

EAP Task Force



JOINT MEETING OF

**THE EAP TASK FORCE'S GROUP OF SENIOR OFFICIALS ON THE REFORMS OF THE WATER
SUPPLY AND SANITATION SECTOR IN EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA**

THE EU WATER INITIATIVE'S EECCA WORKING GROUP

**FINANCING STRATEGIES FOR RURAL WATER SUPPLY
AND SANITATION IN ARMENIA BASELINE SIMULATION**

DOCUMENT 19

PARIS, 2007



**Financing Strategies FOR Rural Water Supply and Sanitation in
Armenia - Baseline Simulation**

Final draft

A project for the State Committee for Water Systems in Armenia, managed by the EAP task force, and with financial support of DFID

Disclaimer: Opinions presented in this document are those of the Consultant and do not necessarily represent the opinion of the Steering Committee of the project or of the Armenian Government

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16 May 2007



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EXECUTIVE SUMMARY

Objectives of this pilot project are manifold, including extending the Finance strategy (FS) methodology to rural WSS and pilot testing the methodology through developing a FS for WSS in about 850 rural settlements in Armenia, as well as testing the rural WSS module of the Feasible model.

This note reports on the baseline scenario assumptions and results for a Finance Strategy for rural water Supply and Sanitation (WSS) in Armenia. In the baseline scenario the current situation for rural WSS is assumed to remain constant. The level of water supply services is kept at the current level (so no improvements, but also no decrease of services), for the financing part of the scenario, policies under implementation (concerning collection of user charges, support from public budget and loans) are simulated.

Data collection and delineation

Data for the baseline have been collected from various sources. From statistics, data on rural inhabitants and settlements have been collected and analysed. Also data on WSS infrastructure at the level of Marzes (provinces) could be taken from census data. This information has been combined with information of Water companies (AWSC, Nor Akunq, Lori WSC), an analysis of the results of a questionnaire of JICA sent to 565 rural settlements (currently not served by water companies) and various other information sources. The following table gives an overview of some of the data collected and assessed.

Marz / Watercompany	Type of intake	Distance from intake				
		number of inhabitants	number of settlements	spring	surface water	borehole
Aragatsotn	spring, borehole	56,000	62	5.9		4.8
Ararat	spring, borehole	75,999	42	5.3		1.2
Armavir	spring, borehole	62,612	35	5.4		1.2
Gegharkunik	spring, borehole	71,724	52	5.9		4.8
Kotayq	spring, surface water, borehole	57,775	34	4.8	6.8	13.8
	spring, surface water, borehole					
Lori	spring, surface water, borehole	57,028	58	3.9	13.5	0.4
	spring, surface water, borehole					
Shirak	borehole	54,247	60	3.4	10.0	1.0
Syunik	spring, borehole	20,655	45	5.1	5.1	
Tavushi	spring, borehole	51,764	37	8.5	12.9	1.4
Vayotz Dzori	spring, borehole	14,975	21	8.0		0.0
AWSC	Spring	394,842	254	5.6		
Nor Akunq	Borehole	17,419	11			1.7
Lori WSC	Spring	16,310	15	12.1		
No distribution		49,904	121			
Total		1,001,255	847	6.2	9.6	3.0

In order to make simulations on the baseline, the data on 847 rural settlements have been grouped in 81 “model” settlements. The criteria used for grouping include: type of water intake; geography/institutional; size of settlements.



Baseline scenario, financing gap

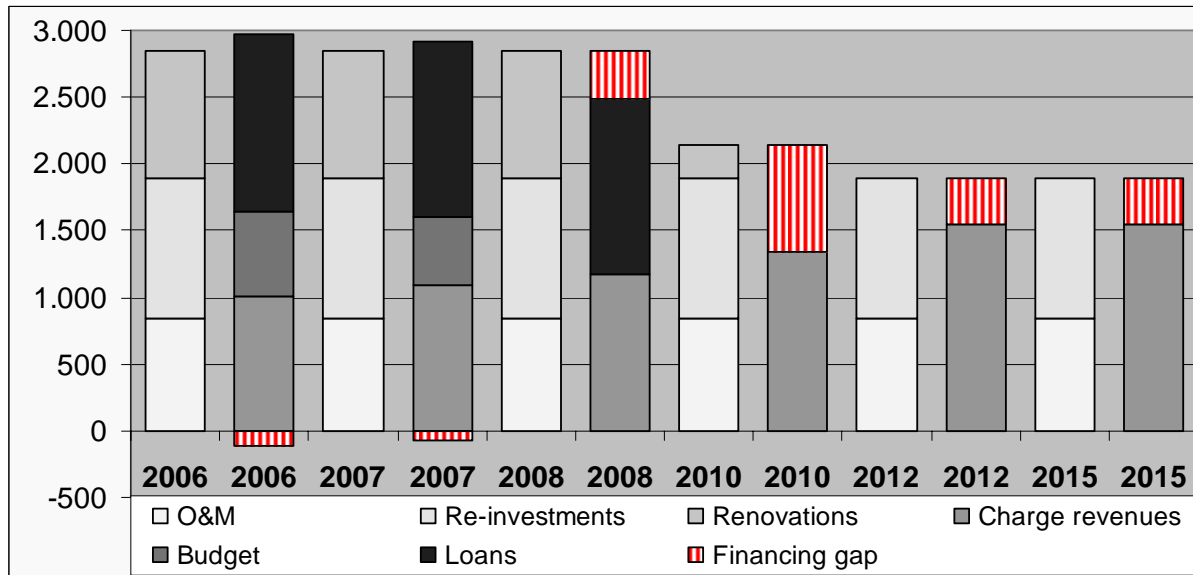
The baseline scenario serves as a basis for comparison of policy or development scenarios. It describes the situation, in which no additional infrastructure or increase of water supply services is assumed (other than already committed and planned renovations). It thus describes a sort of “minimal case”.

The simulations, made with the rural module of Feasible, show that total annual expenditures should be in the range of 2 billion DRAM. Of this about 835 mln DRAM is needed for operation and maintenance, whereas slightly more than 1 billion DRAM would be needed for re-investments. Furthermore, between 2006 and 2009 about 1 billion DRAM will be spent on planned renovations of rural water supply infrastructure.

Revenues for rural WSS consist of user charges, budget contributions and (international) loans. User charges currently yield about 1 billion DRAMs in rural settlements, but will increase due to improved collection (an on-going process) to about 1.5 billion in 2012 (and later). Budget contributions are limited, after 2007 there are no commitments in the budget. It is estimated that in total loans of about 3.6 billion DRAMs are available for rural water supply from 2006-2008.

Taking into consideration the projected expenditures and financial resources the following financial gap/surplus is assessed

Estimated financing gap/surplus for rural WSS in Armenia, including renovations, loans and budget subsidies, in the baseline (in DRAM x 1 billion)



The figure shows, that in the long term, there is a structural financing gap of about 20% of needed revenues to “break even”.

Baseline scenario, affordability

The affordability for the poorest part of rural population has been assessed by comparing their incomes with the estimated user charges (water bill) they have to pay. It appears that they spend about 4% of their income on water supply services. This is more than the assumed affordability threshold of 3%. But the analysis also shows that for most rural inhabitants, the average water bill of about 5050 DRAM per capita per year comes near to the 3% threshold.



Due to two opposite developments (increase of rural income on the one hand and decreasing water use on the other, due to more economical use of water), affordability will hardly be an issue in 2012, diminishing the burden of water bills to about 1% of income on average. However, with less optimistic assumptions (less economic growth, no saving of water and increased water price) by 2012, the water bill will still be problematic for many rural inhabitants. To address this issue, income support (to the poorest inhabitants) and/or tariff policies (set tariffs at affordable level) will be required.

As the analysis shows that with current policies a structural financing gap exists for rural water supply in Armenia, additional contributions from the central budget will be needed to guarantee sufficient (re) investments. The assessment shows that this would require about 0.1 % of the current budget.

Institutional

Currently, about 2/3 of the rural settlements have no regulated water company. In about 100 rural settlements, central water supply does not exist at all. Even if water supply (and sanitation) would be institutionalised in these settlements, this does not guarantee an improvement, as costs of rural water supply may differ considerably (making it unaffordable in certain more remote settlements).

Therefore, the institutional problem should be addressed in such a way, that it would guarantee affordable water supply in all settlements, making use of cross subsidisation where possible.

Key problems and challenges

The key problems that need to be addressed in the national policy dialogue on water supply and sanitation are the following:

- Infrastructure development targets and scenarios in rural areas;
- policy to ensure sufficient and stable revenues for rural water supply and sanitation (user charges and budget contributions);
- institutional issues (establishing sustainable rural water companies).



1 INTRODUCTION

1.1 Aim of this note

This note on the baseline scenario for a Rural¹ Financing Strategy on Water Supply and Sanitation in Armenia, is the first step towards a comprehensive Financing Strategy, including policy scenarios.

In this note attention is given to the following issues:

- data collection and delineation for the baseline in the case of rural Armenia;
- construction of a baseline scenario;
- results of the baseline scenario, and
- policy variables and options for design of policy scenarios (based on the results of the baseline scenario).

1.2 Use of the rural module of the Feasible model

The work presented in this draft note is based on simulations with the (not yet finished) version of the rural module of the Feasible model.

Mainly, the following types of actions are made to use Feasible for simulating the Baseline scenario:

- Collect data on the supply of water and sanitation in rural settlements. Critical data are: (i) the type of water intake (surface water, groundwater, spring, streams etc.) and the distance to the settlement, (ii) the type of water supply for consumers (Public water supply systems: in house taps; yard taps or stand-posts. Individual systems: boreholes with hand pump, stream, water tanks, etc.);
- Delineate the data collected (in Armenia, some 850 rural settlements exist, this should be brought back to a manageable number (for example between 50 – 100));
- Set targets for the Baseline scenario (typically, by extrapolating the present situation, not allowing further deterioration, but can also assume minimal improvements);
- Put the data in Feasible;
- Calculate – by means of Feasible - the current expenditures **for the baseline** assuming no further development of the water infrastructure (except for planned renovations);
- Collect information on the available finance, subdivided in (i) user charges (ii) public budgets (iii) loans and (iv) grants;
- simulate the supply of finance, which results in an estimate of the available finance for paying for the expenditures;
- Assess the Financing gap or surplus, by confronting expenditures with available finance;
- Suggest a policy package to bridge the gap;
- Assess the household affordability and affordability of budget contributions anticipated by the policy package;
- If not affordable, then consider another package (typically, measures are mutually supportive) to the needed finance, or consider another scenario to meet the targets, or scale down the targets.

¹ Rural in general means all areas which are not included in urban settlements. The delineation of “rural” differs from country to country, and often pragmatic solutions have to be found. In this report “rural” is considered to be covering settlements with up to 5,000 inhabitants.



2 DATA COLLECTION, ANALYSIS AND DELINEATION OF THE COLLECTED DATA

2.1 Introduction

In this chapter it will be explained how the Armenian data on rural settlements are processed.

2.2 Available information in Armenia

The following information is available on rural settlements in Armenia:

- statistical information (1000 settlements):
 - o population;
 - o territory (not all marzes, some deviation with territory data on marzes²);
 - o elevation;
- data from census on rural population, population densities, water supply, at the level of marzes (year 2001),;
- data from an own questionnaire amongst AWSC, Lori WSC, Nor Akunq (2005-2006);
- Japanese (JICA) questionnaire sent to about 565 municipalities, where no watercompany is established (water supply is taken care of by municipality) (2006). 416 municipalities have returned the questionnaire (in 8 marzes out of 10);
- General data on water companies (number of settlements supplied with water, annual turn over, water fees) (2004-2005).

2.2.1 Population data

Three sources are available for use:

- census data (grouped per Marz);
- statistical data (per settlement);
- data used when compiling the JICA-questionnaire on 565 municipalities (on the number of inhabitants per village and the number of households) (so not the population as stated by respondents).

As data on population are from different sources, there are some deviations. The most relevant and important deviation is between the second statistical and third (JICA-questionnaire) source³:

- On average the population used in the JICA survey is 7.5% higher than that from the statistical service. Apparently, different data tables have been used.

On the JICA list, also the number of households is mentioned – per municipality. This makes it possible to estimate the average size of a household (which is also relevant model input), which is 3.5 inhabitants per household in Armenia. In Tavushi Marz the average size is smallest: 3.2 inhabitants/household, in Kotayq Marz the average size is largest: 3.9 inhabitants/household.

The population data can also be used to assess the average size of settlements, and the frequency of various subclasses of municipalities (small, medium and large). The average population per settlement is 1 185 (statistical data), with the largest average size in Ararat Marz and the smallest in Syunik Marz. Table 2.1 gives an overview of the rural population data in the Marzes.

² A Marz is equal to a province or a region.

³ This has been assessed by compiling two lists (one of the statistical office, one used for the JICA questionnaire) into one integrated list



Table 2.1
Rural population in Armenia, by Marzes

Marz	inhabitants rural	number of rural settlements	average number of inhabitants	average size of household
Aragatsotn	97409	110	886	3,73
Ararat	164612	89	1850	3,74
Armavir	165632	90	1840	3,30
Gegharkunik	107581	77	1397	3,27
Kotayq	96714	58	1667	3,95
Lori	105272	107	984	3,33
Shirak	102392	115	890	3,90
Syunik	47241	101	468	3,73
Tavushi	81954	57	1438	3,17
Vayotz Dzori	32448	41	791	3,45
TOTAL	1001255	845	1185	3,48

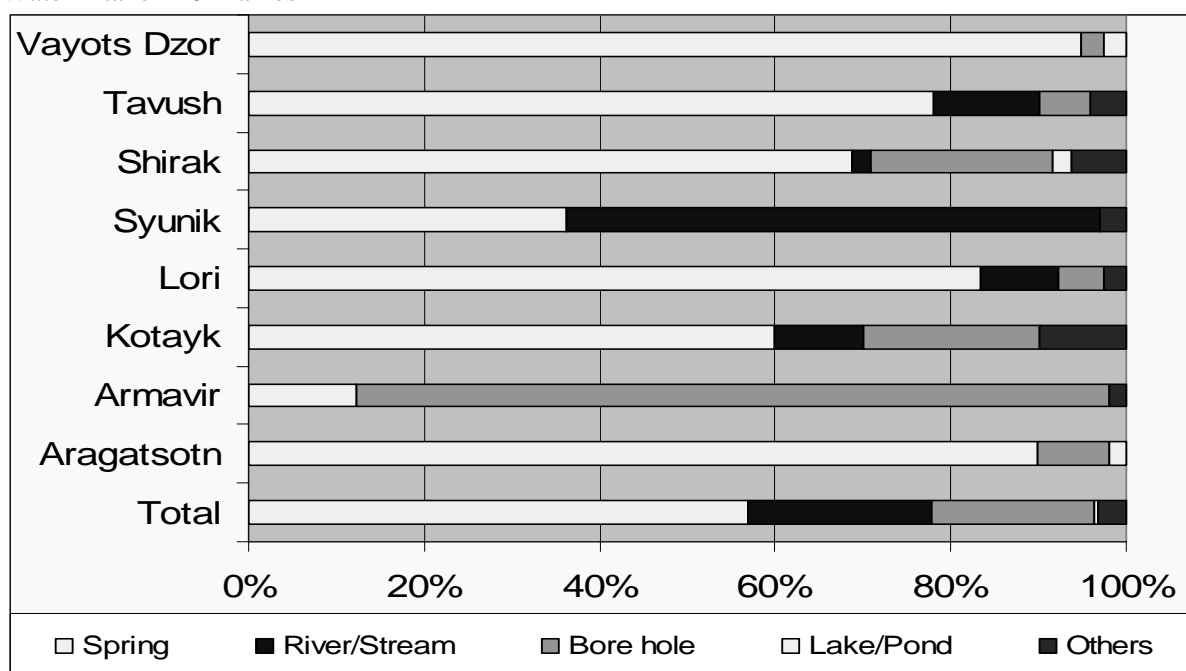
Based on data of about 1000 settlements in Armenia

2.2.2 Water supply and sanitation

Water intake

The situation on water intake can be determined from the results of the JICA questionnaire. This is shown in the following graph for 8 Marzes.

Figure 2.1
Water intake in 8 Marzes



Source: analysis of the results of the JICA questionnaire



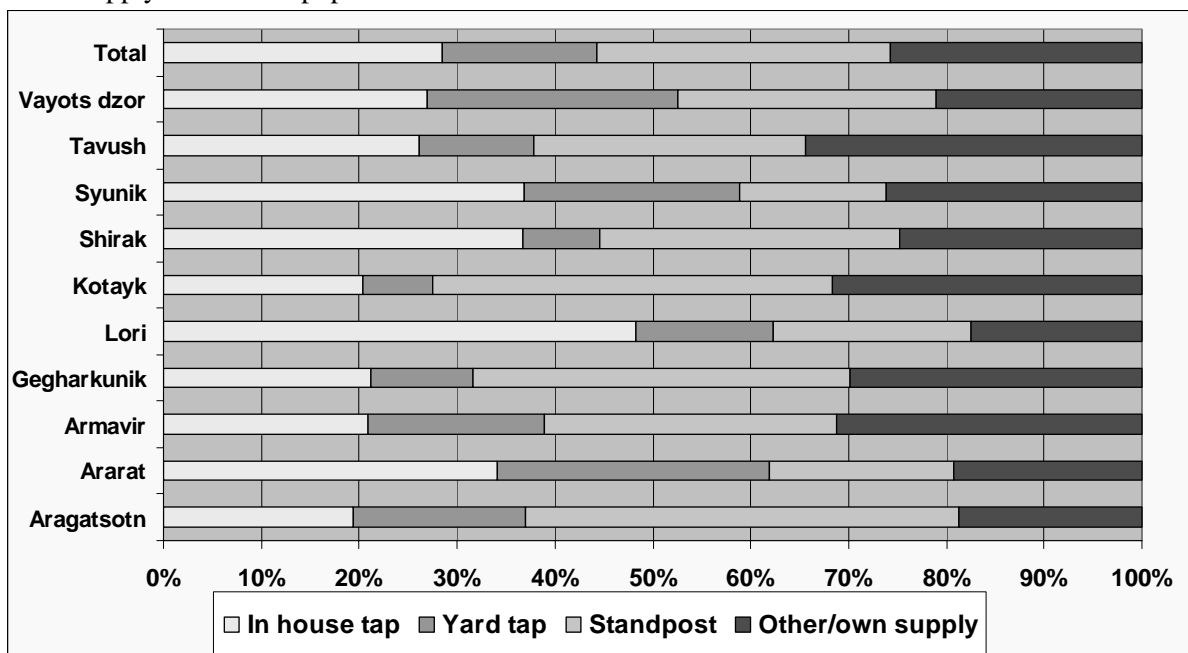
The water companies AWSC⁴ and Lori use spring water as intake. In Lori from (mainly) one source, connected to a long pipeline to Vanadzor. Nor Akunq uses boreholes for water intake.

In-house taps, yard taps and standpipe connections

Some data on water supply and sanitation at the level of Marzes is available from the census. The data give an overview of how the rural population was served with (drinking) water in 2000/2001. A subdivision is made between:

- public supply (with a distinction between supply trough: in-house taps, yard taps, and standposts;
- other – individual (or no) – supply.

Figure 2.2
Water supply to the rural population in 10 Marzes in Armenia



Source: Census

Sanitation

On rural sanitation, little information is available, which can be used in Feasible. Currently about 10% of rural population has connection to sewerage. The following table gives an overview of the type of toilets used in rural Armenia, and the **assumed** type of sanitation.

⁴ for AWSC this information is limited to the sample (only 5 settlements)



Table 2.2

Types of toilets in rural Armenia (2000), and assumed type of sanitation, proportion of population with access to a certain type of sanitation infrastructure and service

Type of toilet	Share of population	Type of sanitation			
		Simple pit latrine	Improved pit latrine	Septic tank	Sewerage
Non flush toilet	79%	60%	10%	9%	-
Flush toilet	21%			11%	10%

Source: census (data on type of toilet) and own assessment

In the current baseline scenario, no simulation of the costs of sewerage is made, as the impression is that the existing systems are hardly/not operated and maintained.

2.3 Grouping of information for scenarios simulation

To use Feasible, the data on the 850 settlements needs to be grouped. The following issues are important when grouping the data:

- type of water intake;
- geographical and/or institutional;
- size of the settlement.

2.3.1 Water intake

At least three groups of settlements have to be distinguished:

- water intake from spring water;
- water intake from groundwater;
- water intake from river/stream.

2.3.2 Geographical and/or institutional

From a practical point of view water supply can be subdivided between settlements:

- (A) that are not served by a water company;
- (B) that are served by a water company.

If possible, a further subdivision between Marzes is practical. This has been done for the settlements without a water company (based on the JICA questionnaire).

Finally, also a group of settlements has been distinguished with no piped water supply (basically, in these settlements all water is supplied on individual basis).

This leads to 14 different groups of settlements (10 Marzes, 3 water companies⁵, 1 group of settlements without public supply).

2.3.3 Size of settlement

Although for a baseline the size of settlement can be simulated in an average mode, one needs to be prepared for modelling a policy scenario. In that case it is better to subdivide the rural population in for example three classes (small, medium and large rural settlements). This enables in a later stage the assessment of cost-effective approaches in policy scenario's.

⁵ for 2 water companies that serve rural areas no data have yet been collected



2.4 Total

The delineation as described above for rural water supply in Armenia, has resulted in the following grouping of data, which is used as input in the Feasible model.

Table 2.3
Delineation of rural settlements in Armenia for water supply

Marz, water company	type of intake	Nr of groups	number of inhabitants	number of settlements	distance intake, spring (km)	distance intake, surface water (km)	distance intake, borehole (km)	average number of inhabitants/household
Aragatsotn	spring, borehole	3	56000	62	5,88			3,73
Ararat	spring, borehole	3	75999	42	5,30		4,76	3,74
Armavir	spring, borehole	3	62612	35	5,42		1,18	3,30
Gegharkunik	spring, borehole	3	71724	52	5,88		1,19	3,27
Kotayq	spring, surface w, borehole	3	57775	34	4,75	6,75	4,76	3,95
Lori	spring, surface w, borehole	3	57028	58	3,93	13,50	13,75	3,33
Shirak	spring, surface w, borehole	3	54247	60	3,40	10,00	0,38	3,90
Syunik	spring, borehole	3	20655	45	5,14	5,06	1,03	3,73
Tavushi	spring, surface w, borehole	3	51764	37	8,53	12,92	1,40	3,17
Vayotz Dzori	spring, borehole	3	14975	21	7,97		0,00	3,45
AWSC	Spring	3	394842	254	5,62			3,48
Nor Akunq ⁶	Borehole	3	17419	11			1,67	3,30
Lori WSC	Spring	3	16310	15	12,13			3,33
No piped distribution		2	49904	121				3,48
Total		81	1001255	847				3,48

Source: team evaluation of data.

In total, the about 850 rural settlements of Armenia, have been delineated into to 81 groups of settlements with (more or less) similar characteristics.

For these groups the following data on household connections to piped water supply and distribution have also been inserted in the model.

⁶ The total number of inhabitants in villages served by Nor Akunq is said to be 27,905 (KfW, 2007). It is not clear if all these inhabitants are actually served by Nor Akunq. This information will be updated when also policy scenarios will be assessed in the next stage of the project.



Table 2.4
Type of (piped) water supply and distribution

Marz, water company	in house connection	yard tap	standpipe	total connected to piped distribution system
Aragatsotn	19%	18%	44%	81%
Ararat	34%	28%	19%	81%
Armavir	21%	18%	30%	69%
Gegharkunik	21%	10%	38%	69%
Kotayq	20%	7%	41%	68%
Lori	48%	14%	20%	82%
Shirak	37%	8%	31%	76%
Syunik	37%	22%	15%	74%
Tavushi	26%	12%	28%	66%
Vayotz Dzori	27%	26%	26%	79%
AWSC	53%	27%	0%	80%
Nor akunq	67%	2%	0%	69%
Lori WSC	29%	44%	0%	73%
No distribution				none

Source: census and questionnaires to water companies

More

over, it has been assessed that the rural settlements in Armenia have, on average, the following characteristics concerning the spatial distribution of population in rural settlements:

- 95% of the rural populations lives in the core area of the municipality, with on average a population density of 2000 inhabitants per square kilometre. This boils down at about 1750 square meters per household (including infrastructure, etc.);
- 5% of rural population lives in the fringe area with an average population density of 2 inhabitants per square kilometre.

For all other factors that influence costs, the default values as defined in Feasible have been used. Except labour costs, where the costs have been assessed at about one-third of the international defaults.



3 BASELINE SCENARIO

3.1 Introduction

In chapter 2 data and data delineation are discussed for the baseline scenario. This chapter deals with the implementation of the described delineation in the Feasible model and simulation of the baseline scenario, including its financial dimension.

In the baseline scenario the following assumptions have been applied:

- the level of water supply services will be kept at the current level (so no improvements, but also no decrease of services);
- for the financing part of the scenario, policies under implementation (concerning collection of user charges, support from public budget and loans) are simulated.

The baseline scenario thus shows whether the expenditures that are needed to operate the current infrastructure are covered by sufficient resources from user charges, public budget and loans.

3.2 Baseline results: assessment of expenditures for water supply

In the baseline simulation, the expenditures have been estimated by using international price levels (except for labour, where the costs have been assessed at about one-third of the international defaults). The following expenditures per region are estimated.

Table 3.1

Estimated total expenditures, operation and maintenance costs and re-investments expenditures, baseline scenario rural Armenia, in million Drams per year⁷

Region	operation & maintenance	re-investment	total expenditure
Aragatsotn	42.7	46.6	89.3
Ararat	74.9	51.8	126.7
Armavir	56.6	32.6	89.3
Gerharkunik	40.8	43.7	84.5
Kotayq	59.5	82.1	141.6
Lori	62.9	106.1	169.0
Shirak	55.7	71.0	126.7
Syunik	42.2	84.5	126.7
Tavushi	48.5	81.6	130.1
Vayotz Dzori	13.4	15.4	28.8
AWSC	297.6	375.8	673.4
Lori WSC	25.9	16.8	42.7
Nor Akunq	14.9	19.2	34.1
Total⁸	835.7	1 028.6	1 864.3

Source: assessment TME with Feasible, 2006.

Note: herein after by **re-investment** we understand investment made in line with assets depreciation, to maintain the value of fixed assets at constant level.

⁷ The original calculations are made in Euros. The exchange rate applied is Dram 480 per Euro.

⁸ Total may deviate from the calculated total due to rounding.



To operate and (minimally) maintain the current infrastructure, annually a little less than 1 billion Drams is needed, or about Dram 800 per inhabitant. For the re-investments (which are needed to maintain the value of the infrastructure at the current value), on average a little more than 1 billion Dram per year would be needed. In the baseline, no renovation of the existing WSS infrastructure is assumed (other than planned renovations).

If also planned renovations are taken into account, the additional expenditures for the years 2006 – 2008 can be assessed roughly as follows:

Table 3.2

Estimated expenditures between 2006 – 2008 for renovations of the existing infrastructure, baseline scenario rural Armenia, in million Drams per year

Region	2006	2007	2008
AWSC	767	767	767
Nor Akunq	91	91	91
Lori WSC	108	108	108
Total	965	965	965

Source: own assessment, 2006

The estimate of expenditures for renovations is limited to the settlements serviced by water companies. These companies have acquired (international) loans, which are used for renovating and upgrading the existing infrastructure. The amounts in the above table have been estimated by means of the needed renovation (which is specified by the water companies), and the available budgets for rural WSS from loans (see next section).

3.3 Financing

For financing the operation, maintenance and renovations of the rural water supply infrastructure, four different types of revenues can be distinguished.

- user charges;
- budget subsidies;
- loans;
- grants.

In the baseline, the first 3 of these have been assessed.

3.3.1 Revenues from user charges

Revenues from user charges for water services constitute an important part of total revenues. Total revenues from user charges can be estimated by the following formula:

$$(\text{total amount billed}) \times (\text{collection rate})$$

The “Total amount billed” can be estimated from:

$$\begin{aligned} & (\text{“water use” (in m3)}) \times (\text{“water tariff” (in monetary units per m3)}), \\ & \text{or by} \\ & (\text{“number of clients”}) \times (\text{“standard water fee per client”}^9) \\ & \text{or a combination of both.} \end{aligned}$$

⁹ this should be calculated for each group of customers and then sum up



The annual revenues from user charges have been estimated for water companies and villages with (own) piped supply.

Two estimates have been made:

- one for the base year (2006);
- one for 2012, for which it is assumed that the collection rate can be increased to the level of consumers that have piped in-house water supply.

For each of the water companies and the group of settlements with own municipal water utilities, a short explanation is given on the estimated revenues.

Arnavodakanal (AWSC)

Current revenues of the water charges are estimated as follows:

- first, total revenues of water charges have been estimated roughly for the whole company: DRAM 2 000 million;
- the share of rural clients in total is assessed roughly: 111 300 of a total number of clients of 262 100 (42%);
- rural revenues are assessed at DRAM 850 million.

For the future, revenues can be assessed as:

- 120 m3 water sold per households per year;
- water supply tariff is DRAM 100 per m3 (actual average 2005 tariff level);
- there are 111 300 clients;
- collection rate increases to 66%;
- total realistic potential revenue is then: DRAM 881 million.

Nor Akunq

Current revenues of the water charges are estimated as follows:

- first, total revenues of water charges have been estimated roughly: Total revenues of water charges are DRAM 171 million (2006);
- the share of rural clients in total is assessed roughly: 5 280 of a total number of clients of about 60 000 (9%);
- rural revenues have been assessed at 9% of DRAM 171 million = DRAM 15 million.

For the future, revenues can be assessed as:

- 120 m3 water sold per households per year;
- water tariff is DRAM 121 per m3;
- there are 5 280 clients;
- collection rate increases to 97%;
- total realistic potential revenue is: DRAM 74 million.

Lori WSC

Current revenues of the water charges are estimated as follows:

- first, total revenues of water charges have been estimated roughly: Total charge revenues of Lori WSC were DRAM 247 million (2006);
- the share of rural clients in total is assessed roughly: 7 500 of a total number of clients of about 38 000 (20%);
- rural revenues have been assessed at 20% of DRAM 247 million = DRAM 49 million.

For the future, revenues can be assessed as:



- 120 m³ water sold per households per year;
- water tariff is DRAM 92 per m³;
- there are 7 500 clients;
- collection rate increases to 70%;
- total realistic potential revenue is: DRAM 58 million

Settlements without water company service

About 50% of rural population has piped water, served by public (also called collective or centralised) water supply systems, but not by water companies. Basically, the municipality operates and maintains the existing water infrastructure.

Especially assessing current revenues is difficult:

- population served is about 149 000 households;
- a water use of 120 m³ per year per household is assumed;
- water tariff is DRAM 100 per m³;
- a collection rate of 5% is assumed;
- total revenues are estimated at DRAM 90 million.

For the future, revenues can be assessed as:

- 120 m³ water sold per household per year;
- water tariff is DRAM 100 per m³;
- there are 149 000 clients;
- the collection rate will increase to 30%;
- total realistic potential revenue is: DRAM 538 million.

The results of this assessment are shown in the next table.

Table 3.3

Estimated revenues of water charges in rural settlements in Armenia, base year and maximal realistic potential (see explanation in text) in the baseline (in DRAM x 1 million per year)

	AWSC	Nor Akunq	Lori WSC	Rest of settlements	Total
charge revenues, base year	849	15	49	90	1 004
number of rural customers	111 299	5 280	7 500	149 366	
% of customers with in house tap	66%	97%	70%	30%	
projected water use per year (m ³)	120	120	120	120	
price (Dram/cubic metre)	100	121	92	100	
charge revenues, realistic potential	881	74	58	538	1 551

Source: own assessment, 2006

The assessment shows that the total revenues in the base year are estimated at about 1 billion Dram. The assumption concerning increased collection – but also the projected water use per customer in 2012 – leads to total estimated revenue of about 1.5 billion Drams per year.



3.3.2 Revenues from budget contribution and loans

For budget contributions and loans, assumption are made on the “rural” share of total subsidies and loans. The following table gives an overview of the basic elements of the assessment.

Table 3.4

Estimated contributions from budget and loans to water companies in Armenia, for WSS in Armenia, total and estimated rural share, in the baseline (in DRAM x 1 million)

	AWSC	Nor Akunq	Lori WSC	Rest of settlements	Total
budget subsidies 2006	1 500	116	-	-	1 616
budget subsidies 2007	1 200	70	-	-	1 270
loans 2005 – 2008	6 435	6 336	5 472	-	18 243
estimated share rural	42%	9%	20%		

Source: SCWS, water companies and own assessment, 2006

In the next table the contribution from the public (central) budget and loans for rural WSS in Armenia is assessed, based on the assumption that in the year 2005, 10% of the loans is used, whereas for 2006, 2007 and 2008 it is assumed that each year 30% of the loans will be disbursed. For the municipalities without a water company, no information is available on possible subsidies from (local) budgets.

Table 3.5

Estimated contributions from budget and loans to water companies in Armenia, for rural WSS in Armenia, 2006 - 2008, in the baseline (in DRAM x 1 million)

	AWSC	Nor Akunq ¹⁰	Lori WSC	Rest of settlements	Total
budget contributions 2006	637	10	-	-	647
loans 2006	820	167	328	-	1 315
budget contributions 2007	510	6	-	-	516
loans 2007	820	167	328	-	1 315
budget contributions 2008	-	-	-	-	-
loans 2008	820	167	328	-	1 315

Source: SCWS, water companies and own assessment, 2006

The table shows that in the period 2006 – 2008 considerable additional finance is available for rural WSS, due to budget contributions and loans. But, it also shows that budget contributions are phased out by 2008, and after 2008 no loan agreements are in place. So from 2009 onwards, there will be a considerable drop in financial resources, if no additional financing sources will become available.

3.3.3 Total financial resources for rural water supply

Finally, all identified financial sources are summarised in the following table, showing the projected development for each of them.

¹⁰ the actual amount available for 2007 is € 0.5 mln (which is less than what has been projected in the baseline)



Table 3.6
Estimated financing sources for rural WSS in Armenia, 2006 - 2015, in the baseline (in DRAM x 1 million)

Financing source	2006	2007	2008	2010	2012	2015
Charge revenues	1004	1090	1170	1346	1550	1550
Budget	647	515	0	0	0	0
Loans	1315	1315	1315	0	0	0
Total Financial sources	2966	2920	2485	1346	1550	1550

Source: own assessment, 2006

It can be seen in table 3.6 that the financial resources in the baseline scenario are relatively “abundant” in the first 3 years of the period till 2015, afterwards, the loss of financing from budget and loans is only very partial compensated by the projected increase in revenues from water user charges.

3.4 Financing gap/surplus

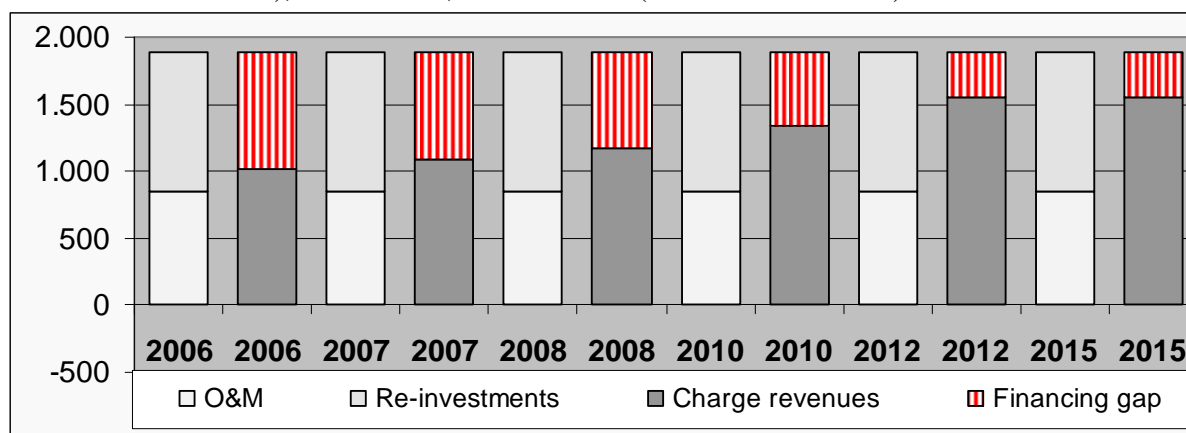
In the baseline scenario the (needed) expenditures are confronted with the available financial resources. If these resources are higher than expenditures there is a financing surplus, in case financing resources don’t cover all expenditures there is a financing gap.

In case of a financing gap, some of the needed expenditures cannot be made, leading to lower service levels, bad maintenance, and lack of reinvestments resulting in a deterioration of the water infrastructure.

In the next two figures, the way in which the financing gap can be analysed is illustrated.

Figure 3.1 shows on the one hand the needed expenditures for operation and maintenance, on the other hand the revenues from user charges. In the figure the renovation of infrastructure is excluded, as well as budget subsidies and loans.

Figure 3.1
Estimated financing gap for rural WSS in Armenia, without renovations (and without budget contributions and loans), 2006 – 2015, in the baseline (in DRAM x 1 billion)



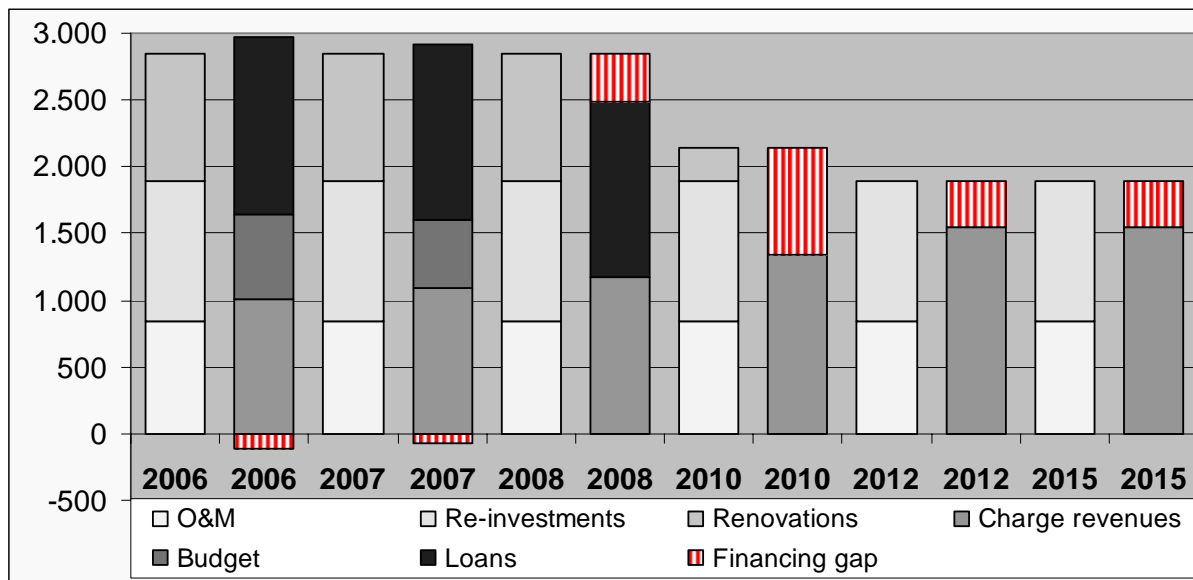
Source: own assessment, 2006



The figure clearly shows a large financing gap. Although charge revenues are enough to cover operation and maintenance costs, funds for reinvestments are hardly available in the first years of the period 2006 – 2015. Although the situation improves, as a result of the assumed increase of revenues of user charges, still a financing gap remains of about 20% of the needed expenditures. It should however be noted, that in this figure, only the charge revenues have been considered, no budget contributions and loans.

In the next figure also the renovations of infrastructure and the additional financial resources from budget and loans are included.

Figure 3.2
Estimated financing gap for rural WSS in Armenia, including renovations, loans and budget subsidies, in the baseline (in DRAM x 1 billion)



Source: own assessment, 2006

Figure 3.2 reveals that, although expenditures in 2006 – 2008 are about 50% higher due to renovations, the financing gap in the first two years is near to zero (actually, a small financing surplus is shown in the graph). But as a result of a lack of financial resources from 2008 onwards, expenditures cannot be kept at the level of 2006 – 2008.

So the initial assessment of the financing gap in the baseline reveals that too little funds are available to fund all necessary expenditures from 2008 onwards.

3.5 Affordability

3.5.1 Household affordability

To assess the affordability of a FS for rural WSS for households, the costs of water services to consumers should be compared with specific household incomes. Special attention should be given to lower income groups. Although no hard guidelines exist on how much the water bill should maximally be, in comparison with household income, often percentages of between 3% - 5% are taken. In this affordability analysis, it is assumed that 3% should be the maximum.



In the baseline for rural WSS, it is estimated that total revenues of user charges will increase from DRAM 1 billion in 2006 to DRAM 1.55 billion in 2012. This should be divided by the population that actually pays charges. In 2006 these are about 200,000 inhabitants, in 2012 about 450,000 inhabitants. Their average water bill can now be estimated at DRAM 5,050 per inhabitant per year in 2006 and at DRAM 3,450 in 2012. By assumption, the average bill goes down as a result of the decrease in average water use per capita (from about 150 litre to 95 litre per capita per day).

The rural income development is assessed, based on the distribution of household final consumption per capita in rural Armenia (2004) per consumption quintile (Armenia Statistics (2006), Statistical Annex, table A3.16). This is then combined with the growth rates per quintile (derived from the PRSP, 2003, page 34). This results in the following findings.

Table 3.7

Estimated rural income distribution per consumption quintile and share of water charge in total household incomes (for households that pay), 2005 and 2012, in the baseline, optimistic assumptions on growth of rural income, Armenia.

Consumption quintile	Income 2005 per capita DRAM/year	Share of water charge in household income	Income 2012, per capita DRAM/year	Share of water charge in household income
20% poorest	125,000	4.0%	255,000	1.4%
2nd 20% population	197,000	2.6%	425,000	0.8%
3rd 20% population	174,000	2.9%	375,000	0.9%
4th 20% population	185,000	2.7%	441,000	0.8%
20% richest	202,000	2.5%	369,000	0.9%
Average	177,000	2.9%	355,000	1.0%

Source: own assessment, 2006

In this assessment it can be seen that in 2005, paying the average water bill (DRAM 5050) for the poorest 20% of rural population really may be cumbersome, as it takes 4% of their household income. Also for quintiles 2-4 the water bill is near the affordability threshold of 3%.

But it also reveals that by 2012, this problem would not exist in this magnitude anymore, as the share of the water bill would decrease to 1% of household income on average.

This optimistic outcome is largely influenced by the assumed rapid growing Regional Gross Product, also for the poorest 40% of the population, and the assumed decrease in average water consumption.

But also another development can be imagined. Due to the lack of funds, water utilities may seek to increase tariffs, water savings may be wishful thinking (in the short term at least), and the assumed economic growth may hamper a little.

This leads to a less optimistic outcome, as shown in the next table, now assuming no decrease in water consumption, 50% less economic growth and a 50% increase in water fees (to 150 DRAM per cubic meter).



Table 3.8

Estimated rural income distribution per consumption quintile and share of water charge in total household incomes (for households that pay), 2005 and 2012, in the baseline, pessimistic assumptions on growth of rural income. Armenia

Consumption quintile	Income 2005 DRAM/year	Share of water charge in Household income	Income 2012 DRAM/year	Share of water charge in Household income
20% poorest	125,000	4.0%	190,000	4.0%
2nd 20% population	197,000	2.6%	311,000	2.4%
3rd 20% population	174,000	2.9%	275,000	2.8%
4th 20% population	185,000	2.7%	313,000	2.4%
20% richest	202,000	2.5%	286,000	2.7%
Average	177,000	2.9%	266,000	2.8%

Source: own assessment, 2006

Now, the results indicate that the water bill still remains problematic for the poorest 20% of the population. In 2012, the situation hardly improves.

So many factors may influence the affordability: economic, behavioural and tariff policies may have a large influence.

3.5.2 Policies to make the water bill affordable

There is a wide range of policies possible to keep or make the water bill affordable for households. Here some of the most obvious policy options are illustrated, as it is important to understand the relation between tariff policy, affordability constraints and the dynamics of both the economy and the water services.

Set water tariffs at level affordable to all income groups

The most general policy is to keep (uniform) water prices at a level that is affordable for all. In the above (pessimistic) example this would imply the following:

- Assume an affordable level of the charge of 3% of household income;
- All consumers / customers have to be able to pay the bill, assuming an average water consumption of 34m³ per capita per year;
- So the water bill for the lowest income group should not exceed 3% of 125.000 DRAM (in 2005) and 190.000 DRAM (in 2012), resulting in maximal water prices of respectively:
 - o 110 DRAM per cubic meter in 2005 (this is in line with the actual 2005 water price of about 100 DRAM);
 - o 168 DRAM per cubic meter in 2012 (in base year prices).

This general pricing approach limits the ability of water utilities to raise enough revenues through user charges, as the total revenues depend on the prices and quantities.

As the water fee is fixed, and the water supply quantity also is rather stable (and the policy may encourage to use water economically, saving water), total revenues are also fixed to a certain amount, not necessarily enough for all needed expenditures. In that case, larger subsidies from the budget are needed.

As a result of this policy, not only the poorer inhabitants are subsidised, but also the richer households, that in principle would be able to pay a higher water tariff.



Subsidise poorest households individually

Another approach is to set tariffs at a higher level, aiming at more revenues and assess what would be the “damage” for the poorest inhabitants. The “damage” might be best defined as the difference between the ability to pay for water services (with for example a limit of 3% of income) and the actual water bill. If this is applied to table 3.8, the following result can be obtained.

Table 3.9

Estimated rural households’ ability to pay for water services (3% of income) per income group, actual water bill and needed subsidy, 2012, pessimistic assumptions, Armenia

income group	maximal affordable payment for water bill (DRAM/capita per year)	actual water bill (DRAM/capita per year)	actual payment (DRAM/capita per year)	needed subsidy (DRAM/capita per year)
20% poorest	5,703	7,576	5,703	1,873
2nd 20% population	9,324	7,576	7,576	0
3rd 20% population	8,243	7,576	7,576	0
4th 20% population	9,392	7,576	7,576	0
20% richest	8,571	7,576	7,576	0

Source: own assessment

It shows that the total maximal ability to pay for water services is some 10% higher than the actual water bill. But it also shows that the 20% poorest would need subsidies to keep the water bill at maximally 3% of their incomes. The total subsidy would amount to 5% of the total actual water bill revenues and comprise some 75 million dram per annum.

But by such a relative small subsidy, the total annual revenues can be considerably increased in comparison with a maximal uniform tariff resulting in only average revenues of 5,700 DRAM per inhabitant (which would be the result in the first example given in this section).

A serious drawback of such a policy to make higher bills affordable for all, is that individual subsidies have to be given. This is always difficult, because it will be hard for the water utility, or a municipal or regional institution, to set up a consistent and reliable cadastre of the poorer population (as income in rural areas especially will be very difficult to determine or control).

On the other hand, it can be argued that in many countries, some sort of social register is kept, for granting certain income support to the poor. If the fraud in such a system can be kept under control (at an acceptable minimum level) it is a good solution, in case additional revenues are badly needed from user charges, and social considerations should be taken on board of the policy. In Armenia a household income support system is already in place and works rather effectively. Over the last 3-4 years it has become better targeted to poor households and could be instrumental in addressing the WSS services affordability issue (see report on task 3 in (OECD/EAP Task Force, 2006) for more details).

Increasing block tariff system

An increasing block tariff could also be introduced to overcome limitations of revenue raising due to poverty. A two (or more) tier system is simple:



- for the first, say, 10 cubic meters per month the household/connection pays a low water price (or no price at all);
- for the additional water use the customers have to pay a higher water price.

The result will always be that the consumers that consume less will on average pay less per cubic meters than consumers with a larger water demand. It thus enables water utilities to supply poorer customers at lower tariff rates and richer customers at somewhat higher tariff rates.

A hard precondition for such policy is that water is metered in a reliable way (which is often not the case in Armenia – for details see Annex 2-5 to the report (OECD/EAP Task Force, 2006). Also, it can be argued that an increasing block system subsidises smaller “richer” families.

3.5.3 Affordability for the budget and the economy as a whole

For the affordability of a water policy (in the baseline), there are no hard guidelines on how much of the public budget (local, regional and/or national) should be spent on water services.

In Armenia, the ability to pay for WSS services lacks for a larger part of the rural population. Money from the public budget will be needed to cover the financing gap. By comparing to what is needed for WSS, with the total budget and specific parts of the budget (or investment in infrastructure) an idea can be obtained of the affordability for the budget.

In the baseline for Armenia, the maximal financing gap is estimated at 800 million DRAM (in 2010). Compared to the 2006 budget estimate of 567 billion DRAM, the financing gap for rural WSS would only constitute 0.14% of the total public budget.

It is clear that only clear commitments and medium term budget planning can solve the question of “budget affordability”.

In Armenia, the Poverty Reduction Strategy Paper states, that water infrastructure investments should be financed by the budget. This would imply that at least 1 billion DRAM annually needs to be set aside to cover needed re-investments for rural water supply. If also the needed renovations (and not just the scheduled) would have to be financed from the public budget, rural WSS would require at least 2 billion DRAM allocated from the public budget per year.

3.6 Key problems and challenges facing rural WSS in Armenia

From the baseline assessment the following – interlinked – conclusions can be drawn concerning the rural Water Supply and Sanitation:

- institutional set up needs further development;
- the WSS infrastructure needs to be better maintained and developed;
- a lack of revenues for financing the needed actions.

Institutional

For rural WSS in Armenia, WSS institutions need to be developed further:

- only 1/3 of rural settlements is served by professional Water companies;
- 2/3 of rural settlements lacks a institutionalised set up of the WSS sector.

Although it can be imagined that local/municipal water utilities could deal with rural WSS, but this would not solve the existing problems. Because a single municipality water utility would lack the basic skills and (financial, administrative and technical) knowledge to further develop WSS



infrastructure, as well as resources to hire skilled labour. The scale (on average some 1,100 inhabitants per community) simply is too small.

WSS infrastructure

In general, the existing rural WSS infrastructure is not optimal. In some 100 settlements, no piped water supply is available, in many other settlements, still a considerable part of the population has no easy access to water supply (let it be sanitation).

Centralised sanitation (sewerage and sewage treatment) lacks almost everywhere (although this is not necessarily a problem).

These problems are interlinked with the lack of funds.

Lack of revenues

The baseline analysis shows that even to sustain the WSS infrastructure at the existing level will be a challenge with the financial funds now available.

Water tariffs are relatively low, an additional problem is that many users do not pay for water services.

This seems to be a “chicken-egg” problem:

- users complain about the level of the service;
- as the level is found to be low, they are not (very) willing to pay;
- while municipalities/operators lack revenues just to sustain the service level, not to speak about improving it.

Apart from this, due to poverty, many rural households (up to 40%) would have difficulties to afford the water bill.

Funding from the public budget is also a problem. Operational subsidies to water utilities from the central budget are to be phased out in a few years¹¹, while contributions from international loans (and required Armenian contribution from the central budget to the capital investment projects financed from the loans) are scheduled only till 2010, inclusive, making it uncertain for water companies how to finance in the (near) future needed investments in WSS infrastructure.

In communities with their own water utilities, it can be assumed that contributions from the local budget are minimal or absent, as local communities hardly have any financial means at all.

¹¹ although in the poverty reduction strategy paper it is stated that budget contributions are needed for (re) investments



4 POLICY SCENARIO

4.1 Introduction

A policy scenario can be build on:

- the findings of the baseline scenario;
- the Millennium Development targets for the water sector;
- other important considerations, like minimal water supply standards.

The elements of each of the above will be shortly discussed in this chapter.

4.2 Baseline scenario findings and resulting actions

4.2.1 Institutional

For large parts of rural settlements in Armenia, an organised water supply by a professional water company lacks. Priority should be given to filling up this institutional gap, by stimulating and targeting institutional reforms.

Attention should be given to the choice of “business models”:

- regional water companies;
- public-private;
- urban and rural service areas;
- etc.

4.2.2 WSS Infrastructure

Even in the modest baseline scenario assumption about (re-)investments, the rural infrastructure will gradually dilapidate, due to lack of funds for renovations. So apart from the renovations already planned by water companies, additional funds will be needed to continue renovations.

Targets for further development of the rural WSS will be discussed in the section on MDG’s.

4.2.3 Revenues

In the baseline scenario, the revenues are too little to support all needed expenditures for rural WSS (even as modest as the baseline assumptions are). It has been assumed that revenues of user charges can be increased, but not enough. Budget contributions are not secured after 2007.

Consistent policies on both user charges and budget contributions need to be developed. In principle, guidance is given by the Poverty Reduction Strategy, as it states that users should pay for operation and maintenance, whereas capital expenditures (re-investments, renovations and extensions) should be provided through the state budget.

Also, a longer term perspective should be developed concerning the attraction of international loans.

4.3 Millennium Development Goals for the water sector

The Poverty Reduction Strategy Paper states, that “the access to safe supply in rural settlements” should increase from 45% of the population in 2001 to 70% by 2012 (and 2015).

By the end of 2006 49% should be achieved. In the Poverty Reduction Strategy Paper “accessibility to safe water supply” means that “in dwelling” and “in building” are regarded “safe water supply”. In total 45% of rural population has access in this way (2001). See figure 4.1

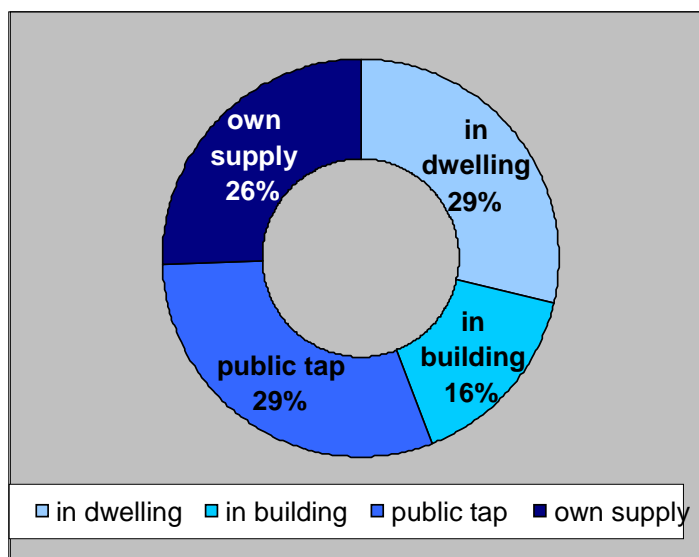


Figure 4.1
Water supply in rural settlements in Armenia, 2001.

Part of the “standpipes” (“public tap”) and “own supply” sources have to be gradually replaced by in house or yard/in building taps. Further distinctions are not mentioned in the strategy, so these should be developed by the Steering Committee.

There are various possibilities to achieve the target:

- The rural population (and settlements) currently without piped supply could be targeted;
- a minimal cost approach: replacing standpipes by yard taps, which would require the smallest investments in the networks;
- a more maximal approach where most of yard taps and standpipes would be upgraded to in-house connections:
- also regional concerns could play a role.



The Poverty Reduction Strategy Paper does not mention water sanitation as a priority. The current situation is however far from optimal. Some improvement (for example from (simple) pit latrines – currently estimated at 60% – to simple septic tanks) can be imagined. This might imply a targeted reduction of simple pit latrines to 30% .

4.4 Minimum water supply standards

Minimum water supply standards¹² would imply that each consumer has the right to a certain (minimal) amount of water of good quality. This can be achieved by supply of piped water, but also other options can be imagined (standpipe within 100 meter). Than still, a certain part of the rural population will be difficult to supply. It is estimated that 5% of rural inhabitants lives in the fringe area, on longer distances from the core of settlements. In these cases, individual solutions should not be excluded.

4.5 Issues

For the further development of a policy scenario, for the following key issues guidance is needed from the Steering Committee.

¹² Minimal water supply standard will be discussed in more detail in a separate paper.



Factor	Baseline assumption	Options in a policy scenario
Sector priority, supply	No	Renovations, re investment and extensions
Sector priority, sanitations	No	Increase the share of septic tanks and simple water treatment.
MDG targets	No	Meet by 2015, various options for realisation of targets
Minimal water supply	No	Set a realistic target (100% by 2015 will be difficult)
User charges	Collection increasing till 2012, no further increase	Gradually increase to achievable level
Household affordability threshold	3% of household income	Social support systems to make water bill payable for poorest part of rural population
Public budget	After 2007 no operational subsidies to water utilities from central budget	Allocate some portion of the central budget for re-investments, renovations and extensions of the rural WSS infrastructure. Incorporate in Medium Term Planning of the budget
International loans	After 2010 no loans; Rural share in current loans uncertain	Attract more loans for rural WSS
Period covered	2006 - 2015	Extension?
Institutional set up	unchanged	Water companies, serving whole territory of Armenia



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