respectively, with about 30% of total capital expenditure from domestic resources (or an absolute amount approximating US\$22 Million) being expended in those sectors. The situation is similar in respect of recurrent expenditure, with the road sector, in particular, having an estimated needs for recurrent maintenance of US\$30 Million, but receiving just 10% of the required amount annually, although a significant increase is envisaged for 2005.

- The state budget allocations for the public infrastructure sectors are planned at US \$84.31 million for the 2004-2007 period. These allocations have been largely determined based on the financing gap projected under the Integrated Financial Rehabilitation Program adopted by the government and the analysis carried out within the framework of Transport Project. However since some of the actual performance indicators (tariff level, losses, electricity savings) fall short of the plan, these allocations are inadequate for the maintenance of the infrastructure. Moreover, the Integrated Financial Rehabilitation Program was not intended to address the issue of infrastructure development. In addition, the government's MTEF program does not specify how these amounts will be shared between urban and rural public infrastructures, or, if at all, between state owned and community owned infrastructures.

**Table 20 State allocations to public infrastructure sectors (US\$ Mill)**

	2004	2005	2006	2007
Drinking Water	2.45	-	-	-
Irrigation	6.00	2.77	2.41	-
Roads	7.38	20.78	21.26	21.26
<b>Total</b>	<b>15.83</b>	<b>23.55</b>	<b>23.67</b>	<b>21.26</b>

Source: GoA

- In addition, the MTEF, as presented in Table 19, does not provide any funding for development and maintenance of the rural infrastructure. And the funds for irrigation and water are envisaged to cover only the current financing gap of the Armenia Water, Yerevan Water and Irrigation Companies.
- The implication of this domestic capital constraint is that there are real limits as to what can be raised to implement a program of rural infrastructure investment. Whilst, it is entirely possible that a significant share of the capital costs could be realized from donors, and to a lesser extent, the private sector, the matching contribution from the state, or additional subventions necessary to ensure 'universal coverage', together with the required additional recurrent expenditures, will effectively constrain the size any program.

### ***How can a program be financed?***

- The estimate of this study is that approximately US\$250-350 million is required to address the basic needs of rural population in respect of rural infrastructure, as discussed earlier, but that these costs are only intended to be indicative, and would need to be further defined at project identification/pre-feasibility stages.

- The following table provides an indication of the availability of funds and potential sources, for a program of rural infrastructure investment over the period of the next MTEF, together with the current estimate of the deficit in each of the years.

**Table 21 Required allocations and sources to meet needs of rural infrastructure sectors (US\$ Mill)**

	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
World Bank	25.0	25.0	25.0	25.0
KfW	10.0	10.0	10.0	10.0
IFAD	?	?	?	?
Mill Challenge	?	?	?	?
<b>Required Total</b>	<b>62.5</b>	<b>62.5</b>	<b>62.5</b>	<b>62.5</b>
<b>Surplus/(Deficit)</b>	<b>(27.5)</b>	<b>(27.5)</b>	<b>(27.5)</b>	<b>(27.5)</b>

Source: Study Estimate

- Given the current level of information, the estimate of this study is that there is an annual deficit in funding of US\$ 27.5 million per year, with funding from IFAD and the Millennium Challenge Funding to be confirmed. However, these figures do not include the corresponding increase in recurrent expenditure that would need to be provided to the communities to ensure the sustainability of the investments.

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## **ANNEX A – THE METHODOLOGY OF THE STUDY**

The study aimed to answer the following research questions: (a) what are rural communities' priorities with infrastructure improvement investment? (b) what are determinants of sustainability of infrastructure rehabilitation? what institutional arrangement will make basic infrastructure investments sustainable? what can the Government do to help communities to enhance their capacity to make the potential investments sustainable? (c) how do the community and local authorities evaluate the quality of infrastructure services and the condition of physical infrastructure? In addition to the above, the Yerevan-based team collected objective quantitative settlement-level data on access to infrastructure services, quality of infrastructure services and condition of physical infrastructure from statistical sources.

To achieve the objectives, a decision matrix methodology was used. This methodology allows simultaneous evaluation of multiple heterogeneous characteristics of an object with the purpose to come up with one resulting characteristic helping make a decision. In our study, the matrix will help make recommendations on rural settlements' infrastructure investment strategy based on communities objective and subjective needs, institutional capacity and household ability and propensity to pay for service. The matrix includes the following decision criteria: community preference, cost efficiency, potential for growth and nature of good. The criteria will be combined using a simple additive function.

The quantitative data for the matrix was compiled using statistical database and short interviews in the communities sampled for the study (see the questionnaire in attachment 1). The qualitative data for the matrix was collected using the following methods: key informant interviews (KII), focus group discussions (FGs) and community meetings (CMs). The instruments are also attached. The study consisted of two parts: assessment of community priorities with infrastructure rehabilitation combined with a quick assessment of the local institutional capacity (determinants of infrastructure sustainability) was done in 100 communities, while more in-depth institutional assessment was done in additional 30 communities.

### **Sampling rural settlements for the study.**

A sample of 100 communities was selected for the assessment of priorities using stratification based on multiple criteria: (a) territorial-administrative division (marz); (b) distance from the highway; (c) community altitude above the sea; (d) community size (number of households); (e) state of the infrastructure in the community; (f) type of infrastructure ownership. The 30 communities for institutional assessment were selected on the basis of three criteria: (a) territorial-administrative division (marz); (b) community size (number of households); (c) infrastructure quality.

### **Designing and piloting the instruments.**

The instruments were drafted, piloted and then used for the survey. The following questions were to be answered during the pilots: (a) do we need to collect data from the leaders only (through KIIs) or from the population as well? (b) do we need to conduct FGs or interviews with the population? (c) if we need FGs, how many of them and is constructing them according to gender and poverty consistent with the methodology? (d) do we use open or closed voting at the CMs? (e) do we explain the cost of infrastructure investment to the CM using required initial investment amount (including 10% from the community) or potential monthly household payments based on cost-recovery tariffs and normative minimum need consumption? (f) what should be the number and composition of the meeting participants? (g) is the phrasing of the questionnaires need to be modified to make them more understandable from both substance and language point of view and with the objective to collect all needed data.

After the pilots were conducted and the outcomes discussed, the following decisions were made: (a) data need to be collected from both the leaders /elite and the population; (b) FGs are more appropriate for gathering information from the population considering both the objectives of the study and the budget; (c) FGs with men and women separately are essential in Armenia (see next paragraph for the other countries in the study), three FGs – with men, women and the poor – would be ideal; (d) to explain the cost of infrastructure improvement to the community, monthly payments based on cost-recovery tariffs and normative minimum need consumption are more appropriate than initial investment amount.

While justification and details of the above described conclusions of the pilots can be found in the attachment 2, one important detail deserves to be mentioned here. Criteria for FG construction can differ in different countries. Keeping the same criteria (e.g., selecting FGs on the basis of gender and not age, for example) will not be a condition of cross-country comparability of outcomes. We use gender-based FGs in Armenia because we know from previous research that men and women in Armenia often have different views and that women tend to keep silence when men are present. We want to have a complete picture of views of representatives of the social groups in the community and also want to find out if there is any conflict of views. We are not planning to analyze views of men in the country or views of women in the country. Therefore, it would make sense to select FGs in each country based on the known differences between particular groups: if we assume that there will be a difference in views based on age and not gender, we would construct FGs based on age; if we know that there is no difference based on gender, we don't need to do FGs based on this criteria.

The instruments were adjusted according to the outcomes of the pilots (see the questionnaires 3-5 provided in the following Annex).

## ANNEX B - THE OUTCOMES OF THE PILOT INTERVIEWS

### 1. Background

*The main objectives of the study:*

1. What are the rural communities' priorities with infrastructure investment?
2. What are determinants of sustainability of infrastructure rehabilitation? What institutional arrangements will make basic infrastructure investment sustainable? What can the Government do to make the potential investment sustainable?
3. In addition, we need to get more information on the quality of infrastructure services.

*Research methods:*

For 30 communities (institutional assessment):

- Key Informant Interviews (KIIss): 3-5 with mayor/deputy, informal leader, intelligentsia)
- Focus Groups (FGs): 3 (households (HH) are randomly selected from the community list, FGs with: men, women, the poor)

For 100 communities (priority assessment and partial institutional assessment):

- Community meting: 1 (HHs are randomly selected from the community list, one HH member is selected with the idea to have equal representation of gender and age (18-39, 40-59, 60 and above) groups are chosen from each HH, no one representing authorities is present).
- KIIss: 1-2 with mayor/deputy and the head of the Council of Elderly)

### 2. Answers to pilot questions

**Institutional Assessment:**

- *Do we need to collect data from the leaders only or from the population as well?*

Data from the leaders does not give enough information on community integrity, ability to make decisions jointly, desire to invest financially and time-wise in joint projects and functioning of such institutions as power and authority (formal and informal), collective and individual responsibility, social protection and other institutions important for sustainability of community-level projects. Data from the population helps understand how stable these institutions are and evaluate their capacity to support community projects, in particular in infrastructure.

**Recommendation:** we need to collect data from both the leaders /elite and the population.

- *Choice between FGs and interviews with the population.*

It would be too time consuming and expensive to conduct interviews with a sufficient number of individuals to be able to conclude that we understand perceptions and verbal behavior of the population. Also, the pilots show that during individual interviews the community problems/characteristics are discussed less, instead the household' issues are at the center of the conversation. As opposed to the interviews, in FGs, we can have more people and the discussion naturally focuses on the community. Also, the FG method correspond to the objective of the study: the participants discuss **together** whether they would be able to act **jointly** in a community project.

**Recommendation:** FGs are more appropriate for gathering information from the population considering both the objectives of the study and the budget.

- *If we need FGs, how many of them and how do we construct them: men, women, the poor?*

The pilots tested all three groups to see whether we can get more information from having homogenous (according to gender and poverty) or mixed groups. Men and women appear to have different roles in the everyday life of the family and of the community and hence different infrastructure service preferences as well as different ways of influencing decision making in the family and in the community. Women are not very vocal, but they do have silent influence and thus disregarding their opinion might lead to a wrong assessment of the community's institutional integrity. Also, as known from the previous local development work in the country, women tend to be much less vocal in the presence of the men, so if their opinion and perceptions are to be known, thy need to be interviewed separately.

FGs with the poor give information on exclusion and hence on community integrity. Also, the poor are more limited in resources than the others: poor HH are usually incomplete families or families with disabled heads or with a high proportion of non-working age members; they have low capacity to substitute lacking services or financial resources with labor (e.g., cutting wood to heat the house is difficult for a female head of HH) and to provide financial and labor resources to community projects. Therefore, their role in potential community-level projects as well as capacity to pay for newly established services is limited and the risk of resulting social tension in the community is high. Therefore, it is important to check how the poor feel in the community and how high this risk is.

**Recommendation:** FGs with men and women separately are essential. Three FGs – with men, women and the poor – would be ideal.

It is important to note that the above decision was made for Armenia only. Criteria for FG construction can differ in different countries. Keeping the same criteria (e.g., selecting FGs on the basis of gender and not age, for example) will not be a condition of cross-country comparability of outcomes. We use gender-based FGs in Armenia because we know from previous research that men and women in Armenia often have different views and that women tend to keep silence when men are present. We want to have a complete picture of views of representatives of the social groups in the community and also want to find out if there is any

conflict of views. We are not planning to analyze views of men in the country or views of women in the country. Therefore, it would make sense to select FGs in each country based on the known differences between particular groups: if we assume that there will be a difference in views based on age and not gender, we would construct FGs based on age; if we know that there is no difference based on gender, we don't need to do FGs based on this criteria.

### **Community meetings:**

- *Open or closed voting.*

We had a long discussion of whether closed or open voting is better. Obviously, with open voting people influence each other. However, this is exactly how it will be in real life when decisions about infrastructure investment will be taken – people will form their opinions based on discussions with others. Open voting with flip charts helps start a discussion and also gives opportunity to discuss the outcomes of voting with the objective to understand reasons for choices made.

**Recommendation:** Open voting is more relevant considering objectives of the study.

- *Flip chart information for the meeting participants: initial investment amount (including 10% from the community) or monthly payments based on tariffs and normative minimum need consumption.*

Two methods were tested during the pilot community meetings: (i) disclosing investments costs for different infrastructure services and the related community co-financing amounts (based on 10% of investment costs). These costs were computed based on the average unit cost estimates for different types of infrastructure mainly provided by ASIF (e.g. cost/km for the rehabilitation of water/irrigation/sewerage pipes, etc) and the community-specific characteristics (e.g. the length of community roads, water/irrigation pipeline, etc); (ii) disclosing the bill that a household in the community will have to pay for each of the infrastructure services per month. These bills were computed based on the cost-recovery tariffs and average consumption levels.

Both of the pilot community meetings were conducted exactly the same way with the only difference being the information disclosed to the community. Both community meetings were started by asking people to describe different infrastructure services in their communities (which ones they are satisfied with, which ones the community is deprived of or is dissatisfied with, etc). In addition the people were asked to discuss what the access/improvement of each infrastructure service would bring to the community. Finally, people were asked to tell which infrastructure services they consider as top priority. Only after this discussion was the information (investments costs/co-financing or the bill) disclosed to the participants on a flip chart and people were asked based on the information to prioritize different infrastructure services by voting. It was quite apparent that the participants' priorities were little (if at all) changed after the information on the investments costs and community co-financing was disclosed. This might be due to the fact that the community members have hardly ever born the co-financing burden. In both pilot communities there had been World Bank investments and the co-financing had been mainly paid through in-kind contribution (mainly old pipes) and some contribution from the community

budget. Therefore the community people do not care much about the costs their community will have to bear. The results were quite different though when the bills for infrastructure services were disclosed. If in the case of investment costs none of the participants bothered to inquire how the costs and co-financing were computed in the case of bills the participants were asking to clarify the underlying assumptions (for example in the case of the irrigation bill what is the assumption re the number of times they will irrigate their land per month, or how many hours of call to Yerevan is the telephone bill implying, etc). In addition, during the voting a number of people changed their priority since on the basis of the information disclosed to them they came to realize that whatever they had listed as their top priority in the beginning of the meeting is not affordable to them.

**Recommendation:** to use the second method (bills computed based on cost-recovery tariffs) for identifying community priorities, since it allows to identify "economically justified" community priorities. In addition to disclosing the information on bills, during the community meeting the participants can be informed that they will have to do an in-kind contribution for the initial investment costs.

- ***Number and composition of the meeting participants***

The number of people at the meeting should be 30-60 depending on the size of the community. As for the composition of the meeting, we want to achieve equal gender and age representation. However, it turned out that women under 35-40 are very difficult to convince to come to the meeting as their relatives prefer them to stay home. Women in general are less likely than men to come to the meetings. Therefore, it would be reasonable to aim at achieving equal gender participation and pay less attention to the age of women while still trying to invite more young women. Men who are eager to attend meetings are usually middle-aged / older, so it would also make sense to invite more younger men knowing that the refusal rate in this group is higher.

**Recommendation:** to have 30-60 people in a meeting depending on the size of the community, achieve equal gender and age representation keeping in mind that the most difficult in Armenia is gender representation. It might be different in other countries.

## **ANNEX C – THE GUIDELINES TO INTERVIEWERS AND QUESTIONNAIRES USED IN THE STUDY**

### **The Quality of Infrastructure Services Questionnaire**

#### **Drinking Water**

1. Are you satisfied with the quality of drinking water?
2. Hours of water supply
3. If no water taps in the houses what is the average time/cost each day for water collection?
4. Is the water clean (treated)?

#### **Irrigation**

1. Are you satisfied with the quality of irrigation water?
2. Hours of water supply
3. If payments for irrigation are made on a timely manner are there interruptions in the water supply (i.e. water not being supplied when needed)?

#### **Electricity**

1. Are you satisfied with the quality of electricity supply?
2. Are there interruptions in the supply other than for the reason of nonpayment, if yes, how often (average hours of interruption per month)
3. Are there frequent fluctuations in the voltage?

#### **Gas Supply**

1. Are you satisfied with the quality of gas supply?
2. Are there interruptions in the supply other than for nonpayment, if yes, how often?
3. What type of fuel do you use for cooking?
4. What type of fuel do you use for heating?

#### **Transport**

1. Frequency of the transport services serving the community
2. Distance to the stop station of the nearest public transport
3. How much of the farm product was dumped, why? (bad roads, lack of public transport)

#### **Telecommunication**

1. If not a telephone subscriber time spent to making a phone call
2. Phone faults, i.e. how many times have to try to dial to the city

### ***The guidelines to organize community interview***

The community interviews were conducted in 100 randomly selected communities: One needs to select sufficient number of members to participate at the community interviews. For small communities the number of participants is approximately 30 and for large communities it is 50-60. In case of having more participants it will be difficult to conduct the interview. This is the objective that we advise not to aspire to increase the number of participants, but to select them with correct principles. It is very important that in the selected group we have representatives of various gender-age groups, as well as various social layers of society: i.e. sufficient number of women, men, young people, middle and elder age people, people living in welfare.

The selection of these people can be done based on the registration books. In the beginning the step of selection is determined (if it is possible to select 30 participants, we divide the number of households of the registration book by 30 and thus determine the step. For example in the registration book there are 600 households. The step will be 20, after which from the same registration book we select every 20<sup>th</sup> household. While inviting to the interview the representatives of those households we shall take into consideration the gender and age of the people, in order to ensure the representation of those groups. Concerning the representatives of vulnerable layers of the community, then their selection can be done in a targeted way by using the list of beneficiaries and making inquiries in the village).

Try not to allow the authorities of the village to be present at that meeting, as they might have a big influence on the population or can form an opinion.

### ***The group of surveyors***

The group of surveyors shall be composed of 2 people. One surveyor shall be able to have an active interview and guide. I.e. his main task shall be the conduct of the interview – to ask questions, listen to the answers and guiding of the conversation.

The second surveyor's main task shall be detailed (preferably word by word) note taking of the conversation that is taking place. He shall also support the first surveyor to maintain order during the conversation, prepare the flip charts for voting.

### ***The plan to conduct a community interview***

Prior to the interview make sure that the participants are informed and know about the place and time of the meeting. Prepare the meeting place in advance and make sure that there is sufficient number of chairs and in general the room is warm and comfortable for the interview.

Begin the interview with the words of welcome, i.e. thank the villagers for participation. To transfer from formal to informal relationships present yourself and possibly ask them to present themselves (if the group is not too big).

Present the objective of your meeting and how are you going to work and for how long, i.e. present also the “rules” of the meeting. The rules are:

- ◆ You ask the question, the participants speak one by one;

- ◆ They don't interrupt each other, but listen till the end and only after express their opinion;
- ◆ They don't criticize each other;
- ◆ Everyone speaks, no one is dominant in the group;
- ◆ There are no correct or wrong answers, the opinion of everyone is valuable for us.

After all this the actual interview begins, which can be conducted around the following general issues:

- ◆ What are the issues of your community (in regard of infrastructure);
- ◆ Which infrastructure/s are in good condition and which ones need to be rehabilitated urgently;
- ◆ When were they rehabilitated for the last time, by whom, what was the community's participation to it;
- ◆ Are there organizations, groups in the community, which are directly dealing with the rehabilitation and maintenance issues? What is the role of local authorities? How does community solve those problems;
- ◆ What is the impact of the infrastructure rehabilitation on the community development or the life of community;
- ◆ Now let us make our conversation more objective-orientated and try to identify the rehabilitation of which infrastructure is priority for you and why? To answer this question we will organize a small exercise. Before presenting the essence of the exercise let us speak about that based on what conditions will you make the final decision?

You don't have material investments in the phase of infrastructures' rehabilitation, however, after the rehabilitation you have to pay monthly or annual presumptive fee. The amounts for each infrastructure are attached to the board. Thus, while making your choice you should remember that for the services provided you have to pay X amount.

Now all the participants are distributed 7 adhesive papers (different colors for men and women). Thus, you have 7 votes and there are 3 infrastructures in your communities that need rehabilitation. Please think for 1 minute without discussing with each other how to distribute those 7 votes for 3 infrastructures. You may cast more votes for the infrastructure, which is a priority for you (by recalling in mind all the above-mentioned conditions) and less votes for the infrastructure, which is not that priority for you.

If you have already decided, then please come to the board one by one and under the relevant infrastructure attach your pre-determined votes/papers.

Upon completing have a discussion about the reasons of selection. Why did you cast more votes for X infrastructure and not for Y? Which are the main factors that were guiding the people and why?

And before that the second surveyor can very rapidly count those papers and on the boards present how the votes of the participants have been distributed.

In the end thank for the participation, cautiously collect the boards, so that the papers do not detach from them.

## **The Key Informant Interview Guide with Community Leaders**

### **(Local Mayors, Council of Elders, School Director)**

#### *Instructions for the researchers*

This guide is for interviewing community leaders (local mayor, or another representative of the local government) and representatives of intelligentsia, businessmen and others.

If the mayor is not available, identify a representative of the local government who is well informed of village affairs.

In general, there should be 4-5 interviews conducted in one community. The main respondents are the community leaders, the council, the rural intelligentsia (school principals, non formal leaders, businessmen).

When interviewing the intelligentsia representatives and the businessmen, some of the questions in the questionnaire may be left out, since the latter are less informed about certain subjects than the formal leaders of the community. These questions are particularly relating to the community budget, the specific investments made by the community

The transcript of the interview should also include the *data of the respondents*.

#### **I. Economical block**

##### **1. Infrastructure accessibility and quality: Preferences in repairing the infrastructures**

- What types of infrastructure services are there in your community? What is the physical status of the infrastructures and the quality of the services delivered (please, ask about the access roads that connect the community to the central main road, about the irrigation and potable water, wastewater, gas, electricity and telephone communications. Clarify what type of fuel they use for heating, and what is the source of water (home water taps, underground well in the yard, etc). Ask about the irrigation water system and its condition).
- What is the type of ownership of the infrastructures in your community: community-owned, central government owned, private, mixed ownership (please, ask questions about the access road that connects the community with the main road, *the irrigation and the drinking water and sewage. /Please pay attention to the fact that, the gas, electricity and the telecommunication are private/*).
- Was there a change in the type of ownership? If so, what was it before? When and why the change in ownership type occurred? Has that affected the improvement of the physical conditions of the infrastructure and the service quality?
- How, do you think, the type of ownership is related to proper maintenance and sustainability of investment or does it depend on other factors?? *[The forms of the*

*ownership are community-owned, central government owned, private and mixed], how would you define a good quality of service and what are the features that determine it?*

- In your opinion, which of the community infrastructures needs urgent repairs. *[Interviewer – to ask about both the type of the infrastructure and the level of the rehabilitation. That is, what are the rehabilitation needs, i.e. installation or replacement of the pipes, gas system introduction and etc.]*? And now, let's assume that the maintenance of that rehabilitated infrastructure is mostly determined by the financial contribution of the community, and more specifically by the collection of the fees/ tariffs to be paid by the community members on a monthly basis. In that case, the rehabilitation of which infrastructures would you consider a priority, given the fact that you have to pay a fee every month.
- And what do you think, what would the rehabilitation of that infrastructure change in your community? How would it be affecting the life of the community, and what development perspectives would it open for the community?

## **2. Infrastructure maintenance financing**

- Do you know when the latest effort to rehabilitate [water supply] in your community was made? Tell us about it – how it was financed, organized, what the problems were. Was it maintained well? How was the maintenance organized? What do you think the best solution for maintenance in this case would be?
- In general, how should the rehabilitation and maintenance costs be funded? How this should be shared between community budget and households? How would you describe the current level of solvency of the households against the services delivered? What can be done to increase their level of solvency, for the population to have adequate motivation to fully pay the fees?
- What possibilities exist to access borrowing / credit? What are the sources, that are accessible for both the community and the households?
- How do the people make savings in the community? What kind of savings these usually are? Whether they would be ready, through their savings or the sale of property to pay for the services that meet the priority needs of their family *[Example: round day water supply, irrigation and etc.]*.
- Whether the community members would be willing to participate in the activities of such an organization, which may serve as an intermediary between the community as a consumer and the service provider. In which cases the people would like to participate and in which they would not?

### **3. Type of economic activity in the community, distribution of jobs and income, demographics**

- What is the main economic activity in the community? Is it well developed? What is needed to improve the situation: change the area of activity, make the market accessible, improve its efficiency, attract investment, and attract businesses?
- What is your vision of economic development of the community? If there are such perspectives, which are their preconditions? What would the main direction of the economic development/activity be? Agriculture? Small and medium businesses? What about tourism, is it an option in your community?
- What is the main area of engagement by the members of community? What type of jobs do people in the community have? Are there private jobs, private businessman or small/medium businessmen? Are there jobs located nearby the community (industry, constructions and etc)? If yes, then how are people benefiting from them? Which part of your community members is engaged in the temporary or seasonal jobs outside the community? Where? (other communities, large cities, capital, other countries , which?). What jobs are they mostly performing? Are there cases, when the head of the family due to having a job in another place, lives outside the community, while the family lives in the community?
- Have you experienced a problem with out-migration? Were there families that have left lately, during the recent two or five years? Which families are they? In your opinion, is there a tendency of more people leaving, or fewer? How has this affected the social-demographic structure (sex and age composition) of the community?
- Are there families in the community, which are poorer than others? What is the reason of their poverty? How are they addressing this problem? To what extent are the infrastructure services accessible to them? Do they have jobs? How many poor families are there in the community? What families are they: single families, with many children, consisting of only elderly.

### **4. Budget management**

- Describe budget management system. Is it efficient? Any problems with it? Were budget management improvements implemented recently (within the last five, two years)? Any improvements in the past? Plans for the future?
- Is there a line in the budget for infrastructure investment/maintenance? Is there a non-budget fund for this purpose?
- Is tax collection rate high enough? Any reform interventions in the past to improve tax collection? Reform plans?
- Do the members of your community know how the budget is formulated? What are the component budget items, and how are they spent?

## ***II. Community development activities***

### **1. Community development projects**

- Whether you have received during the recent five years /two/ any micro-financing? What kind of projects they were and in which areas? How much was the total amount? Who were your beneficiaries? How many families have benefited from those projects? What do you think about the efficiency of the micro financing for your community?
- Whether during the recent five/two/ years you have had in your community projects implemented by any donor organization? What types of projects they were and in which areas? How much was the total amount of assistance? Whether you think that these projects were useful for your community? What were the main sources for the community investment [the user fees, local government budget, other donors, *community members*]. Whether there are certain resident groups, who have benefited more or have not benefited at all /have benefited the least/ as a result of these projects.
- If there were any infrastructure rehabilitation projects in your community, then to what extent has the status of the respective infrastructure changed /the quality as a result of the project implementation? What kind of quality rehabilitation/repair was made?
- To what extent was/is the community benefiting from that infrastructure before the rehabilitation and afterwards? Whether there are residents in the community, who do not have access to the services of the infrastructures? [*Example, are not able to get access to the water supply opportunities*]. *What is the main reason that not all the residents get access to those services?*
- How were/are you handling the funding for the maintenance of that infrastructure before the rehabilitation and after the rehabilitation? What is the level of participation of the community members?

### **2. Operation and Maintenance**

- How would you describe the current level of maintenance of the renovated (if there is so) infrastructure?
- How is the level of maintenance of the infrastructure now compared to before the donor /s project?
- Who is responsible for maintenance (e.g., facility staff, community members, special maintenance committee, etc.)?
- Is there an annual or monthly O&M plan/schedule? What does it outline? Who is responsible for overseeing it?

- Who is providing funding for cleaning, repairs and general maintenance (e.g., user fees/parental contributions? Local government maintenance fund/budget? Central government?)
- Do people pay user charges for using the facility? How easy or difficult is it for you to collect user charges?
- How does the rate of collection of user charges compare to the situation before the project?
- Do people in the community provide unpaid labor for the facility maintenance? What kind?
- Did people in the community provide unpaid labor for the facility maintenance before? What kind?

### **3. Community formal/non-formal organizations**

- What are the groups, organisations or associations in the village? *For example, WUA, NGOs, women's groups, co-operatives, etc.*
- Who initiated/established each of them? What types of activity do they run in the community? In your opinion, what particular importance plays the [organization] for your community?
- As a leader of a community organization, how would you characterize your relationship with other community organizations ? When do you feel the need to collaborate with them?
- What do you think about the input of Council of Elderly in this community's life and particularly in the process of the community project implementation?

## **III. Social relationships**

### **1. Solidarity and co-operation**

- How would you describe the willingness of your community members in helping each other? Whether the members of the community have a willingness to help one another in the rehabilitation of some infrastructure, providing food and clothing to any community member in crisis, in making financial donations to such persons in need).
- Who would usually help each other (e.g., relatives and neighbours only, villagers who know each other but who are neither relatives nor neighbours, etc.)?

- How many people in your community live on the remittances /from migrants, relatives/friends or donations from Diaspora/. Please, assess the importance of such assistant for the family and the community in general.
- If there were a problem that affected the entire community, for instance a crop disease, who do you think would work together to deal with the situation? *Clarify, for example whether each person/household would deal with the problem individually, or the entire community would co-operate? What traditions are there in your community to solving problems?*

## **2. Trust and Cohesion**

- How will you describe the relationships between community members? Would you say that people trust each other in every matter, or they mainly rely on their own? In which cases people trust each other and in which they don't?
- How do people in this community feel about lending and borrowing? How this picture has been changed over the last years?
- Are there groups in your community that have different cultural/religious/social background, groups that are excluded from community life or decision making process? Can you describe them?
- Are there any disagreements in the community over communal resources? Which resources? *Probe, whether conflicts over communal resources such as water, land, etc. are common among community members and how are they addressed.*
- How have donors projects changed the way people in the community relate to each other and the community as a whole.
- In your opinion, how does the degree to which a community is united/cohesive influence its ability to solve local problems? What examples would you bring?

## **3. Participation in community development processes**

- When there is a an urgent problem requiring solution in your community, which groups are usually participating in the decision making? Are there in your community such groups of people, who have a strong voice in the decision making process? What types of groups are they; i.e. family, group of families, non-official groups/organizations or the community itself [*Interviewer – clarify, what institutional or non-intuitional groups are there in the community for the solution of the community problems?*]:
- Can you remember cases, when the community wanted to initiate something and the authorities didn't approve it? Please, tell us about it.
- During last few years have the community members got together to address a common issue (clean up communal space; lay a water pipe; repair canal; etc.)? How often? Please,

give us an example. How many members in the community took part in each of these actions? Who organized and managed the initiatives?

- In general, how are the people in your community becoming aware of the implemented projects [written information, meetings and etc.].
- How would you describe the people's willingness to contribute unpaid labour towards common development goals?
- How would you describe people's willingness in this village to contribute money or materials toward common development goals before?
- Are there people in your community that are not participated in any events or meeting, meaning that they are always isolated? What is the reason of their alienation?
- Can you distinguish in your community such groups of people, whose behavior is unacceptable for most of the members of the community? What impact do these people have on the general community environment. [*Interviewer- probe the availability of people with the community deviating behaviors. Alcoholism/ drug use/ burglary?]*]:

## The Focus Group Discussion Guide with Community Members

### *General information on community and focus group participants*

- The name/location/size of community
- Type of focus group and its composition
- Participants selection procedure

**(Researchers** – While selecting participants, be sure that they represent different social strata, gender and age group. For this purpose use the community lists of households and randomly select 12-14 households. While inviting people ask to present different age group.

*Start the discussion welcoming people and explaining the purpose of the research.*

## I. Economic perspectives of the community development

### 1. Infrastructure access and quality

- ◆ What is the most important task for your community, for which you require an emergency intervention.
- ◆ What type of infrastructures are there available or what kind of services are delivered in your community? How would you describe the quality for each of them [*Interviewer – please ask, about the availability of the main community access roads to the main road, irrigation and potable water, sewage, gas, electricity, telephone communications and their quality. Please, also ask, what kind of fuel is used in the community, what is the water source for the community*].
- ◆ Do you know what is the ownership status of the community access road to the main road, the drinking and irrigation water system, sewage? Are they community owned, central government owned, private or mixed? [*Interviewer - remember, that the gas, electricity, and telephone communication are private*].
- ◆ Do you see any difference in having the infrastructure under the private/ state/ community ownership? In your opinion, is the ownership status connected with the adequate operation of the infrastructure and the sustainability of investments, or it is determined by other factors?
- ◆ In your opinion, which of your community infrastructures needs an urgent repair. [*Interviewer – to ask about the type of infrastructures and about the degree of repair of that. What kind of repair is needed: gas pipe installation or replacement, gas system introduction and etc.*]. And, now assume, that the maintenance of such repaired infrastructure is ultimately determined by the community financial investments, and more specifically the collection of the fees/tariffs by the community members on a

monthly basis. In this case, which infrastructure repair activity would be considered a priority, given the fact, that you have to pay a fee every month?

- ◆ What do you think, what would the repair of that infrastructure change in your community? How would it influence the community life? What would the benefit of that be for your family?

## **2. Infrastructure maintenance**

- ◆ Would community members participate in a group investing collectively in infrastructure maintenance [concrete example]? If not, how else would they be able to take care of the infrastructure if investment in its rehabilitation is made (example; a road is repaired...)?
- ◆ Ho do the people make savings in your community? Usually how are these savings represented? Are you ready, through your savings or sale of your property pay for your priority needs [*e.g. a 24 hour water supply, irrigation and etc.*]?
- ◆ Would you like to participate in an activity of such an organisation, which may serve an intermediary between you, as a consumer, and the service provider. In which cases would you do and which, you would not?

## **3. Type of economic activity in the community**

- ◆ What is the main source of survival in your community? In addition to that, what other efforts are made by our family to improve the life?
- ◆ What jobs are there in your community? Are there small and medium private enterprises or private businessmen/families?
- ◆ What other employment possibilities outside the community do your community members have in the neighboring village or community? Are there cases, when the head of the family works and lives outside the community, and the family continues to live in the community? Whether he helps his family members? Are there cases, when the multigenerational family the younger work and live outside the community, while the older members of the family live in the community? Whether they help their older members of the family?
- ◆ What part of the your community members is absent from the village in various seasons of the year, for the purpose of leaving for work outside the community? Where are they leaving for (other village communities, neighboring cities, larger cities, the capital, other countries (specify)? What type of work are they mostly involved in?
- ◆ Have there been families in your community, which have left recently during the past two or five years? Which families are they? Whether you think the number of those leaving now is higher than lesser?

## II. Community Social profile

### **1. Cultural and social homogeneity**

- ◆ Where are members of your community from and when your community was established? Would you say, that all community members have the same traditions and in this way they are very united?
- ◆ Are there groups in your community that have different cultural/religious/social background, groups that are excluded from community life or decision making process? Can you describe them?
- ◆ If yes, how would you describe the relationships between such groups ? (Tense, friendly etc.)
- ◆ Do you have tradition in your community to celebrate together the national holidays or other? If yes, who usually initiates and who attends? Are there any group that do not attend? If yes, why so?
- ◆ How often do the people in your community have disputes about political issues? Are there groups in the community, which do not agree due to the political reasons? How does it affect the life of the community?

### **2. Trust among community members**

- ◆ How would you describe the relationships between the community members? In which cases do people trust each other, and in which cases they do not? In your view, how have the relations changed in the community during the last 5-6 years?
- ◆ How do people in this community feel about lending and borrowing? Any changes in those relations during the recent years?
- ◆ Speaking in terms of trust in different groups, would you say that women, men, young, poor people have different level of trust. If so, what is the reason?
- ◆ Do people in this community help their co-villagers when they are in a difficult situation? In which cases people would not help? Why?
- ◆ Can you describe the people who would be willing to help the community members?
- ◆ How often do you have conflicts or disputes in the community? Who are the sides of that situation? What is common way of solving such situation?

### **3. Community Coherence, integrity**

- ◆ If there were a problem that affected the entire community, for instance infrastructure problem [e.g. water, electricity problem], who do you think would work together to deal

- with the situation? Probe for example whether each person/household would deal with the problem individually, or the entire community would co-operate.
- ◆ What kind of traditions has the community in solving its problems? (Clean up communal space; lay a water pipe; repair canal; etc.)? Did the community members get together to address a common issue, or local authorities are dealing with this Please, give us example.
  - ◆ Can you tell us about cases, when community members provide cash or in-kind contribution for solving a common problem? What problem and who are these people. Is this common in your community?
  - ◆ Who is the most active in initiating and organizing the collective action/ projects in your community?
  - ◆ What is the role of the local mayor in the success of community projects? Explain.

#### **4. Social inclusion**

- ◆ Are there people in your community that are not participating in any events or meetings, meaning that they are always isolated? What is the reason of their alienation? What is the size of that group? What families are they: single families, families with many children, families consisting of elderly? To what extent the families can have an access to those infrastructures /services?
- ◆ How the community members treat such people? Who usually help them??
- ◆ Can you specify such groups of people in your community, whose behaviours are unacceptable for most of the community members? [Interviewer – probe the availability of people that have distortions of behaviour: alcoholism/drags/ burglary]:

#### **6. Decision making and accountability**

- ◆ When there is an urgent solution requiring problem occurred in your community, usually which groups participate in the decision making? Are there groups of people in your community , that have a powerful voice in making decisions? Which groups are they: family, group of families, certain official groups/organization or the community himself [interviewer – probe, what institutional or non-institutional groups are there in the community for the solution of the community problems?]:
- ◆ If we described your community in terms of the relationships available between the various families, then can we say that all the families in your community have the same reputation, respect and role, or some of them are more powerful and more respected and have more powerful voice in the decision making process? Please specify.

- ◆ **How are the decisions made in your community about the implementation of the community works? Is this a process, is the decision made by all the community, or there are certain groups, which make the decisions themselves? What is the role of the authorities?**
- ◆ Can you remember such cases, when the whole community has made a decision? What kind of decision was that? Please, tell us about it.
- ◆ Whether there are people in your community/or groups, which have “more right” in expressing their opinion? Are there people, who are in general deprived of any “rights”? Can you describe those people?
- ◆ Can you remember such cases, when the community wanted to initiate some work, and the authorities did not agree? Please, specify that.
- ◆ Do you know what community development projects are carried out in your community?
- ◆ How do your community members know about the implemented projects [written information, meetings and etc.]:
- ◆ Do you know how is the community budget formulated? How is it prepared, distributed between various articles and how is it spent?

### **3. Efficient Leadership**

- ◆ How well is organized the community life? If there is an infrastructure problem that needs to be solved, is it clear what the procedures are? How fast is it solved? Are people satisfied with it?
- ◆ How do the community solve problems in general? What does it take to get things done (i.e., solve local problems)?
- ◆ If there are problems in the community, or if people are dissatisfied with the services provided, how do they communicate this to their leaders? What are the results?
- ◆ How the life is organizing and regulating in your community? Can you tell us some rules that are obligatory for community members? How these rules are making and disseminating?
- ◆ Are there people who do not obey these rules? How the community and authorities treat such people?
- ◆ Are there meetings of the community from time to time? How many meetings has there been this year? Do people in the village/community take much interest in such meetings?

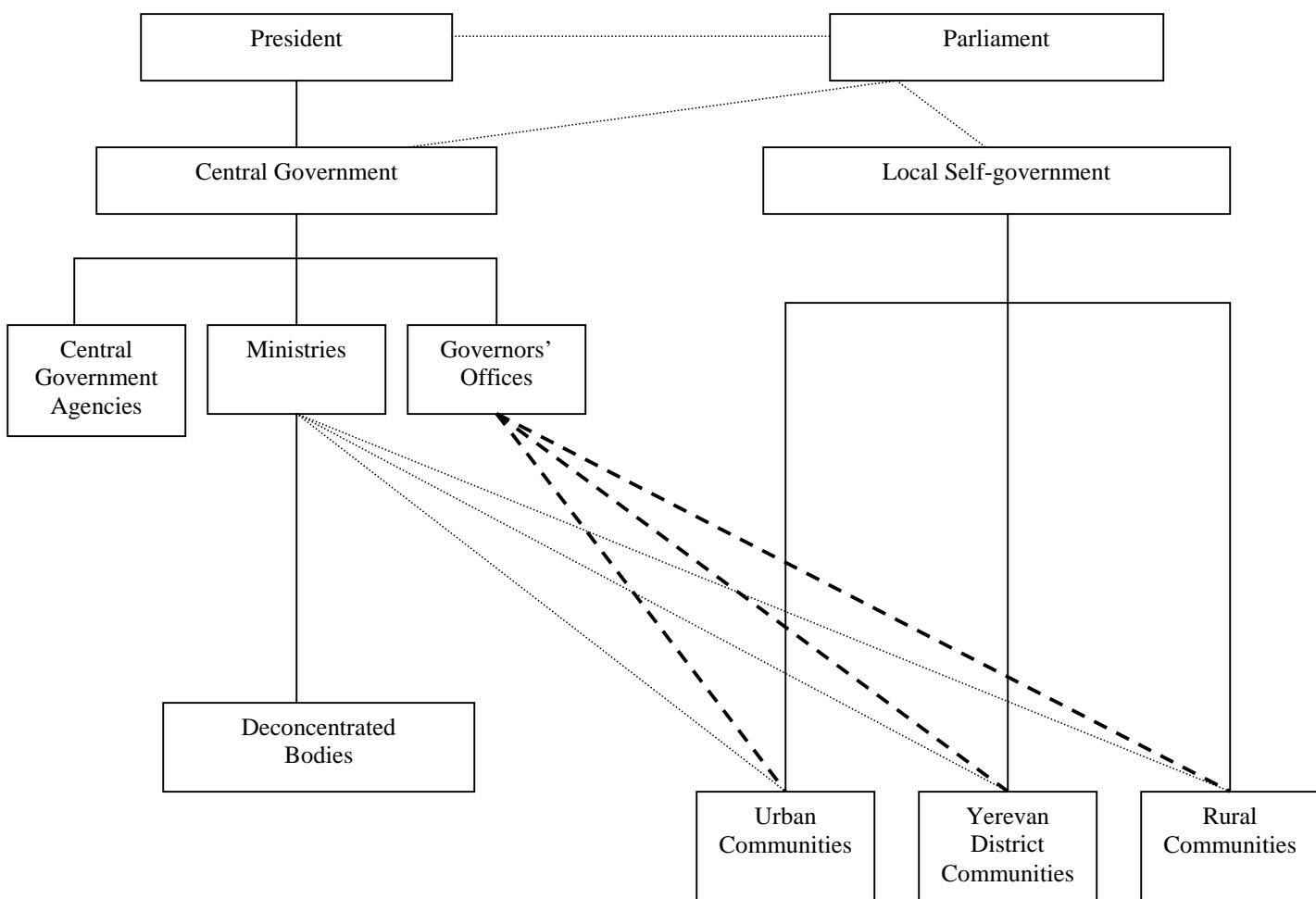
- ◆ In your opinion, what are the features of a “good” leader?
- ◆ Are there any other organizations/groups/associations in this community? [NGOs, or associations, WUAs and etc] Please describe them. Who are their members/leaders? How/when were they initiated? How useful are they for solving the problems of the community?

## ANNEX D – THE INSTITUTIONAL CONTEXT OF SERVICE DELIVERY

### The Institutional Framework for Service Delivery

- Armenia is a unitary and indivisible state, which is reflected in the administrative structure. The Armenian government has a two-tier structure, with most administrative powers exercised by the central government. Marzer, the regional units, are subdivisions of the state administration rather than a separate tier of the public administration system, as they lack elected officials or bodies and budgets.
- In Armenia, local self-government bodies are perceived as separate tier of government, created by the state and performing state responsibilities and duties. Local self-government bodies make policy and implement their powers independent from the Central Government. The following figure illustrates the structure of the relationships.

**Table 22 Structure of Central and Local Government in Armenia**





subordination

supervision

Ministry of Finance is the principal source of funding for local self-governments

- Armenia is divided into ten regions (*marzer*) and the capital city of Yerevan, which is accorded regional status. Marzer are further divided into rural and urban communities (*hamainkner*), whilst Yerevan is sub-divided into districts. Marzer vary greatly in terms of their territory, population, number of communities and level of economic development. The largest region is Gegharkunik Marz, whose 5,348 square kilometers also includes Lake Sevan (1,256 square kilometers). Shirak Marz has the most communities, with a total of 119. Table 23 presents selected characteristics of the Marz.

**Table 23 Selected Characteristics of Armenian Marzer**

Name of Region (marzer)	Territor y (sq. km)	Regional Center	Distance from Yerevan (km)	# of Communities (Districts in Yerevan)		Population Total/urban (in thousands)		
				Rural	Urban	1996	1999	2002
Yerevan	227	Yerevan	-		12	1249,4	1248,7	1103,5
Aragatsotn	2753	Ashtarak	20	111	3	162,5	166,7	138,3
						45,7	46,9	32,9
Ararat	2086	Artashat	29	93	4	305,0	310,0	272,0
						96,5	98,7	79,9
Armavir	1242	Armavir	48	94	3	315,5	321,1	276,2
						123,5	122,7	98,3
Gegharkunik	5348	Gavar	98	87	5	272,4	277,6	237,6
						101,1	102,0	78,9
Lory	3789	Vanadzor	120	105	8	392,4	394,1	286,4
						265,4	265,6	169,9
Kotayk	2089	Hrazdan	50	60	7	325,9	328,9	272,5
						201,0	201,3	154,0
Shirak	2681	Gumry	116	116	3	358,3	361,8	283,4
						242,5	243,6	174,3
Sunik	4506	Kapan	316	106	7	161,9	163,6	152,7
						114,4	115,1	104,1
Vayots Dzor	2308	Yeghegnadzor	119	41	3	68,3	69,1	56,0
						28,0	28,4	19,6
Tavush	2704	Igevan	137	58	4	154,8	156,6	134,4
						62,6	63,0	50,7
<b>Armenia</b>	<b>29743</b>	<b>Yerevan</b>		<b>871</b>	<b>59</b>	<b>3766,4</b>	<b>3798,2</b>	<b>3213,0</b>
						<b>2530,1</b>	<b>2536,0</b>	<b>2066,1</b>

Source: Community Finance Officers Association

- The Constitution of the Republic of Armenia, adopted by referendum on 5 July 1995, explicitly addresses the issue of regional and local self-government<sup>46</sup>, clarifying the responsibilities between the two parties. The relevant articles have become the legal foundation for administrative-territorial reforms, and together with subsequent legislation, formed the basis for the system of territorial administration and local self-government.
- Within this structure, the Marzer are governed through the system of state administration, and the GoA appoints and dismisses regional governors (*marzpetner*) to undertake the

<sup>46</sup> GoA, (1995) Chapter 8, articles 104–110.

defined duties, with the assistance of regional administrations (*marzpetaran*). These duties are primarily administrative, with no budgetary responsibilities, and include; the implementation of the GoA's regional policy; the coordination of the activities of regional agencies of state administration; the mediation of disputes between central and local governments; and the regulation of inter-community issues within their domain.

- Local self-government in Armenia is undertaken only at the community level. Each urban or rural community consists of one or, occasionally, more than one, settlements; there are 1000 settlements in Armenia, but only 930 communities. These consist of 47 urban communities, 871 rural communities and 12 district communities in Yerevan. The responsibilities of the local governments include local initiatives, funded by the local budget, and responsibilities delegated and funded by the state. The largest rural community has 9,696 inhabitants (Akhirian, in Shirak Marz), and the smallest only twenty-seven (Kashuni, in Sunik Marz), but the same structure is applied, irrespective of size, across the country.
- There are five potential sources of revenue for the community budget: centrally established taxes and duties; subsidies from the state budget; local duties and fees; land and property rent; and revenue from the sale of community property. The communities are heavily dependent on state budget transfers, which typically comprise over fifty percent of local budget revenues, up from, approximately, 20% in 1999. Of the two types of central government transfers, subventions, for specific projects, and subsidy, the latter, or what is known as the equalization subsidy, is by far the most important.
- The community budget is used, primarily, for current expenditures, and covers, mainly, administration, pre-school education, housing stock, and public utilities. In many rural communities, administration expenditures comprise the greatest part of budget expenditures, with capital expenditures forming a small part (2-3 per cent) of the total budget. The latter are generally paid from a reserve fund, designed to cover contingency appropriations not provided for in the community budget for the given year. The head of the local community, with the assistance of local administration staff, drafts the local budget on the basis of the annual objectives stated in the community's three-year development plan. The volume of the rural community budgets is low, although it has been increasing over the last years. In 2002, the total rural community revenues comprised US\$10 million, or approximately US\$0.01 million per community.
- The Law on Local Self-Governments<sup>47</sup> endows local governments with responsibility for the provision of the following public infrastructure services: water supply, sewerage, irrigation, gas and central heating systems, construction, maintenance and operation of roads, bridges and other engineering structures within their jurisdiction, operation of community public transport (only in medium and larger cities), construction and operation of irrigation systems. The main problem is that these varied responsibilities were disaggregated to the local communities, without ensuring suitable financial resources would be available to allow the latter to fulfill their mandates.

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<sup>47</sup> Government of Armenia (2003) *Poverty Reduction Strategy Paper*, approved by the Order of the Government N994-N dated 8 August.

- The low collection levels on the local taxes, together with delays in receipt of the central Government support, in either form, means that low revenues inhibit the ability of the local government to undertake their allotted responsibilities, as defined by the above law.
- In addition, many small rural communities are simply too small to be viable entities, and can barely pay salaries, let alone make the required recurrent allocations to ensure the adequate maintenance for key community assets. In many of these communities, there are very real limits to what can be generated through local taxes and fees, suggesting that consolidation of the administrative units is something that needs urgent policy consideration.

### ***What is the policy, regulatory and institutional environment?***

- The policy and regulatory framework for the infrastructure sectors is stipulated by the relevant sectoral laws, such as the Energy Law for electricity and gas supply, the Water Code for drinking water and irrigation, the Transport law, and the Telecommunication law, which define the key policy objectives, the roles and responsibilities for policy-making, regulation and operation of the different infrastructure services. Increasingly, the regulatory responsibilities under the sectoral laws are being separated from policy-making and transferred to the independent regulator, the Public Services Regulatory Commission (PSRC). The law on the PSRC defines the functions of the multi-sector regulator with respect to its regulatory responsibilities in energy, drinking water, irrigation and telecommunication sectors. In addition, the sub-legislation developed by the government on the basis of these laws defines safety, security, and technical norms and standards for the operators, while the PSRC resolutions define tariffs, license operators and set service quality standards.
- The Law on Local Self-Governments<sup>48</sup> endows local governments with the following responsibilities: water supply, sewerage, irrigation, gas and central heating systems, construction, maintenance and operation of roads, bridges and other engineering structures within their jurisdiction, operation of community public transport (only in medium and larger cities), construction and operation of irrigation systems. The following sections provide some further detail on the economic infrastructure of most interest to this study.

### **The provision of road infrastructure**

- The policy and regulatory functions in this sector are assumed by the Ministry of Transport and Communication, while the technical standards and norms (SNIP, GOST, etc) for this as well as other infrastructure sectors are defined by the Ministry of Urban Development. The currently effective norms and standards were mainly inherited from Soviet times and are therefore outdated and overly restrictive.
- As discussed earlier in the text there are three categories of roads based on their functional purpose: (i) interstate highways; (ii) republican roads; and (iii) local roads. The former two categories, interstate and republican roads, are under the ownership, administration

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<sup>48</sup> Government of Armenia (2003) *Poverty Reduction Strategy Paper*, approved by the Order of the Government N994-N dated 8 August.

and maintenance of Armenian Roads CJSC, the national road administration established under the Ministry of Transport and Communication. The latter category, local roads, are further divided by the type of their ownership to marz owned, and community owned roads, and the administration and maintenance of these roads is assigned to the respective administration.

- There are no toll roads in Armenia. The funding for periodic and routine maintenance of state and marz owned roads is allocated from the state budget. The maintenance costs of community owned roads should be covered from the community budgets, which is hampered by limited resources

### **The supply of water and sewerage**

- The management of the water resources of the country, as defined by the Water Code, is performed by the State Water Committee, the Water Resources Management Agency and the PSRC. The State Water Committee is responsible for the implementation of the state water program. The Water Resources Management Agency is in charge of water sector policy-making, preparation of the state water program and it also issues water permits. The PSRC assumes regulatory functions in the sector.
- The main water structures, main water canals, and the distribution network up to the community border are state owned, while the intra-community distribution network is under community ownership. The main canals and the distribution network are operated and maintained by the Yerevan Water Supply Company (YWSC) in Yerevan and some surrounding rural communities, and by the Armenia Water Supply Company (AWSC) in most other towns and 300 rural communities in Armenia. The remaining communities look after their own distribution networks. Recent institutional changes have seen some regional branches of the Armenian Water Supply Company become separate, autonomous utilities.
- The tariffs for the drinking water and sewerage as well as for other infrastructure services regulated by the PSRC are defined based on the “cost-plus” pricing approach. The recently revised tariffs for drinking water and sewerage services provide full-cost recovery. However the government continues subsidizing the water companies since the tariffs assume 100 percent collection from consumers while actual collection rates are lower. These subsidies will be gradually phased out as the payment is enforced through improved metering.

**Table 24 Drinking water and sewerage tariffs (US cent/cubic meter)**

	<b>Yerevan Water Company</b>	<b>Armenia Water Company</b>	<b>Nor Akunq</b>
Drinking water	14.6	16.4	21.9
Sewerage	1.8	1.8	5.4

Source: PSRC

### The supply of irrigation

- As with drinking water, the policy making and regulatory functions in this sector are also defined in the Water Code and are shared between the State Water Committee, the Water Resources Management Agency and the PSRC. Main water structures and main and secondary canals are under state ownership, whereas the tertiary level irrigation system (the intra-community irrigation network) was transferred under the community ownership with the establishment of the Local Self-Governments in 1997. Roughly 80% of the arable land is irrigated through the main irrigation network operated by the Vorogum Jrar Closed Joint Stock Company (CJSC) - Water Supply Agency (WSA), while the remaining 20% are irrigated through community owned network.
- The reform agenda adopted by the government in the irrigation sector promotes a participatory approach to the management of irrigation services, the basic objective of which is to improve the accountability and reliability of irrigation services. Water User Associations (WUA), a form of water user groups, have been established that take over the operation and maintenance of secondary and tertiary irrigation systems and collect irrigation service fees for the operation and maintenance of both “lower level” and “higher level” system facilities. WUAs are independent, and self-managed and they are expected to eventually become self-sustainable. Currently 52 WUAs have been established that cover the operation and maintenance of the irrigation system for over 80% of the irrigated land. 624 rural communities are included in the WUAs. From the remaining 247 rural communities around 50 do not have irrigated land while the rest are self-irrigated (not connected to the main network).
- The wholesale irrigation tariffs are defined by the PSRC whereas WUAs define the retail tariffs. The wholesale tariffs are set at the cost-recovery level and are differentiated based on the method of the irrigation (gravity or pumping) and the area. However the end user tariffs are often set below cost-recovery level by the WUAs with the difference being subsidized by the government. The government subsidies are allocated to the WSA and WUAs and are not targeted. These subsidies will need to be gradually removed and replaced with targeted subsidies to the poor households.

**Table 25 Wholesale irrigation tariffs (US cent/cubic meter)**

	Sevan-Hrazdan	Akhouryan-Araks	Vorotan-Arpa	Debed-Agstev
Gravity method	0.17	0.14	0.38	0.37
Pumping method	1.52	0.87	7.14	6.51

Source: PSRC

### The supply of electricity

- In accordance with the Energy Law, the Ministry of Energy is in charge of policy-making, while the PSRC assumes regulatory functions in this sector. The electricity distribution network in Armenia is owned, operated and maintained by the privately owned joint stock company, Electrical Network of Armenia CJSC. Although heating supply is another mandatory responsibility of the local governments, most centralized heat systems

are in extremely poor condition, or have totally collapsed in recent years. While the ownership of electricity and gas supply systems was not transferred to communities, the local governments must facilitate the installation of such services for community residents and businesses.

- The electricity tariffs are set by the PSRC and provide full cost-recovery. The end-user tariffs are differentiated based on the time of the consumption (day or night) and on the level of voltage the electricity is supplied.

**Table 26 Wholesale irrigation tariffs (US cent/cubic meter)**

	0.4 KW consumers	8 (10) KW indirect line consumers	8 (10) KW direct line consumers	Over 35KW consumers
Day time tariff	4.55	4.55	3.64	2.91
Night tariff	2.73	2.18	2.18	2.18

Source: PSRC

### The supply of gas

- The legal and regulatory framework of the gas sector is based on the Energy Law, which prescribes policy-making responsibilities to the Ministry of Energy and regulatory functions to the PSRC. The entire gas transmission and distribution infrastructure, including underground gas storage, are owned, operated and maintained by ArmRusgasprom CJSC, which is 45% owned by the government of Armenia, with the remaining 55% of company shares being controlled by the Gasprom of Russia (45%), and ITERA International energy corporation (10%). The local governments have no responsibility with respect to the ownership, operation and maintenance of the gas network other than facilitation of installation of gas supply.
- Gas tariffs set by the PSRC are differentiated based on the consumption volume and provide full coverage of costs.

**Table 27 Gas tariffs by consumption group (US cent/cubic meter)**

Consumers with below 10,000 cubic meter consumption	10.72
Consumers with 10,000 cubic meter and above consumption	7.91

Source: PSRC

### The supply of telecommunications

- The policy functions in telecommunication are currently overseen by the Ministry of Transport and Communication while the regulatory responsibilities are being transferred to the PSRC. The regulatory framework for this sector is based on the License Agreement and the Share Purchase Agreement that were granted to ArmenTel, subsidiary of a private Greek Telephone company OTE, during the privatization.

- The local governments have no responsibility for the provision of telecommunications, which is provided by the ArmenTel. It enjoys a monopoly on the provision of services in rural areas, reflecting the cost and limited coverage of mobile networks.
- The Government is currently in arbitrage with ArmenTel owners with the purpose of amending the license of the company and revoking its monopoly over international data transfer and mobile services.

**Table 28 Telecom tariffs (US cent/minute)**

	<b>Fixed fee (US dollar)</b>	<b>Minute fee (US cent/minute)</b>
Fixed line phones	1.65	1.45
Mobile	12-18	15
SMS	-	12

Source: ArmEnTel

### ***What is the Policy and Regulatory Structure for Public Services Delivery?***

#### **The Policy Framework**

- The Government has embarked on a program to try and address the key rural issues within the PRSP framework<sup>49</sup>, while its objectives for the agricultural sector are specified in the recently adopted Sustainable Agricultural Development Strategy (SADS)<sup>50</sup>. The overall objectives of SADS are to promote sustainable agricultural development, to ensure greater food security, and to increase rural incomes. Sustainable economic growth and employment generation are recognized as important preconditions for poverty reduction. Major contributions to economic growth are expected to derive from the promotion of small business development and increased employment generation as well as improvements in the business environment.
- According to Government strategies, over the period 2003-2015, agricultural production will remain the main factor for rural poverty reduction. It is expected that the growth in agricultural production will result mainly from improved productivity. The attainment of this improved productivity will result, according to the PRSP, from the implementation of a number of key measures focusing on: (i) the resolution of problems of irrigation and water use; and (ii) through encouraging opportunities for wider possibilities of non-farm employment.
- The PRSP provides a high role for investments in basic rural infrastructure, outlining the following priorities: the construction and rehabilitation of rural roads to increase the

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<sup>49</sup> Government of Armenia, (2003)

<sup>50</sup> Government of Armenia, (2004)

efficiency of the agriculture, provide access to markets, optimize the distribution of health and educational facilities; the enhancement of accessibility to drinking water for the population, ensuring 24 hour water supply and improving the quality of the water supply; and an irrigation program aimed at increasing the share of irrigated land and regulation of irrigation water supply systems.

- However, there is no separate Policy and Strategy for the development of the Rural Sector, and the MTEF makes no specific allocation for increased capital or recurrent expenditures in this sector.

## **ANNEX E - THE MAIN FINDINGS FROM PREVIOUS PROGRAMS/STUDIES**

- There have been a number of previous initiatives, in the form of both studies and projects, in the area of rural infrastructure provision in Armenia. The intention of this section is, through an examination of these earlier initiatives, to identify the most salient points *vis-à-vis* both the characteristics of rural communities, including the distribution of poverty, and the particulars of the initiatives themselves to enhance the sustainability of potential rural infrastructure investments.

### **Combined Survey of the Poorest Communities in Armenia -UNDP**

- One recent study<sup>51</sup> undertook a Combined Survey of the Poorest Communities in Armenia, including: (i) a questionnaire on the characteristics of poverty in the communities, which was completed by the heads of the communities; (ii) an assessment of socio-economic conditions of communities in individual marzes by over 100 experts, and an identification of those communities which were regarded as most vulnerable to poverty, (iii) Poverty indicators collected from all communities throughout the country were analyzed and a method-approach for assessing the so called “community poverty predisposition” was developed, (iv) ten communities from each marz were selected for the combined survey that involved survey with two separate questionnaires for the heads of the communities and for the households.
- The main factors employed in the survey were, namely: (i) number of resident population; (ii) ratio of refugees, (iii) ratio of those living under the temporary shelter; (iv) altitude above sea level; (v) distance from regional capital; (vi) distance from the city capital; (vii) location in respect of the state border. The broad approach allocated a rank score, implying no weight on any indicator, from 0 (lowest impact on poverty) to 5 points (highest impact on poverty), based on its quantitative value. The arithmetical sum of the points ascribed to each of 7 indicators for a given community was interpreted as the “absolute value of poverty predisposition” for that community, allowing the communities to be ranked in relative terms.
- The results of the Combined Survey, which are summarized in Table 29, suggest that the average distance from both the regional center and the capital are important pre-determinants of poverty, which, in turn, implies that the road network that reduces, what can be termed, the ‘economic distance’ to key markets, the sum of time and money costs, is of vital importance for the remote communities. This does not overlook the lower comparative advantage of agricultural activities in those areas, together with the lack of appropriate policy addressing the development of non-agricultural activities and/or

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<sup>51</sup> UNDP (2002)

migration, but acknowledges that even in those areas where there is potential comparative advantage, it is not being realized due to physical and institutional barriers. Other importance factors, as revealed in the table, are altitude and, to a lesser extent, the proximity of the communities to the Azeri border.

**Table 29 Summary of groups of communities with various levels of poverty**

Groups of poverty predisposition	Average number of population	Average distance from regional capital (km)	Average distance from Yerevan (km)	Average altitude above sea level (m)	Average representation* of refugees in the total population	Average representation* of those living under temporary shelter in the total population	Share of communities bordering Azerbaijan in the total number of communities
Up to 20	7292	11.9	33.8	872.3	1.2	1.0	-
20-30	4717	20.9	46.2	1069.5	1.7	1.1	-
30-40	2974	33.7	109.2	1533.2	1.4	1.2	7.8
40-50	1271		162.9	1564.9	1.6	1.8	17.3
50-60	707		226.9	1632.8	2.5	1.2	36.8
60 and more	364		237.6	1772.8	3.6	1.2	80.4
Average	2750	40.3	123.9	1428.2	1.7	1.3	15.0

\* coefficient of representation computed according to the following scale: 1) under 1%, 2) 1-10%, 3) 10-25%, 4) 25-50%, 5) 50-75%, 6) 75% and higher

## The Armenia Social Investment Fund – The World Bank

### The Armenia Social Investment Fund (ASIF)

- The ASIF project provides a good example on how a decentralized approach can contribute to the improved basic social and economic infrastructure sustained by capacity building. The ASIF program promotes institution building and social capital formation at the local level focusing on strengthening local governments and communities in decentralized management of basic public services. Thus, the findings of assessments carried out within the scope of the ASIF II and lessons learnt from ASIF I are particularly pertinent for the development of rural infrastructure strategy in Armenia.
- Overall, ASIF II assessments<sup>52</sup> conclude that the small-scale community infrastructure projects carried out under the ASIF II Project have generated a visible development impact in terms of social and economic benefits to the poor communities of Armenia. Building upon some 200 infrastructure projects completed under ASIF I Project, as of end April 2004, a total of 142 infrastructure projects were completed under ASIF II. The majority comprised school rehabilitation or construction (147), followed by water supply (59), benefiting 392,000 community members and creating nearly 112,000 man days of short-term employment. In addition, school heating systems were constructed or repaired in a number of schools. These projects responded to the communities' priority needs and were carried out through self-help interventions promoted by the ASIF.

<sup>52</sup> These include the most recent ASIF II Assessment, Social Capital Assessment, and Beneficiary Assessment.

- The recently completed Social Capital Assessment concludes that adequate institutional framework, consisting of institutional arrangements, participatory methods, service delivery, and capacity building serves as an effective catalyst for institutional development and social capital formation. In addition, the recent Beneficiary Assessment found that partnership could be reinforced under the ASIF II Project as a result of: (i) requiring government officials to be part of the Implementing Agency; and (ii) establishing a closer link with Government officials through the local government training program. Social Capital and Beneficiary Assessments also found that local level institutional strengthening activities are instrumental for improving the quality and sustainability of service delivery and increasing civic participation in local development. Finally, the experience under the ASIF has shown that the active engagement of community members under the project's participatory framework yields positive results.
- Key lessons learnt from ASIF I and reflected in the design of ASIF II include:
  - (i) need to **improve poverty targeting** in CDD projects to reach the poor more effectively and to better reflect the emerging community demands by revising methodology for regional allocation of funds<sup>53</sup>, refining the micro project approval criteria<sup>54</sup> and typology, and introducing monitoring and evaluation system for assessing poverty targeting;
  - (ii) need to **improve inter-sectoral and inter-agency coordination** to ensure that project activities are consistent with relevant sectoral policies and investment priorities. Measures designed to achieve this include the development of an effective public outreach strategy and establishment of regular consultations among the line ministries, NGOs, and donor agencies;
  - (iii) measures to **improve quality of works** to improve the overall quality of micro projects, involving improved procedures for technical specifications, bid selection, competitive contracting of design and supervision of micro projects, quality control monitoring techniques, etc;
  - (iv) critical need to **improve project sustainability** through a comprehensive framework encompassing strong institutional support from the ASIF office, effective systems and procedures, and greater involvement of the key stakeholders;
  - (v) need to further **improve efforts in local capacity building** through training programs so that local government staff and communities can prepare and implement projects.
  - (vi) need to **place emphasis on monitoring mechanisms** such as beneficiary assessments, client satisfaction surveys, and other more directly participatory methods of client involvement in monitoring and evaluation to monitor outcomes on the ground in order to set up a systematic approach to monitoring and evaluate the impact of development activities and adjusting related policies and programs on a continuing basis;

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<sup>53</sup> The formula for regional allocations under ASIF II is based on two factors: the share of population and the degree of a region's poverty.

<sup>54</sup> The micro project approval criteria are based on the needs and condition of infrastructure facilities, cost per beneficiary and the capacity of the implementing agency.

- (vii) need to **make community contribution criteria more flexible**<sup>55</sup> since otherwise a number of poor communities are not able to come up with the required contribution and projects with high potential benefits to the poor have to be dropped;
- (viii) need to **intensify decentralized decision making** at the local level, which has proven to help make projects demand driven and to strengthen project ownership. This involves building partnerships and stakeholder participation at the local level through information dissemination and active involvement of stakeholders at all stages of the project cycle; enhancing project ownership through enforcement of maintenance agreements promoting the provision of line items in local government budgets for operations and maintenance of completed facilities, flexibility in generating community contributions based on capacity to pay, and monitoring of project sustainability; and progressively building local capacity with the objective of preparing communities towards direct contracting of works.

### **The Poverty Assessment, November 2003**

- The report studies poverty in Armenia in 2001 and examines trends in poverty over the 1998/99 to 2001 period. It looks at the determinants of poverty and analyzes linkages between economic growth, sector policies and poverty. The findings are based on two rounds of the Armenia Integrated Living Conditions Survey (ILCS), one carried out in 1998/99 and the other in 2001. The key findings of the report include the following:
  - Poverty has declined urban area since 1998/99, but increased slightly, on average, in rural area;
  - The rural economy has not, so far, benefited from the growth in the national economy;
  - Agricultural production is a key component on the rural economy, but it is dependant on irrigation, and the systems are often rundown; and
  - Inadequate housing and public services (heating, water, waste disposal) is widespread and contributes to deteriorating living conditions for the poor.
- The main policy recommendation of the report to contribute to the eradication of the rural poverty was the promotion of off-farm employment to complement rural household incomes, and to allow a gradual consolidation of farmland as families finding off-farm opportunities rescind marginal plots. Essential complementary policies recommended include the development of land markets to facilitate the process of land consolidation, and the rehabilitation of irrigation infrastructure.

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55 The principal forms of contributions under ASIF II include: (a) monetary contributions including allocations from local authorities, contributions from community members, and contributions from alternate sources; (b) labor contributions from community members; and (c) in-kind contributions, mainly construction materials.

## The Main Issues in the Literature

- The earlier section noted that the improvement of the rural infrastructure is an explicit objective for the Government of the Republic of Armenia (GoA), and is clearly stated in the national Poverty Reduction Strategy Paper (PRSP). This predicates that rural infrastructure provision is a key element for rural poverty alleviation. This section provides a summary of, what might be termed, the main research literature to highlight the strength of the evidence as to whether, or not, infrastructure provision is the *sine quo non* of poverty reduction in rural areas, and identifying the current gaps in knowledge as a guide to policy in the sector.
- There are three main issues:
  - Links between agricultural growth and poverty reduction;
  - Links between infrastructure improvements and agricultural growth; and
  - Links between infrastructure improvements and poverty reduction.

### ***Agricultural growth and Poverty Reduction***

- One of the central tenets in the ‘research’ literature is the efficacy of agricultural productivity on poverty reduction. In a recent WB study “Agricultural productivity growth and poverty alleviation” (Irz *et al.*, 2001), the authors use cross-country empirical data to examine the links between agricultural yield per unit area and measures of poverty. They show that an increase in crop yield of ten per cent led to a six to ten per cent reduction in the number of people living on less than one dollar a day. In a study in Bangladesh, Wodon (1999) demonstrates that pro-rural development strategy would, probably, reduce the poverty headcount by three per cent, compared with a base policy scenario with no specific emphasis on rural development.
- Similarly, Coxhead and Warr (1991), in their empirical study of the Philippines farm economy, estimated that in the case of a 10% improvement in farm output, applicable to irrigated areas, with technology that is productivity-increasing but labor-conserving, will engender an 8% increase in the income of landless workers. In another empirical study (Timmer, 1997), agriculture is regarded as a key ingredient in attaining sustainable poverty reduction: the authors estimate that a one per cent increase in agricultural GDP per capita led to a 1.6 per cent gain in the per capita income of the poorest one fifth of the population in the 35 countries that were included in the study.
- Lanjouw and Feder (2001) note that although the traditional image of rural households in developing countries is that they are engaged, primarily, in farming and animal husbandry activities, in recent decades, this view has been changing. The emerging consensus is that rural households are often quite diversified in their activities, with non-agricultural sources often contributing substantially to household income, and that the scale of non-farm activities are generally associated with lower absolute poverty. The impact of non-farm economy on inequality is less straightforward, but also positive: non-farm activities when profitable generally accrue to the relatively wealthy and growth in these activities increases inequality in the short run. The poor don’t possess the skills,

contacts and assets needed to access these activities, therefore they don't benefit directly from them. However, there may be an indirect impact: high-productivity activities tighten the rural labor markets and increase rural employment and wages in general.

- The consensus appears to be that although there are reasons to believe that agricultural growth relieves rural poverty and there is empirical evidence, including the above *inter alia*, of the positive link between agricultural growth and poverty reduction, both the robustness and the generality of this link is unclear. Specific factors that condition the sustainability of growth outcomes, include sources of growth (high-productivity or low productivity), diversity of rural economy, access to broader than local markets. Different policies are designed to promote investment in high-productivity rural activities, to increase the diversity of rural economy by including agricultural processing, manufacturing and tourism in it, to liberalize markets and create mechanisms for engaging the rural population in the diversified and widened activities.

### ***Infrastructure improvements and agricultural growth***

- A recent WB rural strategy background paper “Rural Infrastructure, Development and Poverty Reduction” (Calvo *et al.*, 2001), notes that there are indications that improved infrastructure promotes economic growth, and has relatively high rates of return compared with other forms of investment. The provision of rural infrastructure, in particular, is linked to increases in agricultural growth and improved productivity in a number of studies.
- Binswanger *et al.*, (1987) note a strong correlation between the percentage of paved roads and road density, and crop yield, reporting estimated elasticities of 0.305 and 0.058 respectively. The implication, in the case of the former, is that a 10% increase in paved roads leads to a 3% in crop yields.
- Wiggins and Proctor (2001), present evidence of increased diversification of rural economies with more opportunities created by location close to major cities and much lower opportunities for development for remote areas. The comparative advantage of these areas is activities based on immobile neutral and cultural resources and closely related activities. Improved transport and communication as well as other infrastructure services create opportunities for this type of development.
- Lanjouw and Feder, (2001), argue that a key element of the non-farm rural development strategy is infrastructure. They emphasize the importance of infrastructure in supporting non-farm rural economy and demonstrate the robustness of finding in many studies. Rural infrastructure is viewed as a necessary condition for the growth of the rural non-farm economy, since poor infrastructure imposes high costs on all economic activity and private investments tend to occur when infrastructure is of a reasonable standard. In addition, infrastructure helps to expand the output market and break away from limited demand of the local market.
- The general conclusion from this, admittedly brief, review of the literature is that infrastructure provision has a positive impact on rural economic growth through the

following mechanisms: It attracts private sector investment; It broadens the output markets; It helps increase productivity of the traditional sector (farm activity) and to move it from subsistence agriculture to a higher-productivity farming; and, it helps diversify the rural economy. If traditional farming can survive (at a subsistence level though) without easily accessible and reliable infrastructure services, non-farm businesses are not viable without it.

### ***Infrastructure Improvements and Poverty Reduction***

- There is some evidence that the benefits of infrastructure favour poor people by generating more equitable growth (see the review of literature by Malmberg-Calvo *et al.*, 2001): investments in roads are twice as effective in targeting and reducing rural poverty as any other form of intervention; more equitable access to infrastructure services encouraged growth with equity. The authors conclude that infrastructure development enhances capabilities, facilitates empowerment and reduces vulnerability, this contributing to reducing not only income poverty, but no-income poverty as well.
- Brenneman and Kerf (2002) conducted an extensive literature review of the linkages between infrastructure provision and poverty alleviation. The evidence that emerged from this exercise was clear: The provision of reliable energy supply was a determining factor in the establishment of small businesses, and the latter were more productive in those communities with a reliable supply. In addition, the higher efficiency of modern energy sources can lead to significant financial savings for the poor, and engender health improvements due to the greater cleanliness of the fuels. An improvement in supply can also reduce current time expenditures in collecting alternative fuels and lead to a general improvement in the standard of living for a poor household.
- Improvements in the transport infrastructure of a country or a region can have a dramatic effect on the business environment, leading to a significant growth in the returns to small producers and traders and the number of small businesses. The concomitant, assuming appropriate competition and regulation, are increases in the choice and quality of produce, together with the returns to producers in the region. Improvements in transport are also likely to improve both access to, and the time spent in, educational establishments, as well as improving timely access to health facilities. Well designed transport infrastructure can also improve safety in poor communities, and reduce the amount of time spent in the pursuit of tasks.
- Improving the water supply, in the form of clean drinking water and improved sanitation, can also have indirect impacts on economic growth, through the attainment of improved health, thereby increasing the amount of working time, and reductions in the time expended in non-productive activities, such as collecting water. The provision of reliable water supply can also provide financial savings to households, in that they no longer have to purchase bottled water, fuel to boil water.
- Linkages between rural infrastructure investments and household welfare are examined in the WB Policy Research Paper “*Do Rural Infrastructure Investments Benefit the Poor?*” (Songco, 2002). The paper argues that the poor do benefit from infrastructure

improvements, but in order to generate and maximize these benefits, it is critical to remove impediments and create a supportive environment for rural economic growth. The paper notes that combined interventions are important and the development of other services, such as micro enterprise advice is important. One of the most important conclusions of this paper is that the poverty reduction impact increases with the complementarity of the interventions (e.g., when the provision of roads is combined with provision of other necessary services).

- The importance of complimentarity of infrastructure interventions to achieve positive poverty outcomes is argued in the paper “Achieving the Millennium Development Goals: the Role of Infrastructure” (Leipziger *et al.*, 2003). A key argument in this paper is that some of the biggest improvements are likely to come from combined interventions: it is well known that improved impact of water and sanitation is much greater when accompanied by information on hygiene practices. Another study supports the same argument: in India, child infection diseases are much less prevalent and severe in households with piped water, but this gain is largely by-passed by poor households especially when the mother is less educated (Jalan and Ravallion, 2001).

### **The Main Knowledge Gaps**

- However a number of important questions do not appear to have been addressed so far in the research literature. Specifically, the factors determining the sustainability of infrastructure investments have not been clearly identified. Furthermore, there has been no systematic attempt to analyze the state of the rural infrastructure and, particularly, to assess the investment needs, and preferences, of particular communities. Finally, while a number of donor funded initiatives have undertaken community outreach activities and have identified community priorities for social and economic infrastructure services, the approach employed for this study has been different trying to identify community preferences under real budget constraints thus attempting, at least to some extent, to ensure that these preferences involve affordability and sustainability considerations.

## **ANNEX F– THE COVERAGE, CONDITION AND USER SATISFACTION WITH THE EXISTING SERVICES**

### **The Irrigation Sector**

- The importance of irrigation to the agriculture sector in Armenia cannot be overstated, as over 80% of total agricultural produce is grown on irrigated land. The irrigation infrastructure, which supports this production, includes 80 water reservoirs (77 of which are used only for irrigation, with a further 3 used for both irrigation and drinking water), together with more than 3 thousand kilometers of main and secondary canals, about 15 thousand kilometers of tertiary canals, over 400 small and large pumps, 1,276 tube wells, and 945 artesian wells.
- The main water structures together with the main and secondary canals are under state ownership, whereas the tertiary level irrigation system (the intra-community irrigation network) was transferred to community ownership with the establishment of the Local Self-Governments in 1997.
- There are no accurate statistics on the area of irrigated land in the country, as the GoA land stock-taking, undertaken in 1998, which estimated that irrigated land in the country amounted to 274 thousand hectares, included both the land actually being irrigated at that time and the land that had been irrigated prior to 1990.
- Around 80% of the total irrigated land is irrigated through the main irrigation network operated by the Vorogum Jrar Closed Joint Stock Company (CJSC) - Water Supply Agency (WSA), while the remaining 20% is irrigated through the community owned networks.

### ***The policy framework for the sector***

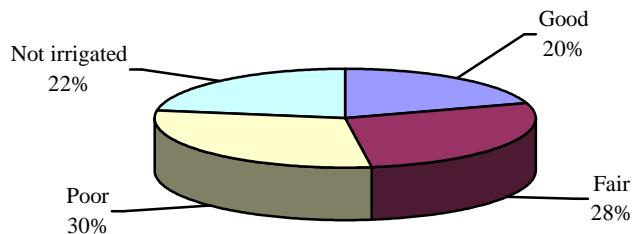
- The reform agenda, adopted by the GoA in the sector, promotes a participatory approach to the management of irrigation, with the basic intention of improving the accountability and reliability of irrigation services. Water User Associations (WUA), a form of water user groups, have been established to take over the operation and maintenance of the secondary and tertiary irrigation systems and collect service fees for the operation and maintenance of both “lower level” and “higher level” system facilities. Previous attempts by the GoA to introduce participatory irrigation management practices in the country have not been particularly successful, primarily due to a combination of a lack of preparatory awareness building amongst farmers, and insufficient local capacity.
- The intention was that these WUAs are independent, self-managed and will, eventually, become self-sustainable. Currently, 52 WUAs have been established that cover the operation and maintenance of the irrigation system for over 80% of the irrigated land, and

including 624 rural communities. Out of the remaining 247 rural communities, around 50 do not have irrigated land, while the rest are self-irrigated (not connected to the main network).

### ***The condition of the irrigation networks***

- The lack of recurrent expenditure, and maintenance, on the infrastructure over the last decade, has had a deleterious impact on the condition of the network. Table 25 reveals that, according to the World Bank and IFAD estimates<sup>56</sup> the irrigation infrastructure is in a poor state or entirely non-operational in over 52% of previously irrigated land. 20% of the total network is regarded as being in good condition, whilst 28% is regarded as being in fair condition.

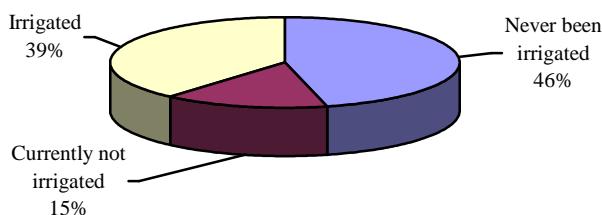
**Table 30 The condition of the irrigation infrastructure (2003)**



Source: Water sector development and institutional improvements PIU

- However, the lack of maintenance expenditure is not the only factor that has engendered a retrenchment of the irrigated area, as a major increase in the electricity tariff, which was introduced in 1996-1999, and raised the cost for pumped a cubic meter of water more than three times, leading to a significant reduction in the area of irrigated land. Thus, according to IFAD database<sup>57</sup>, only approximately 39% of the total arable area is being irrigated, down from 54% previously, as revealed in Table 6.

**Table 31 The area of irrigated land (2003)**

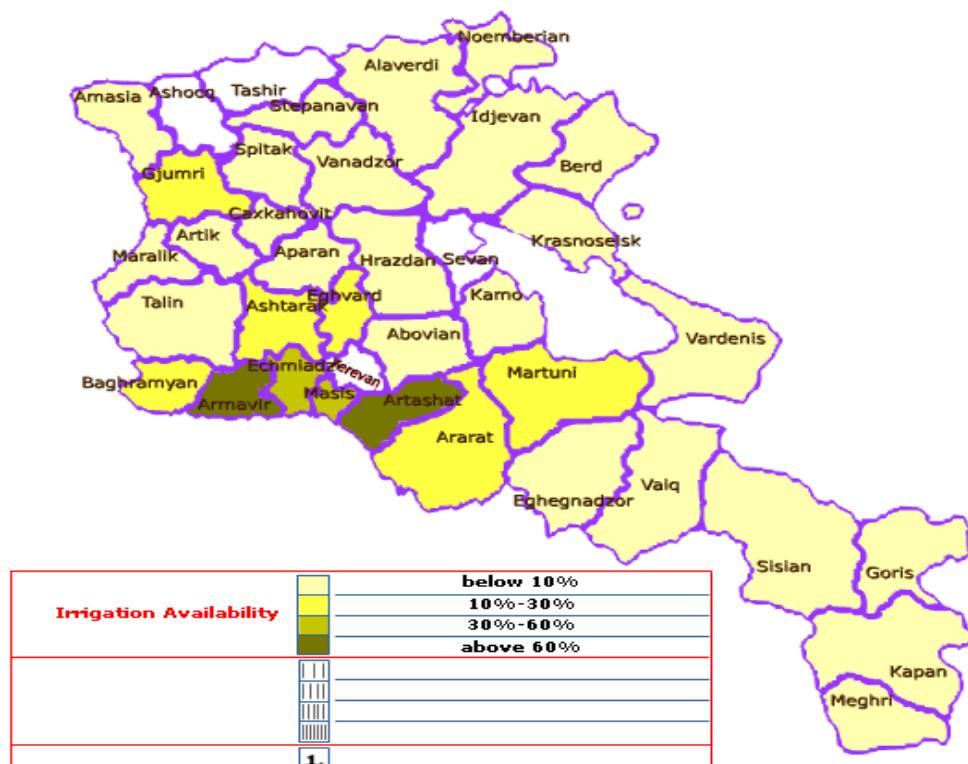


Source: IFAD database

- The geographical distribution of the availability of irrigation system is illustrated in the following figure, with the majority of the country facing less than 10% availability.

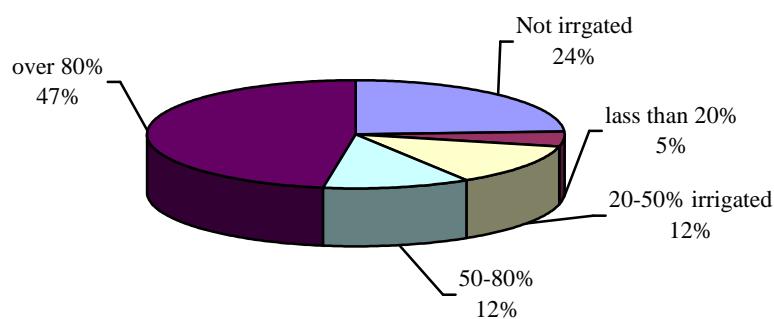
<sup>56</sup> Water sector development and institutional improvements PIU

<sup>57</sup> Data have been collected in 2003.

**Table 32 A schematic representation of irrigation availability**

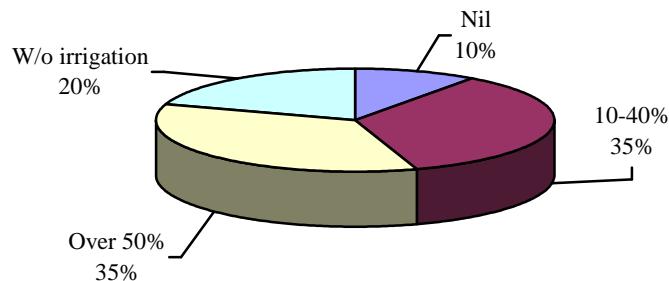
- The recent increase in the electricity tariffs, together with the age and inefficiency of the majority of the existing pumps means that mechanical pumping is, in many cases, no longer the economically viable solution for many rural communities. This has lead to a switch to the gravity method of irrigation, which, according to IFAD estimates<sup>58</sup>, is used for 69% of total irrigated land, with the remainder still served by electric pumps. This switching between delivery modes is expected to continue, as irrigation tariffs are gradually raised to cost-recovery levels, reflecting the increased costs of consuming electricity and the use of the pumping method.
- There are pronounced differences between the communities with respect to share of irrigated land, as some 210 rural communities (24% of the total number of rural communities) do not have access to irrigation, a further 43 (5%) have less than 20% of their total arable land under irrigation, whilst 409, (47%), have over 80% of their total arable land under irrigation.

<sup>58</sup> IFAD database, (2003) Study Database prepared by the Community Finance Officers Association

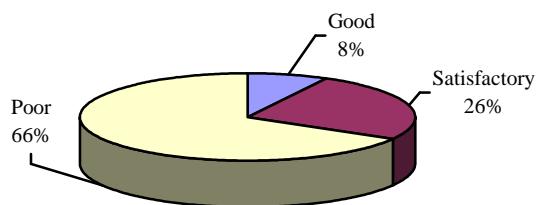
**Table 33 Community access to irrigated land (2003)**

Source: IFAD database

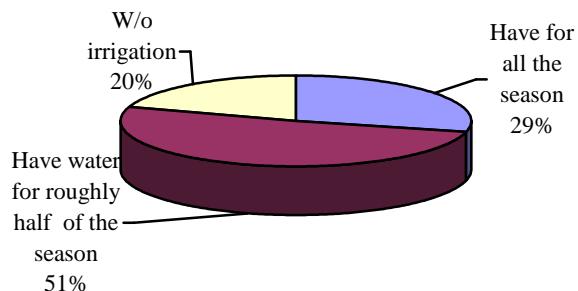
- The limited precipitation levels in Armenia (roughly 450mm annually) underlines the importance of irrigation to agricultural production, with absent or inadequate irrigation contributing to a loss in crop production in certain communities. Table 8 provides an indication of the estimates of rural farmers, consulted during the course of this study, as to the proportion of total crop production lost due to absent or inadequate irrigation. 10% of the sampled communities (n=100) have suffered no losses, whereas 35% have suffered crop losses that exceed 50% of the value of their total production. The average value of crop losses, due to inadequate irrigation, was reported at approximately US \$150,000 per rural community.

**Table 34 Respondent assertion of crop losses due to absent or inadequate irrigation**

- Overall, less than 30% of rural communities are satisfied with the quality of irrigation water supply. This dissatisfaction reflects, primarily, the lack of control over the service by the rural farmers, with 66% stating that they perceived that the quality of the irrigation supply is poor.

**Table 35 Respondent satisfaction with the quality of irrigation supply**

- The low satisfaction with the irrigation supply, in turn, reflects, in many cases, the interruptions in the water supply. Thus, whilst 29% receive irrigation water for the whole growing season, approximately 50% of the rural communities reportedly receive irrigation water for only half of the growing season.

**Table 36 Proportion of irrigation season when water is supplied**

- In addition, the supply is unreliable, even if timely payments are made by the farmers. This reflects the more general problem that disconnections are not possible at the individual level (or household) and therefore rural farmers can suffer a disconnection due to the non-payment by their neighbors or the disconnection is caused by the nearby community (where the irrigation network passes through that community). 53% of respondents have suffered interruptions of this form.
- There are also frequently differences in the level of satisfaction with the quality of irrigation water provision among inhabitants of the same community. This is, generally, a manifestation of a perception of unequal distribution of irrigation water among community farmers, which can arise from a number of factors: The low capacity and deterioration of system pumps can preclude the movement of water to all the suitable agricultural land of the community. Similarly, the uneven distribution of the tertiary irrigation system in the community or limited maintenance and inadequate cleaning of intra-community streams are further causes of unequal water distribution.

### **The perception of the local communities in respect of irrigation services**

- There are well-known limitations to subjective data of this sort; the respondents may not have sufficient knowledge to provide a reliable assessment of the situation, their preferences may reflect recent extreme events, rather than provide a more balanced perspective of their experiences over time. However, despite these limitations, there are

two reasons why the collected information is valuable: (1) there has been very little research into demand-side information about consumer preferences in Armenia, using a nationally representative sample of rural communities; and (2) since sector data in many cases are not very recent, nor very reliable, micro data can strengthen the quantitative sector data and enrich our understanding of the context of rural infrastructure.

### **The irrigation sector**

- Respondents' evaluation of the quality of irrigation service is very low. This includes access to irrigation due to non-existent or damaged network, capacity and condition of water pumps and water supply schedule.

*"We...don't have irrigation water at all in the summer. Therefore, we cannot plant orchards; we grow only wheat, barley and potatoes."*

**Focus groups with poor, Kurt**

- The respondents from all communities complain about the irrigation supply schedule. Firstly, the supply begins late: in Ararat Valley, the vegetation period starts in May, whereas the irrigation starts on June 10. Moreover, unreasonable supply cut-offs happen during the irrigation.

*"... The cucumber is to be watered twice a day, but irrigation water is cut off for 1-2 months. I can forget my hard work and efforts, but why or how should I pay for the water, if my field is burnt and dried out?"*

**Focus group with men, Vanand**

- Communities in the study have negative experience with the quality of service of the intermediaries collecting charges – in particular, in irrigation, those are WUAs and WUCs – and would prefer to eliminate them from the supply chain.

*"The irrigation water comes from the pond by gravity flow. After the first watering, they cut off the water supply for a long time. We need to pay for the water for them to resume the supply. It belongs to the Water Users Company (WUC). It would be better that the community owns it. The pond is the property of "HaiEnergo" Company. They collect charges from us, pay to the WUC, which in turn pays to "HaiEnergo". Due to the lack of water 70% of the yield is spoilt."*

**Uyts Male Focus group interview**

### **The Rural Road Sector**

- The importance of adequate road infrastructure to the economic development of a country or a region cannot be overstated, and a considerable amount of academic research has underlined the centrality of road infrastructure to regional economic development<sup>59</sup>. This

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<sup>59</sup> see WDR (1994) for a detailed discussion on the broad links between transport infrastructure and economic growth.

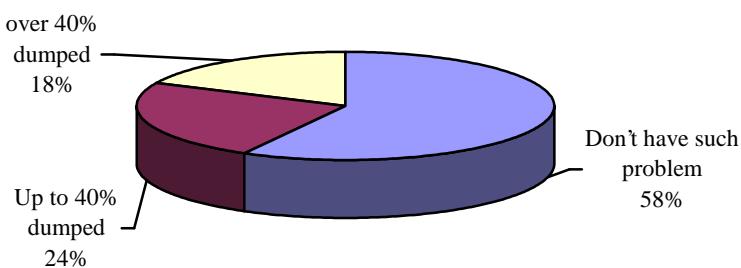
link is even more pronounced in the rural context, where the provision of adequate road infrastructure is essential for the attainment of sustainable economic development, and hence poverty reduction, for the rural community. Ahmed & Hossein (1990) found villages with better than average access to be significantly developed in terms of agricultural production, household income and health. Lebo & Schilling (2001) note that the percentage of people living below the poverty line is 42%, on average, but rises to 70% in those areas that do not have a road connection.

- These connections can take a variety of forms, reflecting the need to connect both with the higher level within the road network, both to the regional centers, the administrative capital, and at the other extreme, the need to connect individuals with their agricultural units. This range of access needs is reflected in the demand for a range of infrastructure types, reflecting the particular location and stage of development of individual communities, but the key concept for poverty alleviation is one of ensuring ‘basic access’, which has been defined as “...ensuring the minimum level of access necessary to sustain socio-economic activity” (Lebo & Schilling, 2001). The following sections illustrate the current distribution of rural infrastructure, and provide an indication, where available, of the ‘costs’ of hiatus in the provision of appropriate access.

### **The costs of poor access**

- The survey of rural inhabitants as part of this study found that the poor condition of rural roads resulted in significant losses of produce in 42% of rural communities, with 18% of reporting communities reporting output losses of 40% or more, a further 24% reporting losses that exceeded 30%. In a small proportion of the communities, these losses accounted for 70-80% of the total harvest of the community.

**Table 37 Proportion of communities who had experienced output losses due to absent/inadequate road infrastructure**



- The extent of these losses is supported, at least partially, by the data collected in the IFAD survey<sup>60</sup>, which suggest that, approximately, only 50% of total rural produce<sup>61</sup> is actually traded, primarily through sale (which accounts for 92% of traded produce) and to a lesser extent, through barter (8% of traded produce). Of course, the portion of untraded

<sup>60</sup> IFAD database 2003

<sup>61</sup> Total produce includes agricultural products, cattle, fish, dairy products.

produce also includes quantities for personal consumption and for informal exchange or gifts within the community.

- A UNDP<sup>62</sup> survey of Most Vulnerable Population in Armenia, conducted in 2002 also highlighted the significance of roads for the well-being of rural population. In particular, the results suggested that the more remote the rural communities are from the regional centers and the capital, the more these communities and their population are predisposed to poverty, as presented in the following table.

**Table 38 An indication of the relationship between poverty and community ‘remoteness’**

<b>Average distance of communities (km)</b>	<b>Poverty Inclination* of Rural Communities</b>					
	<b>Below 20</b>	<b>20-30</b>	<b>30-40</b>	<b>40-50</b>	<b>50-60</b>	<b>60 and more</b>
From regional centers	11.9	20.9	33.7	47.2	76.6	85.4
From the capital	33.8	46.2	109.2	162.9	226.9	237.6

\* The closer this indicator is to 100, the higher is the predisposition of the community to poverty.

- The data collected during the course of this study reveals an average distance between the rural communities, marz centers, and former regional centers of 40.6km and 15.1km respectively. It also suggests that there is a positive relationship between remoteness and the incidence of poverty.

#### ***The extent and condition of the rural road network***

- The total length of the Armenian road network approximates 7,700 km (excluding 2700 km of municipal streets). There are three categories of roads based on their functional purpose: (i) interstate highways, which comprise 1561 km; (ii) republican roads, which comprise 1800 km; and (iii) local roads, which comprise 4342 km. The former two categories, interstate and republican roads, are under the ownership, administration and maintenance of the national road administration. The latter category, local roads, are further divided by the type of their ownership to marz owned (3352 km), and community owned (990 km) roads, and the administration and maintenance of these roads is assigned to the respective administration.
- This study proposes to focus on the '**lifeline roads**' defined as the most optimal road network connecting rural communities to the interstate highways. While the "lifeline" roads may not always represent the shortest root from an individual rural community perspective, at the network level the recommended approach would result in significant cost savings and thus better maintenance and condition for the "lifeline" roads. Thus, the alternative roots outside this "lifeline" network have not been included in the scope of this study. The "lifeline network" includes 2,702km of roads outside the community border (759km of state owned republican roads and 1943km of marz owned local roads) and a fraction of the community owned local roads (total length of 990km).
- The majority of the rural road network is surfaced with asphalt or bitumen pavement. Although, there is some variation depending on the administrative ownership of the roads, with those rural roads under state ownership being entirely asphalt paved, while a

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<sup>62</sup> UNDP (2002)

sizable share of the roads under community ownership are surfaced with earth or gravel (over 22%), as revealed in the following table.

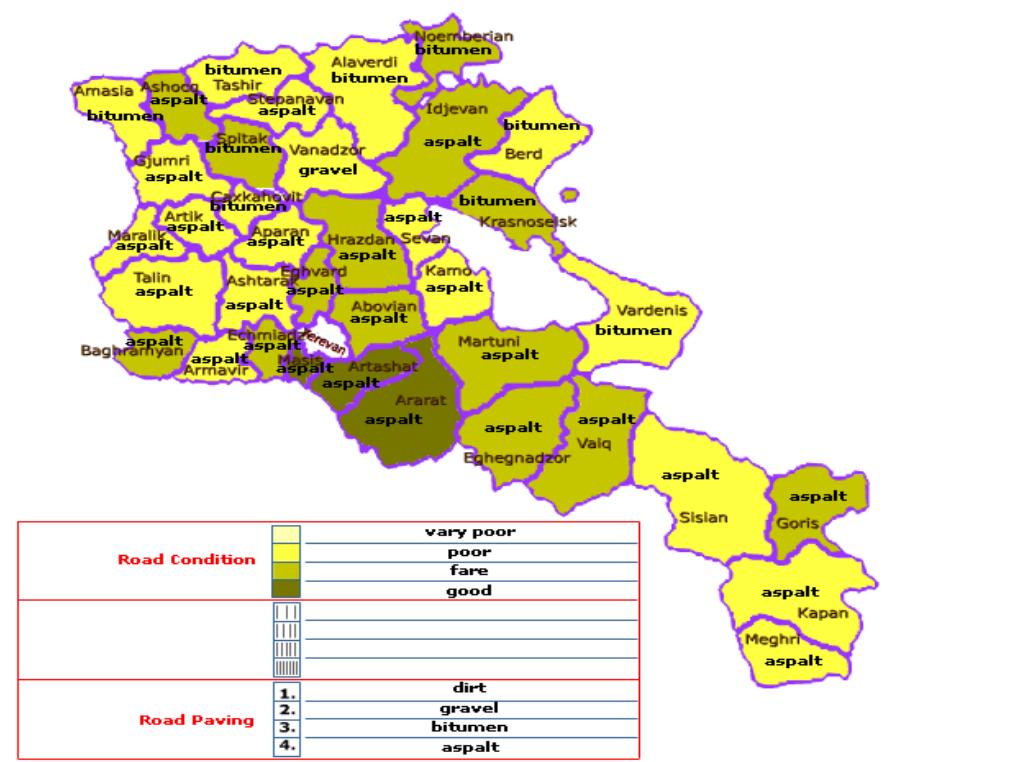
**Table 39 The pavement of rural roads by ownership category**

Ownership Type	Type of Road Pavement				
	Total (km)	Asphalt (%)	Bitumen (%)	Gravel (%)	Earth (%)
State	759	95%	1%	4%	-
Marz	1,943	77%	11%	10%	2%
Community	990	68%	9%	16%	6%
<b>Total</b>	<b>3,692</b>	<b>78%</b>	<b>8%</b>	<b>11%</b>	<b>3%</b>

Source: study data

- While the road pavement alone is certainly not sufficient to explain the state of the local versus the state owned roads, the qualitative assessments of the rural inhabitants and physical examinations, made within the scope of this Study, indicate that the local roads under both community and marz ownership are overall in much poorer condition than state owned republican roads.

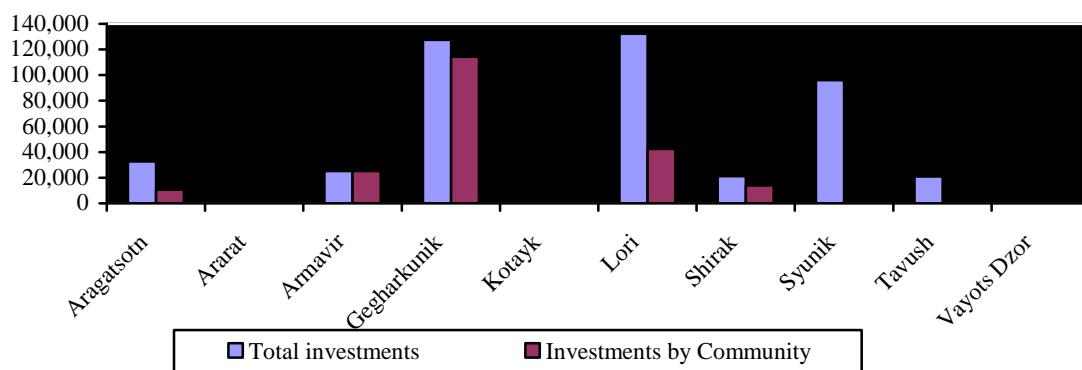
**Table 40 A schematic representation of the condition and type of the road network, by area**



- While the road network in Armenia has benefited from a significant injection of foreign funds during the past five years, these funds have been targeted to the rehabilitation of the main (mainly interstate) roads, with the intention of returning them to good condition. However, the secondary and local roads, which connect the rural areas to the primary road network and to the main regional commercial centers, have received almost no capital or recurrent funding for the past decade. By contrast, this study estimates that

total expenditures in the rural roads<sup>63</sup> has amounted to approximately US\$ 0.5 million over the last five years, with approximately half (US\$ 0.23 million) funded from the community budgets. The following figure indicates the scale and distribution of investment in the local roads across the different marz.

**Table 41 Investments in Rural Roads, by Marz, over the period 1999-2003 (US\$)**



- The majority of the investments, especially those funded from the community budget, have been small scale repairs/rehabilitations. As a result, rural roads are in a very poor condition, with declining passability, reduced traffic speed and increased maintenance costs. According to the finding of the Road Financing Study<sup>64</sup>, in some regions of the country transportation costs have increased 2–3 times, leading to a 20-30% rise in the retail prices of goods and services.
- The data collected during this survey reveals that from the total length of 3,692km of roads which connect rural communities with main roads, 2,250km (61%) are classified as poor or very poor<sup>65</sup>, with a further 1033km (28%) in fair condition and only 406km (11%) in good condition . Furthermore, only 597km (16%) of these roads are fully passable during the winter time, while over 748km (20%) are completely impassable<sup>66</sup>. Overall, those marzes whose rural roads are in fair or good condition, have full or limited winter passability of roads in winter time, while in marzes were rural roads in a poor condition, on average, roughly one third of the roads are impassable during the winter.

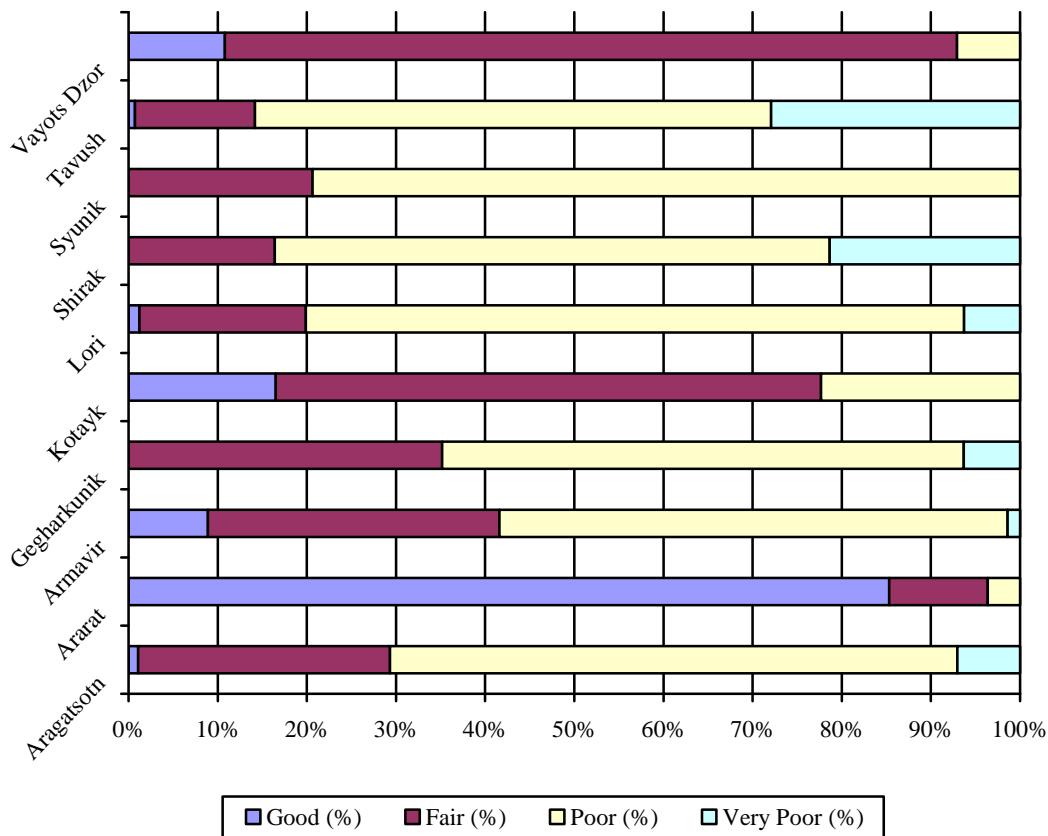
<sup>63</sup> The survey included only those roads connecting rural communities with the main road. The main roads are defined as those having regular transport service.

<sup>64</sup> Road Financing Study, December 2002 (undertaken within the scope of the current World Bank Transport Project)

<sup>65</sup> The classification of the rural roads has been determined based on the maximum speed car can pass that road. The following range has been used in the Survey: (i) Good- 60km/h or above; (ii) Fair- 40-60km/h; (iii) Poor- 20-40km/h, and (iv) Very Poor- less than 20km/h.

<sup>66</sup> If the roads are closed only for a few days during the winter time then the passability has been considered as limited. This is typically the case for large communities that can open the roads through own resources. If the roads are closed for longer periods and the community is not able to open it through its own resources then the roads have been classified as impassable.

- The data also reveal marked differences in the condition of the roads in the different marzes, as illustrated in the following figure, with over 90% of the rural road network in good or fair condition in Ararat and Vayots Dzor marzes. In Shirak and Tavush marzes, the opposite is true, with over 80% in poor or very poor condition. It is possibly not surprising that the latter are two of the most mountainous and remote of the marzes in the sample. The following figure reveals the proportion of the road infrastructure in good, fair, poor and very poor in the marzer.

**Table 42 The condition of the road infrastructure in the marzer (2003)**

- Overall, the rural inhabitants are dissatisfied with the condition of the road network. This is especially true for inhabitants of remote villages since the poor condition of the rural roads imposes large costs of time and money for the people. Besides these direct costs there also indirect costs associated with poor road infrastructure, such as wear and tear costs for the cars, which in turn result in excess transportation costs ranging between US \$1- US \$5.00 for a round-trip, depending on the particular journey.

### *The availability of public transport*

- Without an adequate road network, provision of reliable and accessible transportation services is virtually impossible, especially since less than 10% of the rural communities

have access to railway services<sup>67</sup>. The survey reveals that over a quarter of rural communities in Armenia do not have public bus or minibus service. Furthermore, the distance to the nearest bus station<sup>68</sup> was reported to be over 3 kilometers for one third of rural communities, extending to 20 kilometers for some of the most remote and isolated ones.

### ***The perception of the local communities in respect of transport***

- The residents described the situation as the following:

*“The roads are in a terrible state; during the winter no vehicle can drive out of the village. Around New Year’s, a 6-month old child with high fever died before it was possible to take him to the hospital.”*

### **Focus group with women, Barekamavan**

*“Once a week our bus drives to Noyemberyan and returns after a short while. Those who have longer business to do, have to pay for petrol to get another driver to return.”*

### **Interview with the school director, Barekamavan**

- The link between roads and agricultural production was strong, and noted by a number of respondents, with many complaining about the loss of crops, and the corresponding, lack of incentives to develop agriculture due to bad roads and related inability to bring the harvest to markets.

*“If our roads were good, the majority would be engaged in agriculture. [In case the farmer has his own car], he will be able to transport the crops and there will be a financial benefit to the community. Also, in this case, the village bus fee will reduce, and new shuttle routes can be opened for the village. Our village has vast lands, some people would prefer to lease them. If the roads are better, the cooperation with the city will expand.”*

### **Kamo, Deputy Head of Village Administration**

*“You have to pay 3000 AMD for a round trip to Yerevan; not everybody can afford it. Because of transport, we cannot bring our crops to market, as a result, 70% of the crops – potatoes, garlic – is spoiled.”*

### **Focus groups with men, Karchaghbyur**

- The residents are trying to maintain roads in some communities, but it is not easy with the limited capacity and resources of the communities. The community budgets are insufficient to provide needed capital investment, and the extent of the involvement is an in-kind contribution from the community in the form of physical labor, once or twice per year. However, such an approach can only delay the inevitable, and the overall trend is one of further deterioration. For example, in Aragyugh and Kotayk, the roads were

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<sup>67</sup> According to the Rural Infrastructure Survey conducted within the scope of this study only 85 rural communities have a railway station.

<sup>68</sup> This includes both bus and minibus station.

asphalted about twenty years ago, and are now entirely worn out and out of order; deep pot holes have emerged blocking transportation. Partial renovation works are regularly undertaken: the pot holes are filled with sand, road-metal and are cemented. However, such measures do not ensure long term results; after heavy precipitations, mudflows and frost, nothing remains from the work and the potholes remain.

## **The Drinking Water Sector**

- Armenia enjoys relatively abundant water resources, with total water resources averaging 10.2 billion cubic meters ( $m^3$ ) annually, of which only about 2.4 billion  $m^3$  are used for drinking water. The drinking water infrastructure includes 123 water intakes, 176 ground water resources (artesian wells and tube wells), 29 river water in-takes, 4820 km main canals, of which 700 km are in and around Yerevan, and the rest in the marzes. The total length of the local distribution networks is 8020km, of which 1900km is in Yerevan.
- The main water structures, main water canals, and the distribution network up to the community border are state owned, while the intra-community distribution network is under the community ownership. The main canals and the distribution network are operated and maintained by the Yerevan Water Supply Company (YWSC) in Yerevan and some surrounding rural communities, and by the Armenia Water Supply Company (AWSC) in most other towns and 300 rural communities in Armenia. The remaining communities look after their own distribution networks. Recent institutional changes have seen some regional branches of the Armenian Water Supply Company become separate, autonomous utilities. As part of an assistance program financed by KfW (German Development Bank), the branch serving the Amavir marz was turned into a joint stock company called Nor Akunq (New Source) whose shares are owned both by the communities it serves and by the Government. A similar transformation is now taking place in the marzes of Shirak and Lori.

### ***The condition of the supply networks***

- The location of drinking water reserves, in the majority of the communities, supports the use of the gravity method to supply water to the majority of communities. Some of these areas could also be served by the existing water infrastructure, which allows supply to be made by electric pumps. However, a lack of maintenance, repairs, and renewals during the previous 12 years had meant that the water supply distribution networks in Armenia are, currently, in a state, resulting in frequent leakage from the system.
- These problems are particularly pronounced in rural areas due to deficiencies in the original design of the water network, a lack of zoning, and the additional deterioration engendered by the harsh conditions. The data from the survey reveal<sup>69</sup> that only 2% of rural communities have drinking water infrastructure in good condition, while significant investments are regarded as necessary to return the network to good condition in over 60% of the communities.

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<sup>69</sup> The condition of the infrastructure is based on the assessment of community mayors.

- The following table provides the condition of the drinking water supply networks for the different communities, with Armavir, Gegharkunik and Vayots Dzor marzes, all having a system where over 75% is in poor condition. In the rest of the marzes, only one, Syunik with 31%, has less than half its drinking water network is in poor condition.

**Table 43 Condition of drinking water infrastructure at marz level**

Marz name	Number of communities	State of drinking water infrastructure		
		Good	Fair	Poor
Aragatsotn	111	5%	26%	68%
Ararat	93	1%	47%	52%
Armavir	94	2%	22%	76%
Gegharkunik	87	0%	14%	86%
Kotayk	30	3%	43%	53%
Lori	105	4%	30%	67%
Shirak	116	3%	29%	68%
Syunik	106	0%	69%	31%
Tavush	58	0%	40%	60%
Vayots Dzor	41	0%	20%	80%
<b>Total</b>	<b>871</b>	<b>2%</b>	<b>35%</b>	<b>63%</b>

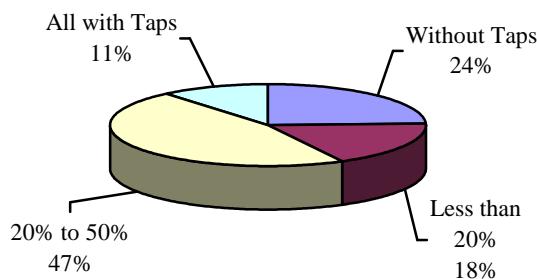
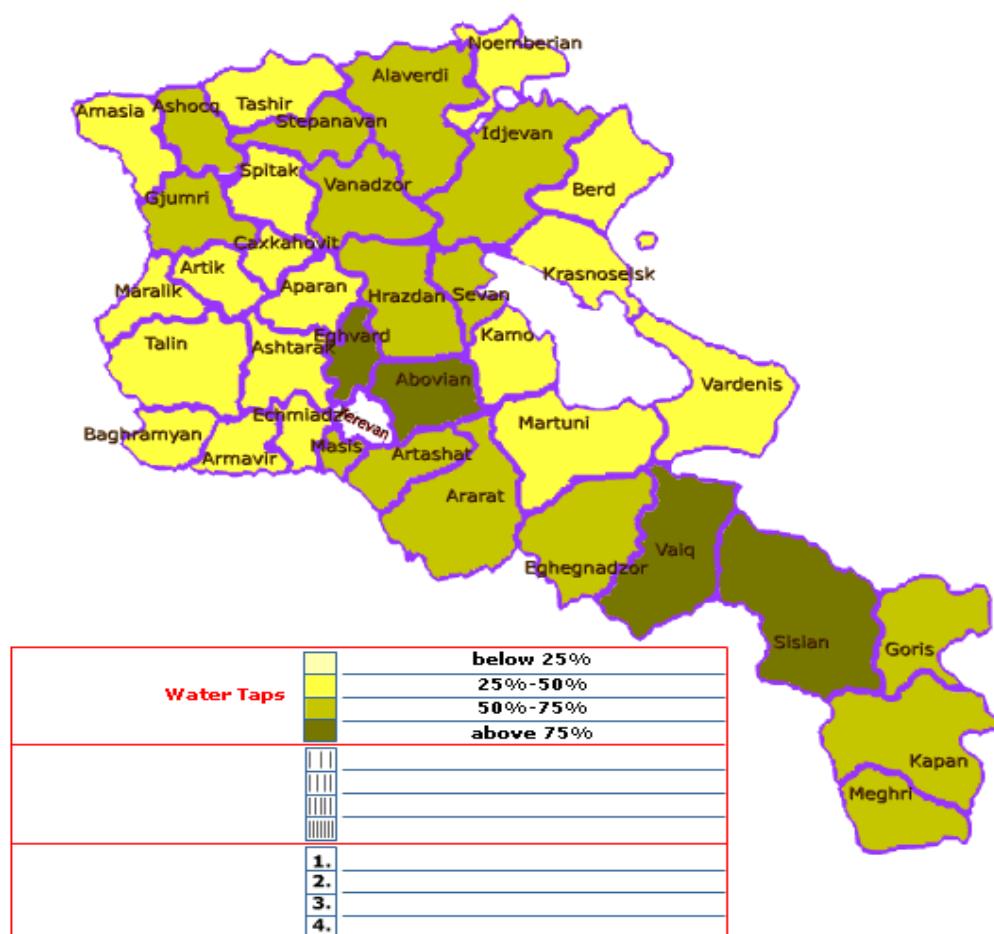
Source: study data

### ***The earlier investments in the sector***

- The total investment in the rural drinking water infrastructure, over the last 5 years, has amounted to US\$ 6.4 million<sup>70</sup>, funded, primarily, by different international organizations (Save the Children, ASIF, KFW, and WFP). Only a fraction of this amount (US\$ 0.5 million) has been funded through community budgets or through the state budget (US\$ 0.1 million). There has also been significant variation in the distribution of that expenditure, with Tavush marz receiving nearly 50% of the total amount, followed by Lori marz which received approximately 17%, and 20% of rural communities receiving no external funding (any funding other than that from the community budget) for the construction/rehabilitation of their drinking water infrastructure.
- There are marked differences between the water supply of urban and rural settlements. Thus, all of the capital's residents and about 95% of Armenia's other urban residents receive centralized water service, whereas the Survey reveals that only 88% of rural communities have full, or partial, access to drinking water with the remainder being dependent either on water vendors or on the water of neighboring villages. Moreover, while the vast majority of urban households (about 87%) have indoor water taps, only 51% of the rural households have access to home taps. The operating connection for the rest of the rural households consists of boreholes and public standpipes. The following figure provides an indication of the proportion of households with taps, as a proportion of total households, whereas the following schematic provides an indication of the geographical distribution of taps.

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<sup>70</sup> The amounts have been provided by the community mayors and are acknowledged to be a significant underestimate of the true figure.

**Table 44 Households with taps as a proportion of total households****Table 45 A schematic representation of the distribution of households with taps**

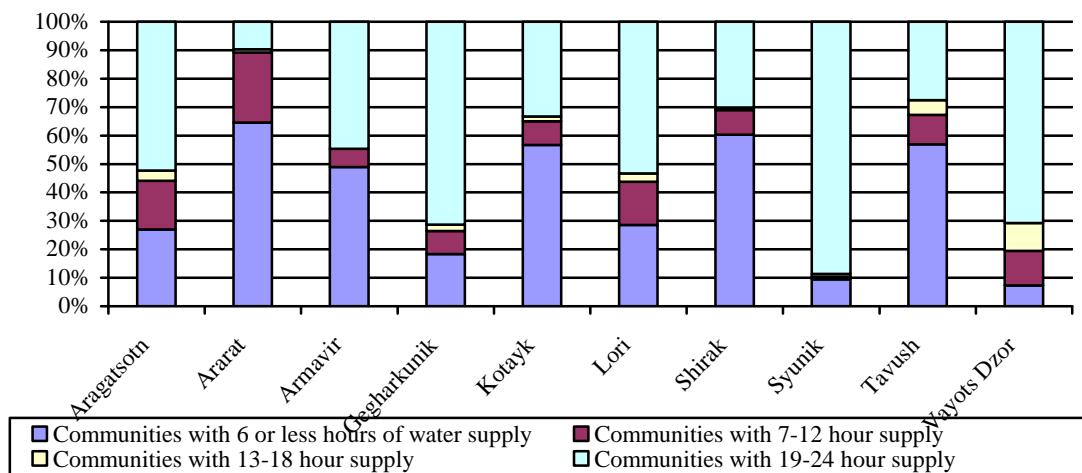
- The limited, or non, availability of individual water taps imposes significant time and money costs on local residents, as they are forced to either collect water from a suitable source, or pay to purchase drinking water. The responses to the survey suggests that approximately 10% of rural households incur significant monetary costs in the purchase of suitable water, paying between 100-1000 dram per bucket (US\$ 0.18 – 1.80). While 86% of rural households expend 1 or more hours to collect drinking water, with 26% expending more than 4 hours per trip to collect drinking water. The burden of these time

costs often fall disproportionately on females, implying that a solution to these problems can have real gender, as well as social, benefits for the communities.

### ***The quality and continuity of the service***

- However, there is a further problem even where drinking water is provided, and that relates to the continuity and quality of the service. The majority of the rural communities that 'benefit' from drinking water provision, only have water for between two to eight hours a day. The average water supply time across all the communities in this category is 14 hours per day, with only 44% of rural communities enjoying round-the-clock service. This lack of continuity is a particular problem in Ararat, Shirak and Tavush marzes.
- The proportion of communities falling into each category also varies across the individual marz, as revealed in the following figure.

**Table 46 Proportion of communities, by marz, and hours of drinking water supply.**



- The constant interruptions to the water supply, the lack of individual water taps and the inadequate quality of the water results in low satisfaction with the quality of drinking water provision amongst the communities. Only 40% of rural communities report the provision of drinking water to be satisfactory or better, whilst 60% are dissatisfied with service provision.
- A further concern for rural inhabitants, where supply is provided, reflects the absence or inadequacy of water treatment, as the quantity of chlorine injected is usually insufficient, particularly to protect against pollution in the distribution networks. Alternatively, there are no facilities to treat water supply from local sources (tube wells, springs), which is generally the case for those rural communities that have decided to shift from the pumped network to gravity network. The poor quality of many of the water pipes further exacerbates the problem, as many are without any cathodic protection, without any internal or external lining, and some are constructed from asbestos. As a result, rainwater and sediment in the pipes mixes with the drinking water, meaning that the quality of the

latter falls far short of acceptable microbiological standards as also reported by the state epidemiological department.

- There are notable differences in the continuity and quality of drinking water provision and the condition of the infrastructure between those rural communities where the drinking water network is operated by AWSC, and those communities which operated their own network. In respect of the former, the average supply time is only 10 hours per day for rural communities receiving drinking water from AWSC, while it is 18 hours per day for those communities that are responsible for their own distribution network. The following table reveals the variation in the condition of the infrastructure, by ownership type, with the infrastructure, generally, in relatively better condition when it is owned by the community. However, even within this category, 55% of the network was reported as requiring significant investment, compared to 64% for infrastructure owned by water supply companies.

**Table 47 Investment requirements of drinking water infrastructure by ownership type**

Network Operator	State of the Drinking Water Infrastructure			
	Total number of communities*	Good (%)	Needs small investments (%)	Needs large investments (%)
Community	454	2%	43%	55%
Water Supply Co.	308	2%	33%	64%
Mixed	8	0%	25%	75%
Total	770	2%	39%	59%

\* Includes only communities with access to drinking water supply

- The main source of the drinking water supply in rural communities was found to be spring water, accounting for 80% of total supply (363 communities), with wells providing drinking water for 14% (63 communities) and the mains network providing the remaining 6% (27 communities).

**Table 48 Source of community water supply, by provider category**

Network Operator	Source of Water Supply			
	Total number of communities*	Centralized (%)	Spring (%)	Well (%)
Community	454	6%	80%	14%
Water Supply Company	308	63%	21%	16%
Mixed <sup>71</sup>	8	50%	0%	50%
Total	770	29%	56%	15%

Includes only communities with access to drinking water supply

### The perception of the local communities about drinking water supply

- Respondents' evaluation of the quality of drinking water service and of the quality of water is low. Almost all sampled communities describe serious problems with the water network.

<sup>71</sup> These are communities that are funded under the KFW water project and have mixed ownership, of which 51% belongs to the State Water Committee, while the remaining ownership is shared between participating villages and cities.

There is a perception that poor quality water was a cause for quite serious health deterioration.

*"Almost everyone in the village has goiter and nephrolith. The water is not good for use, moreover, the lime scale is high, the pipeline is wrecked, waste water leaks into the pipes with fresh water and we use such water. The water supply company installed water meters and stepped back, it does not care about anything... There is a danger of epidemic, however there have been no disease cases...so far."*

**Focus group with men, Araghyugh**

*"In the course of the last 3-4 years, no woman has delivered her first-born, all have had miscarriages. If anyone succeeds in preventing the miscarriage, the first-born is delivered dead. Isn't it obvious? They drink poor quality water; use it in everyday life, bathe; let alone the heavy buckets that they carry. Certainly, that is the end ...."*

**Interview with the head of village administration staff, Vanand**

*"In 1998, the internal drinking water network was renovated in our village. 3 km section of the external network is obsolete and worn out, and the water that come in the village is polluted as a result. Moreover, water is supplied during certain hours, so all the villagers have dug pits in their yards, where their reserve water. The water, after remaining in the hole for many days, becomes stale and loses the quality. During the summer months, due to water shortage, we don't have water for long periods. We have to collect water in pits in the yards, it spoils, but we still drink it. We almost never drink fresh water."*

**Focus group with women, Aragatsotn Marz, Aralez**

*"There is a spring in the upper district and about 70 households had water supplied from that spring, That water is prohibited for drinking, however people use it."*

**Interview with the school director, Mosesgegh**

*"The drinking water comes from Shukee. In summer, the drinking water is sold and they cut off the water supply. They supply water whenever they want to. In winter, they cut off the water supply for several days, and when they resume, the pipes burst. Accidents happen continuously. If they do not cut off the water supply, there will not be so many accidents. In addition, the quality of water is extremely poor - it is rusty. No chlorinating is done. An accident happened in the kindergarten last year: people from the sanitary station tested water and found out that it was not good for drinking. Nevertheless, we use this water and pay for it. The amount is taken in advance for the whole month. For example, today is March 12, we did not have water 7 days ago, but we paid for the whole month. It is no fault of the Village Head; it is the fault of the WSC. The supplied water is insufficient. Every household has constructed two- or three-ton capacity water reservoir, and collects water, when available. If you need to give a glass of water to the sick man, it takes hours to fill the glass."*

**Uyts Male Focus group interviews**

## The Sewerage System

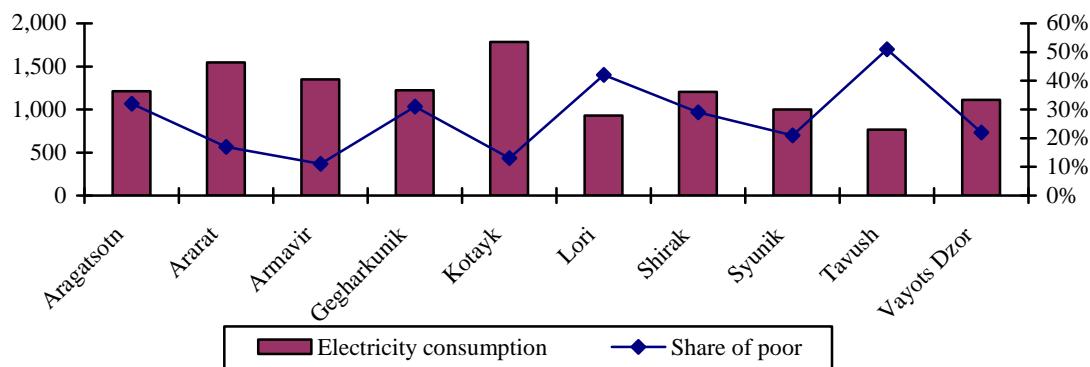
- The survey revealed that the centralized sewerage system in the majority of the communities is virtually non-existent, with only 11% of rural communities, on average, having access to a centralized sewerage system. Shirak and Ararat marz are the best provisioned, with 205 of their communities having access to a mains sewerage system, whereas in Tavush and Vayots Dvor, the proportion of communities with access is in the low single figure percentages. The remaining communities rely on private arrangements to dispose of sewerage.
- A second factor is that in those communities that do have access to the centralized sewerage services, the lack of recurrent expenditure on maintaining the wastewater network has had a negative impact on the sewerage and wastewater treatment plants, rendering both inadequate in operational terms in the majority of the cases. The result is leakage, contamination of the drinking water supply and health risks to the community.

## The Electricity Sector

- The provision of reliable energy, particularly a reliable electricity supply is both a basic need and a necessary condition for sustainable economic development. The lack of a reliable supply has a significant impact both on the living standards of the rural population (by denying them opportunities to meet basic human needs such as cooking, heating, and access to information), and on the economic development of rural communities.
- The survey data reveals that rural households consume 410 million kwh of electricity, which is roughly one-third of the country's total residential electricity consumption. The average annual electricity consumption per rural household is 1,276 kwh, however there are significant differences between the average consumption of different rural communities (a range of between 224-2705 kwh per annum). This could be explained, at least partially, by differences in the economic development and poverty status of the communities as well as the adequacies of the metering system in many the communities.
- The electricity distribution network in Armenia is owned, operated and maintained by the privately owned joint stock company, Electrical Network of Armenia CJSC. The payment for electricity forms a sizable amount of the total expenditure of households, amounting to approximately 5% of total household expenses<sup>72</sup>, or 87% of expenditures for utility services. However, this share is lower in rural areas, falling to 3% of rural household expenses, or 84% of expenditures on utility services in those areas, possibly reflecting consumption restraint due to the higher perceived cost.

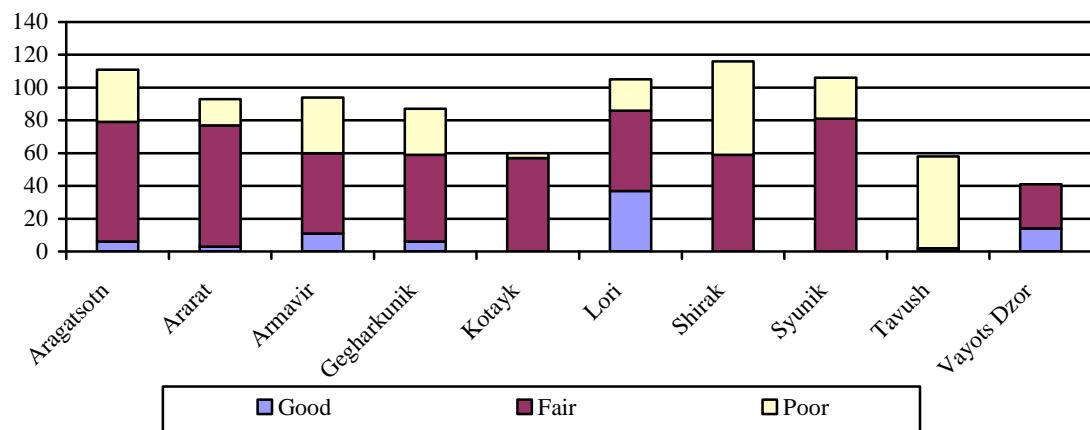
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<sup>72</sup> "Social Snapshot and Poverty in Armenia", Statistical Analytical Report, Yerevan 2003

**Table 49 Average annual electricity consumption per household, per community in Kwh (1999-2003)**

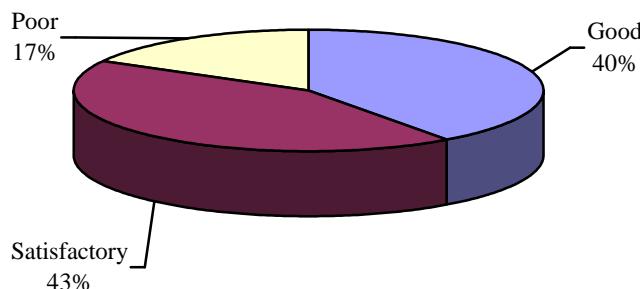
### The condition of the infrastructure

- Though overall the rural population does have access to the electricity supply, the electricity network is extremely (in most cases over 40 years) old and does not comply with technical standards for safety and reliability. The Survey data suggest that in less than 11% of communities the electricity infrastructure is in good condition, 76% needs investment, albeit small, and 13% needs large investments to continue functioning<sup>73</sup>.
- There are also differences in the condition of the infrastructure across the marz, with the network in comparatively better condition in Lori and Vayots Dzor marzes while in Shirak, Tavush and Lori marz it is largely in poor condition. Table 45 presents the condition of the electricity infrastructure by marz.

**Table 50 The condition of the electricity infrastructure, by marz**

<sup>73</sup> The condition of the electricity network based on the community mayor assessments.

- The total investment in the electricity network, funded from the community budgets over the last five years (1999-2003) have amounted to US\$ 0.06 million. Although this is a conservative estimate of the true costs, as it excludes the provision of community labor and other in-kind contributions used in parallel to any contribution from the community budget.
- The impact of inadequate maintenance is seen in the frequent interruptions in electricity supply, even when timely payments are made. These interruptions average 20-25 hours per month, and are primarily related to the extremely poor condition of the grid, and its fragility under severe weather conditions. In addition, there are serious safety concerns about the condition of the grid in a large number of rural communities since the electricity cables and poles damaged by bad weather can fall on residential houses, and are left without repair for sometime. There are also frequent voltage fluctuations and surges that damage household electronic appliances.
- Despite the poor overall quality of the network, and the limited amount of recurrent expenditure on the network, public satisfaction, as expressed by rural residents in the survey, is high, with 83% being satisfied with the provision of electricity, out of which 40% think that the provision is 'good', as displayed in the following figure.

**Table 51 Respondent satisfaction with the provision of electricity**

- There are a number of possible reasons for this; firstly, individual perceptions are comparative, so despite the service being poor by national or international standards, it is good in comparison with the provision of the other utilities in the rural communities. Secondly, despite the poor quality the supply is there, on demand, metered with a reasonable certainty of service.
- The following represents the comments garnered during the community meetings:

*"During the recent windstorms our village was seriously damaged, especially the poles. We don't have power supply at all. The poles are like hair-thin rotten paper. If they fall down, they may kill about 50 people. It can go on standing for 1 or 2 months longer; what will happen afterward ... it is 50 years old. That is the biggest horror for the village. 3-4 days ago 10-15 poles fell down on the houses because of winds, killing the cattle, ruining houses. We, all the villagers, have collected money, repaired 2-3 houses, 4 still remain in ruins. The residents are now living with their relatives."*

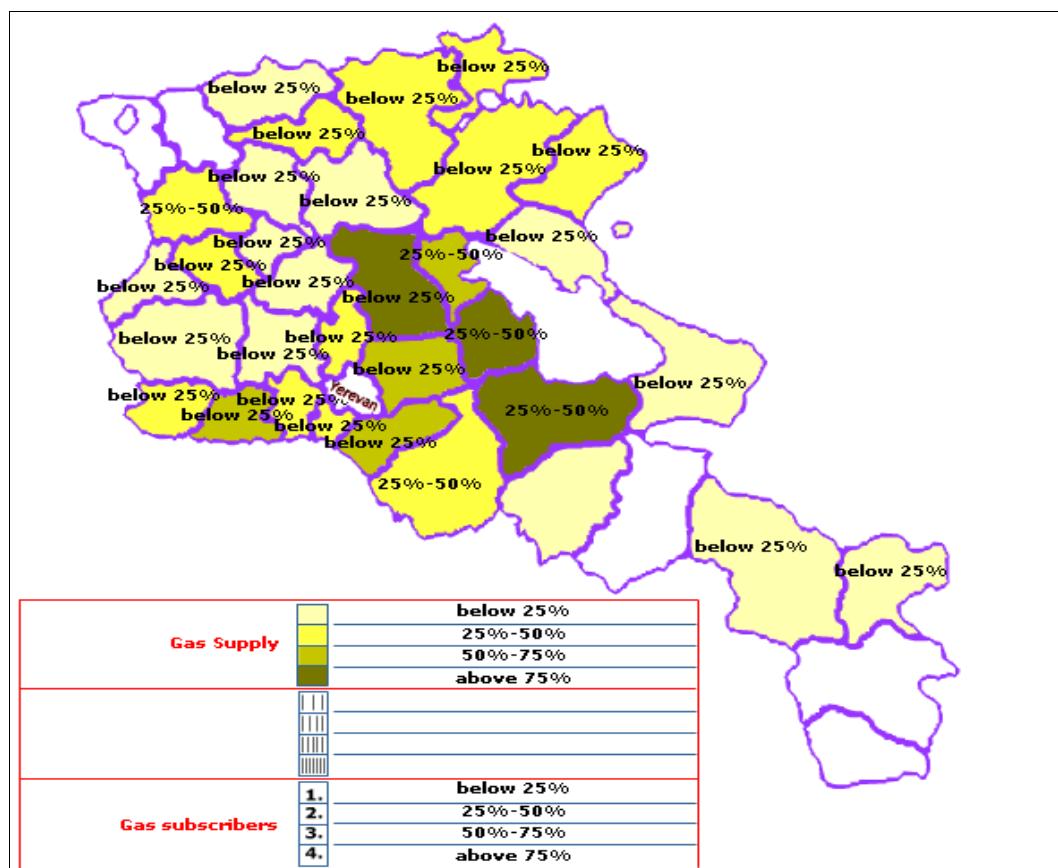
**Nahapetavan community**

- In Arevshat village of Armavir Marz, the power poles may fall down at any time. Several poles have already broken and the high-voltage wires lie on the ground, even in the yard of a residential building. The respondents reported that the power station did not care about the repairs; the community members managed to acquire replacement poles, but could not find the relevant machinery and a specialist to do the work. A similar situation is described by respondents in Kut:

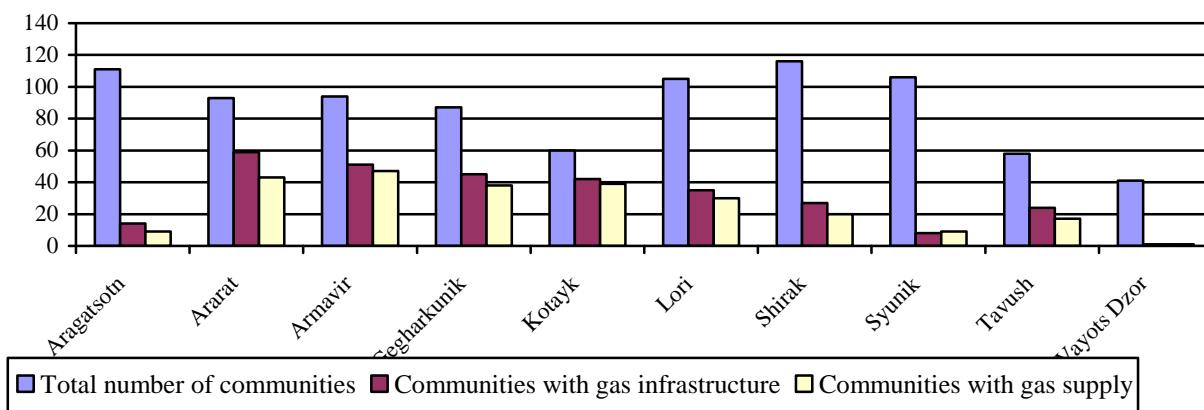
*"Poles broke down because of winds, and we had to disconnect that section, so that power is supplied to the rest of the community. Now, 2-3 households are deprived of power. We are waiting till the windstorm is over, so that we can pull out the old poles that are standing idle in the field and see what we can do with them. We replace old poles with other old ones that are in a better shape. We have never addressed the power station, we solve our problems ourselves."*

**Interview with the school deputy director, Kut****The Gas Sector**

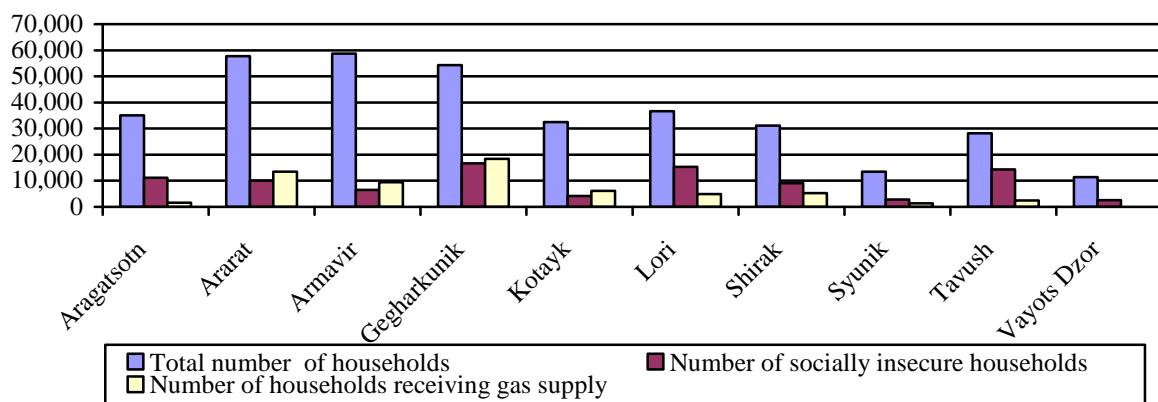
- The entire gas transmission and distribution infrastructure, including underground gas storage, are owned, operated and maintained by ArmRusgasprom CJSC, which is 45% owned by the government of Armenia, with the remaining 55% of company shares being controlled by the Gasprom of Russia (45%), and ITERA International energy corporation (10%).
- The gas distribution infrastructure in Armenia was extensive with 1800 gas regulating stations, 800 electro-chemical protection stations, and over 9000 kilometers of distribution network.. This infrastructure was, prior to 1991, supporting gas supply to 480 thousand subscribers, covering 42 cities and towns and 365 villages. However, this extensive system began to breakdown following the atomization of the FSU, and gas supply to residential customers was gradually disconnected over the period 1991-97, reflecting problem with the provision of gas, at a national level, over this period. The following figure displays the distribution of gas supply, together with an indication of the number of subscribers, as a percentage of total number of households, in the country.

**Table 52 A schematic representation of the distribution and number of subscribers for gas**

- From 1998, supply was reconnected to small number of the residential customers, primarily in urban areas, and gas reconnections in the capital have been progressing actively. By contrast, the reconnection of gas supply to the rural areas is still at a very low level, and the survey data reveal that gas infrastructure is available in only 37% of all rural communities. Of this proportion, only 78% of communities that have the gas supply infrastructure receive a supply of gas (29% of total communities), as a number of communities have the supply facilities (8% of total communities) but do not receive gas. This is a reflection of the deterioration of the infrastructure, which renders it unsuitable for use.
- Ararat, Armavir and Kotayk marzes have the largest proportion (over 50%) of rural communities that have the infrastructure and receive gas supply. Overall, the demand for gas supply is higher in the communities that lack alternative types of fuel for heating and cooking purposes (mainly wood and dung). receive gas supply. The following figure displays the availability and access to gas across the marz.

**Table 53 Availability and access to gas supply by marz**

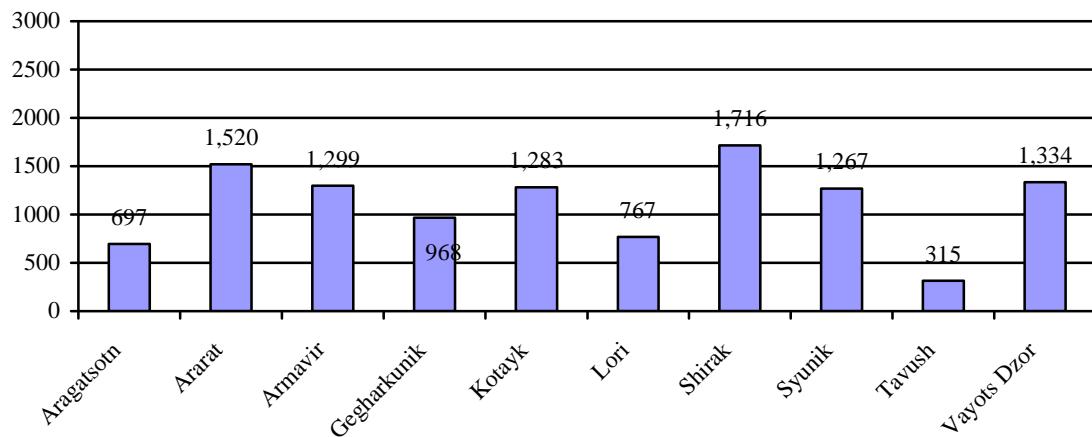
- The access of rural households to gas supply is even lower, reaching approximately 18% of total rural households. This is related, primarily, to the inability of poor households to pay for the connection of the gas to their houses and/or to make the prepayment for the connection. The data collected during the course of this study suggests that over 50% of households in rural communities receiving gas supply, do not have access to gas supply in the homes. Possibly not surprisingly, the proportion of households within a community with access to gas supply is higher in marzes with a lower share of poor.

**Table 54 Access to gas supply by rural households**

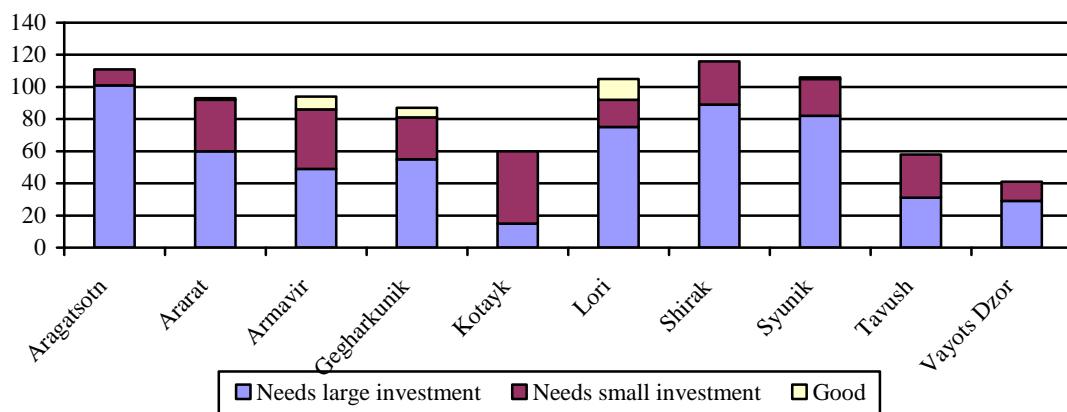
- According to ArmRusGasprom data, the average annual consumption of gas is under 850 cubic meters per gas subscriber. However there are significant differences between the consumption volumes both between marzes and between different communities within the marz. The different levels of consumption can be explained by differences in the climate, the availability of free alternative types of fuel, such as cattle dung or wood, together the relative wealth or poverty of different communities. Thus, communities with nearby forests or with large number of cattle (therefore having dung in excess of land

fertilization needs) continue to use these alternative fuels for heating/cooking purposes even if they receive gas supply. The survey data reveals that the average annual consumption of gas varies between 300 and 1,700 cubic meters for different marzes of the country, as revealed in the following figure. On average, rural households consume more than urban once.

**Table 55 Average annual gas consumption by households, by marz (m<sup>3</sup>)**



- Generally, those rural communities that receive gas supply consider the quality of the service as satisfactory. The gas supply is mostly continuous and any interruptions are mainly related to accidents that result from the poor state of the infrastructure; Over 50% of gas network is over 15 years old and due to the insufficient maintenance, the network has deteriorated. The network was reported to be in fair condition in the remaining 29% of those communities that have the infrastructure. Overall, the condition of the gas infrastructure is better in marzes with larger share of rural communities receiving gas supply, i.e. Ararat, Armavir and Kotayk, as revealed in the following figure.

**Table 56 The condition of the gas infrastructure in the rural communities**

- The total investments of ArmRusGazprom in the gas infrastructure over the last two years (2002/2003) have amounted to US\$ 8.3 million, of which only US\$ 0.6 million has been spent for the gasification of the rural settlements. Furthermore the survey data suggest that allocations for the repair, or rehabilitation, of the gas network from the community budgets for the last years have been marginal, amounting less than US\$ 0.1million.
- The company is planning to gasify 133 villages in the upcoming two year period. These are more affluent villages, located nearby the main gas pipeline, which are more densely populated and where the majority of the population can afford the initial connection costs. Theses three factors, the distance of the community from the closest main gas pipeline, the density and affluence of the population, have a direct impact on whether and/or if a particular rural community will be connected to the gas supply. According to the Survey, on average, the distance of those communities not having available gas infrastructure from the nearest gas main pipeline is 12 kilometer, although there are significant variations between marzes as well as between individual communities. The implication is that private sector investment in extending the supply network to the sparsely populated, remote, rural communities is not a viable investment in commercial terms, and that the market failure will need to be addressed by public sector investment.

### **The perception of the local communities in respect of gas**

- When asked to describe the quality of the gas network and the quality of gas delivered, a few respondents described a picture of an inadequate, or non-existent, network, and poor, frequently, interrupted service, epitomized by the following comments.

*"Much of the gas network renovation has been done at the expense of the population; besides, ARMROSGAZARD has built 3.5 km-long pipeline. However, as the pipes are very old, we can get disconnected from the main pipeline just because of wind or snow. We believe that this sector needs reforms."*

**Interview with the village community head, Noratus**

- Respondents also complained that the quality of the provided gas is low, with the gas being “half air” and delivered with insufficient pressure.

*“Sometimes, the pressure suddenly falls, and then suddenly grows.”*

*“Once my house was about to explode due to a sudden growth in pressure. Good my neighbor was home. He is a specialist and immediately got hold of the situation.”*

#### **Focus group, Mastara**

- There is one other significant problem with gas, despite being more affordable than electricity and wood, and that is gas is still too expensive for some community members – this relates primarily to the installation of pipes connecting the house with the community network. In some communities, a large percentage of households cannot afford to pay for this connection to the network. For example, in Shahumyan community of Ararat Marz, about 30% of households do not use gas - they were not able to afford pipes brought to their houses.

#### ***The provision of drinking water***

- A number of specific reasons were mentioned by respondents when asked why they chose drinking water as an investment priority, although the study found that in the same communities (with the same quality of service provision) women more often prioritize investment in drinking water than men. Also, the extreme poor sometimes have different preferences. For example, for them, sometimes the availability of low-quality water is sufficient:
  - (4) Most importantly, drinking water was chosen because the availability of clean water is regarded as essential for health. Low quality of water was perceived as leading to quite negative health consequences;
  - (5) Another major factor was the opportunity cost (in money or time), which was cited as a reason by a number of respondents. With no drinking water available through a pipeline, people often have to buy water from trucks for a high price, or spend quite a considerable amount of time collecting water from an, often, remote spring and carrying it back to the community; and
  - (6) A third reason is the economic one, with the perception of a number of respondents being that it was important for the economic development of a community. One example of such a community is Gegharkunic Marz, where one of the major activities of the population is fish farming, which requires a constant supply of high quality water.

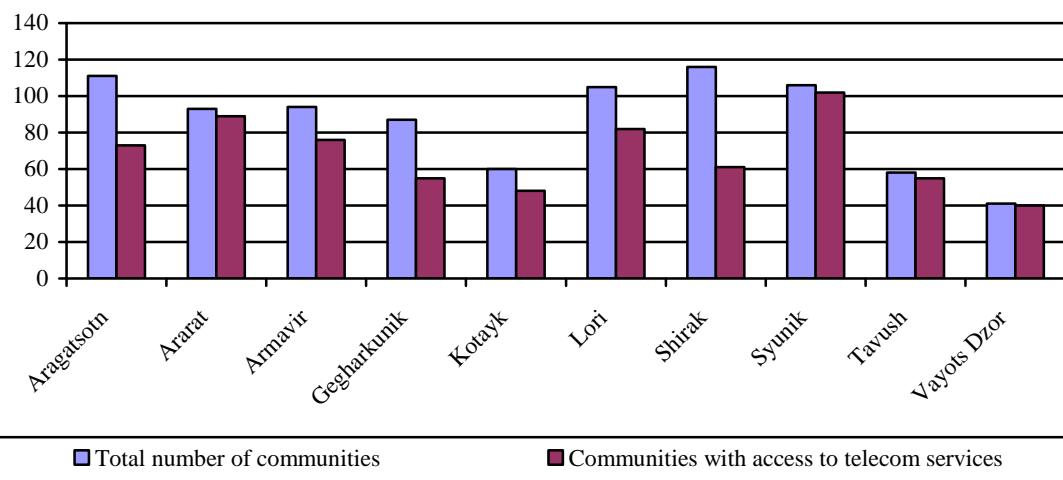
#### **The Telecommunication Sector**

- The provision of adequate telecommunication services is a key asset for rural communities, providing an important link with the outside world. This is especially true for remote rural communities, where the roads may be impassable for some of the year, and where intra-national, or international, rural-urban migration has created a significant ‘rural’ diaspora, that would be incommunicado without a telecommunications link. In addition,

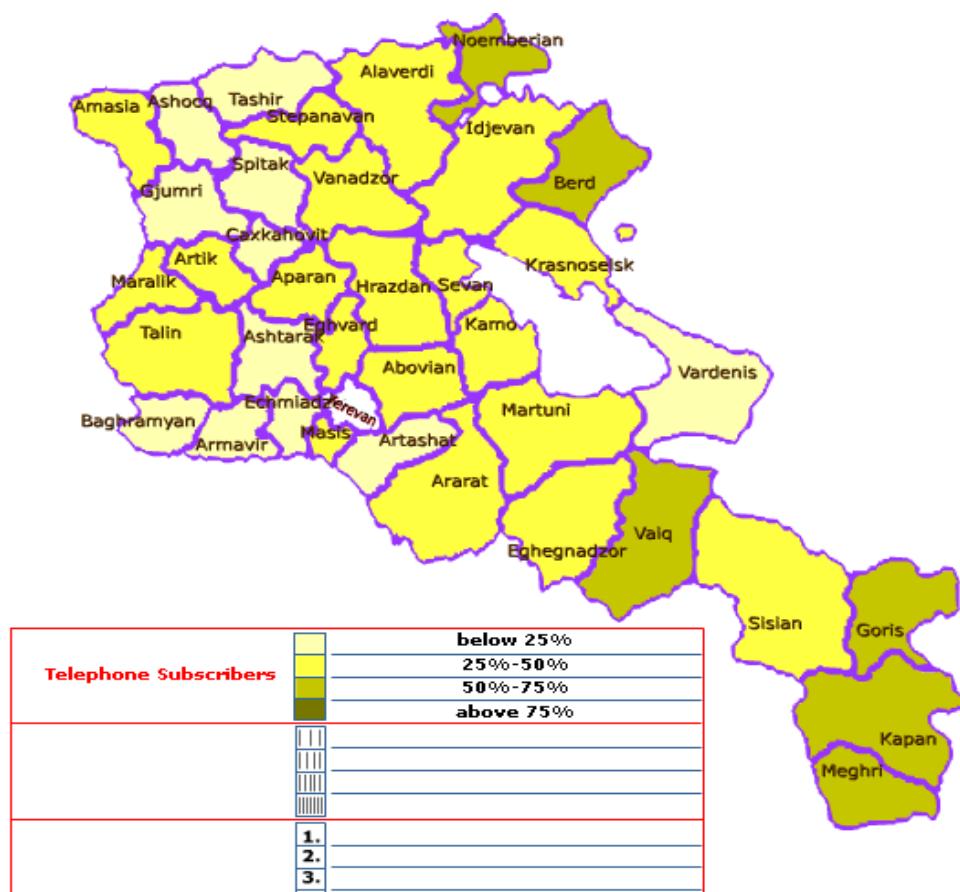
earlier research has also shown that the provision of telephone services in a community can engender significant benefits via improved information flow in terms of the attainment of lower input prices, higher output prices and additional health benefits.

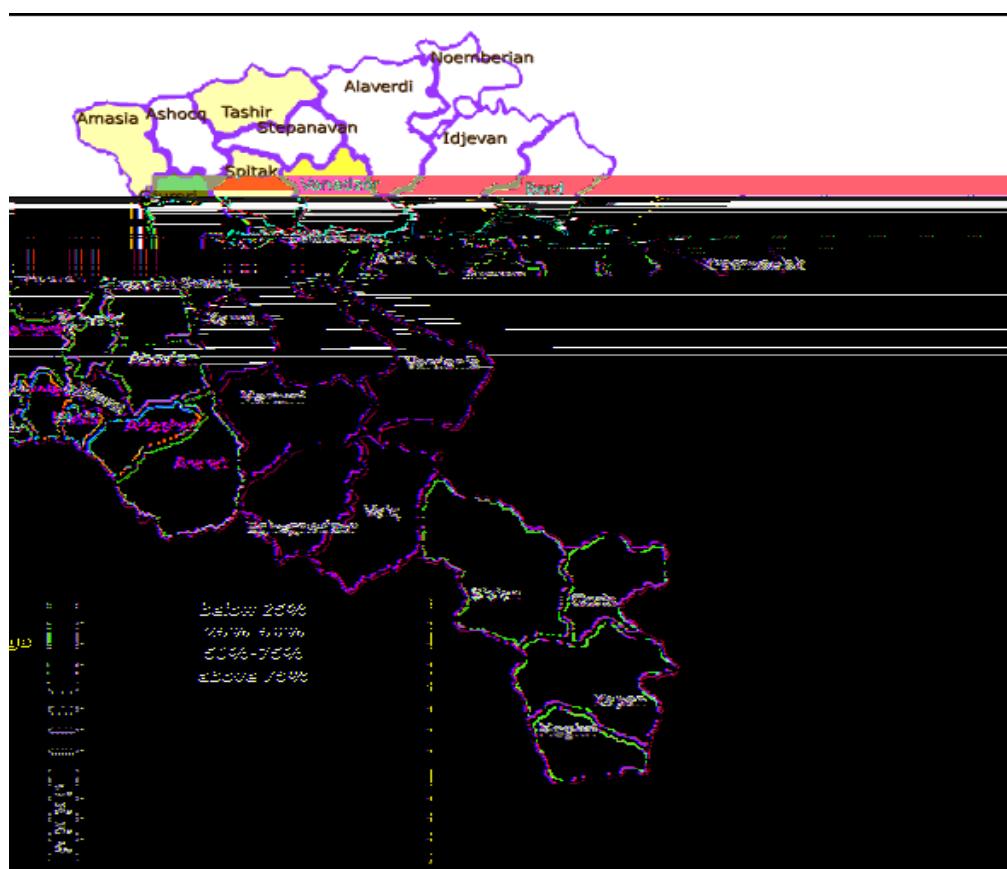
- The telecommunication infrastructure is owned, operated and maintained by ArmenTel, which is a wholly owned subsidiary of a private Greek telephone company OTE. Superficially, access to the system appears acceptable in rural areas, with 79% of rural communities having access to telecommunication services. However, this figure overstates the actual access, as in many cases it consists of a single telephone, available either in the mayor's office or in the post office of the community. Moreover, in the most cases the quality of service is extremely poor and the round-the-clock service is available only in very few communities. Less than 30% of rural households have individual telephone connections, with access particularly low in the rural communities of Aragatsotn, Gegharkunik and Shirak marzes as revealed in the following figure.

**Table 57 Access to telecommunications services, by marz**

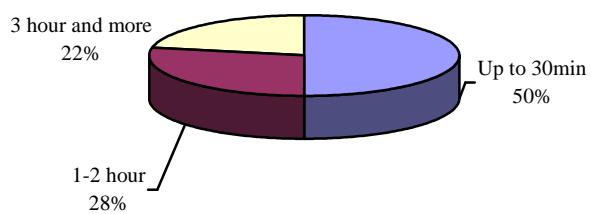


- The problem of limited access to land based telecommunication services is exacerbated by the fact that over 68% of rural communities are outside the mobile phone coverage area (Tavush, Vayots Dzor marz), and even in those areas where there is coverage, the signal is weak and unreliable. Possibly not surprisingly, access to the internet is also very low with only 7% of rural communities having access.
- The following two figures indicate the proportion of telephone subscribers, as a proportion of the total number of households in each area, and the extent of the coverage of cellular networks in Armenia.

**Table 58 The percentage of households with telephone subscriptions as a proportion of total households**

**Table 59 The extent of the cellular network coverage in Armenia**

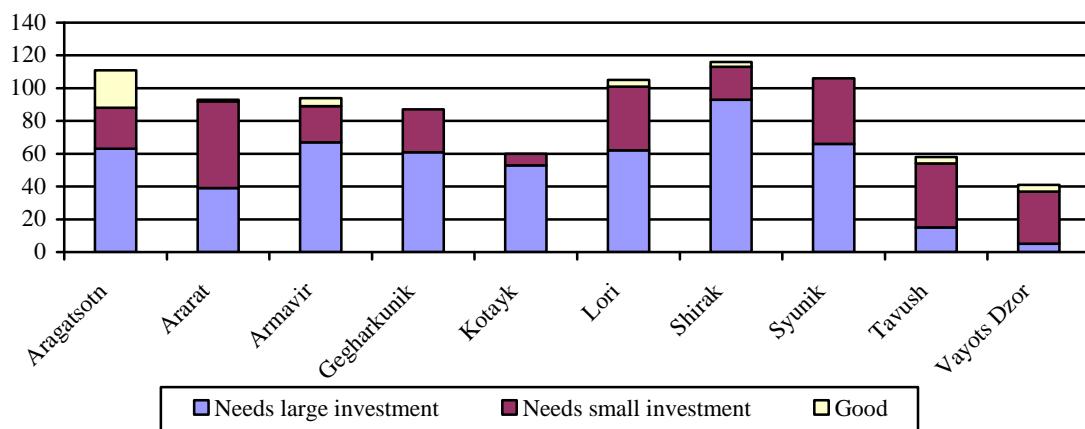
- The absence of availability of individual land lines or mobile phones results in significant time and money expenditures for rural inhabitants who wish to make a telephone call. The scale of these expenditures was revealed by the survey, where it was found that some rural inhabitants spend up to several hours (up to 8 hours in cases when there is no telephone in the community) and pay fees, sometimes as high as US\$ 3-5 per call. The following figure reveal the proportion of rural inhabitants falling into the three categories of time expenditures in making a telephone call.

**Table 60 Proportion of rural respondents and time required to make a phone call**

## Investments in the network

- The telecommunication infrastructure has suffered the same neglect in terms of recurrent expenditures and maintenance as the other networks, serving the rural communities. The result is that both the internal and external transmission systems are in poor condition<sup>74</sup>, with the responses to the survey suggesting that the infrastructure is in good state in less than 3% of the rural communities, while it is in a poor condition in 61% of communities, and a fair condition in the remaining 35%. The condition means that large investments are required in over 50% of rural communities in most of the marzes, as revealed in the following figure.

**Table 61 The investment requirements of the telecommunication networks by marz**



## The level of respondent satisfaction

- The quality of the telecommunication service is generally regarded as low and unsatisfactory, by 70% of rural residents, with 19% regarding the service as satisfactory and 11% regarding the service as good. The quality of the long distance communication is noted to be especially poor. There are frequently long delays in getting a connection to the marz center, or the capital, if it is possible at all. It was reported that long distance calls were impossible in 20% of all rural communities, and it could only be achieved with difficulties in another 50%.
- One of the problems that preclude a solution to these difficulties is that the private sector telephone operator lacks any financial incentives to establish, or rehabilitate adequate telecommunication infrastructure in these marginal rural communities. This is a generic difficulty with any network utility<sup>75</sup>, and the solution to the market failure is for the public sector to step in and make the investment, or enter a contract that provides a subsidy for the provision of the service to the peripheral areas.

<sup>74</sup> The condition of the telecommunication infrastructure is classified based on the Community Mayor assessments.

<sup>75</sup> See Newbery (2002)

### The perception of the local communities in respect of telecommunications service

- Although most of residents don't consider a telephone service as important as the other infrastructure services, in emergency situation its availability can be critical, also for some residents it is of major necessity on the everyday basis:

*"Once, there was a car accident on the other end of the village. We tried to call Artik, we couldn't reach them. One of the passengers died before we were able to find a car."*

#### **Focus group with men, Mastara**

*"For me, telephone is the second most important problem after drinking water. I have 3 children abroad, my husband is in Russia, 2 of my sons are in the army; there is no telephone communication in the village, even at the post office, the one there is disconnected. I cannot call my children, the cellular phone is very expensive, and I can't afford it, each call costs 3000 AMD; it is very hard, impossible for me to fetch that amount. I wish there were one normal telephone to keep in touch, otherwise I have to go Ashtarak or Yerevan every time and make additional expenses in such desperate living conditions".*

#### **Focus group with women, Ujan**

- Those respondents, who have access to telephone service, complain about the **low quality of service**. There is no community among the surveyed that did not express their low opinion of the quality of telephone service. Some are even saying that paying service arrears doesn't make sense since if service is restored, the quality is so low, it is better not to have it at all. The equipment at telephone stations are heat-sensitive, they do not work at the extremes of winter cold and summer heat. They do not work when it rains, or when there is a cut in the supply. In the past, there were accumulators that used to supply power during the cut-offs, however they are out of order now.

### The preferences of the communities in respect of ownership

- The general preference of the communities towards the ownership of the rural infrastructure, within their domain, is clearly split depending on the type of infrastructure. In the case of electricity, gas and roads, a number of respondents were in favor of private or state ownership, because they perceived that communities don't have financing and/or the capacity to maintain the assets. However, there was also explicit recognition that the condition of the assets in these sectors, owned by private sector or large public sector companies, was poor, and that it was difficult for the community to communicate complaints to the owners and demand repairs.
- In the case of the supply of water, both drinking water and irrigation water, the preference was clearly the opposite with strong support for community ownership of the intra-community networks.

*"I do not accept private ownership, and I don't count on state ownership either. We are left with Village Council and the Head. If we want to have a proper "master,"- infrastructures should belong to us."*

**Interview with Noratus Village Council member**

- There appear to be a number of reasons for this: Firstly, there is the reality that a community is likely to look after an asset that it owns. This was expressed succinctly by one respondent that "...the villagers will not saw the branch on which they sit". Secondly, there is the perception, borne out by experience, that the village authorities are likely to take a more compassionate attitude to non-payment by individuals within a community. And finally, villagers are able to communicate directly to the village authorities, who are then more likely to act promptly when a problem emerges. The following comments epitomize this perspective:

*I see a direct connection between the type of ownership and the level of maintenance. We will take better care of our property than someone else's property. The ASIF has passed to us the drinking water internal network. Now, we don't have any problems with any of the pipes, we have not broken one. We, both local administration and the villager, keep an eye on it. As to the state-owned water pipeline, it slips everyone's attention – it is ownerless.*

**Interview of Goghavt Community Head, Shirak Marz**

*"If something goes wrong all of a sudden, it is the inhabitants who fix it. Every village district solves its problem: the Village Head organizes and the people work. For example, there was a burst in the water main, and our village district applied to the Village Head, he found the welder and asked him to come to the village. The man did the work free of charge; however, the inhabitants of our village district took care of the oxygen, electrodes and provided meals to the welder. Organizational matters are put on good grounds, and that is due to our Village Head."*

**Interview with the Arpi Village Council member, Shirak Marz**

*"We do the repairs of the drinking water pipeline. This year the central water pipeline froze, and all the villagers went to that site. In December, the tractor-drivers of our village dig the soil, and the villagers carried tires and burnt them to keep the pipeline warm. By the time people from the Water Company arrived from Yeghegnadzor, we had done everything. We succeeded in opening our pipeline with great difficulty, and prevented further damage. All the costs were covered by the Village Administration, and the villagers did the works."*

**Interview with the Meghrashen Village Council Head**

- One possible reason for this preference for local ownership is the negative attitude of the majority of rural inhabitants to state, or private, ownership is the lack of trust that outside owners, both the state and the private sector, will act in the interests of the community.

*"Private or state owned – there is great danger: both will think about their profit and not do a kopeck-worth repair. We will not be able to make our voice reach to them, and then, they will*

*say: “Take it or leave it, that how things stand, I am the owner and do whatever I wish to do – even “plant boiled okra””.*

**Interview with the Arevashat Village Council Member**

- However, the issue of community ownership is almost a ‘second best option’, as again if service quality was guaranteed, and supply could be metered at the household level, which would allow households the flexibility to consume as much as they could afford, at a, potentially, higher tariff, then ownership is unlikely to be significant. One could argue that that the transactions costs of public, or private, with appropriate regulation, ownership of the whole network are likely to be lower, which is the traditional argument for one public sector network provider. The opposite, with community ownership, whilst attractive in principle, raises transactions costs, and over time requires some consolidation to try and realize economies of scale in maintenance interventions<sup>76</sup>, however, if the former cannot be effective, then the community may be a suitable ‘second-best’ option for ownership of some parts of the network.
- A second issue in the call for community ownership is the affordability issue, with many inhabitants calling for community ownership because the perception is that the community would be more tolerant on non-payment. Again, however, this is a ‘second-best’ argument as a more efficient means of subsidizing those households would be to make the transfer explicit, though the family welfare plan or something similar.considerations.

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<sup>76</sup> For a fuller discussion of this issue in the road sector see Sirvio & Talvitie, (2004)

## ANNEX G – THE DECISION MATRIX

- This annex describes the development of a methodology, ‘the decision matrix’, that has been constructed, using the empirical data collected as part of the study, to assist the GoA in selecting the most appropriate rural infrastructure investments, from the set of all potential investments. To this end a number of criteria were defined, to reflect the preference of the community, the cost effectiveness of any intervention, poverty level, and the potential contribution towards economic development in the form of agriculture, tourism or industrial development. The decision matrix can be used for the prioritization of interventions at country-wide as well as regional levels, across the sectors as well as for each individual sector.
- The broad approach can be considered as a form of stylized multi-criteria analysis, where potential interventions are ranked based on the scores allocated in respect of the defined criteria. The following section identifies the criteria used in the decision matrix, together with the rationale for their selection..

### The criteria in the decision matrix

- The criteria included in the decision matrix were explicitly selected to reflect both the long and short term strategic objectives of the government, such as poverty reduction, economic growth and effective allocation of scarce public resources. In addition, the decision matrix incorporates the preferences of communities thus, to some extent, also addressing affordability and sustainability issues. The community preference is based on the voting results during the community meetings, and in the Decision matrix , it is represented by the percentage of participants in each meeting who ranked a particular piece of infrastructure first, second and so on. Only the first three preferences have been included in the matrix,
- The number of people eligible for the poverty benefit plan is used as a proxy for poverty due to the paucity of poverty data at the community or rayon level. The formula used to calculate cost-effectiveness is the following, and was selected to try and alleviate potential distortions where the size of the population was small, but the absolute number of poor households was large, relative to comparative communities:
  - number of people /cost of intervention + number of poor/cost of intervention
- The intervention cost for all communities and types of infrastructure has been estimated in the course of this study (see the following Annex for more details).
- It is important to mention that these costs are based on the current technologies, standards, and unit prices prevailing in Armenia. Also, the interventions are based on the principles

of universal access, although not explicitly defined by the government of Armenia. In some cases, significant cost reductions could be realized as a result of introducing more cost-effective technologies, streamlining excessive standards and formulating concept of more realistic and affordable universal service. For example, in case of roads, a reduction in cost of approximately 50%-70% could be realized, based on experience elsewhere in the region, using new standards and technologies. The following represent a summary of the potential options that were identified as possible alternates:

- 1) payphones and/ or tele-centers versus private phones in telecommunications;
  - 2) good quality, round-the-clock water from fountains, boreholes, etc. at the 1 kilometer distance versus individual taps;
  - 3) “lifeline” roads of four meter width, with no or narrow shoulders, bitumized or gravel roads versus 4.5 meter wide partially paved roads in mountainous areas;
  - 4) septic tanks versus centralized sewerage; and
  - 5) the gas supply to be only offered at the household level.
- If the policy decision is to consider these options, then they could be added to the decision matrix in a short time.
  - Finally, the potential for growth for each rayon has been estimated by a number of national experts, using the Delphi method, which is discussed in Annex K. The intention of the exercise was to use their expertise to make sure that those areas that are considered to have the highest growth potential, are represented additionally in the Decision matrix, to provide the Government with the option to focus interventions in areas of highest economic potential.

## ANNEX H - THE COST ESTIMATES IN THE DECISION MATRIX

### *The road infrastructure*

- The costing of investments for the rural roads has been carried out for the optimal roots connecting rural communities to the interstate roads or to the nearby city. This approach will allow to focus on the most urgent investment needs for roads. Thus, while the total length of the road network connecting rural communities to the interstate roads or nearby city is around 6,142km the length of the optimal roots is roughly 60% of the entire network (3,692km).
- Due to the absence of reliable data on the condition and type of paving for the intra-community roads, the investment costs for the optimal root have been estimated excluding intra-community roads. Therefore, the costing is based on 2,702km length of optimal root<sup>77</sup>. It should be noted though that overall the condition of intra-community roads is poorer than the rest of the roads network since the budget limitations have limited rural community investments, if any, to small scale repair and rehabilitation works.
- The following key input variables are underlying the investment estimates:

**Table 62 Range of Road Maintenance Interventions and Unit Costs**

<b>Work Code</b>	<b>Description of the Work</b>	<b>Unit Cost</b>	<b>Unit Measurement</b>
AB50+L30	Single layer of asphalt paving with 50mm of width and with 30mm leveling	10.65	\$/m <sup>2</sup>
AB50+50	Double layer asphalt paving each with 50mm width	14.5	\$/m <sup>2</sup>
AB40	One layer asphalt paving	7.9	\$/m <sup>2</sup>
SD	Surface dressing	6	\$/m <sup>2</sup>
BG	Black gravel paving	5	\$/m <sup>2</sup>
G	Gravelling	2.5	\$/m <sup>2</sup>
P	Patching	2	\$/m <sup>2</sup>
CR	New construction of republican roads	70	\$/m <sup>2</sup>
RR	Rehabilitation of republican roads	40	\$/m <sup>2</sup>
CM	New construction of marz owned roads	50	\$/m <sup>2</sup>
RM	Rehabilitation of marz owned roads	30	\$/m <sup>2</sup>
O&M1R	Adequate operating and maintenance works for republican roads	1200	\$/km
O&M1M	Adequate operating and	800	\$/km

<sup>77</sup> This is the total length of 3,692km for the optimal root less 990km of intra-community roads.

	maintenance works for marz owned roads		
O&M2R	Minimum satisfactory operating and maintenance works for republican roads	1000	\$/km
O&M2M	Minimum satisfactory operating and maintenance works for marz owned roads	600	\$/km
O&M3R	Most urgent operating and maintenance works for republican roads	800	\$/km
O&M3M	Most urgent operating and maintenance works for marz owned roads	400	\$/km

\* Unit costs are based on the actual road construction works of recent years in Armenia.

- Based on the condition of the road and the type of paving three different road rehabilitation options have been estimated:
  - *Rehabilitation 1*: rehabilitation of the surface with its strengthening or with replacement of the type of paving with the type one level better than the existing one;
  - *Rehabilitation 2*: rehabilitation of the surface maintaining the existing paving; and
  - *Rehabilitation 3*: rehabilitation of the surface with replacement of the type of paving with the type one level lower than the existing one.
- It should be noted that the cost of rehabilitation works in each of these options includes only road surface rehabilitation while other costs related with road artificial structures, road security structures, horizontal and vertical profiling and embarking, etc are excluded. Detailed analysis of the road network would be necessary in order to estimate these excluded investment costs as well.
- In addition to the road rehabilitation costs three different options for the operating and maintenance costs have been estimated for republican and marz owned roads separately:
  - *O&M 1*: adequate O&M costs;
  - *O&M 2*: minimum satisfactory O&M costs; and
  - *O&M 3*: most urgent O&M costs.
- Based on this methodology, the investments for the rehabilitation of the optimal roots range between US \$33,500-68,800 per km, which translates to the total investments in the range of US \$91-186 million. The table below provides the breakdown of rehabilitation costs by marzes.

**Table 63 Rehabilitation Costs by Strategy and by Marz (US\$)**

Marz name	Length (km)	Rehabilitation 1 (US\$)		Rehabilitation 2 (US\$)		Rehabilitation 3 (US\$)	
		Total Cost	Cost/km	Total Cost	Cost/km	Total Cost	Cost/km
Aragatsotn	339.5	22,350,300	65,833	16,782,450	49,433	11,008,900	32,427
Ararat	171	12,770,050	74,679	9,683,900	56,631	4,714,000	27,567
Armavir	185.5	15,625,750	84,236	11,623,050	62,658	8,317,500	44,838
Gegharkunik	224	15,758,500	70,350	11,682,200	52,153	7,579,200	33,836
Kotayk	239.5	16,625,850	69,419	12,469,650	52,065	9,424,900	39,352
Lori	286	14,306,100	50,021	9,664,650	33,792	6,959,300	24,333
Shirak	360	25,344,800	70,402	18,157,550	50,438	11,678,500	32,440
Syunik	461	40,806,550	88,517	28,243,200	61,265	21,186,400	45,957
Tavush	202	10,615,000	52,550	7,550,100	37,377	4,887,800	24,197
Vayots Dzor	233.5	11,712,550	50,161	8,750,350	37,475	4,749,500	20,340
<b>Total</b>	<b>2,702</b>	<b>185,915,450</b>	<b>68,807</b>	<b>134,607,100</b>	<b>49,818</b>	<b>90,506,000</b>	<b>33,496</b>

- The operating and maintenance costs for the optimal roots range between US \$500-900 per km, which translates to the total costs in the range of US \$1.4-2.5mln. The table below provides the breakdown of operating and maintenance costs by marzes.

**Table 64 Operations and Management Costs by Strategy and by Marz (US\$)**

<b>Marz name</b>	<b>Length (km)</b>	<b>Rehabilitation 1 (US\$)</b>		<b>Rehabilitation 2 (US\$)</b>		<b>Rehabilitation 3 (US\$)</b>	
		<b>Total Cost</b>	<b>Cost/km</b>	<b>Total Cost</b>	<b>Cost/km</b>	<b>Total Cost</b>	<b>Cost/km</b>
Aragatsotn	339.5	297,200	875	229,300	675	161,400	475
Ararat	171	149,800	876	115,600	676	81,400	476
Armavir	185.5	169,200	912	132,100	712	95,000	512
Gegharkunik	224	193,200	863	149,800	669	106,400	475
Kotayk	239.5	240,000	1,002	192,100	802	144,200	602
Lori	286	258,800	905	201,600	705	144,400	505
Shirak	360	318,200	884	246,200	684	174,200	484
Syunik	461	432,800	939	340,600	739	248,400	539
Tavush	202	184,400	913	144,000	713	103,600	513
Vayots Dzor	233.5	226,000	968	179,300	768	133,000	570
<b>Total</b>	<b>2,702</b>	<b>2,469,600</b>	<b>914</b>	<b>1,930,600</b>	<b>715</b>	<b>1,392,000</b>	<b>515</b>

### The provision of the gas supply infrastructure

- The identification of the investment requirements for the rehabilitation or construction of gas infrastructure has been undertaken by delineating rural communities into three main groups:
- **The first group** includes those communities that, currently, do not have gas infrastructure (which amount to 556 rural communities). The required costs for the construction of the gas infrastructure in these communities comprises two major investments, namely the construction of the medium pressure pipeline and the construction of the intra-community gas network.
- The construction costs of the medium pressure gas pipeline have been estimated based on the average length of this pipeline per rural community and the unit construction costs. The unit costs are the actual costs for the construction of one km of the medium pressure gas pipeline based on the currently existing standards for construction works<sup>78</sup>, for gasification and gas supply of residential houses and residential buildings. It should be noted that the unit costs vary depending on the diameter of the pipe and the type of the construction that can be used between US \$13,000-30,000 per km.

<sup>78</sup> And there is a generic issue about the appropriateness of the current infrastructure standards

- The average length of medium pressure gas pipeline has been estimated by dividing the rural settlements into three groups of regions according to the following criteria:
  - degree of gasification in the region;
  - density of the population;
  - the average distance of the rural communities from the main gas pipeline;
  - climatic and geographical conditions; and
  - the length of the medium pressure gas pipeline constructed over the recent years.
- Table 65 provides the unit costs and the average length used in estimating construction costs of the medium pressure gas pipeline.

**Table 65 The estimated investment costs of the provision of the gas supply network in Group 1 communities**

Regional Groups	Construction Costs of a New Medium Pressure Pipeline (US\$)				Average Length of the Medium Pressure Gas Pipeline (km/community)	
	Open Pipeline		Underground Pipeline			
	Minimum*	Maximum*	Minimum*	Maximum*		
Ararat, Armavir, Gegharkunik and Kotayq	12,727	21,818	20,364	34,909	2.3	
Lori, Tavush and Shirak					3.7	
Aragatsorn, Syuniq and Vayots Dzor					5.3	

\* Three diameters of medium pressure pipeline are typically used in Armenia, namely 108mm, 133mm and 155mm. 108mm pipelines are the cheapest (minimum in the table) and the 155mm pipelines are the most expensive (maximum).

- The investment costs for the internal network are estimated based on the number of subscribers. There are two major components to these costs:
  - Construction of the gas distribution network with the costs of US \$36 per subscriber;
  - Installation of gas meters with the cost of US \$72 per subscriber.
- It should be noted that there are other major categories of investment costs that are required to ensure the complete gasification of Armenia, including rural settlements, such as equipment for electrical and chemical protection, construction of gas distribution stations, etc. Since these costs are largely fixed for the country and therefore do not vary with the gas connection of the individual rural communities, they have been excluded from investment cost estimates.
- The second group includes those communities which, currently, do not have a gas supply, but which do have existing gas infrastructure (60 rural communities). The required investment costs in these communities are 30-70% lower than in the previous grouping, reflecting the availability of gas infrastructure. The range of possible savings depends on the geographical conditions, as well the state of the infrastructure in the individual communities. Again, three regions have been differentiated for assessing investments costs needed for the rehabilitation of the gas infrastructure. Table 4 provides the average cost savings for each of these regions as compared to the new construction costs.

**Table 66 The estimated investment costs of the provision of the gas supply network in Group 2 communities**

<b>Regional Groups</b>	<b>Cost Savings</b>
Ararat and Armavir	40%
Aragatsotn, Syunik, Vayots Dzor	60%
Gegerkunik, Kotayk, Lori, Tavush and Shirak	70%

- The **third group** of communities consists of those currently receiving gas (which comprises of 255 rural communities). Although in the majority of cases, the gas infrastructure in these communities is in need of rehabilitation and the quality of supply is therefore inadequate for the purposes of this study, the investment costs for these communities are assumed to be zero.

#### *The total investment requirements for gas infrastructure*

- The use of the same approach as previously, suggests that the total investment needs for gas infrastructure fall in a range of US \$69 to US \$119.2mln, depending on the diameter of medium pressure pipeline selected, and whether the gas pipeline connection is underground or on the surface. Table 67 provides the breakdown of investment costs by marzes.

**Table 67 Estimated total investment requirements, by marzer, (2004 prices)**

<b>Marz</b>	<b>Minimum Investment Costs (US\$ million)</b>	<b>Minimum Investment Costs (US\$ million)</b>
Aragatsotn	9.9	21.5
Ararat	8.2	10.4
Armavir	8.1	10.3
Gegharkunik	7.3	9.8
Kotayk	4.1	5.0
Lori	7.5	13.4
Shirak	7.7	15.1
Syunik	7.8	18.8
Tavush	4.6	6.5
Vayots Dzor	3.8	8.4
<b>Total</b>	<b>69.0</b>	<b>119.2</b>

#### **The provision of the irrigation infrastructure**

- Overall, the entire system of irrigation infrastructure, with the exception of some of the structures rehabilitated under recent World Bank and IFAD projects, is in need of rehabilitation, based on an assessment of condition alone. This includes, particularly, the state owned main and secondary canals and pumps, as well as the community owned tertiary systems. The estimated total cost for the rehabilitation of these structures is US \$ 800 million. However, this assessment of cost has taken no account of the economic viability of the individual investments, and has only been undertaken with a view to the return of irrigation to previously irrigated land, since reliable estimates of the

investments requirements to establish irrigation infrastructure for the rest of the arable land are not available, even if they were economically viable.

- The investment cost estimates have been limited to the community owned tertiary irrigation system. This approach has been selected due to the fact that the overwhelming share of prior investments have been directed at the state owned main irrigation structures, while a disproportionately low amount of investments have been targeted at the tertiary systems. As a result, the tertiary systems are in a particularly poor condition, resulting in high losses, and poor quality service.
- Based on the results of physical examinations of the irrigation infrastructure, and feasibility studies carried out within the scope of the World Bank and IFAD projects the technical condition of the infrastructure has been evaluated and classified into the following categories:
  - Good: The irrigation is based on the gravity method, the technical state of the infrastructure is satisfactory and the capacity of the system is 75%<sup>79</sup>.
  - Fair: The irrigation is based on the mechanical pumping with the cost of the electricity consumption for pumping one cubic meter of water not exceeding 0.15kwh, the technical state of the infrastructure is satisfactory and the capacity of the system is below 75%.
  - Poor: The irrigation is based on the mechanical pumping with the cost of the electricity consumption for pumping one cubic meter of water exceeding 0.15kwh, the technical state of the infrastructure is poor and the capacity of the system is below 50%.
  - Not operating: Previously irrigated land currently not receiving irrigation supply due to different technical problems.

- The unit costs have been based on the actual costs of rehabilitation under the World Bank and IFAD projects. The unit costs for each category of infrastructure vary significantly, reflecting the particular climatic and geographic specifics of the rural communities. Table 68 below provides the range of unit costs used for the four categories of infrastructure and the total investment needs for each category.

**Table 68 The estimated investment costs for the irrigation infrastructure**

Condition of the Infrastructure	Unit Investment Costs (US\$/ha)	Area Covered (thousand ha)	Total Investment Costs (mln US\$)
Good	Nil	50.4	Nil
Fair	40-240	69.7	12.5
Poor	60-650	75.5	27.9
Currently not operating	60-890	56.4	36.6
<b>Total</b>	<b>40-890</b>	<b>252.0</b>	<b>77.0</b>

<sup>79</sup> This is a limitation imposed by the original design. The capacity in this context indicates the likelihood of water scarcity as a result of droughts.

- The table indicates that roughly half of the total investments are required for currently not operating infrastructure. Table 69 provides the investment needs for each marz.

**Table 69 The investment requirements in irrigation infrastructure for each Marz (2004 prices)**

<b>Marz Name</b>	<b>Investment Costs (US\$ million)</b>
Aragatsotn	10.4
Ararat	7.4
Armavir	13.2
Gegharkunik	10.9
Kotayk	6.1
Lori	4.4
Shirak	5.4
Synunik	8.0
Tavush	7.6
Vayots Dzor	3.6
<b>Total</b>	<b>77.0</b>

### The provision of the telecommunications

- The investment costs for the telecomm infrastructure have been estimated based on two assumptions: Firstly, since in the few rural communities that are currently endowed with some kind of telecom infrastructure, the quality of the service is very unsatisfactory, it is assumed, even for these communities, the existing infrastructure is not adequate and needs replacement. Secondly, all the regional centers of the country are equipped with modern digital telecom systems, and are connected to the transmission system with fiber optic cables. While this assumption is not true for all the raions of the country, most are currently equipped with adequate telecom infrastructure, and the necessary infrastructure is being established in the remainder, in a progressive manner. Hence, the investment costs for rural communities have been estimated, with a view to the provision of the telephone connection between rural communities and the regional centers. Table 62 provides the key input variables used in investment costs:

**Table 70 The input variables in estimate of telecommunications investment costs**

Description	Cost (in US\$)
Internal transmission system (per subscriber)	50
Digital exchanger (per community):	
Less than 100 subscribers	4,000
100-250 subscribers	5,000
250-500 subscribers	15,000
500-1,000 subscribers	20,000
Over 1,000 subscribers	25,000
Fiber optic cable (per km)	20,000
MW technology (per community)	70,000
Radio modem technology (per community)	12,000

\* Unit costs are based on currently prevailing market prices in Armenia.

- Two major components of costs for the establishment of the telecommunication infrastructure in the rural communities are external transmission system costs and internal network installation costs.

#### ***The cost estimates for the internal network***

- These costs include internal transmission costs and costs of exchangers. The internal transmission costs are largely fixed for each subscriber (see Table 5) and therefore the total internal transmission costs are higher for densely populated larger communities.
- Two types of exchangers can be used for the provision of telecom services in the rural communities: PBX or modern digital exchangers. The investment costs of the modern digital exchangers per rural community vary between US \$4,000-25,000 based on the number of subscribers (see previous table). The total costs for the installation of modern digital exchangers in all of the rural communities are estimated at US \$10mln. The PBX cost is on average three times lower than digital exchangers, however it is mainly suitable for the business rather than residential use. The quality of telecom service will suffer especially if PBX is used in larger communities. Therefore, the investment costs for the telecom infrastructure have been estimated assuming installation of digital exchangers in all of the rural communities.

#### ***External transmission system costs:***

- The amount of required investment for the external transmission system largely depends on the type of technology, which in turn depends on the specific telecommunication needs of the communities. Three main technological options are available, each with a different associated cost and offering different communication opportunities for the communities:
- **Option 1:** connection of exchangers of rural communities to the exchangers of regional centers through the fiber optic cables. This is a rather expensive solution since the unit cost of fiber optic cable is high (see Table 70 for details). The investment requirements for individual communities largely depend on the distance of the rural community from the regional center as well as on the number of households in the community. The total investments for the installation of the fiber optic cable in all of the rural communities is estimated at around US \$264 million.

- This technological solution will provide state-of-the-art telecom services in the rural communities with modern digital communication, Internet, Intranet and other data transmission services with high speed (over 100MB between the community and the regional center and over 2MB between the subscribers), easy and low cost installation of mobile, television, radio and other types of communication systems. It is worth highlighting that if this technology is implemented with the installation of conventional cables, it will result in little cost savings, but the quality of the communication will be significantly lower.
- **Option 2:** connection of exchangers of rural communities to the exchangers of regional centers through the microwave (MW) technology. The qualitative characteristics of this technology are similar to the previous one, however the costs in this case will be fixed per community making US \$70,000 for the MW technology plus the costs of the exchanger. The total investments for the installation of the MW technology in all of the rural communities are estimated at around US \$61 million.
- MW technology will result in significant cost savings in remote rural communities where the distance between the community and the regional center is large. The fiber optic cable connection, on the other hand, might be cheaper solution for communities located nearby the regional centers. If this methodology is applied the total costs of the external transmission using either fiber optic cable or MW technology (depending which is cheaper for individual communities) will cost less than US \$70 million.
- **Option 3:** connection of exchangers of rural communities to the exchangers of regional centers through the radio-modem technology. Radio modem installation costs will again be fixed per community and amount to approximately US\$ 10,000-12,000. The total investments for the installation of the radio-modem technology in all of the rural communities is estimated at around US \$11 million.
- Although this technology is significantly cheaper than the previous two technologies, it has a number of limitations that will result in significant costs if the communication needs of the rural communities increase above basic needs (e.g. if they require data transmission services, such as Internet).
- Thus, there is a clear cost and opportunity trade-off for each of the aforementioned technological solutions. The solution for each rural community should be selected, based on their specific telecommunication needs and with due consideration of the affordability issues in these communities. Radio-modem connection might be suitable for the most remote (and typically the poorest) communities, since it will be both more attractive economically and more affordable. This solution might also be appropriate for meeting basic telecommunication needs of the other rural communities at least in the short-term. Alternatively, if a dual track approach was to be adopted, a fiber optic connection, or MW technology, could be considered for the most affluent rural communities with good economic development potential.
- The total investment costs for the establishment of the telecom infrastructure in rural communities is estimated at US \$88mln if modern external transmission system is used

(either fiber-optic cable or MW technology connection), and US \$39mln if radio-modem technology is used for the external transmission system. Table 71 provides an estimate of the investment costs by Marz.

**Table 71 The investment costs for telecommunications equipment by Marz**

Marz Name	Investment Costs With Radio Modem Technology (US\$ million)	Investment Costs With Modern Technology (US\$ million)
Aragatsotn	4.2	10.4
Ararat	5.6	10.8
Armavir	5.7	8.2
Gegharkunik	4.9	9.8
Kotayk	4.2	10.2
Lori	3.3	6.7
Shirak	4.0	10.5
Syunik	2.5	8.4
Tavush	2.9	6.2
Vayots Dzor	1.5	3.8
<b>Total</b>	<b>38.8</b>	<b>85.0</b>

### **The provision of clean drinking water**

- The investments costs necessary for the rehabilitation or establishment of the drinking water infrastructure have been estimated based on average unit costs for service provision, adjusted for each community to reflect the geographical specifics and the number of population for each community. Two types of rural communities have been differentiated for the costing purposes:
  1. *Communities receiving water supply from local sources (tube wells, springs):* The total investment costs for an individual community include the costs for the rehabilitation of the water intake, the canal (from intake to reservoir), the daily regulating reservoirs, the water distribution network, connection costs for individual households and costs for providing water treatment. In addition, for communities that rely on pumping water, the costs necessary for the rehabilitation of pumping stations or individual pumps (in the case of tube wells) are added to the investment costs;
  2. *Communities connected to the main (centralized) water network:* The investment costs for these communities are computed based on the similar components listed above, with only exception being the canal rehabilitation, which for this communities includes the section connecting the main canal to the daily regulating reservoir.
- The unit costs of each of the major investment components is detailed below.

**Table 72 Unit Costs of Major Investment Components**

<b>Investment Component</b>	<b>Unit Costs (US\$)</b>
Water intake	1,500-5,000
Water canal/m	10-110
Daily regulating reservoir	10,000-500,000
Distribution network/m	10-150
Water treatment per community	7,000
Water connection to individual household	50

- These unit costs are based on the actual costs of different projects, including the World Bank financed projects. The large variation of unit costs is mainly related to the number of inhabitants and the related water demand in the community, the geographical location of the communities, the distance of the community from the main water canals (in the case of centralized water supply) or from the water intake (in the case of local sources of water) and on the existence of the water distribution network in the communities (results in 70-80% cost-savings).
- Based on this approach, the total investment costs for the rehabilitation of the drinking water infrastructure of the rural communities are estimated to amount to US\$44 million. Table 65 provides the breakdown of the investment costs by marzes.

**Table 73 Investment costs for drinking water provision by marz (2004 prices)**

<b>Marz Name</b>	<b>Investment Costs (US\$ million)</b>
Aragatsotn	5.5
Ararat	5.8
Armavir	5.1
Gegharkunik	5.2
Kotayk	3.4
Lori	5.3
Shirak	5.5
Synunik	3.0
Tavush	3.0
Vayots Dzor	1.6
<b>Total</b>	<b>43.5</b>

## ANNEX I – AN EXAMPLE OF THE OUTPUT FROM THE DECISION MATRIX

	Marz	Community name	Community Preference	Community Preference	Households	Population	Poverty (per FBP)	Cost \$ '000	Cost-effectiveness	Potential for growth/agriculture	Potential for growth/industry	Potential for growth/tourism
1	Gegharkunik	Vardenik	roads	1	3050	8798	1826	16.0	664	4.6	3.5	4.8
2	Gegharkunik	Zoldkar	roads	3	2281	6205	178	12.0	532	4.6	3.5	4.8
3	Lori	Shnokh	roads	3	880	3117	224	7.5	445	3.5	3.0	4.7
4	Shirak	Azatani	roads	2	1278	5117	150	15.0	351	4.0	2.5	3.7
5	Gegharkunik	Nerqin Getashen	roads	2	2670	7658	673	30.0	278	4.6	3.5	4.8
6	Shirak	Axhuryan	roads	1	2815	9696	845	48.0	220	4.0	2.5	3.7
7	Ararat	Taperkan	roads	3	1480	3708	189	24.0	162	6.2	4.2	4.0
8	Gegharkunik	Saruxhan	roads	1	3404	7690	924	64.0	135	4.5	3.3	4.3
9	Tavush	Norashen	roads	3	541	1792	212	12.5	160	3.8	2.8	4.0
10	Shirak	Nahapetavan	irrigation	1	247	817	131	9.6	99	3.6	3.2	3.3
11	Gegharkunik	Ajgut	irrigation	2	346	1071	210	9.4	137	3.3	2.2	4.0
12	Lori	Gugarg	roads	2	1720	5665	764	50.0	129	3.3	2.8	5.0
13	Gegharkunik	Eranos	roads	1	1825	5306	745	90.0	67	4.6	3.5	4.8
14	Aravir	Paraggar	irrigation	1	2700	7211	160	92.7	80	6.2	4.7	6.3
15	Ararat	Avshar	drinking water	1	1630	4390	137	119.7	38	6.2	4.2	4.0
16	Ararat	Bardzrashen	irrigation	2	390	1411	77	17.3	86	6.2	4.5	4.5
17	Aragatsotn	Bjurakan	drinking water	1	1606	4312	350	118.5	39	5.7	4.8	6.3
18	Vayots Dzor	Malishka	roads	3	1720	4591	367	50.0	99	4.2	4.3	6.0
19	Aravir	Amberd	gas	1	379	1363	41	42.4	33	6.2	4.7	6.3
20	Ararat	Dalar	irrigation	2	795	2844	126	45.6	65	6.2	4.5	4.5
21	Gegharkunik	Tzaxkunq	irrigation	2	315	1014	60	12.5	86	4.2	3.5	6.2
22	Ararat	Getapnya	irrigation	3	429	1292	58	12.6	107	5.9	4.0	3.2
23	Shirak	Pemzashen	irrigation	1	757	2862	716	34.4	104	3.6	3.2	3.3
24	Kotayk	Mekhradzor	gas	2	730	2800	189	32.7	91	4.3	4.8	4.2

## ANNEX J – THE SAMPLING STRATEGY

### *Selection of communities for revealing the infrastructure investment priorities.*

Considering the types and quality specifics of village/rural communities, which are conditioned by geographical and administrative location, for the first part of the survey based on the rural communities database<sup>80</sup> of Armenia multilevel stratification selection of 100 communities was complied based on three criteria:

- marz;
- location in relation to sea level;
- distance from the central highways.

Based on these 48 mutually excluding layers were selected and cluster was proportionally divided among the layers.

In addition to this, layers were defined based on three independent variables<sup>81</sup>:

- the general assessment of the condition of infrastructure in the communities (poorly developed, average developed, and developed infrastructures)
- water ownership type;
- road ownership type.

The cluster has been selected by these quota in a proportional manner. In the resulting cluster, the rural communities are represented according to their size – population/families. Enrollment of the community into the cluster was conditioned by the number of the families present, which provided opportunity for inclusion of possibly large rural population in the survey. The stated multilevel layered cluster has allowed to obtain data, which is representative for the rural communities of Armenia.

### *Methods of selection of participants of community interviews and main information bearers*

The number of community interview participants in average comprised 30 – 60 people depending from the community size. The selection of participants has been conducted based on the population register of community through the simple accidental/*ad hoc* selection. The gender and age representation was secured during the formation of lists of participants.

Due to time constrains in some communities the implementation of this cluster selection method was complicated, especially in big communities. In these cases the number of participants has been completed through the selection of residents of different areas through accidental choice.

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<sup>80</sup> As database for this the information data of the Union of Communities Finance Officers has been used.

<sup>81</sup> This data was taken from the database of the survey of the rural infrastructure conducted by the Union of Communities Finance Officers.

***Cluster of survey of infrastructure investments sustainability***

In addition to *ad hoc* selected 100 communities for the purposes of implementation of the second objective of the survey 30 communities were chosen by targeted selection method. The selection criteria for these communities were the availability of infrastructure projects in the community as well as the marz location. The ASIF data has been used for the selection of these communities as well. Selected 30 communities represent 10 marzes of Armenia: three communities from each marz. See Attachment 5.

## **ANNEX K – THE DELPHI APPROACH**

### **The Economic Growth Potential for each region based on Delphi Method**

The economic development of the communities is largely dependent on the availability of adequate economic infrastructure services. This impact, though, is not identical for all of the rural communities and is correlated with such factors as the geographical location, climate, size and productivity of arable land, etc., which together determine the economic growth potential of communities. In order to account for the effectiveness of the rural infrastructure interventions the economic growth potential of the communities was selected as one of the criteria in the decision matrix.

The economic potential of the rural communities has been assessed based on the Delphi method, i.e. a structured process of collecting, and distilling knowledge from a group of experts by means of a series of questionnaires interspersed with controlled opinion feedback. Three different panels of experts were selected to estimate the growth potential of agriculture, tourism and on-farm employment for 37 regions (raions) of the country. Each panel was responsible for the assessment of growth potential of only one dimension (either agriculture, or tourism, or non-farm employment). Each panel consisted of six experts with expertise in the relevant area. The experts included representatives from the government agencies, NGOs, associations and donor organizations.

The Delphi exercise consisted of the following steps:

1. A questionnaire was transmitted to each panelist asking him to rank the potential for growth at rayon level on a scale of 1-7. It also requested the panelists to provide a brief rationale for ranking, identify impediments to growth for each of the above specified areas and also list the infrastructure service the improvement of which would have the largest impact on the growth;
2. Second round questionnaire was developed reflecting average rankings collated, justifications of the experts and transmitted to the experts requesting them to reconsider their assessment in the light of the provided information;
3. Second round rankings and justifications were analyzed and reflected in the tree round questionnaire;
4. The third round responses were analyzed and since the ranking and expert justifications were largely in agreement the exercise was concluded at this stage.

## **ANNEX L – UNIVERSAL ACCESS IN THE TELECOMS SECTOR**

In the telecommunication sector, the existing legislation does not include a concept of universal access or service. The concept was included in the license granted to Armentel, the operator that enjoys a monopoly over fixed lines, mobile and international connections, in Armenia, it was ill-defined. The terms of the license require the incumbent licensee to both digitalize all 800 rural communities and ensure the provision of a density of fixed line at the level of 20/100. Although the license does not make it clear whether the ratio relates to the provision of 20 lines per 100 residents or 20 lines per 100 households.

A further problem with this target, apart from this lack of clarity, is that it is either unrealistic or has already been attained, depending on one's interpretation. The objective of 20 lines per rural resident is regarded as unrealistic, at least in the medium term, since it effectively implies that all households should have a fixed line<sup>82</sup>, whereas the latter interpretation had already been achieved at the time the contract was signed. Moreover, not only does the license not provide a mechanism for universal access, it confuses the situation further by stipulating that cross-subsidy should be avoided in the future.

The requirement to digitalize all 800 rural communities can also be regarded as unrealistic, which in combination with the performance of Armentel so far, has resulted in only about 30 communities, in two rayons, being connected to the telephone network, and only using radio-relay technology. Only a small fraction of inhabitants in these communities have fixed lines and many of these are vocal in their dissatisfaction with the quality of the service. While no public information is available about the magnitude of the investment, according to anecdotal information collected by the study team, the cost per customer is reported at US\$ 1000, which, if true, would be extremely high by international standards.

The new telecommunication legislation, which is currently being developed with the support of USAID, attempts to address the issue of universal service. This model is based on a definition of Universal Service which aims to promote fixed voice telephony for all residents. However, this might be unrealistic in the short to medium term. International best practice for countries at a similar level of sector development as Armenia, especially when vast areas of the country (primarily rural areas) still lack a single public phone, shows that appropriate universal service goals should be based on community access to services (e.g. through payphones, telecenters), rather than universal private access<sup>83</sup>.

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<sup>82</sup> as an average rural household consists of 4-5 members – study data

<sup>83</sup> See the comments of the WB on the draft electronic communication law dated March 2004



## ANNEX M – SUMMARY COMMUNITY DATA

**Table 74 General Data**

	Number of Communities	Population	Number of Households	Distance from regional center (km)	Distance from capital (km)	Altitude above sea (km)
Aragatsotn	112	104,598	35,054	14	60	2
Ararat	93	192,101	57,762	13	35	1
Armavir	94	177,935	60,483	11	50	1
Gegharkunik	87	156,204	54,360	14	120	2
Kotayk	60	118,490	32,459	14	31	2
Lori	105	116,007	36,595	16	146	1
Shirak	116	109,129	31,109	15	128	2
Syunik	106	48,528	13,510	20	305	1
Tavush	57	125,918	27,300	18	178	1
Vayots Dzor	41	35,368	11,453	18	145	2

**Table 75 Community Preferences**

	First Priority			Second Priority			Third Priority		
	Entire Community	Women	Men	Entire Community	Women	Men	Entire Community	Women	Men
Gas	33%	35%	32%	14%	13%	10%	12%	13%	13%
Drinking water	31%	31%	26%	17%	22%	21%	21%	21%	24%
Irrigation	18%	14%	21%	23%	24%	18%	19%	18%	27%
Roads	13%	13%	17%	22%	17%	30%	26%	19%	20%
Telecom	4%	6%	3%	23%	23%	20%	20%	29%	14%
Sewerage	1%	1%	1%	1%	1%	1%	2%	0%	2%
Electricity	0%	0%	0%	0%	0%	0%	0%	0%	0%

**Table 76 Poverty and growth**

	Share of socially insecure households	GDP per capita (KUSD)	Economic growth potential*		
			Agriculture	Industry	Tourism
Aragatsotn	32%	2,640	4	3	5
Ararat	17%	1,062	6	4	4
Armavir	11%	1,698	6	4	4
Gegharkunik	31%	2,019	4	3	5
Kotayk	13%	955	5	5	4
Lori	42%	2,083	4	3	4
Shirak	29%	2,579	4	2	4
Syunik	21%	3,811	4	3	5
Tavush	51%	1,025	4	3	4
Vayots Dzor	22%	1,135	4	4	6

\* assessed on a scale of 1 to 7 with 1 being the lowest and 7 the highest score.

**Table 77 Access to infrastructure services**

	1.1 DRINKING WATER		Gas		Telecommunication		Irrigated land
	Community access	Household access	Community access	Household access	Community access	Household access	
Aragatsotn	85%	42%	8%	4%	65%	21%	11%
Ararat	85%	56%	46%	23%	96%	29%	35%
Armavir	86%	37%	50%	16%	81%	17%	45%
Gegharkunik	86%	44%	44%	34%	63%	31%	4%
Kotayk	95%	73%	65%	19%	80%	37%	10%
Lori	90%	54%	29%	13%	78%	27%	3%
Shirak	97%	57%	17%	16%	53%	19%	7%
Syunik	92%	75%	8%	10%	96%	58%	2%
Tavush	72%	42%	30%	8%	95%	48%	6%
Vayots Dzor	95%	74%	2%	0%	98%	44%	4%

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