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Successful implementation of Public-Private Partnerships to local communities

Providing water supply services in Sub-Saharan Africa

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The following thesis examines the issue of water scarcity and Public-private partnerships (PPPs) build to overcome this challenge. PPPs are risky projects but beneficial when succeeding. This research focuses on implementing the partnerships to local communities since implementation and involving locals to the process of building partnerships are crucial factors in successful PPPs. The paper aims to examine several factors and issues behind PPPs to provide beneficial information about the partnerships. The research was made by using several databases and researches from international organisations: United Nations, World Bank and African Development Bank, because the focus area of the research is Sub-Saharan Africa. To examine the implementation practically, the paper presents two case examples: one from Ghana and other one from South Africa. Wide range of different kind of articles, books and journals were read through to find the answers to the research questions and beside the databases the research was made in libraries in Helsinki, Finland and in Krems an der Donau, Austria.

Keywords	AfDB, implementation, PPPs, SSA, UN, water scarcity, WB

Table of Contents

List of Tables and Figures

1 Introduction

Water is a need for all the living organs: no water, no life. Water supply services are important part of humans' lives and in high income countries people are used to having daily, easy access to clean water through a water tap. It is a startling matter when one begins to wonder what it means to have direct access to water source, since it is not reality for all the people in the world. According to WHO, in year 2014 700 million people did not have access to clean water resource, and these people were all in developing areas. The population growth and a growing need for water makes providing pure water more challenging. Water flows unequally in nature and some areas are naturally drier, but some areas face lack of water because of the economic situation.

Poverty, climate change, educational inequality and agricultural issues also affect the water supply. To overcome these challenges poor states must develop ways to build water services. Shiva (2002) argues that the water business is a tempting idea for multinational corporations; already in the beginning of 2000 century the World Bank estimated that the potential value of the water market would be over $1 trillion. The value of this market is increasing when the competition on clean water resources is accelerating and population keeps on growing. However, privatisation is not the only option for securing water services in a state.

Public and private actors may work together as partners. This can be seen as a better option than pure privatisation, since most of the partnership types retain part- or whole ownership by the state and it is possible to build the projects in a way that the locals are included in the process. In ideal situations PPPs work in a way they were meant to: to succeed in helping poor states to provide to their citizens water or other scarce resources, such as electricity. The efficiency and success of the project is dependent on many aspects, including acceptance and participation of the local population.

Public-private partnerships hold a lot of potential, and the effect of these in certain areas is huge, but they also hold risks and possibilities for failures. The idea behind this research is to scan and reveal the possibilities and risks behind these kinds of partnerships. The main focus is on the area of Sub-Saharan Africa, since based on the research it is mainly water scarce area because of economic situation and many states use PPPs to provide services to citizens. The topic of water supply is important because at the mo-

ment water supply is on an unstable basis and unclean water is a global safety risk; for example, the National Ground Water Association (2015) ranked water as a first global risk last year. The idea of this research is to gather information about PPPs and examine successful ways to implement them to local communities.

1.1 Research Objectives and Structures

The author aims to provide as logical a structure as possible when identifying the research topic and answering to the research questions. The paper begins with providing information about water and examining the current global situation with respect to water. After that the general model of water distribution is introduced and water as a good is explained as well as the demand for water. The next chapters are about water scarcity and United Nation's Millennium Development Goals and their role when trying to achieve water security.

When water and water challenges are fully examined, the author describes the PPPs, what are they, how do they work, who are the actors within, what are the benefits and risks, what are the important issues when implementing them and involving citizens to the projects, how do they differ from privatisation and traditional public services and under what kind of contracts do they operate. After in-depth analysis about the partnerships is provided the last part of paper is explained.

The last part is about Sub-Saharan Africa and it explains why was it chosen, what kind of issues the area faces in relation to water scarcity; its population growth, agricultural and economic development important, how climate change affects water scarcity and water supply services, the importance of educational development, and what the African Development Bank does in relation to these agreements. The whole research is finished with case examples from Ghana and South Africa.

1.2 Research Methodology

The research methodology of this Bachelor's thesis is founded upon the secondary research method. This means research based on already published knowledge, such as books, journals, articles. (Driscoll, Brizee, 2016) The method was chosen because the topic is widely researched and many organisations, companies and banks work on PPPs, so many in-depth researches, books and articles are accessible in many databases and libraries.

The research material was searched from libraries in Finland and in Austria as well as from online research centres and databases. Scientific articles about the topic were used, as well as

books. The World Bank's and African Development Bank's databases were used when looking for more specific information about the specific projects. The researched material was important for better understanding about PPPs, the researched area and the issues affecting the partnerships.

The used research materials enabled finding insights from professionals working in specific fields related to the topic and it allowed the author to find what kind of information about the topic already exists. Most of used articles and books where provided by some international or national organisation, such as UN, WHO, OECD, AfDB, World Bank or UNDP. These organisations have been working on the field of water scarcity and water businesses for a long time and they have provided a wide range of materials and publications about the topic.

Other sources were from scientists, professors and other specialists working in certain universities or working on the partnerships. The author aimed to find both critical and more positive voices. The case study examples were researched and evaluated in comparison to PPPs in other countries. The author has examined the basis of PPPs in her research made in 2015; this earlier research was used as a guide and baseline for the thesis.

1.3 Research Questions and Limitations

To do a research with a clear goal and purpose, the thesis is based on research questions. The questions guided the author through the study and helped to find the information looked for. These questions are:

1. *How can PPPs be used when solving the problem of water scarcity?*
2. *What are the best ways to implement PPPs for society and local communities?*

The questions set limits on the relevant answers for the study. The questions were set on the basis of the author's earlier knowledge and research about the topic. The answers to the questions are explained throughout the study and again collected in the conclusion.

The paper has some limitations. The author was aiming to find first-hand knowledge and field experience of some on-going PPPs, but the search did not provide results. The author sent several requests for professional interviews, but it did not lead to results. The other limitation is the wide range of materials. The search for relevant publications took relatively long time and could have been done even more precisely but the tight schedule set its own limitations for the research. One challenge with the material was the difficulty of finding useful in-

formation about the implementation of partnerships. As Abubakari, Buabeng and Ahenkan (2010) state in their research about Ghana's water services, even though a lot of information exists about PPPs, not many of those concentrate on the implementation part. PPPs would be interesting to research from locals' viewpoint, but these kind of interviews did not exists and it would possibly require a field research in the place where partnership is on-going.

2 Water

Drinkable water is a limited natural resource; 97,5 % of all the water on Earth is salty ocean water, (UNESCO, 1996) which means that only 2,5% is fresh water, such as ground water, lakes and rivers. This would be enough to distribute clean water for everyone's needs, but water flows unequally in nature and new challenges such as climate change are affecting the situation. Approximately two-thirds of all fresh water is frozen in ice sheets and glaciers. (Green Facts, 2015)

In 2014 the WHO made a report about water facilities in the world and the results were as follows; 2,5 billion people do not have access to improved sanitation and 700 million people do not have access to drinking water. The continuing conflicts, decrease of clean water level and unequal distribution of water are affecting to poverty rates and quality of life. United Nation's General Comment number 15: The Right to Waters describes legal bases for water for every human in the world. The second paragraph of the comment begins with a statement:

> "The human right to water entitles everyone to sufficient, safe acceptable, physically accessible and affordable water for personal and domestic uses." UN Committee on Economic, Social and Cultural Rights (CESCR) (2003)

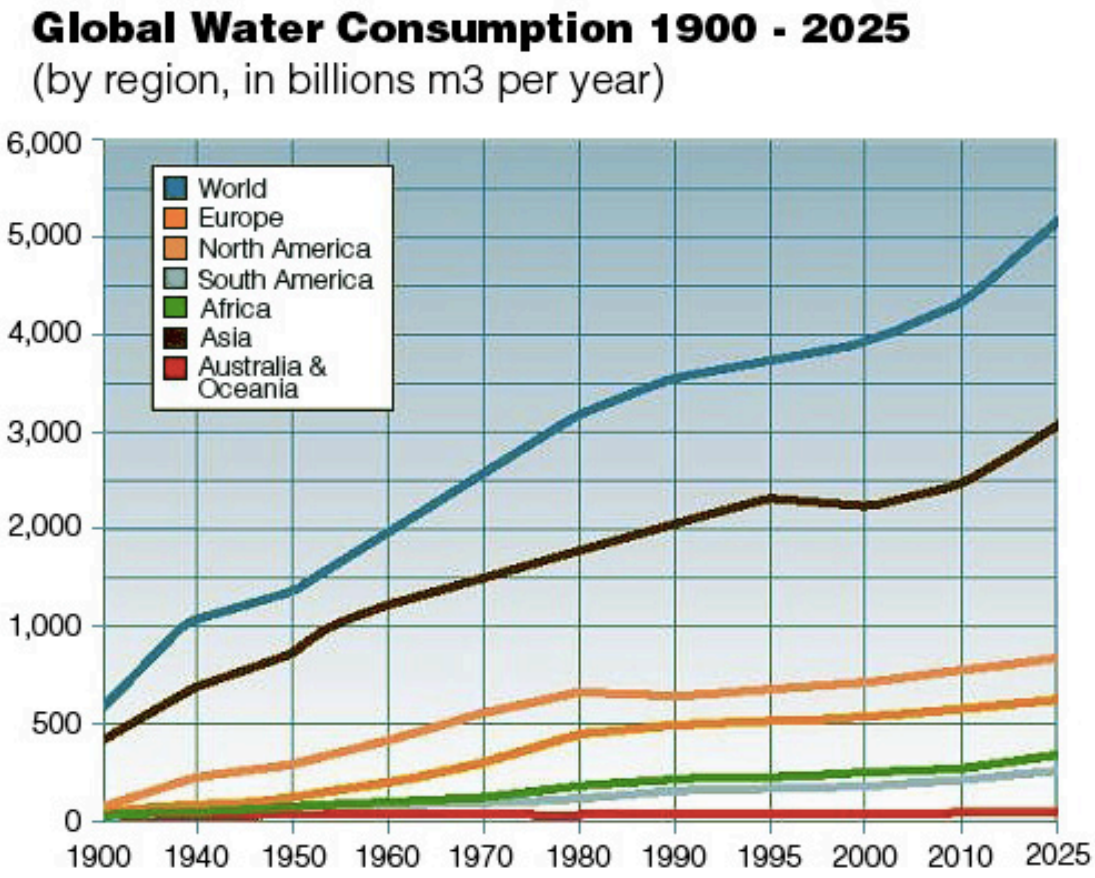
UN defines water as a human right. (UN Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 15, 2003) However, the comment does not define how this right should be applied in practice and who is responsible for doing so.

The United Nations Development Programme (here and afterwards abbreviated as UNDP) (2006) published the guidelines of the meaning behind this specifically. According UNDP (2006) to every person should have a satisfactory and permanent water supply for personal and domestic needs and the quality of this water should be good; it should not cause any diseases, it should smell, look and taste as clean water does. It should also be physically near; according the WHO the source of water should be within 1,000 metres from home and 30 minutes should be

the maximum amount of time used to collect it. UNDP also suggests that water costs should not be more than 3 % of the household incomes. However, this human right is only a human right of a few; lack of clean water and sanitation causes millions of deaths in a year, mainly in poor, developing countries. The problem of unclean water is influencing the whole world.

As shown in the figure 1, the consumption of water has increased and will keep on increasing significantly when the global population grows. It is important to notice that the amount consumed in different continents differs not only because of the population growth but also because of abundance of water.

Figure 1: The development of water consumption in the world



Source: Bowring, et al. (2014) *Mission 2017: Global Water Security,* MIT

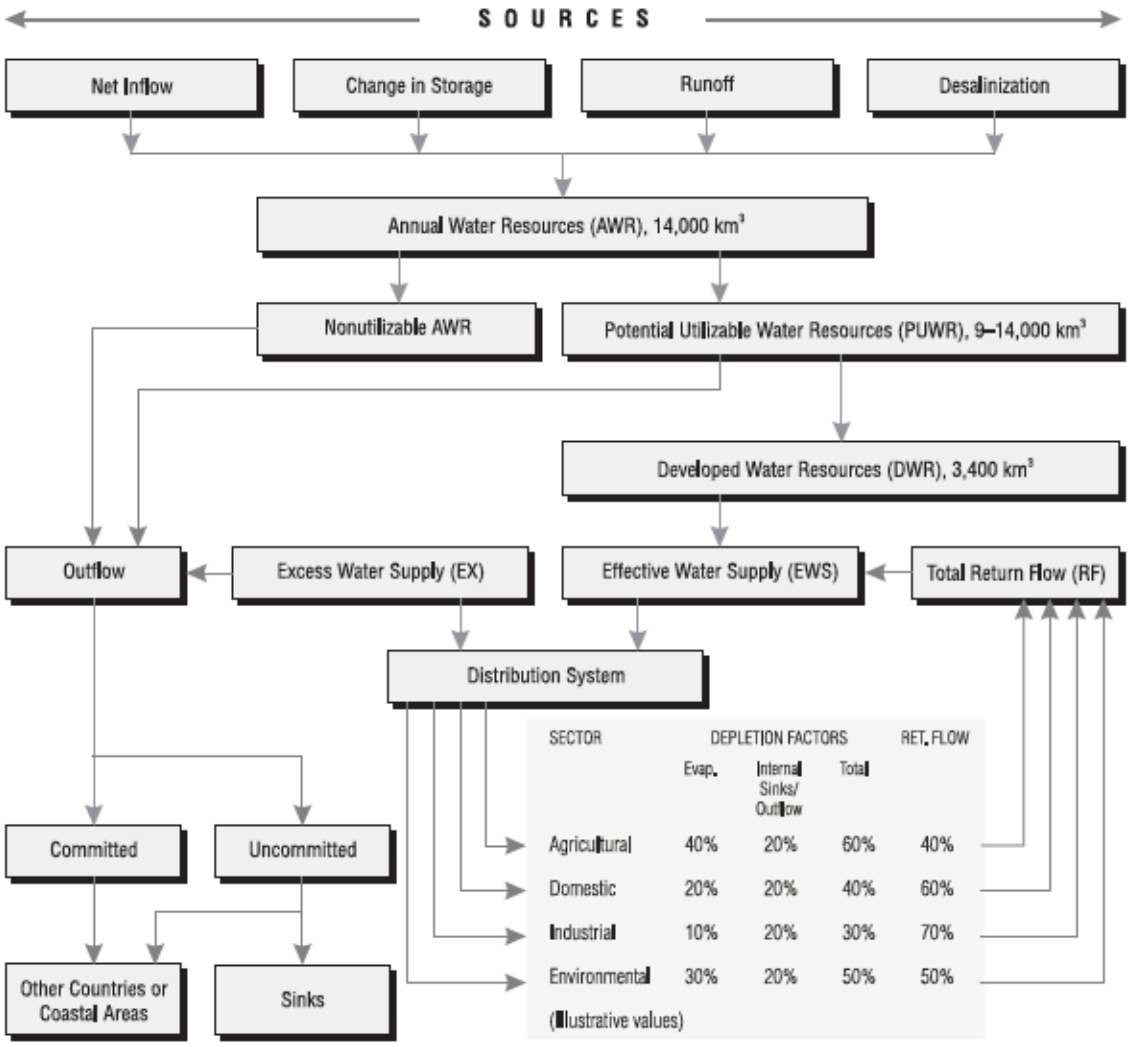
2.1 Water distribution

According to Seckler et al. (1998), water exists in four different sources, which form the global water balance. Water distribution is explained in this chapter and it is based on the work of Seckler et al (ibid) unless otherwise mentioned. Water inflow from rivers and aquifers minus outflows is the *net flow of water.* However, this flow can be disturbed and it may change because of inter annual changes that affect to snow and ice glaciers, lakes, aquifers and soll-moisture. This change is called as *changes in storage.* The changes affect the sustainability of a water source, both negatively and positively, since in some cases it means that new water sources are born annually.

Runoff means the surface and subsurface flow of water. Runoff is almost impossible to measure directly on a large scale because of water recycling. *Desalinization* means water produced from seawater or brackish water but it is a limited and expensive source. All these

four form the *Annual Water Resources (*here and afterward abbreviated as AWR) of a country. This is shown in figure 2.

Figure 2: The distribution of water



Source: Seckler et al., 1998, *International Water Management Institute, IWMI*

It is important to notice that AWR only forms from above sources on a sustainable basis, which is why for example the depletion of aquifers is not considered part of it. *The potential utilizable water resource* (here and afterwards abbreviated as PUWR*)* is the amount of AWR that is potentially utilizable with socially, environmentally, economically and technically feasible water development programs. Many countries have not developed their PUWR, which means that part of it goes directly to the outflows. When defining a country's PUWR, it is important to consider the reliability of the annual water source. *The developed water re-*

source (here and afterwards abbreviated as DWR) is the part of PUWR that is controlled and it becomes the first or primary water resource to the supply system. DWR is almost impossible to measure, because it often comes from multiple sources, with an exception of few countries, like Egypt, where all of DWR comes from one source, High Aswan Dam.

In figure 1, the DWR feeds into the *effective water supply* (here and afterwards abbreviated as EWS). The EWS leads on to the distribution system, which is divided into sectors that are important for understanding the issue of water scarcity. The other source of EWS is the *return flow*, water used by these sectors. The main sectors that use water sources are agriculture, domestic, industrial and environmental sectors.

If water distribution can be defined as in figure 2, based the study of Seckler et al. (1998), one may wonder how is water actually seen in relation to other resources or society's every day needs. To understand the ways of producing water services one must define is water as a pure public or private good, or something more complex. Often goods can be defined as public or private, but with water the answer is not that simple. (Kaul, Grunberg and Stern 1999) In the following chapters public and private aspects in the issue of water will be examined.

2.2 Water as a good

As Raunio (2015) defines in her study about PPPs, in areas that suffer from water scarcity the states are often poor and cannot produce water services to the citizens or to the needs of industries or agriculture. This makes the issue of water supply services politically delicate and important to the states, but also problematic from a financial point of view. This means that these states need to involve either public organisations or private entities when producing water services. The private sector has been involved to water and sanitation projects in the Global South since the 1990's, according to Budds and McGranahan (2003).

The UN conference in Dublin 1992 about water and sustainable development published four principles about sustainability and water use, and the last one of the principles was stated as followed:

> "Principle No. 4 – Water has an economic value in all its competing uses and should be recognized as an economic good"

The idea behind this statement was that societies' earlier use of water has often been wasteful and damaging, and if the water is seen as having an economic value, it is possible to

achieve efficient and equitable use, as well as to encourage conservation and protection of water resources. (WMO, Dublin statement on water and sustainable development, 1992)

When a subject has a high public agenda, but demands participation of private sector actors, conflicts are likely to occur since the private sector pursues profit whereas the public benefit rarely is profitable, as Raunio (2015) defines in her research. The on-going debate about public versus private or these two operating together often attracts high attention towards the participation of private sector, but it may detract the attention from actual challenges, actual scarcity of water and obscure the roles private enterprises can play in water and sanitation projects, as Budds and McGranahan (2013) argue.

Budds and McGranahan (ibid) explain in their research that usually areas that are not served with water pipes or clean water are small, low-income towns and villages, in the rural areas of developing countries, towards which large international companies have shown only a little interest. This is understandable given the goals of private enterprises. In this kind of place a third party, and international or local organisation, plays an important role.

Raunio (2015) argues that when a private sector actor is included in a water project, it often polarizes the conversation in the area, especially when the prices of water are rising. The situation is absurd since the private sector has come to solve the problem of water supply, but because in these places demand is higher than supply, the prices are rising. This makes the situation unbearable for citizens who suffer from poverty and might force them to build illegal connections to water pipes as presented in case study from South Africa, presented in chapter 7.2. Budds and McGranahan (2013) stress the fact that under the right circumstances the private sector can and often does improve the efficiency of water supply and increases the funding of the project. These circumstances will be examined later in this thesis.

As Budds and McGranahan (ibid) argue, the private sector is strongly encouraged to act in the Global South by international financial players. However, Rugemalila and Gibbs (2013) argue that so far the results has been rather disappointing. However, Pawar (2014) states that the public sector cannot alone supply enough water for the demand, since the challenge of demand exceeding the supply in water sector is real.

According to Lewis (2016), the rapid population growth in urban areas, especially in Sub-Saharan Africa, has led to a situation where existing water sources have dried up, or to polluting the water sources with, for example, human waste. This means that water sources need

to be rebuilt and brought to the locals, which in poor states might be difficult to do without help from private sector. However, this does not mean that water would be purely private or even purely public good, as Perry, Rock and Seckler (1997) argue; the issue of water being private or public good is a question of values.

2.2.1 Public goods

Kaul, Grunberg and Stern (1999) describe in their book *Global Public Goods* the aspects of public goods. According to them a term 'public good' means goods with features of non-rivalry and non-excludability; the goods are impossible to produce in competitive markets and it should not be possible to prevent people for using them. Pure public goods are very rare but they have both these qualities. Kaul, Grunberg and Stern (ibid) argue that public goods cannot be produced in economic markets; these goods are something everyone can enjoy; for example, clean environment would be this kind of good.

Most goods are impure public or private goods, since pure private goods are as rare as pure public goods. As Kaul, Grunberg and Stern (ibid) define it, impure public goods are something affecting both private market and public wealth; for example it could be a healthy meal. A healthy meal may seem to be a private good since a consumer purchases it in exchange for money, but a healthy meal also affects positively to the consumer's health, which again compensates in higher productivity and less costs for society. Impure public goods create positive externalities for society.

As this research is about producing water supply services in water scarce areas, it is important to understand the relevance of water as a good; both for consumers and for the markets. By the definition given in the chapters above, water is an impure public good, which also could be described as a private good with high public benefits, since water has significant public benefits but in many areas consumers use it in exchange for money. However, the water purchased should be clean. According to Budds and McGranahan (2013) clean water not only affects positively consumers' health, but also makes the society cleaner and safer, as well as offering protection from infectious diseases. This means that providing clean water for consumers is beneficial to both public and private sectors.

2.2.2 Private goods

The description of water being an impure public good means that part of it, or even the whole supply chain of clean water is a private good or supplementing a private good. Kaul,

Grungerg and Stern (1999) explain private goods in relation to money, since those are products or services traded in exchange for money, or sometimes in an exchange to another good. As Perry, Rock and Seckler (1997) argue, a private good could be determined by the overriding value of consumer sovereignty. However, this description completely ignores the distribution of income in society as well as the affect of positive externalities.

In a welfare state an economic system provides services and goods for citizens but in areas fighting to overcome poverty, the provision of services and goods is more complicated. In poor states citizens often lack the resources to purchase basic goods and services, such as food or clothes. This correlates with higher need for basic goods in these areas. As Kaul, Grunberg and Stern (1999) explain global inequality, the gap between rich and poor, makes already basic, everyday goods as luxury products in poor areas.

In welfare states water might be seen as a good purchased in exchange for money, but it is challenging to explain this to citizens in poor areas. These poor areas are also areas where poor people live in high-income countries accustomed to municipal provision, and water is a good paid for via taxation. The lack of wealth is not the only challenge when describing water as a private good, Kaul, Grunberg and Stern (ibid) argue. Private goods are simple to purchase and sell when the owner is known, but with a product that comes from natural resources and flows unequally in different areas and states, the ownership is difficult to define. Based on their research, turning water into a purchasable, the private good aspect is problematic since the ownership and rights to water are conflicting. In this question one must remember that pricing this kind of good is also unclear, especially when people do not have wealth to purchase many products necessary to ensure life.

Perry, Rock and Seckler (1997) argue that if water is seen as a good with both public and economic value, one needs to remember the difference between the “economic value” and “financial value”. These two values rarely correspond but in the issue of water, the distinction is particularly important, since its economic value is significant, but the financial value is impossible to define in a universal way. However, Perry, Rock and Seckler (ibid) believe that privatizing water would give greater possibilities to farmers, consumers and markets to affect the pricing of water.

2.3 Demand and supply, perfect competition and monopolies

Markets are the combination of two things; demand and supply. As Mankiw (1998) described this basic economic theory; when market equilibrium exists, the supply and demand

are in balance, which basically would be a situation where the buyers have bought all they want to buy and the sellers have sold everything they want to sell; everyone would be satisfied. However, usually markets are in opposite situation; either the producers are producing too much or not enough. Mankiw (ibid) claims that markets are naturally moving towards equilibrium and also prices eventually move towards their equilibrium price. According to this theory market shortages and surpluses are only temporary in free markets.

However, this theory makes a lot of assumptions including assumptions based on model of perfect competition. According to Sloman and Garratt (2009) p.118, the model of perfect competition is based on four assumptions. The first one is that firms are price takers, which means that they do not have power over the price decision so the price would be determined by the interaction of demand and supply in the whole market. The second assumption is that the firms would have complete freedom of entry into the industry; this means that new firms can enter into a market and existing firms cannot prevent that. Third assumption is that all the firms produce exactly the same product, which would mean that none of the firms could build a brand. And fourthly: the producers and the consumers would have perfect knowledge about the market. This would mean that producers are fully aware of costs, prices and market opportunities and consumers would be fully aware of quality, price and availability of the product. Sloman and Garrott (ibid) argue that since these rules are very strict, only few industries actually meet these assumptions, such as potato farmers because of the very similar product, and some other agricultural industries.

Now perfect competition in water supply services does not exist. According to Asmundson (2012) perfect competition is the other end of the spectrum and monopolies are the other one. Monopoly is a situation where is only one supplier of a certain good and no simple substitute exists. This often applies for utilities; it would be inefficient to have two water companies to manage watersheds or water pipes in the same area. Monopoly is a good option in some cases, but it also means that the consumers have no choice or possibility to purchase service or product from any other than monopoly and in worst-case scenarios access to the product or service is unaffordable for some. Asmundson (ibid) argues that this is why governments often regulate monopolies: to ensure that monopolies do not set the prices too high and so abuse their market power.

If clean water is inaccessible, people are forced to use unclean water, since water is necessary to maintain life. This would mean that water shortage in water provision has more significant consequences than a scarcity of t-shirts, for example. In relation to water, demand

exceeds the supply especially in places that are facing serious water scarcity, as Pawar (2014) argues. The theory of demand and supply defines the changes in prices being dependent on demand, which means that if demand is low, prices are also low, and vice versa. (Mankiw, 1998) This again correlates alarmingly in water-scarce areas; in areas where demand for water exceeds supply, water is more valuable in an economic sense and the prices may rise unreasonably high and thus unaffordable for the citizens. If again the water service is produced by a state-owned monopoly, the state can control the prices.

If a private actor replaces a public actor in water-scarce areas, it will increase the price of water. This mainly happens in places where a state cannot afford the production of water supply services or the maintenance of the system. The increase of water price is shown with concrete example in chapter 7.2 where a case example from South Africa is presented. According to the theory of demand and supply the price is a crucial factor and in the case of water it defines who can afford clean water if the water is traded as a private good.

3 Water scarcity

According to the UN (2015), water scarcity affects more than 40 per cent of the global population. However, before defining solutions to the problem of water scarcity, one needs to define what does water scarcity actually mean. According to Rijsberman (2006) to understand the concept of water scarcity, the issue of water insecurity needs to be defined first. Water insecurity is a situation when a person does not have safe, affordable access to a water source fulfilling the need for drinking or sanitation. When a large amount of people are water insecure for significant amount of time within a defined area, the area is called a water-scarce area. However, a common description for ‘water scarcity’ does not exist.

Water scarcity can be measured by several indices. According to Brown and Matlock (2011), the Falkenmark indicator, which was developed in 1989, is probably the best-known indicator to measure water stress, but it does not identify the reasons for the stress. As presented in figure 3, where the indicator measures water scarcity in cubic meters, if the area has more than 1,700 m^3 of water per capita, it does not suffer from water stress. In 1992 Falkenmark developed the “benchmark” indicator of 1000m^3 of water per year, per capita and it has been accepted by the World Bank among others (Brown, Matlock, 2011).

Figure 3: The Falkenmark Indicator, level of water stress

Index (m^3 per capita)	Category/Condition
>1,700	No Stress
1,000-1,700	Stress
500-1,000	Scarcity
<500	Absolute Scarcity

Source: Brown, A.; Matlock, M, 2011, *A Review for Water Scarcity Indices and Methodology*

Risjberman (2006) explains in his research why Falkenmark's indicator dominates the discussion about water scarcity; it is very understandable and the data is available. But he also defines the limitations of the model: annual and national scarcity levels hide important scarcity levels of smaller areas, nor it does not take into account the availability of infrastructure that determines the availability of water to users and it does not reflect on important variations in demand among countries, such as climate change or lifestyle within different cultures.

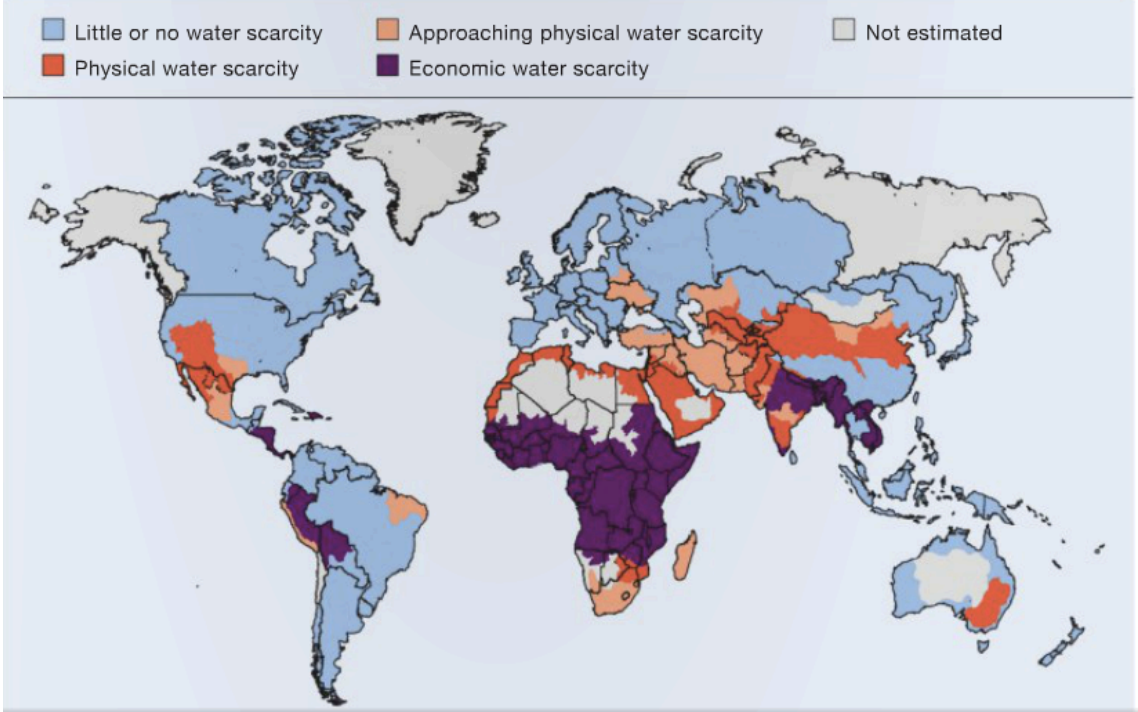
Based on Falkenmark's model, in 2000 scientist Leif Ohlsson developed his own model to measure the water stress level called *The Social Water Stress Index.* As Brown and Matleck (2011) it described, Ohlsson integrated the adaptive capacity of society to the model to consider how technological and economic means affect the overall freshwater availability status of a region. The model uses the UNDP Human Development Index (here and afterwards abbreviated as HDI) to measure the social variables. (Rijsberman, 2006)

Water scarcity affects all aspects of society, from drinkable water and sanitation to food production, especially when in poor states the people are often dependent on their own land and agriculture. Molden (2007) states that water scarcity is either physical or economic scarcity, and the situation is affected by climate change both in the present and future, since it affects all facets of society and environment. A growing population is also a major factor affecting the scarcity, but if good water management, such as good governance, targeted investments, and effective institutions, would be achieved in more areas the people lacking water services would be helped.

In figure 4, the division between physical and economic water scarcity is pictured on a world map. As seen in the picture, some areas in Asia, Latin America and especially almost the whole area of Sub-Saharan Africa (here and afterwards abbreviated as SSA) are facing the challenge of

economic water scarcity. This makes the situation with water supply services in these areas particularly interesting, since the states and citizens lack the resources to be able to enjoy clean water. In these areas private sector investments are important, but the results of their work when measured as benefits for ordinary citizens can be questionable.

Figure 4: Water scarcity in the world



Source: Molden, 2007, International Water Management Institute, IWMI

3.1 Physical water scarcity

According to Molden, in 2007 one-fifth of the world's population, approximately 1.2 billion people lived in the areas affected by physical water scarcity, this includes e.g. environmental flows of water. It also appears where water is abundant; in these places the resources are overused due the overdevelopment of hydraulic infrastructure, mostly for irrigation. In these places not enough water for human use and environmental need exists. These areas require import of water from other states.

3.2 Economic water scarcity

According to Molden in 2007 about 1.6 billion peoples' lives were affected by water scarcity because of the limitations in financial resources. This is caused by the lack of investments in water, or lack of human capacity to satisfy the demand for water. Much of this is because in-

stitutions favour one group over another one and are not listening to other groups, especially women in these areas, who are mostly responsible for collecting water. (UN Women, 2014)

In the areas of economic scarcity people are facing trouble to get enough water for agriculture or even drinking needs. This is caused because economic water scarcity includes light infrastructure development. In some of the places where infrastructure exists, the distribution of water may be inequitable. The development of water distribution would help to reduce poverty. (Molden, 2007)

4 United Nation's Millennium Development Goals 2015

The UN's Millennium Development Goals 2015 (MDGs) were set at the beginning of the millennium, to support and encourage people around the world to improve the quality of everyone's life. The goals contained 8 different actions to fight against gender inequality, HIV and AIDS and other diseases, poverty and hunger, improve maternal health, reduce child mortality rates, achieve environmental sustainability, full education for children and build global partnerships. The goals were ambitious and they have many subcategories. The intention was to achieve these goals by 2015. For this paper the most important one is number 7, environmental sustainability and its subcategory 7c:

> "Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation." (UN, 2002)

According to UN, this goal was created to promote welfare of people, as well as economic prosperity and in the end to save environmental or natural capital. UN (2014) defines seven different resources as natural capital: mineral and energy resources, soil resources, land, aquatic and timber resources, biological resources other than timber or aquatic (livestock, crops, wild animals, orchards) and water resources. According to World Bank (WB) (2015) one of the reasons why gross domestic product (GDP) is incomplete measurement tool is because it does not take natural capital into account. WB (ibid) argues that natural capital is critical asset especially in developing countries, where it is a significant part of total wealth: 36 per cent. To take natural capital into account UN (2012) developed the System of Environmental-Economic Accounting (SEEA) that contains internationally agreed definitions, concepts and accounting rules for producing internationally accepted and comparable statistics on the environment and how is it related to economy.

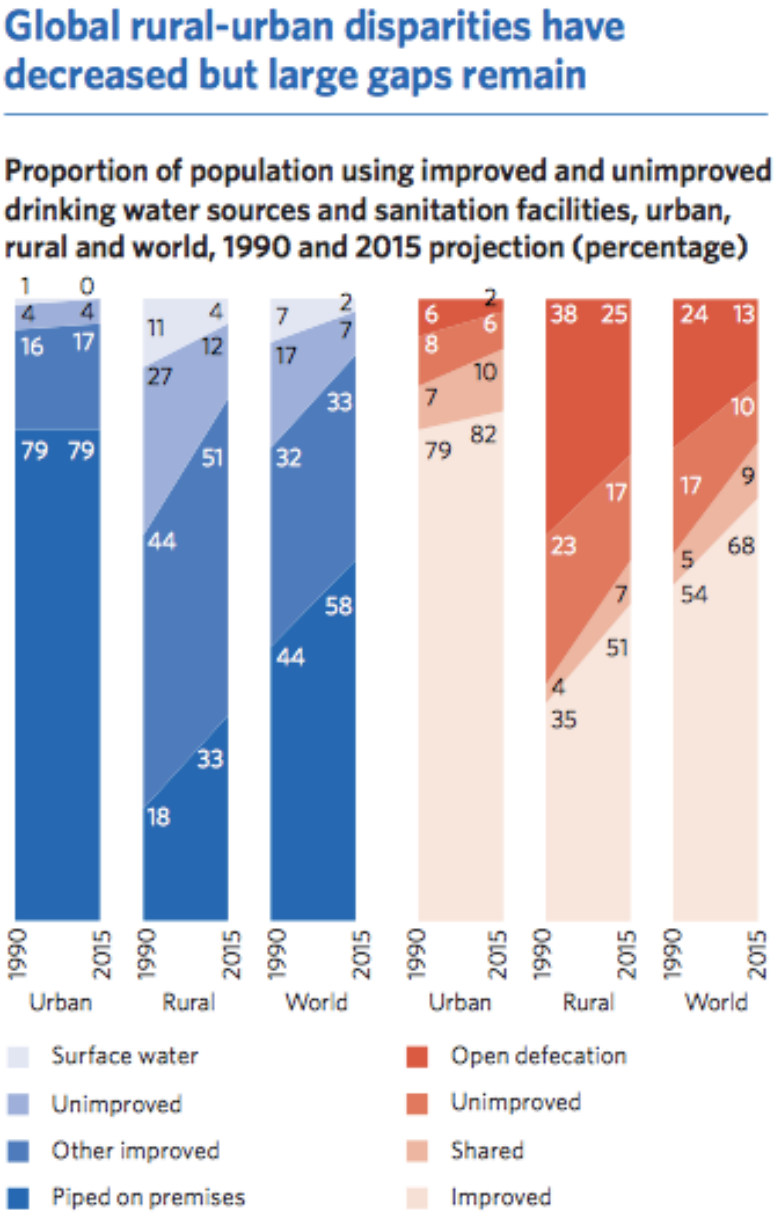
WB (2015) argues that they want to measure natural capital because it would make governments and people value environment more and it would allow development when common definition and rules on the matter exists. However, since the argument comes from a bank, one must critically evaluate is the bank defending financial value of environmental resources and their meaning for capital markets, or actually the environmental resources themselves. According to WB (ibid) more than 30 countries have already started to implement SEEA. WB has even developed a partnership program, the Wealth Accounting and the Valuation of Ecosystem Services (WAVES) to promote sustainable development. If WAVES or other international cooperation helps countries to implement SEEA to their accounting and to take better care of their natural capital, it could help countries to continue from what MDGs achieved, but this will be seen in

the future since the idea of measuring environmental or natural capital is relatively new. However, at the end of 2015 the UN published a report about the progress in achieving the goals and with the subcategory 7c the results were as follows:

1. The global MDG target for drinking water has been met five years ahead of schedule.
2. Since 1990, 2.1 billion people have gained an access to improved sanitation but the world has missed the MDG target.

The goal for improved access for drinking water was met in 2010. Between 1990 and 2015 the global population using improved drinking water source increased from 76 per cent to 91 per cent. Piped water supply premises serve 1.9 billion people out of 2.6 billion who gained access to improved water sources. This is a remarkable increase since it means that in many areas either the state has managed to build the piped water supply services or they have done it in cooperation with a private entity, public entity or other kind of organisations.

Figure 5: Improved and unimproved drinking and sanitation facilities



Source: UN, 2015, *MGD Report,* p.59

According to UN, since 1990, the amount of people without access to improved drinking water was cut in half in Latin America and the Caribbean, South-Eastern Asia, Eastern Asia, Southern and Western Asia. Only in Sub-Saharan Africa (SSA) and in Oceania the target was not met. Nearly half of all people who are still using unimproved sources of drinking water live in SSA, which is approximately 300 million people.

The second sub-target of improved sanitation was not met. However, between 1990s and 2015 the global population using an improved sanitation facility has increased from 54 per cent to 68

per cent; 2.1 billion people have gained access to improved sanitation during this time and the amount of people using open defecation has globally fallen almost by half, from 24 per cent to 13 per cent. However, this means that in 2015 2.4 billion people are still using unimproved sanitation. The goal was met only in Caucasus, Central Asia, Western Asia, Eastern Asia and Northern Africa. With this goal Southern Asia had the lowest improvement.

Private investments are widely noticed in the UN's publications about reaching the MDGs. It is important to notice that even though the UN defines water as a human right, it does not rule out private sector and its assistance is a necessity in many areas. According to Raunio (2015) the challenge is in the situations where common knowledge does not exist, when the community does not understand or does not want to accept the aspect of paying for the water or where making the contract of organising water supply services is unclear. The economic scarcity makes situations challenging. However, even if private investments or partnerships would be the only option to provide water supply services, they might take away jobs from locals as well as take decision-making power away from local municipalities and governments.

5 Public-private partnerships

As stated in the research made by Raunio (2015), PPPs are increasing both in developing and developed countries as they provide citizens basic services, such as water, energy, and transportation services. However, lately PPPs have also been used in IT services, hospitals, schools, military services, and other areas. According to Raunio (ibid), in general the name PPP refers to agreements between the state and a private entity, which come together to make a contract and plan to provide services. The goal is to meet growing demand for goods that have high public benefits, like water. Tanzania's Prime Minister's Offices policy report for PPPs (2009) p.1, reminds that in PPPs the private entity often assumes the risks for significant time period and in return benefits financially by receiving tariffs or user charges. Many different ways to build these partnerships exists, many different types of contracts are used depending on the concept, width and length of a project, as well as the specific need of a certain area, its citizens and the partners. However, PPPs are not the same as pure privatisation of public assets. The distinction is made by contracts, which are explained below in chapter 5.2.

According to Marin (2009) p.1-7, the growth in water PPPs began between 1991 and 2000. Already during that time the population served by private actors in developing countries grew from 6 million to 94 million and the number of active water PPP projects increased from 4 to 38. However, according to Marin (ibid) the lack of data on the populations successfully served by water PPPs and on the quality of services provided has made the objective assessment of these PPPs difficult. Since the matter is sensitive and ideological, the debate about the projects often becomes polarized, which has led to challenges in setting up new projects and especially SSA is a challenging region to reform.

However, according to Kirkpatrick, Parker and Zhang (2006) the donors such as WB create pressure for developing countries to try privatisation when building utilities. This is a critical issue when considering building PPPs, especially when objective or empirical analysis are not well examined in the materials of WB, African Development Bank (AfDB), UN or other international organisations. Empirical analyses are more likely to be found from independent researchers who have been working in the field or studying matter from universities. Kirkpatrick, Parker and Zhang (ibid) have made an empirical analysis of providing water services in Africa where they compare privatisation and state owned utilities. Their research failed to find any evidence that private utility would perform better than state-owned utility. Hall and Lobina (2005) argue that surprisingly International Monetary Fund (IMF) stated that it cannot be taken for granted that PPPs would be more effective than public investment and government supply of

services. However, these kinds of statements from international organisations are challenging to find, when they usually try to stay neutral about the matter or encourage for private investments.

Marin (ibid) claims that between 1990 and 2009, more than 24 million people in developing countries have gained access to piped water. When PPP succeeds, the quality of water service is improved, especially by reducing water rationing. In PPPs one of the important factors when choosing the private operators is the efficiency of the operator. In water PPPs the effectiveness can be broadly measured in three main ways; water losses, labour productivity and bill collection.

Marin (2009) argues that water PPPs are a viable option in developing countries, despite limitations and some failed projects; according to him the water PPPs have been satisfactory when measuring the overall performance. However, some other researchers disagree with Marin and describe possible flaws and problems with these agreements. For instance Kirkpatrick, Clarke, and Polidano (2002) describe in their research some of the disadvantages of these partnerships. They point out that even though the intention of an action in partnerships is good, these partnerships may displace public workforce in the area of partnership and are then causing higher unemployment within locals. According to them, PPPs may turn into a monopoly, because of a lack of competition.

According to Raunio (2015) the challenges to build successful PPPs are sometimes caused because they are dependent on mutual trust between the government, private actors and citizens. However, as Marin (2009) states, several PPPs have managed to provide more effective services with better quality; out of 65 developing countries that have used water PPPs since 1990's, at least 41 of those were still using private water entities in 2009. Water PPPs often operate in extreme conditions and physically difficult places, but as stated in chapter 3 about water scarcity and especially economic reasons for the scarcity, many failed PPPs happen in areas where poverty eventually rules out the private operator.

The PPPs usually differ depending on the region since the definition of "partnership" may confuse locals and even the parties themselves. Budds and McGranahan (2013) refer in their research to the fact that the term does not automatically mean an equal amount of responsibilities and risks for the parties. "PPP" is a widely used term and since a fixed definition does not exist, the contracts are important when deciding who is responsible and who bears the risks for different parts of the project.

According to Kayaga (2008), water and sanitation PPPs are the least common types of PPPs, especially in the SSA region. However, this does not mean that developing countries' governments would not need assistance in organising water and sanitation supplies, but it is more a sign that the topic is politically delicate. Kayaga (2008) argues that in some developing areas the citizens see water as a gift from God, which is a viewpoint that western nations most likely find difficult to understand, but for these citizens it simply means that water is not a good to be paid for. These issues make implementation of the projects difficult but the involvement of the locals even more important. One solution for this is to use local companies; as Marin (2009) states, local companies understand local culture and people better, which can allow them more easily to establish reasonable partnerships with local authorities and also better minimise the political risks. Local companies might be better at serving small cities than their international competitors.

Hall and Lobina (2013) are critical of water PPPs. They claim that the private sector's goal to achieve maximum profit is impossible to combine with the need of poor areas. These researchers are not alone with this kind of opinion on the matter; the literature on PPPs is often strongly arguing about the disadvantages of these (Iossa and Martimort, 2013). However, as Raunio (2015) states that the failure of PPP is not necessarily a result of private sector deficiencies, often it is a combination of many reasons. One of the reasons for PPP to fail is poor implementation of the partnership within the local community. However, based on all the research made for this thesis, public sector must consider carefully all the sides of PPPs before entering into a contract.

5.1 Actors in PPPs

PPPs combine cooperation between two or three parties. Kayaga (2008) defines PPPs as partnerships in which the public sector enters into contractual agreement with private actor(s) to build infrastructure facilities or to provide services to citizens. When the public entity does not have enough money to hire a private entity to build the infrastructure, it can apply financing from a bank, e.g. local commercial bank or development bank. In SSA it is usually the AfDB or Southern African Development Bank, who finance these kinds of projects. The government might be at the level of the state, but most likely local, smaller government.

AfDB (2016) states in its website that at the end of 2015 it has made US$112 billion of loans and grants through approximately 4370 operations since 1967. Only in 2015 they financed 240 projects for about US$8.8 billion. These are significant numbers and the bank provides a

database to make a research about all the projects past and present. The banks benefit from the partnerships by collecting interest for the loans and by creating new partnerships and networks.

The importance in recognising the actors in these partnerships lays in the fact that parties may run into conflicts if their interests differ greatly. This might even ruin the whole project if the parties do not find a way to manage the conflict. This is why careful contract design is important when starting partnerships, as stated in the research made by Raunio (2015).

5.2 Types of contracts

PPPs have different kind of contracts depending on what each state or area and private actors are looking for. The types introduced in this chapter are based on the research of Budds and McGranahan (2013) who provide more general knowledge about the issue and Kayaga (2008) who provides specific information about the contract types in SSA, unless otherwise mentioned. Under these types the contracts differ in specific levels.

Service contracts are the option for states and areas who want and are able to keep as much as possible of the responsibility by themselves. Service contracts give the minimal responsibility to a private operator, keeping the ownership of the water resources in a state. In these cases the responsibility of private actor means only some specific tasks, such as maintenance of the pipes or installing meters. These types of contracts are usually for short term projects; the contracts are valid only one or two years.

Management contracts give the responsibility of certain tasks, operations or maintenance from government to a private actor but it keeps the responsibility for investment or expansion in the government. Payment of the company may be fixed or related to the company's performance. These types of projects usually last from three to five years. Management and lease contracts do not differ too much from each other; leasing contracts are very similar to management contracts but it gives all the responsibility of maintenance or operations to the private company. Within lease contracts the responsibilities also include billing and revenue collecting and the private actor pays a lease fee for the government and the project usually lasts from 8 to 15 years.

Under a concession contract a private operator is responsible for the whole utility and is managing it. The private actor is responsible for investments and it owns the commercial risks. These contracts last long, from 25 to 30 years, and government's role is to predomi-

nantly as regulator. BOT-contracts (Build-Own-Transfer) is similar to a concession contract; the only difference is that the constructor is responsible for constructing the infrastructure from scratch. These types are usually used for water purification sewage treatment plants when the government is purchasing the supply. These contracts are from 20 to 30 years long and after that the assets either remain with the operator or transfer to the government.

The divestiture model is a type of contract where the government transfers the whole water business, including the infrastructure, to the private actor. These kinds of contracts are eternal and e.g. England and Wales have fully transferred the states' water supply to private companies. The process mainly demands tight regulation and laws, to secure continuous water supply for the citizens.

Kayaga (2008) argues that many of the projects in the beginning of this century were management, lease or concessions projects in SSA countries, and as it is also stated in the report made by World Bank (2014), these seem to be still the most general ones used in SSA region. In the case examples presented in this research a management contract was used in Ghana (chapter 7.1) and a concession contract is used in South Africa (chapter 7.2)

5.3 Implementation of PPPs

According to Tucker et al. (2010), there is evidence that partnerships including civil society and local groups perform well in serving poor households. Implementation is the critical factor of a project's development; it needs to receive as much thought as the proposed solution. Without carefully planned implementation partnerships might fail.

According to research made by Bowring and his undergraduate students (2014) in the Massachusetts Institute of Technology (here and afterwards abbreviated as MIT) the entities processing PPPs must consider social, economic and political obstacles throughout to prevent possible losses and failed projects. These obstacles are closely related to local citizens. In water scarce areas people are often uneducated and their knowledge is inadequate about the sustainable use of water. In an ideal situation citizens and industry are educated about the importance of water security and use water responsibly. A partnership must work to raise the awareness of water issues in local towns, to promote wise behaviour with water and collaboration between people and other project stakeholders is important to ensure sustainable solutions. When a project succeeds in one city or urban area of one state, the state should collaborate with other states that are facing similar difficulties. The financing part of the PPPs must be carefully organised in order to avoid corruption. (Bowring, et al. 2014)

According to Global Water Partnership (2000) implementation of water projects is part of good water governance; integrated water resource management (here and afterwards abbreviated as IWRM) is important part of implementing a water supply system to a local communities. To reach a working water management system, local city councils, states, other public entities and private partners must follow national and international regulations. If a government manages to create laws and regulatory that encourages cooperation between parties, IWRM is possible to reach. Government should focus on this task, and bear the responsibility of enabling the working environment for water projects, while the private sector and communities assume the responsibilities for providing and operating services.

According to Global Water Partnership (2000) wide participation of stakeholders is important in order to achieve IWRM and good water governance, including involvement of women. Special efforts towards involvement of women is highly recommended, since women tend to focus on issues men do not, including facilities suitable for sanitation and washing clothes. The challenge of including people in the projects is related to the issue of costs, since costs increase always when more people are included.

According to Bowring et al. (2014) improving education and possibilities for education is an important part of achieving IWRM. The possibility to educate oneself increases willingness to participate in surrounding society, speak up about one's interests, argue for reforms needed and recognize abuses. When building water management systems and water supply, providing education to citizens increases the communication between local governments, private entities and locals. Giving people education gives them the ability to manage and increase the quality of their own lives, which again is an important part of building a sustainable, water secure community. This is a way to train communities to be self-sufficient and to learn how to maintain water quality. According to Bowring et al. (ibid) the approximately 40 per cent of people living in developing countries or water scarce areas have no knowledge about water-borne diseases. In the best situation the implementation of a water project succeeds to help schools directly by providing water supply services such as direct pipelines to the facilities, which means that students can be taught about water issues directly with examples. (Bowring, et al., ibid)

Zevallos and Pastor (2007) argue that including citizens in the water partnerships makes them more understanding towards the tariffs and payment, because they can possibly affect the level of tariffs. The process of negotiation and participation of citizens also makes it pos-

sible for the private sector to understand peoples' needs and financial situations, which will more likely help to set a fair price.

According to Bowring et al. (2014) the implementation most likely succeeds better when the local culture and population are taken seriously and local residents have been provided with a possibility to volunteer or work in the project. When an international company is responsible for building a water supply system, the risk is that local culture or habits are not understood and so overruled. With locals helping in the project, the need is most likely better met.

5.4 Risks in PPPs

Effah and Chan (2015) argue that the water sector is particularly risky when implementing PPPs because the risks apply directly to the infrastructure. These risks are related to financial issues, sector performance and conflicts over policies. The water sector is complex, and according to Effah and Chan (ibid) most of the projects face challenges because of the difficulties among different parties to understand the risks and their consequent underestimation. Despite risks and misunderstandings, the water PPPs will exist also in the future and it is expected that risks will be better understood with sufficient time and development.

According to Effah and Chan (ibid) applied contracts play significant roles in preventing risks in PPPs. Based on their research from various states and projects, poor contract design is the first ranking risk among PPPs. This is understandable since the contract defines the risks and responsibilities of parties involved in the projects and also impacts how a project is implemented in an environment, since it also guides the future behaviours of the parties. The second risk is water pricing and tariff review uncertainty. Economic scarcity makes the pricing challenging also because water services would need precise estimation on demand-revenue ratios over a project's duration. Pricing also varies depending on the area since it is affected by the local regulation and since water pricing is politically sensitive subject economic pricing and tariff review causes massive challenges in developing countries. (Effah and Chan, 2015)

Effah and Chan (ibid) argue that the third most significant risk is political interference. Since water has political effect it justifies political interference. This refers to a risk of government interfering in the activities of regulations and to the work of private operators, violating contract provisions, for instance via corruption, which is one of the main risks in poor, developing areas when implementing PPPs. After political interference comes the risk of public resistance to PPPs, which causes resistance to make a contract with private entity when build-

ing water supply services in a state. According to several researchers, resistance has been remarkable especially in water PPPs, and it must be managed by the state in order to make it possible for any private entity to take part to providing the service. (Effah and Chan 2015; Hall and Lobina 2013)

As Effah and Chan (2015) continue: after these first risks come others. For instance, lack of PPP experience; non-payment of bills, which fails when citizens fail to pay to the company, and creates chronic payment failure circle; other financing risks, such as high operational costs over-estimation of the need or time when the need occurs; and so on. PPP is never a simple project and the operational side and public side of projects must communicate openly and rely on each other to prevent these and other risks.

5.5 Benefits of PPPs

Despite the risks in PPPs, they also hold great advantages and benefits for all parties. The following sections present these benefits for each party and are based on the research made by Ndandiko and Ibanda (2010) unless otherwise stated. This chapter is purely based on an assumption that PPP succeeds.

5.5.1 Public sector

The public sector benefits from PPPs several ways. The risk and responsibilities are divided among different entities as well as maintenance and design construction. This affects positively the lifecycle cost management since greater attention towards design and quality-building materials is achieved. This also increases the costs but with a private entity involved, it is beneficial to the public sector. Since the consortium is not paid solely for the construction but also for the service delivery, the construction will most likely be carefully managed.

Involvement of a private entity and the specialists employed by it signifies that more innovative solutions are most likely to be achieved. Local government can engage the private sector's capacity to innovate and deliver improved value for funding. If a government agrees on sharing its assets or facilities with other users it provides public services with greater economic value, for example by sharing government-owned buildings, materials or intellectual property such as educational materials. If PPP succeeds well, more public resources will be saved than with cooperation with other public entities, which again correlates positively when providing other public services.

5.5.2 Private sector

For the private sector PPPs mean business opportunities and export opportunities. It is very beneficial for a company to be involved in a process from the beginning until the end, to be planning project design, construction, operations and maintenance, not only because the reward will be higher when more work is done, but also because it correlates positively with learning possibilities. If the private entity is a foreign company, the export opportunity will increase the competition of service providers, which will give the best prices to the locals.

5.5.3 Wider community

The partnerships provide opportunity to strengthen bond markets in the state. In PPPs the local government can monitor and regulate the quality of delivery and the compliance with the staff and take care of environmental, financial, legal, commercial and health-related issues with less risk for conflicts, for example by creating jobs. The opportunity for the private entity and the public entity will expand businesses and encourage employment opportunities. PPPs can also adapt locals to the processes and allow them to participate in decision-making processes of the local government.

5.6 Comparison between traditional procurement and PPPs

The following table is based on the research of Ndandiko and Ibanda (2010).

Table 1

Traditional Procurement	PPPs
Government builds or purchases an infrastructure.	Government purchases infrastructure services from private entity.
The infrastructure is built by short-term design and construction contracts.	Everything is defined in one long-term contract integrating design, build, financing, maintenance, risk share etc.
Specifications are based on input – especially if state is responsible for financial side all by itself.	Specifications are based on outputs since the risk and costs are divided and private entity provides the service.
Government retains asset risk by itself.	Private sector retains asset risk.
Government tries to make the procurement by using as less money to on-going costs as possible.	Payments begin once the asset is commissioned. The payment profile is relatively even, and includes a bank or other financing party, reflecting the level of service provision over the longer term of the contract.
Government is responsible for construction time and cost overruns.	Private contractor is responsible for construction time and cost overruns.
Government operates the facility and decides the employees and other operations.	The contractor operates the facility and decides the employees and other operations.
Government manages multiple contracts over life of the facility, because it is responsible for all the parts of the facility.	Government manages one contract over the facility, which makes the project simpler.
Often no on-going performance standards.	Performance standards are important part of the project. Payments may be abated if services are not delivered to contractual requirements.
Quality less defined and might even be a surprise.	The quality is defined and demanded from the beginning.

5.7 Comparison between privatisation and PPPs

The following table is based on the research of Ndandiko and Ibanda (2010).

Table 2

Privatization	PPPs
Complete transfer of government owned entity to the private entity. Government's involvement regulatory if even that is required.	Government retains ultimate responsibility for the delivery of services throughout the contract.
Sale of shares or ownership, sale of operating assets or services owned by public sector.	Government's ownership over public assets remains.
Focuses on how is something to be delivered.	Focuses on what is to be delivered. This makes possible to concentrate as few constraints as possible.
Risk transfers to the private sector	Risk is shared between public and private entities based on the contract
Cost transfers to the private sector.	Cost remains partly in public sector.
Citizens are not part of the process.	The citizens are taken into an account if the PPP is well planned and –made.

Now Kirkpatrick, Parker and Zhang (2006) p.6-7, argue that past studies of privatisation have indicated that in privatisation competition is generally more important than ownership, but in water service sector competition is usually cost inefficient. This means that in the water sector competition usually appears only when private companies are competing to win the contract or concession agreement. Kirkpatrick, Parker and Zhang (ibid) p.28, argue that it must be stressed that the provision of affordable, accessible and safe water to the poor should be a fundamental priority for low-income countries. In these countries policy-makers face difficulties between allowing firms to charge high enough prices to recover from costs and ensuring that poor are provided with affordable water. At the same time they must attract the necessary foreign investments and technical capabilities to upgrade and expand the new build water supply network.

The difference between PPPs and pure privatisation is the amount of state's participation to the water utility. PPP is a difficult reform to make but complete privatisation is even more difficult, and it means that public assets are sold to a private entity. Kirkpatrick, Parker and Zhang (2006) p. 26, as well as Hall and Lobina (2005), argue that no strong difference in performance of state-owned utility or privatised utility was founded. State can succeed in building water utilities by itself, when it has funding and professionals building the utilities.

6 Sub-Saharan Africa

The choice as a case example area of Sub-Saharan Africa for this research paper is supported by many factors and reasons; primarily, the economic water scarcity the area suffers. Other issues are examined in the following sections.

6.1 Education

Lack of water means lack of equality; Hesselbarth (2005) argues that improved water supply and sanitation affects positively on primary education, since piped water supply means relief for girls from their duty to collect water. According to UN Women (2014), in SSA girls and women spend 40 billion hours per year collecting water. This is an equivalent amount of annual labour to that of the entire workforce of France.

Hesselbarth (ibid) argues that both boys' and girls' educational achievements and possibility to attend to school improves significantly when better nutritional status and reduced health risks are achieved with improved water supply systems. Dirty water also might cause chronic diarrhoea, which can result in permanent effects on brain development, which again affects the child's capability to learn.

6.2 Population growth

According to UNICEF and WHO (2011) the world's population has increased by approximately 1.5 billion people since 1990, and almost all of the growth has happened in developing areas; 94 per cent. SSA has seen the most significant proportional population growth of 59 per cent while Southern Asia, South-Eastern Asia, Western Asia, Oceania, Latin America and the Caribbean, each have increased approximately 30 per cent.

This rapid growth affects directly to all the services countries need to provide, among those to the water supply. The report from UNICEF and WHO (ibid.) shows that 12 countries have each seen an increase of more than 1 million people in the number of people without access to clean water source, despite the huge process of actually enabling access to safe drinking water to millions more people.

When examining the water challenge in developing countries, one must remember that only the process of rapid urbanisation is increasing the challenges enabling access to safe drinking water. The amount of people living in urban areas increased from 43 per cent to 50 per cent from 1990 to 2008. (UN & WHO 2011) This growth affects the structure of cities, including their employment situations and waste management systems.

6.3 Climate change

According to Boko et al. (2007) p. 435, Africa is one of the most vulnerable continents to climate change. In Africa rising temperatures cause multiple stresses occurring at various levels. Africa's developmental challenges such as poverty, limited access to capital, ecosystem degradation, complex disasters and conflicts throughout the different countries in the continent and complex governance makes controlling the results of climate change difficult.

Boko et al. (2007) claim that about 25 per cent of Africa's population, approximately 200 million people, are currently experiencing high water risk and climate change is likely to intensify the pressure. The population at risk of increased water stress is estimated to be 350-600 million people by 2060. Climate change doesn't only affect the people, it also affects to whole ecosystem. It is a threat to Africa's forests and will change grasslands and marine ecosystems as well. When the ecosystems are affected, it most likely has a negative impact on tourism as well, which again correlates with economic development.

Climate change is also affecting water supply in Africa. It affects the quality of water, and the amount of drinkable water. As stated in the research made in MIT (Bowring et al. 2014), the environmental regulation must exist in all countries to ensure clean water. According to Bowring et al. (2016) up to 4 per cent of fresh water goes into energy production. Energy and water are in direct conflict since both are needed.

Climate change causes variable issues everywhere in the world, and in Africa it affects multiple issues, from nature to people's health. Since Africa is a developing area and comprises various emerging markets, it is difficult to estimate the consequences of climate change when poverty already impacts negatively on daily life.

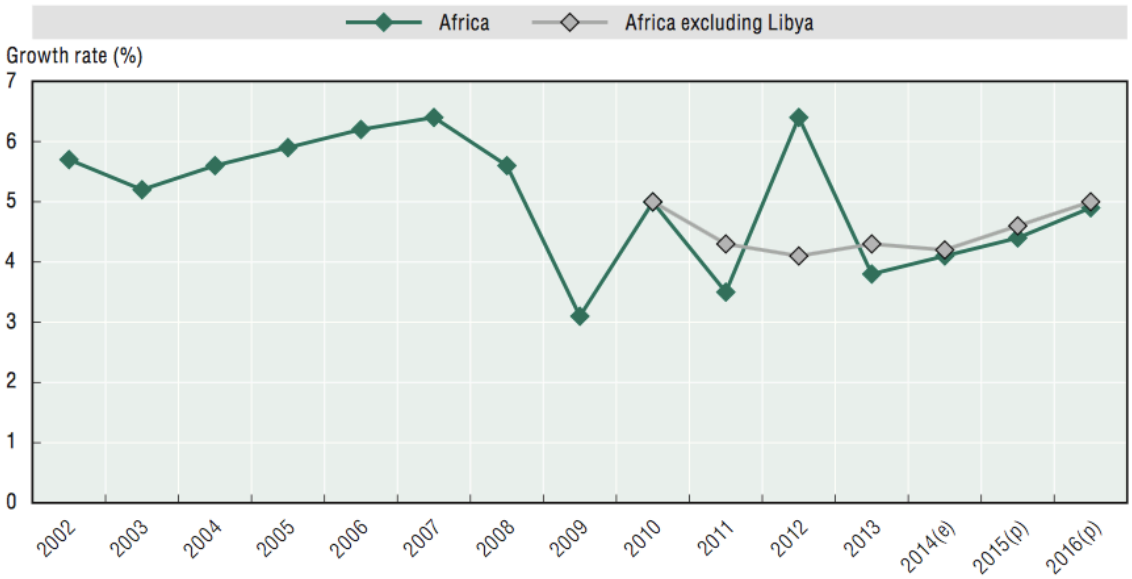
6.4 Economic development

Despite the difficulties Africa is facing because of climate change or social issues, economically the continent holds great promises. As Davis et al. (2015) state in their report about Africa's economic development, Africa's economic development with services is a source of income and employment. The service sector holds a significant role in Africa's trade and social development. The exports and imports of Africa totalled US$ 271 billion in 2012. This is a remarkable number for Africa, even though as a global player it still is marginal in services trade (by comparison, services trade in 2012 totalled for USA US$ 3.82 trillion and for China US$ 3.82 trillion (Parker, 2013)). The services in this context means infrastructure services, financial and banking services, educational services and commercial services. The

volume of service sectors differs in different countries throughout the continent, so commercial services are stronger in Ethiopia whereas the banking industry is more developed in Nigeria.

Figure 6 shows the growth of Africa's gross domestic product and it is expected to strengthen 5 per cent in 2016. According to these estimations Africa's economic growth should soon be closing in on the growth rate before the economic crisis of 2008. This is possible because domestic demand is boosting growth in many countries while external demand remained, mostly because of export and export value of goods is depressed by lower prices. Grey line in the figure expresses the economic impact of Libya's conflict to African markets. However, since GDP does not describe human development, it is described in the figure 7. (Davis et al. 2015)

Figure 6: The development of GDP in Africa 2002-2016



Source: AfBD, OECD, UNDP, 2015, *Africa's Economic Outlook,* p. i

Figure 7: Country classification of human development levels in 2014

High human development (above 0.7)	Medium human development (between 0.55 and 0.7)	Low human development (below 0.55)		
Algeria	Botswana	Angola	Ethiopia	Niger
Libya	Cabo Verde	Benin	Gambia	Nigeria
Mauritius	Congo	Burkina Faso	Guinea	Rwanda
Seychelles	Egypt	Burundi	Guinea-Bissau	Senegal
Tunisia	Equatorial Guinea	Cameroon	Kenya	Sierra Leone
	Gabon	Central African Republic	Lesotho	Sudan
	Ghana	Chad	Liberia	Swaziland
	Morocco	Comoros	Madagascar	Tanzania
	Namibia	Congo, Democratic Republic of the	Malawi	Togo
	Sao Tome and Principe	Côte d'Ivoire	Mali	Uganda
	South Africa	Djibouti	Mauritania	Zimbabwe
	Zambia	Eritrea	Mozambique	

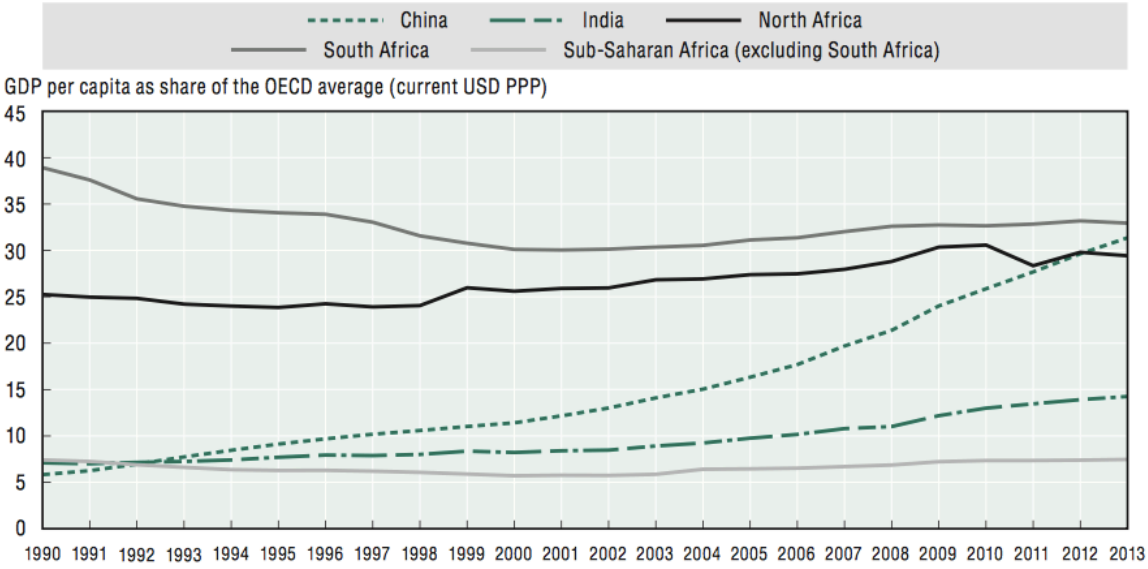
Source: AfDB, OECD, UNDP, 2015, *Africa's Economic Outlook,* p. vii

Note: Data were unable in South Sudan and Somalia

According to Davis et al. human development levels in Africa are lower than in rest of the globe. E.g. in 2013 the difference between SSA and rest of the world was 28 per cent, even the human development level rose in SSA to slightly over 0.50. However, even a slight rise in human development helps the countries to improve their health and education outcomes and reduce poverty. High inequality and high gender inequality affects economic development and human development in Africa. Many risks affect the human development: it is highly vulnerable to political, social, environmental risks as well as economic risks. Conflicts and issues like Ebola virus are particularly significant.

To symbolise the inequality, figure 8 compares the GDP development per capita for Africa, China and India for years 1990-2013. In the figure one can see that actually the development of GDP per capita has mostly remained the same in Africa, or in South Africa even decreased, while in China it has increased massively and in India slowly.

Figure 8: GDP per capita for Africa, China and India, 1990-2013



Source: AfBD, OECD, UNDP, 2015, *Africa's Economic Outlook,* p. xiv

6.5 Agricultural development

As Issala et al. (2013) p.8-19, state in a report about African agricultural development, it is the sector that creates most jobs in Africa and it is the major producer. The population relying on agriculture is 48 per cent of the total population in Africa and is almost 70 per cent in East Africa. Agricultural production in Africa has grown steadily over the last 30 years; the growth of the value in agricultural sector has been about 160 per cent since 1980's, which overrules global growth over the same period: global agricultural growth has been approximately +100 per cent.

According to Issala et al. (ibid), agriculture in Africa is mainly focused on national markets, however the free trade agreements between African countries are encouraging regional trade within the continent. Despite the development of agriculture in the continent, hunger is still an issue in many countries. In 2010 the population in Africa rose to 1 billion and out of this number 230 million people were undernourished. The situation varies in different countries, but the worst is concentrated in the east. Water scarcity affects the agricultural development, since it makes sustainable farming challenging.

According to Boko et al. (2007) climate issues make some of the African countries to face semi-arid conditions that make agriculture difficult and the climate change will make this even more challenging in the future. The length of the growing season will most likely be re-

duced because of the climate change and at the same time when the population increases food production will face new challenges. In some countries reductions in the production might be as much as 50 per cent already in 2020 and crop revenues might drop as much as 90 per cent by 2100.

6.6 Africa's Development Bank

The AfDB is a multilateral development bank that makes grants and loans to the governments of African states as well as public and private entities investing to the continent of Africa. According to several NGOs, (FAN et al 2007) it is the biggest development institution that is fighting against poverty and working to increase the living conditions across the continent. As stated in the primer from NGOs, the mandate of AfDB is to *"contribute to the economic development and social progress of its regional members – individually and jointly."* This mandate they work to make true by promoting economic and social development through loans, equity investments and technical assistance. (AfDB, 2000)

The AfDB began in 1963, when African governments agreed to its establishment and signed an agreement. The AfDB is owned by its members, who at the moment are 53 African countries as regional members and 24 other countries as non-regional members, including US, Germany, and Canada. These members have an equal number of basic votes and an additional number of proportional votes according to their paid-up shares. None of the members has veto power. The non-regional members hold approximately 40 per cent of the votes. (FAN et al, 2007)

According to Rudolph, (2015), AfDB has its own rural water program: the Rural Water Supply & Sanitation Initiative (RWSSI) that was initiated in 2003. This program is meant to finance rural water projects in Africa. According to Rudolph (ibid) since 2003 Afdb has invested €1.27 billion in financing RWSS programs in 33 countries. By the end of December 2014 RWSSI had mobilized a total of over €5.68 billion from the AfDB, African governments, beneficiary communities and other donors. RWSSI has provided water supply to over 97 million people and sanitation access to over 70 million people. RWSSI has played important role when providing water services in the continent of Africa and it is part of AfDB's strategy of 2022.

7 Case examples

7.1 Ghana

Ghana is a state in SSA with 27 million people and the population growth is estimated to continue. (World Population Review, 2015) According the Ministry of Water Resources, Works and Housing, (2016) in year 2012 urban water coverage was 63 per cent and rural water coverage 64 per cent. The situation has develop in urban area 4.? per cent from 2008 and in rural area 7.5 per cent, but still approximately 36 per cent of the population is outside of water services. Ghana has several on-going projects in order to provide more water services for its citizens.

According to Abubakari, Buabeng and Ahenkan, (2013) in Ghana the ineffectiveness of public services led to a situation where between 1989 and 1996 170 state-owned companies were privatised. The most successful and recent privatisations are in the telecommunication and banking fields. However, they argue in their research that privatisation does not most likely succeed if it is not well implemented and coordinated. They argue that strong, effective, sustainable, efficient and vibrant PPP would reduce possible market failures. Ghana has also tried PPPs in several sectors, and the most recent ones are in developing urban water delivery. According to Abubakari, Buabeng and Ahenkan (ibid.) in Ghana some of the neighbourhoods get water only once a month,

The development of public water supplies in Ghana began in the 1920s and nowadays there operates a state-owned water institution called Ghana Water Company Limited (here and afterwards abbreviated as GWCL). According to Abubakari, Buabeng and Ahenkan (ibid.) and Tucker et al. (2010) GWCL made a five-year management contract with Aqua Vitens Rand Ltd (here and afterwards abbreviated as AVRL) that is a Dutch/South African joint venture, and the company took over of all the GWCL operations for total base fee of USD 11 million for the duration of 2006-2011 in the area of Accra. This contract was financed by WB, since WB financed Ghana's development project for urban water delivery (Urban Water Project, UWP), all together a loan of USD 103 million. The profits from the partnerships were handed over to GWCL, which was responsible for developing assets and monitoring the operator. (Tucker et al. 2010)

The main responsibilities of AVRL under this contract were about reducing non-revenue water, improving the quality, quantity and flow of water, reducing customer response times, customer accounts receivable and collection, interruptions and emergency response, reducing

power consumption and chemical usage. WB provided bonuses and penalties for AVRL in response to performance targets. (Tucker et al. ibid)

Tucker et al. (ibid.) argue that this collaboration achieved some improvements. The collection rate of water was increased from 80 per cent to 95 per cent; the company developed a more equitable system of water distribution in Accra, and the quantity of water produced was increased by 10 per cent. Approximately 38,000 new connections serving 100,000 people were created, as was a maintenance program for controlling water quality. The staff was trained to take care of the maintenance in coming years. However, the measurement of success in achieving central performance targets such as non-revenue water reduction and energy consumption faced difficulties because the parties did not manage to agree a common set of measures. Some difficulties arose because of the unstable management issues in AVRL; the managing director of the project was changed twice. According to Abubakari, Buabeng and Ahenkan (2013) the project faced problems because implementation was not working; the contract included "grey areas"; certain concepts and interpretations were too ambiguous and resulted in delays. According to their research, the goals were clear theoretically but when it came to the implementation part, they had interpretational challenges.

According to Abubakari, Buabeng and Ahenkan (ibid.) one issue the partnership faced was the problem of staff. They employed both locals and external staff from the operative company AVRL, and noticed that the local members of staff were skilful and experienced when the external members of staff were less so. This caused conflicts in human resource management. However, the solution to the problems this PPP faced would have not necessarily involved changing the management. The problems in this PPP were deeper and given the condition of infrastructure used, they should have possibly use more financing to build new pipelines.

The challenges of implementation are multidimensional. If the challenges with implementation could have been minimised, the results of the project could have been even better. However, one must keep in mind that the circumstances in Ghana and external issues do not allow the market to operate fully, especially when providing public services, such as water. (Abubakari, Buabeng and Ahenkan (2013). According to Grafton et al. (2011) p. 29-30 fully operating water markets would need to meet several requirements to be successful markets. Water markets cannot be judged only by economic efficiency, the environmental sustainability is one of the most important aspects of water markets. Fully operating markets do not

guarantee success because the markets are combined from several different actors and factors.

7.2 South Africa

South Africa is the most southern country in the continent of Africa, and its population is approximately 52 million people. (South Africa Info, 2015) Mbombela is a municipality in South Africa, formerly known as Nelspruit. According to Tucker et al. (2010) the population in this municipality grew from 24,000 to 230,000 only during 1990 to 1994, and according to Statistic South Africa in 2011 the population was 588,000.

This volume of population growth affects the service supply and other issues in the area, above all water. According to Bender and Gibson (2010), in 1999 the Nelspruit Transitional Local Council signed a 30-year concession agreement with Greater Nelspruit Utility Company, (nowadays Silulumanzi) which is partly owned by international water company Biwater, to take over the municipality's water and sanitation operations. The agreement means that the service provider is responsible for drinking water and the waste water cycle, from treatment and distribution over operation, pipes, maintenance, pumps and plants. (Villiers, 2014) In 2000, the Nelspruit Transitional Local Council was replaced by the Mbombela Local Municipality and new boundaries more than doubled the population in the area. However, this did not change the boundaries of the water concessions area.

According to Bender and Gibson (2010), the concession in Mbombela municipality has been a success, after the first 10 years of contract. Tucker et al. (2010) note that the Development Bank of Southern Africa funded the partnership and the project achieved some success. According to McDonald and Ruiter (2005) p. 135, most important was the achieved quality and level of the water service in the concessions area, while the engineering achievements have been enormous. Bender and Gibson (2010) argue that in 1999 45 per cent of the 45,000 households within the concession area did not have access to a water source, but in 2010, 94 per cent of the 74,000 households in the area had access to a formal water source and 88 per cent got access to water on a daily basis.

McDonald and Ruiter (2005) p.135 argue that the partnership has resulted in 1268 temporary jobs and the improvements are achieved with respect for good governance of water supply. Bender and Gibson (2010) argue that investments have increased which has helped to maintain good infrastructure and the staff is well trained and qualified. Tucker et al. (2010) argue

that for the first 5 years the capital investment was ZAR 190 million, approximately USD 15 million.

The partnership is aiming to achieve 24-hour supply within the whole area. However, as Bender and Gibson (2010) argue, that has not been achieved, because the water treatment plant has not been able to supply the actual demand levels and because of locals' financial issues, illegal connections have been made continuously on supply lines. The issue with water tariffs is illustrated in Figure 9.

Figure 9: Water tariffs in Nelspruit 1999-2002

1999 Tariffs			2002 Tariffs			% increase from 1999 to 2002
Bands	Monthly consumption (kl)	Charge/kl (R)	Bands	Monthly consumption (kl)	Charge/kl (R)	
1	<6	1.26	1	<6	0	0
2	6–30	1.82	2	6–30	3.09	69
3	30–100	2.03	3	30–100	3.21	58
4	>100	2.20	4	>100	3.41	55

Source: McDonald and Ruiter, 2005, p. 142.

As seen in the figure 9, the involvement of private sector lifted the prices already during first three years. In the poorest households this means that water has become something impossible to purchase, which again explains the illegal connections to the pipelines. According to Tucker et al. (2010), part of the non-payment of citizens can be explained by the high unemployment rate in 2001; the employment rate was only 23 per cent, leaving 77 per cent of the citizens unemployed.

Some managerial problems were caused because of the shift from Nelspruit to Mbombela as it shifted the organisational structure, as McDonald and Ruiter (ibid) argue. According to Tucker et al. (2010) that caused extended negotiations over the agreement and that was very expensive for all the parties.

According to McDonald and Ruiter (2005, p. 143, the concession agreement faced serious problems from the side of labour organisations in the beginning. These were reluctant, argu-

ing that water is a basic need, not something the private sector should take over. The protests worked and led to long lasting negotiations with Biwater about the local workforce and their wages.

According to Villiers, (2014) Silulumanzi said in 2014 that threats of interruption of the water supply exist. The area of Mbombela is a challenging area in which to operate because of its climate, population growth and so on, but still the service provider is responsible for providing the service. This example of Mbombela shows that without involving locals in the process, taking care of regulations and agreeing on the tariffs, the whole partnership might become very expensive at least time wise, for all the parties.

8 Conclusion

Water scarcity is an on-going challenge that will continue to affect the globe. However, it is a challenge that modern economies are capable of answering, if common interest is achieved. In many areas water scarcity is more of a socio-economical problem than a lack of water resources, as presented in this research with the example area of Sub-Saharan Africa. At the moment the areas suffering water scarcity are mostly poor, conflicted areas, where climate change and fast population growth create extra pressure to provide basic services, like water supply services. These states need external help and support, financially and with experts from the field. A state might continue with other public entities, it might sell the whole procurement for private sector, or it might end up cooperating with a private entity and apply for funding from a development bank or commercial bank, by entering into a PPP with these parties.

PPPs might be the best possible option for a state to provide public services for the citizens. PPPs can be used in several fields and if successful they have many beneficial sides:

I. Dividing the risks between the parties
II. Dividing the costs between the parties
III. Improved quality of service

However, a state must evaluate possible options carefully before entering into a one, because also many risks appear in PPPs. State should first evaluate throughout all the options to provide water services by finding investments and building water utility by itself, since historically speaking there is no strong evidence that state could not build as good or even better water supply service than a private entity. If after evaluation state or local government chooses to build PPP with private entity, it must go through risks carefully and make a contract that is suitable, clear and risks are divided between the parties. When a state or local government enters into agreement with a private entity it is important to provide the services for the citizens with the citizens involved and with careful planning of implementation and contract specification. The ways to successfully implement PPP are presented through this thesis and the obstacles faced are social, economic and political.

To achieve the best possible outcome, a state should:

I. Provide educational possibilities to locals
    a. The education possibility should be gender equal, accessible, and it should contain education about sustainable water use.

   b. Educating people increases the communication between municipality or local government and the citizens.
   c. Education makes people also more active in their communities and encourages them to participate to surrounding society.

II. Take care of regulations and good governance
   a. To achieve IWRM the state must follow national and international regulations in order to remain in good terms with the other parties.
   b. Creating a contract with as much thought that given to wanted outcome of the whole partnership.
   c. Create a cost efficiency plan.
   d. Good governance is also about preventing corruption.

III. Involving women in the projects
   a. Women think of practical issues from different sides than men in places where they are responsible for household tasks, such as water collection.

IV. Employ citizens within the projects
   a. Involvement to the partnerships makes the people more willing and understanding towards the tariffs and payments.
   b. This makes it easier for all the parties understand the needs of the citizens and local culture. As presented in the case example from Ghana, the locals might also be better in the job than external workforce.

Even though PPPs are often criticized, they are possible to build in successful ways. The state or local government must remember to use sufficient time in the planning and implementation of the partnership. The greatest obstacle in the partnership planning is that because they might seem very costly, governments tend to spend more time on the cost planning than on other parts of the process of implementation. However, if the government understands the value and importance of other parts of the partnerships, they will most likely save money than by concentrating only on the financial part of the project.

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