Water supply and sanitation in the Community of Portuguese-Speaking Countries – current situation and objectives

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Abstract

Nowadays, about 780 million people do not have access to drinking water and 2,5 billion do not have adequate access to sanitation. The current paper focus on these two subsectors, in particular in the Community of Portuguese-Speaking Countries (CPLP). Worldwide, it was found that there are many differences between countries in both subsectors, mainly between developed and developing countries (UNICEF e WHO, 2012). Generally, the coverage level of sanitation is lower than the coverage level of water supply. The objectives of each country were presented. Even if there are similar objectives, the solutions to the specific issues of each country might be different due to their specific characteristics. According to the identified challenges, a proposal for a vocational training course at a medium level, for developing countries, is presented.

Key-words: water supply, sewage sanitation, Community of Portuguese-speaking Countries, vocational training course.

1. INTRODUCTION

Given the importance of the worldwide problems regarding the development of the societies, the United Nations organized in September 2000 the Millennium Summit, in New York. Many world leaders attended this conference, where the Millennium Declaration was created, with the support of the 189 Member States of the General Assembly of the United Nations. In this Declaration, several goals were established that should be achieved by 2015. These goals are included in eight different objectives, denominated Millennium Development Goals (MDG).

The MDG 7 is the most related to this paper. Firstly, half of the proportion of the population without sustainable access to safe drinking water should be reduced, against reference values from 1990, by 2015. Later, in 2002 another goal was introduced, saying that half of the proportion of the population without basic sanitation should be reduced, against reference values from 1990, by 2015 (UN, 2012). All of the 8 objectives are connected to each other, thus, the fact that one of the objectives is achieved can help the other ones to also be closer of being achieved. If these two goals of the objective 7 are achieved, the rate of diseases related to the lack of water, or to the consumption of contaminated water, can be reduced, as well as the rate of child mortality, for example.

Regarding the water supply, the situation has been improving in the last years. In

2010, the rate was 89%, which corresponds to the goal that only had to be achieved in 2015 (UNICEF e WHO, 2012), so this objective was successfully reached.

In 2008, 61% of the global population had access to sanitation facilities. If the trend stabilizes, in 2015 the percentage will be 77%, which means that the goal will not be achieved and 2,6 billion people will not have access to sanitation facilities (UNICEF e WHO, 2012).

In this paper, the situation of the Community of Portuguese-Speaking Countries – Angola, Brazil, Cape Verde, Guinea-Bissau, Mozambique, Portugal, São Tomé and Príncipe and Timor Leste – will be analyzed. The rural areas will deserve special attention because these areas have more difficulties regarding the water supply and the access to sanitation (UNICEF e WHO, 2012).

2. COVERAGE LEVELS IN CPLP

Table 1 shows that the percentage of population who has access to drinking water is increasing over the years, in all the countries analyzed. Furthermore, the population of urban areas who has access to drinking water is higher than the one of the rural areas. Angola and Mozambique are the countries that have more difficulties.

Table 1 – Percentage of population who has access to drinking water (UNICEF e WHO, 2012)

		Urban (%)	Rural (%)
Angola	1990	46	40
	2010	60	38
Brazil	1990	96	68
	2010	100	85
Cape Verde	2000	84	81
	2010	90	85
Guinea-Bissau	1990	45	32
	2010	91	53
Mozambique	1990	73	26
	2010	77	29
Portugal	1990	98	94
	2010	99	100
São Tomé and Príncipe	2000	86	70
	2010	89	88
Timor Leste	2000	69	49
	2010	91	60

Table 2 shows that the percentage of population who has access to sanitation facilities is increasing over the years in each country, but this increase is not higher than the increase associated with drinking water. Additionally, the population of urban areas who has access to sanitation is significantly higher than in rural areas. Mozambique and São Tomé and Príncipe are the countries that present more difficulties in this regard.

Table 2 – Percentage of population who has access to sanitation facilities (UNICEF e WHO, 2012)

		Urban (%)	Rural (%)
Angola	1990	67	6
	2010	85	19
Brazil	1990	80	33
	2010	85	44
Cape Verde	2000	61	25
	2010	73	43
Guinea-Bissau	2000	36	5
	2010	44	9
Mozambique	1990	36	4
	2010	38	5
Portugal	1990	97	87
	2010	100	100
São Tomé and Príncipe	2000	27	15
	2010	30	19
Timor Leste	2000	56	33
	2010	73	37

3. OBJECTIVES IN THE CPLP

To identify the objectives of these countries regarding the water supply and sanitation, strategic plans of each country were analyzed, whenever possible. Sometimes, the strategic plans do not exist, this is the case of Brazil where only the strategic plan of Pernambuco could be analyzed, or do not mention explicitly all of the objectives, so it was necessary to complement this analysis with other documents. This study allows us to identify whether the goals of these eight countries are similar and if though the solutions might be different due to the characteristics of the countries. It is important to notice that the following objectives can be related to the water supply and to the sanitation facilities simultaneously. However, this does not mean that the priority given to the goals is the same for both sub-sectors. One example is the reduction of the water losses in the water supply. Even though it concerns the sanitation as well, it is more important for the water supply because the reduction of treated water will reduce the access to drinking water and, in the end, it would be a wasteful investment.

Another important aspect is the fact that the same objective can have slightly differences between countries due to their different levels of development. That is the case, for instance, in the objective of increasing the access level of drinking water. All the countries support this objective, but for the World Health Organization, Portugal is the only one which has almost a total coverage level, although there is still space for improvements. In other countries, this objective is really important because the coverage levels are very low. Also noteworthy is the fact that the coverage level of water supply and access to sanitation should increase simultaneously, due to the relationship between the two sub-sectors, since they are complementary.

The next identified aim is the establishment of a coverage level in a limited period of time. Only Pernambuco (Brazil), Guinea-Bissau and São Tomé and Príncipe did not establish this concrete goal. However, this goal is important in both sub-sectors because it allows to evaluate if the country is making progresses and if they are enough to reach the final goal.

Another objective is the setting of the water sector on top of the National Agenda, which allows knowing if this sector is a priority for the country. Only Mozambique has this goal, which shows that the country values the sector of water when compared to other sectors.

Regarding the public health, it is important to promote the adoption of safe hygiene practices and sanitation, as well as to increase the knowledge of the local people regarding diseases that could be related to lack of water and sanitation. All of the countries have this goal. Portugal is one of the countries that has this goal because, even though it is a developed country, the public awareness is still an important topic. The good environmental practices are promoted as well.

In the technological domain, the implementation of new infrastructures is a common objective in the CPLP, as well as

the rehabilitation of the existing ones. Portugal is the country where the coverage level is almost total and that has numerous problems in the conducts that arise during the construction phase, which explain the fact that it has more rehabilitation projects. This objective is related to the water supply and to the sanitation. It would be better if the implementation of water systems and sanitation systems occurred at the same time because it is necessary to the wastewater evacuation, avoiding contaminations.

Another objective is the reduction of water losses. Even though this objective is not related to all of the countries in study, it does not mean that Guinea-Bissau, Mozambique and São Tomé and Príncipe do not have this kind of problems. They might give priority to other problems. Portugal is the most developed country, among the case studies, and it is also concerned about the water losses.

The increased production of desalinated water is another objective but only for Pernambuco and Cape Verde. This technique is not practiced in all of the countries, at least in a large scale, so this objective is not a priority at the moment. Besides that, this goal is only related to the water supply. In Portugal, this process is used in Madeira (Porto Santo) (IGA, 2012).

The reuse of wastewater is an objective for Cape Verde, Portugal and Timor Leste. This process is important since the water consumed by the population, mainly in domestic uses, can be reused in order to reduce waste. The wastewater reuse could be used in activities that do not require drinking water, contributing this way to the rationalization of the water (Delgado, 2006). For instance, a good practice that could be implemented in Portugal is the implementation of washbasin in the toilet, allowing people to use the water to wash their hands before flushing toilet (Caroma Industries, 2012).

The use and expansion of new technologies is related to research and innovation in the water sector and can introduce some adequate solutions. In this case, only Angola and Guinea-Bissau do not have explicitly this objective. However, this goal is important due to the diversity of the regions inside a country and between countries, which turns the solutions to be possibly different for each region. For some countries, like Mozambique or Cape Verde, the sustainable systems can be a good technology to be implemented. This objective is related to both sub-sectors.

Considering the domain of water resources, it is possible to identify the adoption or reinforcement of management models. This is an important objective due to the concept of the simultaneous approach of the water supply and sanitation. It is better to have an integrated approach because, in case there is no other way of collecting the wastewater, the water supply will cause some difficulties to the population because the water cannot be evacuated and cannot be treated, for instance. Only São Tomé and Príncipe and Timor Leste do not take this objective into consideration.

The control and the protection of the water resources is a common objective for the

CPLP. It is relevant because it can avoid contaminations and, consequently, the required treatment of the river's water does not need to be so aggressive due to the lower degree of contamination. This objective is related mainly with the water supply, although it is related to the sanitation as well.

The information system is associated with the hydrogeological mapping. This map is useful because it provides information about the location of aquifers for example, increasing the probability of finding underground water. Only Mozambique and São Tomé and Príncipe have this goal. Portugal already has a hydrogeological map (SNIRH, 2010).

The decentralized management of water resources is an objective considered in all of the documents analyzed, with the exception of Portuguese plan. This goal will allow to each region to have the power of taking their own decisions. This way, it would be easier to deal with difficulties and to find adequate solutions.

Another important point in the management of water resources is the sustainability, which says that the use of water resources for the satisfaction of present needs cannot compromise the satisfaction of the future generations. This goal is common to the eight countries, which shows its importance.

At the institutional level, the intention of improving or creating an institutional, legal and/or regulatory framework in the country is also mentioned. This objective varies according to the country. In Angola, for example, the main domains that need an intervention are the legal and the regulatory framework. In Portugal, for example, the institutional framework is the most important issue.

The establishment of public-private partnerships can be also an option for the CPLP because it can increase the existing financing. This goal should be achieved by each country.

Another objective is the incentive for participative planning, which consists in the integration and participation of the community in the conception, construction and utilization of the facilities and in the operation and maintenance of the systems. In this case it is possible to consider the opinion of the population before taking any measures or before the implementation of any infrastructure. This planning method is important because it allows the collaboration of the community who will be in contact with the new infrastructures. Sometimes, the facilities are useless because the community do not have the knowledge to use them. All of the countries present this goal, even though the degree of participation is different for each country. In Mozambique, for example, the community can participate in the management of small scale systems.

Regarding the development of additional programs, only Portugal does not have this objective mainly because its goals are already well defined in the strategic plan.

Concerning the financial resources, each country has the objective of assuring financial funds, allowing the fulfillment of all

of the other objectives mentioned before. Portugal, for example, has already an important fund, the Community Fund (QREN, 2007).

Another aim related to the financial resources is the implementation or restructuring of the tariff system in order to promote the costs recovery and the sustainability of the investments.

The goal related to the sustainability of the systems is only present in the strategic plan of Portugal. However, this does not mean that the other countries do not want to have sustainable systems. They just have other priorities at the moment. This goal is mainly related with the increase of the efficiency of services, as well as the reuse of resources.

Finally, the last objective is related to the capacity building of technicians. This goal is important for every country in the CPLP. Nevertheless, Portugal and Brazil do not need to have the same Knowledge in the training program as the other countries. In the case of Portugal, the strategic plan mentions that the training should be provided by the company of the water sector. The hiring of researchers is a benefit as well, because it allows the technological evolvement of the country to new solutions (PEAASAR, 2007). Regarding the Portuguese-Speaking African Countries and Timor Leste, the formation of technicians capable of doing maintenance and reparations is essential. This objective is extremely important because, sometimes, the country invests money in boreholes, for example, and the maintenance of the new system is really difficult due to a lack of technicians who could apply the procedures. As maintenance is not carried, breakdowns occur and, once more, they are not repaired because no one is qualified to do the work. The systems are, in this case, useless and can be a source of pollution, in particular in the health care. If this objective is achieved, several problems can be solved in a medium and/or long term. One problem is the increase in water and sanitation coverage level. Furthermore, it can create new jobs, improving, consequently, the quality of life of several families. Therefore, training is one of the pillars for the water sector, and without achieving this objective the development of these countries will face several difficulties.

In general, it is possible to identify eight common objectives between these countries and they belong to different domains, which show the diversity of the goals.

Table 3 – Summary of the objectives

Common objectives	Non common objectives
Increase significantly the access to drinking water and sanitation facilities	Put the water sector on top of the National Agenda
Implement new infrastructures	Establish coverage levels
Control and protect the water resources	Reduce the water losses
Promote the participative planning	Increase the capacity of the production of desalinated water
Training of professionals	Reuse treated wastewater
Ensure financial funds	Use and expansion of new and adequate technologies
Promote the adoption of safe hygiene and sanitation practices	Adopt or reinforce the integrated management models of the water resources
Promote the sustainable use of water resources	Do hydrogeological mapping
	Promote the decentralized management of the water resources
	Create or improve the institutional and/or legal and/or regulative framework
	Establish public-private partnerships
	Develop additional programs
	Establish an adequate tariff system
	Promote the sustainability of the services

4. PROPOSAL OF A VOCATIONAL TRAINING COURSE

Among the common objectives, one of them was selected in order to be developed. A proposition was made regarding the design of a vocational training course.

In order to implement a vocational course, it is necessary to establish previously its general characteristics. The section of education of the *Sustainable Sanitation Alliance* was used as a source of information. This organization offers a training course for developing countries and it was helpful in the selection of the curricular units, as well as their contents (SuSanA, 2008). Furthermore, the information of the Vocational Training Center for Water and Sanitation (VTCWS) was important because this training center offers short duration courses and long duration courses (CFPAS, 2008). Finally, the World Health Organization was helpful because they propose actions related with water and sanitation, which were useful for the elaboration of the content of the curricular units (WHO, 2008).

First of all, the duration of the course needs to be decided. The ideal would be that the vocational course allowed the transmission of the required knowledge to train competent professionals, who would be able to handle different situations, depending on the experience of the candidate. The formation cannot be too long because it is not supposed to be a university education. Besides that fact, it would be too expensive for the candidates to attend the course because they would have to consider the travelling, the

accommodation and the feeding for a longer period. For all of these reasons, the duration of the course is considered to be five months. In order to have financial help, one possibility is to ask to the CPLP for a contribution, giving accommodation and feeding, due to the fact that most people do might not have the financial means to attend the course.

The certificate of evaluation and accreditation of the course is a crucial matter because it allows the recognition of the training course by companies and the society, and it is an incentive for students to apply. The class size is limited to 25 students per course, allowing a better monitoring by the teachers. Notice that, since the course has a duration of five months, it is possible to teach it twice a year.

The persons who would like to apply have to present several prerequisites. They must have completed the equivalent of the 10th grade of a Portuguese school and the selection will be done by interview. The main target audience would be the people who already have a professional connection with the water sector, water supply or sanitation, and who have interest in developing complementary knowledge in this area. It is envisaged that the hour load will be six hours per day, starting at 8 am and finishing at 4 pm, having lunch time from 12 am to 2 pm.

Another important characteristic is the fact that the course could be done simultaneously in different countries which imply that the content of the curricular units can be slightly different. Since the lack of technicians, as well as the lack of their formation, is very high, it would be recommended that the course takes place in several provinces of the same country, allowing the increase of the number of students that can have access to the course. The provinces have to be strategically selected in order to reach the unprivileged people. In fact, this proposition is more oriented to rural areas because these places face more difficulties than the urban areas.

This vocational course is composed by four parts, as it is explained in Figure 1. The course is proposed to begin in February and it could be conclude by the end of June. During the first fifteen days it would be taught an introductive course about the water supply and the sanitation, where general information about the training will be presented, as well as the basic concepts regarding the water supply and the sanitation. In the following two months the students would have a module with three curricular units. The first one is “Water Supply”, in which students will learn to design and explore water supply infrastructures and the different treatments to decrease contaminations. The other one is the “Hydraulic and Water Resources”, where students will be able to solve basic problems related to runoff and they will learn the concepts related to the water resources and watersheds. The last one is the “Promotion of Hygiene and Institutional Framework”, where the concepts regarding the hygiene and the public health are going to be exposed, presenting the pollution’s origins and several solutions for the communities. In the next module, which has

the duration of two months as well, the students are going to learn about “Sanitation”, learning how to conceive and explore sanitation facilities as well as wastewater treatments. Then, the curricular unit “Exploration of Electric Pumps” will present the mechanisms of pumps and explains how to do the maintenance and the damage control. Knowledge regarding wells and boreholes will also be exposed. Regarding the “Management of Small Scale Systems”, it will be presented the operation and maintenance of small scale systems of water supply and sanitation facilities, and students will learn how to elaborate budgets and accounting procedures.

The evaluation period will occur in the last fifteen days of the course, taking into account the continuous evaluation along the training course. The evaluation is individual and the minimum grade is 9,5 out of 20. An important characteristic is the fact that the same curricular unit could be taught by several teachers, allowing them to stay in the field only the time required to expose the content of his course. Knowing that the curricular units have a maximum duration of two months and that they will have more than one teacher, the hiring process will be easier because the teachers can have more flexibility. This way, the teachers just need to stay in the work place within two months. It was estimated that this vocational course will need between fifteen and twenty teachers, depending on the financial means. In order to improve the theoretical-practical lessons, the creation of partnerships with institutions and entities related to the water sector would be desirable, allowing students to have access to laboratories and field visits. They will also have the opportunity to attend several seminars in order to enrich the training. Even though this proposition is oriented for the CPLP, with the exception of Portugal, it must be continuously improved and adapted to the reality of each country.

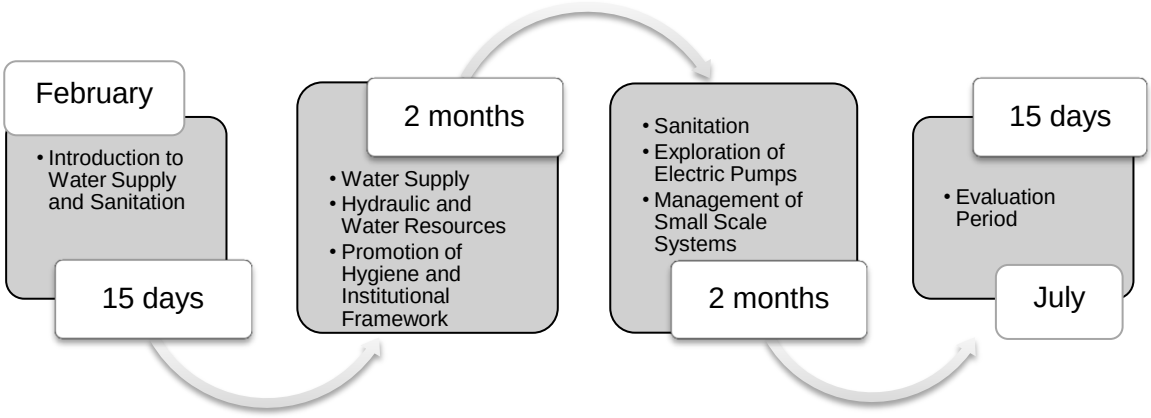

Figure 1 – General scheme of the curricular plan

The table 3 presents the information regarding the courses. The curricular units will be mainly theoretical-practical classes. Some of the courses have laboratories

and/or field visits. The schedule regarding each curricular unit is presented as well.

Table 4 – Summary of the curricular units and their characteristics

	Curricular Units	Theoretical-Practical hours/week	Laboratory hours/week	Field Visits
Introduction	Introduction to the Water Supply and to the Sanitation	30	-	-
1st Module	Water Supply	7	3	Yes
	Hydraulic and Water Resources	8	2	-
	Promotion of Hygiene and Institutional Framework	10	-	-
2nd Module	Exploration of Electric Pumps	6	4	-
	Sanitation	10	-	Yes
	Management of Small Scale Systems	10	-	-

5. FINAL CONSIDERATIONS AND CONCLUSIONS

Nowadays, the lack of drinking water and sanitation conditions is a real problem. The goal related to the water supply, defined by the MDG 7, was already reached but there are still 780 million people without access to drinking water. Regarding the sanitation, the goal is still far from being achieved and there are still 2,5 billion people without access to sanitation facilities (UNICEF e WHO, 2012). In addition, the increase of the access to drinking water and to sanitation conditions is important because of the impact that it has in other sectors like health, education or environment.

Developing countries are the ones which have more difficulties in the water sector. Inside the CPLP, Portugal is the country which has the best coverage levels in the water sector. In contrast, Mozambique is the country which is in the worst position. It is also possible to conclude that the coverage levels to sanitation conditions are, in general, lower than the water supply. However, the best way to solve this problem is to address them simultaneously because they are complementary.

Regarding the objectives, it is possible to identify several common goals between the eight countries, although, due to the diversity of the countries, the solutions might be different. It is important to know that not all of the strategic plans analyzed expose explicitly the objectives for the country in the water sector, probably because they have to choose the more important objectives, establishing priorities, due to a lack of financing.

One of these objectives is the lack of qualification of human resources.

Sometimes, water supply systems stop working, due to damage or lack of maintenance, and there is no one qualified to repair the system, which represents a big difficulty. The vocational training course proposed here intends to contribute to the increase of access in the water supply and sanitation sectors.

The course has a duration of five months and it is oriented mostly for the Portuguese-Speaking African Countries. Notice that improvements and adaptations can be done in the professional training course, taking into account the country where the course takes place.

This proposal has good benefits since the course has a strong laboratorial component and workshops. This way, the students can be better prepared for the future, allowing them to solve real problems. The course is oriented for rural areas due to the fact that they have more difficulties than the urban areas. Due to the financial problems of the population, the CPLP could provide financial help for the students.

In conclusion, this vocational training course represents a good opportunity for these countries to improve in the domain of the human resources and, consequently, increase the access to drinking water and to basic sanitation.

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