Czech University of Life Sciences Prague

Faculty of Economics and Management

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Water Scarcity in Ethiopia: An Economic Perspective

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Thesis title

Water scarcity in Ethiopia: An Economic Perspective

Objectives of thesis

Achievement of the aim set in the paper requires solving several objectives, which derive from the topic of the study. They are as follows:

1) To outline the problem of the global water crisis.
2) To highlight the challenges of water scarcity in Ethiopia.
3) To determine the effect of poor water management on the reduction of water resources.
4) To characterize the water-scarcity-related shocks in Ethiopia.
5) To describe Ethiopia's governmental policy on water scarcity.
6) To analyze the economic impacts of water scarcity in Ethiopia.

Methodology

The study is based on using the set of methods that are directed to study the problem of water scarcity in Ethiopia comprehensively. The methods implemented in the course of the study are primary and secondary ones.

The primary methods of study include data collection and quantitative analysis of the information about volumes of water usage, scarcity, purification measures, stress, etc. The data will be collected from the statistical sources which represent the information about the tendencies of water consumption and demand in different countries around the world. The results of the paper will be analyzed with the help of general scientific methods including induction, deduction, extraction, analysis, and synthesis. In the course of the paper, these methods will be used to estimate Ethiopia's GDP, index of industrial production, agricultural growth, and other rates. Among the primary methods, the time series, consumption of water in Ethiopia in dynamics, the weighted and standardized anomaly will be used. They will help to evaluate the water scarcity risk associated with Ethiopia.

The secondary methods of the study include the use of scientific publications, academic sources, Internet articles, and other materials dedicated to the study of the water crisis problem worldwide. Among the major sources of information, the works of such authors will be used as: The defense statements of the study derive from its aim and objectives of the paper. They include as follows:

1) The humanity challenges water crisis around the world.

2) Water scarcity in Ethiopia generated significant impacts on its industry and agriculture.

3) Ethiopia's water scarcity has a negative influence on the development of Ethiopia's economy.

4) High Inflation, unemployment rate, and low GDP are the consequences of Ethiopia's problem with water scarcity.

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Keywords

Water, Scarcity, Drought, Economics, Impact, Water stress, Ethiopia's main issues

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Declaration

I declare that I have worked on my bachelor thesis titled **"Water scarcity in Ethiopia: An economic perspective"** by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15 March 2021 _____

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Water Scarcity in Ethiopia: An Economic Perspective

Abstract

Water is essential for human life, industrial purposes, environmental sustainability, etc. Approximately 250 million hectares are irrigated every day for agricultural activities. As stated in the forecasts, more than a billion people will suffer from water shortage in the next 30 years. The water shortage issue becomes one of the crucial problems of our modern social and geopolitical life. In some countries, the crisis water shortage significantly affects the quality of life for the entire population. This work is focused on water scarcity in one of the biggest countries in Africa, that deal with water shortage – Ethiopia. The research of this work is represented by analysing water scarcity impacts on Ethiopian industry, agriculture, and well-being growth. The study aims to investigate the economic consequences and perspective of water scarcity in Ethiopia. The broad outlook on the study of water scarcity in the specified country covers the studies of the past and current situation with water provision in Ethiopia and determination of the future perspectives for solving the problem of water scarcity plus Ethiopia's economy.

Keywords: Water, Water Scarcity, Industry, Agriculture, Aid, Dam, Water Programs, Population, Growth.

Nedostatek vody v Etiopii: ekonomická perspektiva

Abstrakt

Voda je nezbytná pro lidský život, průmyslové účely, udržitelnost životního prostředí atd. Každý den je zavlažováno přibližně 250 milionů hektarů pro zemědělské činnosti. Jak je uvedeno v předpovědích, více než miliarda lidí bude v příštích 30 letech trpět nedostatkem vody. Otázka nedostatku vody se stává jedním z klíčových problémů našeho moderního sociálního a geopolitického života. V některých zemích má krizový nedostatek vody významný vliv na kvalitu života celé populace. Tato práce je zaměřena na nedostatek vody v jedné z největších afrických zemí, které se zabývají nedostatkem vody - Etiopii. Výzkum této práce představuje analýza dopadů nedostatku vody na etiopský průmysl, zemědělství a růstu blahobytu. Cílem studie je prozkoumat ekonomické důsledky a perspektivu nedostatku vody v Etiopii. Široký pohled v studii o nedostatku vody dané zemi pokrývá průskum minulé a současné situace v zásobování vodou v Etiopii a stanovení budoucích perspektiv řešení problému nedostatku vody plus etiopské hospodářství.

Klíčová slova: Voda, nedostatek vody, průmysl, zemědělství, podpora, přehrada, vodní programy, populace, růst.

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1 Introduction

Water covers about 70% of the whole surface of the planet. 3% of the water resources are represented by the freshwater crucially needed by humans to survive. Two-thirds of water is frozen in glaciers. Today about 1.1 Billion people around the world lack access to water. Many water systems existing on the planet which are important to feed the growing population and plants are stressed by humans' activity (Water Scarcity, 2020). The demand for water is increasing globally. In the last decades, water consumption has increased twice, and many regions suffer from insufficient water resources. According to the forecasts, 18 Million people will live in regions with absolute water scarcity by 2025. The challenge which humanity can face in the forthcoming years can be so complex that people in some countries will be without fresh water (Food and Agriculture Organization of the United Nations). Water is essential for human life, industrial purposes, environmental sustainability, etc. Approximately 250-Million-hectare land is every day irrigated for agricultural activities. The use of water resources for agriculture has grown 5x times more from the beginning of the 21st century. The growth relates to the increase in the world population and necessary to satisfy humanity's food. Water is also required for drinking and industrial production.

For people, fresh clean water is needed to maintain life and good health. It is required to support eco-balance because plants, animals and almost all life needs water to exist on our planet (Rosegrant, Cai, & Cline, 2002, p. 2). According to UNICEF and the World Health Organization, 2.2 billion people do not have enough drinking water, and about 4.2 billion lack safe sanitation. The decrease in water resources is connected to population growth and the increase in water consumption. As stated in the forecasts, more than a billion people will suffer from water shortages in the next 30 years (Parkinson, 2020).

Relevance of the topic: The water shortage issue becomes one of the most crucial problems of modern social and geopolitical life. In some countries, the crisis of water shortage significantly affects the quality of life for the entire population. It is expected that water demand will increase by 400% in the manufacturing sector and by 130% for household use by 2050. 60% of all freshwater is obtained from the shared river basins. The governments of different countries challenge the necessity to look for ways to ensure their

demand for water resources. The countries with dry climate suffer from water shortage more than those which have a wet climate. In 2016, about 94% of people were affected by droughts (Guppy & Anderson, 2017). Every year people use about 4.600 cubic km of water. 70% of the water is used for agricultural purposes; 20% for industrial purposes; and 10% for household use. The demand for water is at its peak level in developing countries. Climate change leads to the increase of the stress on water supplies because its dry regions become drier (Watts, 2018). According to Watts, drought and soil degradation are the largest risks of natural disasters. In today's world, Mexico, western South America, Southern Europe, Australia, China, and South Africa are considered to be very dry regions. People living here lack fresh drinking water significantly, or the water quality is deteriorating (Watts, 2018).

Level of exploration of the topic: The issue of water scarcity is a problem that requires an urgent solution. Taking into account the negative prognosis about the worsening situation with water resources, it is necessary to take measures now than later. The majority of studies are focused on the factual representation of the water scarcity data around the globe (Guppy & Anderson, 2017; Parkinson, 2020; Rosegrant, Cai, & Cline, 2002). The scholars emphasize that the water crisis is challenged in many dry regions all over the world, but in the future, it is believed that the entire humankind can suffer from water shortage. Water scarcity has been globally identified as the crucial problem of the 21st century. The focal rising concerns are that humans will lack water for agricultural and industrial use (Srinivasan, Lambin, Gorelick, Thompson, & Rozelle, 2012).

Novelty of the study: This paper's novelty is focused on the study of water scarcity problems in Ethiopia from an economic perspective. Lack of water can have an impact not only on households, humankind's way of life but also on how specific industries, agriculture, and other sectors of the economy will be forced to operate their day-to-day activities. Especially lack of water is observed in such areas as growing crops because water is needed to stimulate their growth. The economic outlook on water scarcity will show the dependence of the country on water and it can be used as the main tools to implement a more effective policy of water resources management and storage.

Problem of the study: The research question of the study is as follows:
To what extent water scarcity in Ethiopia does affect its economic growth?

Ethiopia as a country with a dry climate is strongly dependent on water resources. Warm weather causes more water use that leads to the exacerbation of water extraction. Poor management control by the government can lead to the increase of the population, demand for freshwater that will generate the imbalance between water supply and demand (Payus, et al., 2020).

Aim of the study: The study aims to investigate the economic consequences and perspective of water scarcity in Ethiopia. The broad outlook on the study of water scarcity in the specified country covers the research of the past and current situation with water provision in Ethiopia and determination of the future perspectives for solving the problems of water scarcity for the economy of the country. It is necessary to outline the possible solutions which must help to overcome the deficiency of water in Ethiopia and contribute to the well-being of the country and its citizens.

2 Objectives and Methodology

2.1 Objectives

Achievement of the aim set in the paper requires solving several objectives, which derive from the topic of the study. They are as follows:

1) To outline the problem of the global water crisis.
2) To highlight the challenges of water scarcity in Ethiopia.
3) To determine the effect of poor water management on the reduction of water resources.
4) To characterize the water-scarcity-related shocks in Ethiopia.
5) To describe Ethiopia's governmental policy on water scarcity.
6) To analyze the economic impacts of water scarcity in Ethiopia.

2.2 Methodology

The study is based on using the set of methods that are directed to study the problem of water scarcity in Ethiopia comprehensively. The methods implemented in the course of the study are primary and secondary ones.

The primary methods of study include data collection and quantitative analysis of the information about volumes of water usage, scarcity, purification measures, stress, etc. The data will be collected from the statistical sources which represent the information about the tendencies of water consumption and demand in different countries around the world. The results of the paper will be analyzed with the help of general scientific methods including induction, deduction, extraction, analysis, and synthesis. In the course of the paper, these methods will be used to estimate Ethiopia's GDP, index of industrial production, agricultural growth, and other rates. Among the primary methods, the time series, consumption of water in Ethiopia in dynamics, the weighted and standardized anomaly will be used. They will help to evaluate the water scarcity risk associated with Ethiopia.

The secondary method of the study includes the use of scientific publications, academic sources, Internet articles, and other materials dedicated to the study of the water crisis problem worldwide. Among the major sources of information, the works of such authors will be used as: _____

The **defense statements** of the study derive from its aim and objectives of the paper. They include as follows:

1) The humanity challenges water crisis around the world.
2) Water scarcity in Ethiopia generated significant impacts on its industry and agriculture.
3) Ethiopia's water scarcity has a negative influence on the development of Ethiopia's economy.
4) High Inflation, unemployment rate, and low GDP are the consequences of Ethiopia's problem with water scarcity.

Structure of the study. The structure of the study suggests the division of the paper into chapters.
– Introduction contains information about the relevance of the paper, its aim, objective, research question, methodology, and defense statements.
– The Literature review chapter is focused on the study of issues associated with water consumption and water scarcity in Ethiopia and the related shocks.
– The Methodology chapter includes the determination of the academic implications of the study and a description of the method used to investigate the problem of the paper.
– The Analytical part of the paper is dedicated to the study of the economic impacts of water scarcity in Ethiopia. The major impacts are focused on Ethiopia's national economy, its agriculture, and industries. The potential risks for the economic development of the country are determined and ways to improve the situation are provided.
– Conclusions contain a brief summarization of the results obtained in the course of the study. They are based on the processing of the statistical information, and use of the publications and opinions of the scholars and other experts.

3 Literature Review

In this chapter, the issues of global water crisis are discussed.

3.1 Global Water Crisis

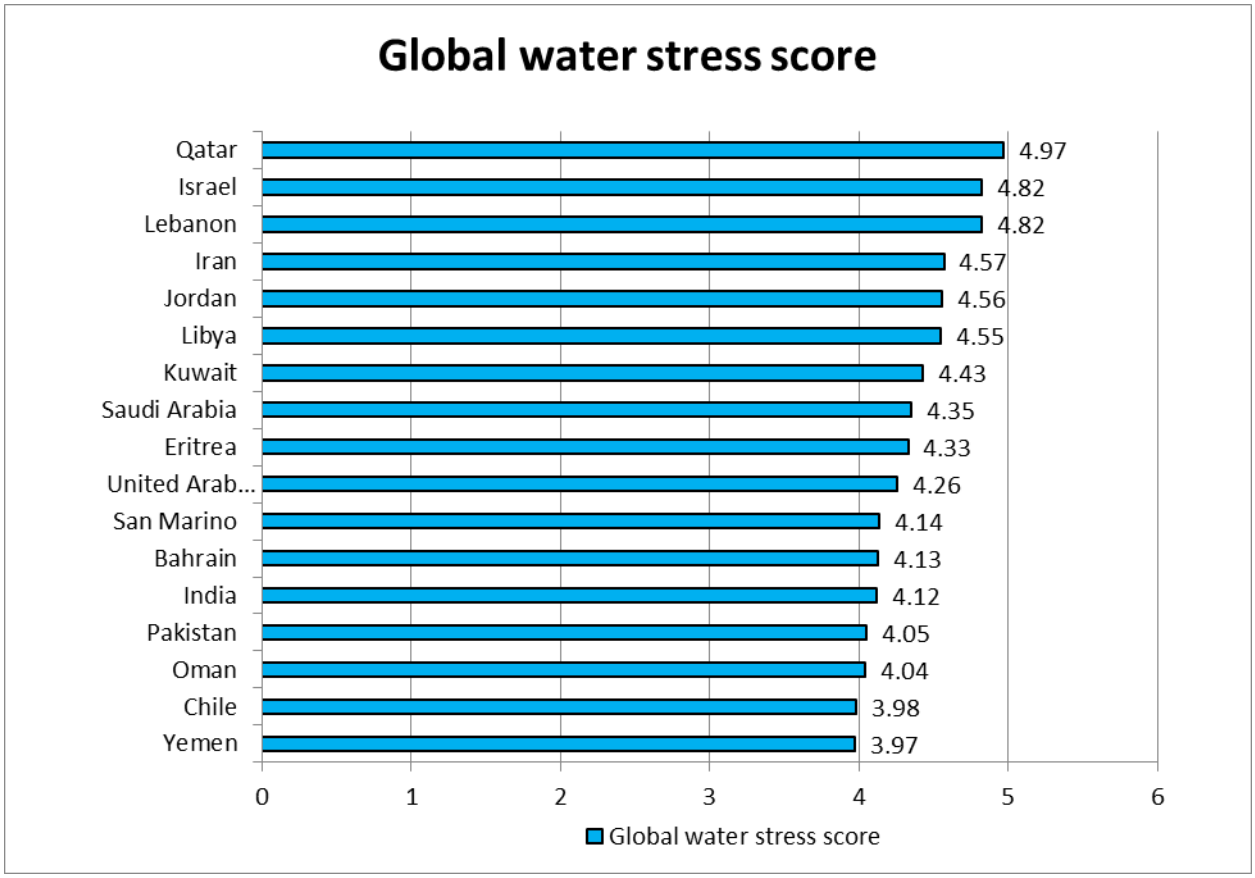
The issues of the global water crisis were first brought to the center of attention at the United Nations Conference that was held in Rio de Janeiro for the Environmental and Development of our planet (in 1992). Later the Conference was called Rio Earth Summit. As a response to the Conference, the General Assembly of the United Nations established the first World Water Day on the 22nd of March in 1993. Since then, International World Water Day has been celebrated annually. Its task is to build detailed awareness/focus attention of people to the importance of fresh water and support the reasonable management of existing water resources. In 2003, the global community proclaimed the International Year of Fresh Water and in 2005 the International Decade of Action "Water for Life" (Brundtland, 2012, p. 11).

According to Boretti and Rosa, more than 30% of the groundwater systems in the world are now in stress conditions. No one exactly knows how much water remains in these basins. Water pollution is becoming worse. Today 12% of the population consumes water from unsafe sources that causes health and unsanitary problems. 2.4 billion people around the globe lack the proper sanitation in relation to water use. Industries discharge about 730 million tons of effluents into the water (Boretti & Rosa, 2019, p. 1). Hoekstra states that water is estimated as a scarce resource because (Hoekstra, 2010, p. 4). Water cannot be produced similarly to industrial items. It is the natural resource that is present in some locations and absent in others. Many regions in the world suffer from drought or, on the contrary, flooding. Water scarcity takes place in the dry periods, while flooding is typical for the wet periods. The economic value of water can fluctuate depending on the region throughout the year (Hoekstra, 2010, p. 5). As argued by O'Brien, and Leichenko, the water resources are distributed unevenly on the planet. Some communities suffer from its surplus, while others from its deficit. 50% of the countries around the world are dependent on water provision from the upstream countries and 15 states on the bordering nations which ensure about 2/3 of its water resources (O'Brien & Leichenko, 2008).

According to the United Nations statement, there is no water global crisis as such, but some regions of the planet are strongly affected by water stress, that's why water is estimated as a scarce resource (United Nations, 2020).

Not all agree with such a statement because the water crisis has become too common to ignore. As claimed by Tiseo, billions of people continue to suffer from poor water quality or its shortage in the dried regions of the planet. The scholar emphasizes that such regions as the Middle East, for example, challenge the extreme levels of water stress that negative effects on households, industries, agriculture, etc. The water in many regions is of poor quality that leads to the infection of people with such life-threatening diseases as cholera, dysentery, poliomyelitis, etc. Especially, the lack of freshwater is observed in rural regions (Tiseo(a), 2020). The score of global water stress in different countries shows that Qatar, Lebanon, Israel, Iran, Jordan, and Libya have the highest level of water stress (Fig. 1.1.1):

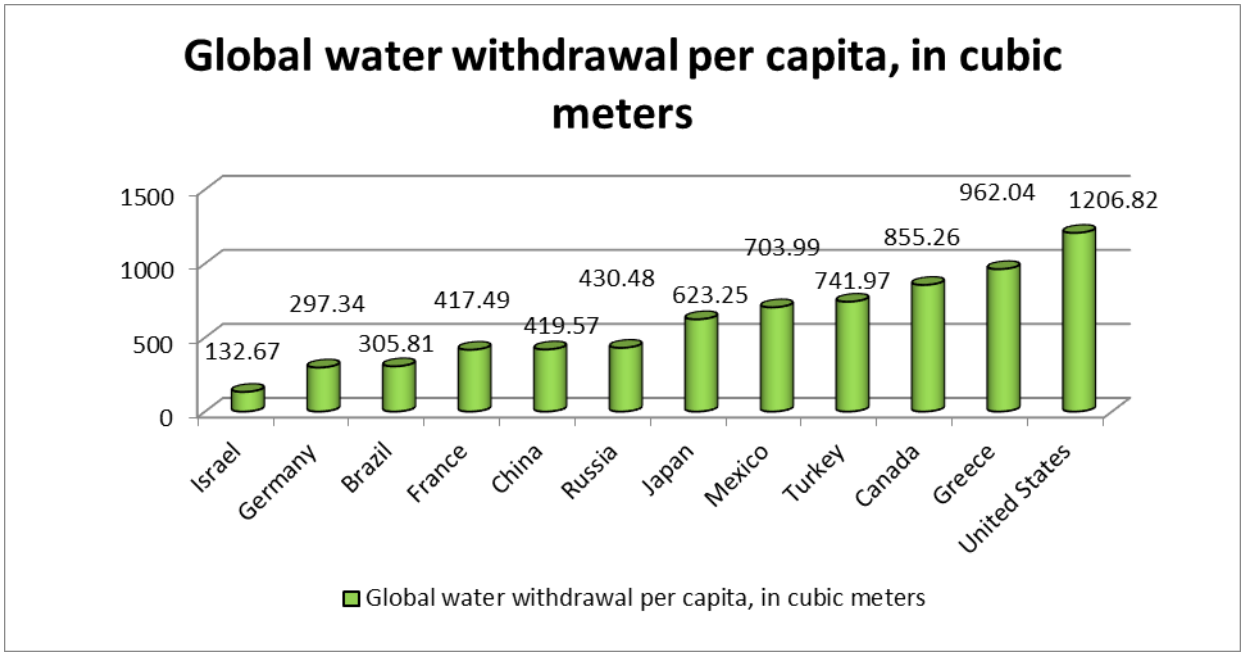
Figure 1: Score of water stress around the globe



Source: based on the data of Tiseo (Tiseo(b), 2020)

It is forecast that the global water consumption and withdrawal will reach about 4.350 Billion cubic meters by 2040. The biggest growth of water demand is expected in such regions as India, Africa, and some other developing Asian countries (Tiseo(c), 2019). Today the global consumption of water in the different countries demonstrates that the leader in it is the United States, Greece, and Canada (Fig. 1.1.2):

Figure 2: Global water withdrawal



Source: based on the data of Tiseo (Tiseo(d), 2020)

In the opinion of Hertel and Liu, there is a stable link between water scarcity and economic growth (Hertel & Liu, 2016). According to the World Water Council, the growth of population and its industrial and household consumption lead is responsible for the reduction of water resources. Particularly in the 20th century, the world's population has tripled, and the use of water increased six times. It is forecasted that in the next fifteen years, the world population will increase by 40-50%. Which will eventually lead to an increase in water consumption (World Water Council, 2020).

Therefore, the global water crisis is a problem that is viewed by almost all countries, although the extent of water scarcity is varied dependently on the dry or wet climate, governmental management, and other policies directed to save the water resources. The scholars are unified in the opinion that in future the humanity will suffer from a serious lack of freshwater.

3.2 Ethiopian Problem of Water Scarcity in Dynamics

Ethiopia is historically the oldest African country in the world and the second-most populous country from Africa population exceeding 115 million people. The climate of the country is very dry and suffered several times many humanitarian crises caused by long-lasting droughts. They have led to famine, and lack of food. Droughts also generated several problems of malnutrition and water-related diseases. Because of the water scarcity, the sources in Ethiopia often become dried or they are contaminated with human and animal feces that make this water dangerous to consume. Many children in the country do no go to school because they have to collect water to help their families to survive. Water scarcity leads to the inability to have crops that contribute to the increase of poverty among Ethiopia’s population. The lack of water caused severe competition among the industrial enterprises in the country (Chidlow, 2020).

According to the global organization “Water”, about 33 million Ethiopians do not have access to improved water sources. 89 mln people in the country live in unsanitary conditions and consume unclean and contaminated water. In rural places, the population has to walk 3 to 5 hours every day just to collect water from a nearby water source. Not only humans but animals suffer water scarcity too (Water, 2020). In compliance with the survey of Life water International, a non-profit health organization, in Ethiopia, about 62 million people are strongly affected by the water deficit. Lack of clean water leads to that 97% of the total population not capable to receive proper sanitation. About 31% of Ethiopia's population relies on unprotected water resources to ensure their daily needs in this vivid substance. 62% in the country live in conditions where they do not have access to an adequate quantity of drinking water (Lifewater International, 2016).

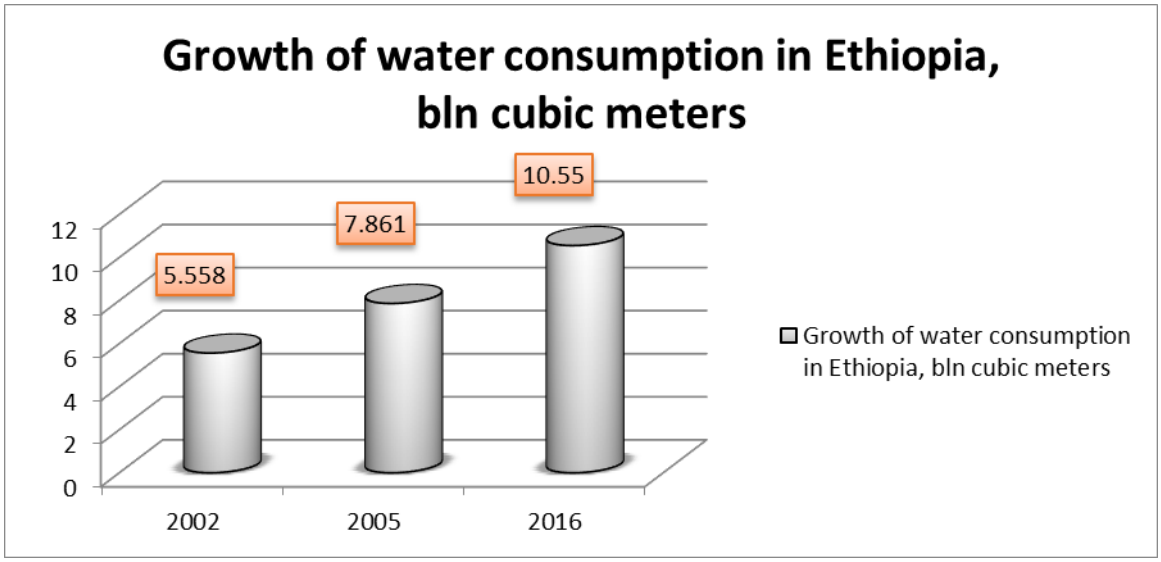
Major sources of water in Ethiopia include 12 basins among them 8 rivers, 3 dry basins, and 1 lake. Thus, Ethiopia is considered to be the place of location for the major

rivers of Africa. It has about 1.575 cubic meters of water resources per capita annually. Although with such a big number of basins, only 3% of the water resources are accessible for the entire population.

Ethiopia is home to many major rivers amongst sub-Saharan African countries with a likely average of 1,575 cubic meters of available water resources per capita per year. Though plenty of water is available in the country, only 3 percent of water resources can be accessible. Mostly the water demand is satisfied due to the use of groundwater. It is obtained by exploitation of shallow wells, spring, and deep wells. A part of Ethiopians who do not have access to water supply obtain water from unprotected sources, such as springs and hand-dug rivers. They can be polluted and contaminated. The major reason for water pollution in the country is the rapidly growing population, high rates of industrialization, uncontrolled urbanization, and poor waste management. For example, such rivers as Akaki in Addis Ababa are used as a place to release waste produced by the city. Over 90% of the industrial enterprises in Ethiopia do not have any waste treatment facilities, thus they discharge waste into nearby rivers and streams (Verma, 2020).

The dynamics of water consumption in Ethiopia shows the double increase of water demand among the population (Fig 1.2.1):

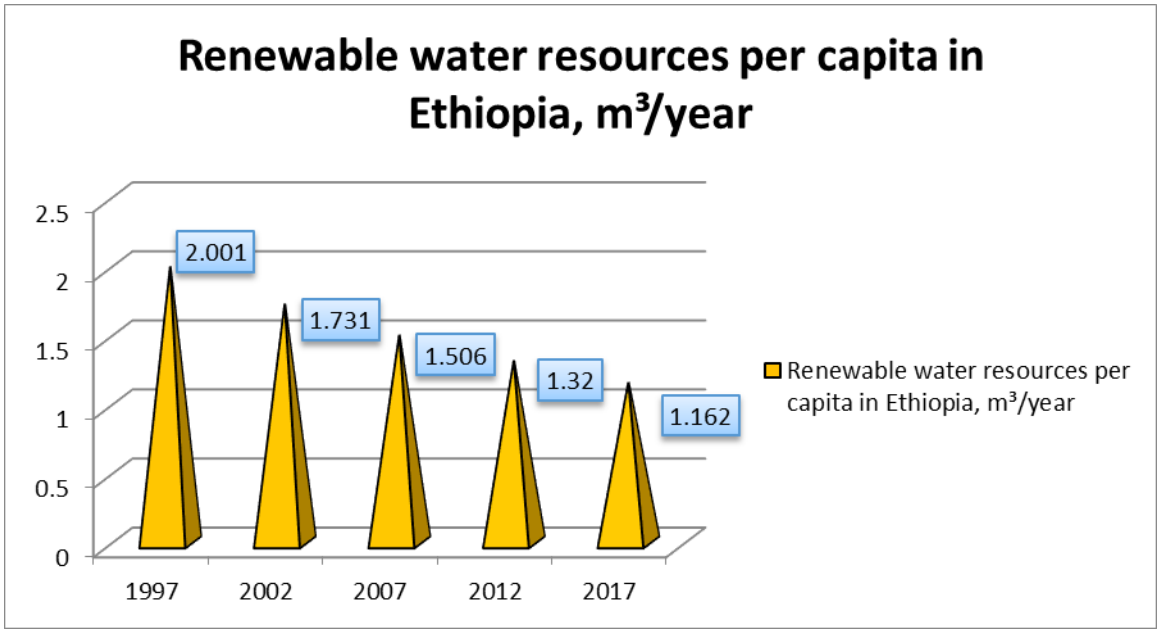
Figure 3: Growth of water consumption in Ethiopia from 2002 to 2016



Source: based on the data of Worldometers (Worldometers, n.d.)

According to Fig. 1.2, the demand of Ethiopian's population in the water almost doubled. At the same time, the number of renewable water resources has decreased (Fig. 1.2.2):

Figure 4: Renewable water resources per capita in Ethiopia from 1997 to 2017



Source: based on the data of Worldometers (Worldometers, n.d.)

The problem is aggravated by the fact that in Ethiopia, rainfalls are highly changeable.

3.3 Poor Water Management as Threat to Water Resources

In Ethiopia, water usage and management problems are not restricted by the uneven provision of the country's different regions. It is known that Ethiopia's eastern region is severely hit by drought when water from the Nile river is significantly reduced. These droughts are the main causes of famine in Ethiopia. That is why proper management of water resources is a way for Ethiopia to tackle the famine threat. The measures taken by Ethiopia to improve water management doesn't still have any success yet, and 65% – 70% of the total land area is estimated to be deserted as per the United Nations (Mekiso, 2020).

Over the years, the United Nations, the donor community, and non-governmental organizations (NGOs) have played a key role as policy advocates and technical advisers on water resources. The World Bank was the most important of all sources of investment. Between 1961 and 1995, they financed numerous completed and ongoing water management projects totaling about $ 60 billion. However, major challenges remain. The ability of governments to tackle problems in the water sector is often limited by the lack of appropriate policy and analytical frameworks, including the regulatory aspects of water management and service delivery. This results in diffuse effort and confusion in the design and implementation of water resource assessments and management programs. Even a cursory glance at policy documents, country assessments, and analytical summaries produced by governments and the international community is enough to see that data management systems for national water resources are generally inadequate throughout the region. Lack of reliable information leads to quite obvious consequences, and above all is the main obstacle hindering the implementation of effective national strategies and programs for the rational use of water resources. African countries, in active cooperation with their development partners, are placing increasing emphasis on strengthening national infrastructures for the rational use of water resources. This activity encompasses capacity building and professional development of national personnel in the planning, design, and implementation of development projects in the water sector. Current efforts to build national technical capacity include integrating all relevant tools to further facilitate the availability of data for informed decision-making (Kastens, 2000, p. 18).

Since 1999, Ethiopia has accepted “The Water Resources Management Policy”. It is aimed at the development of the country’s water resources in order to contribute to the economic and local communities’ development of Ethiopia’s population. The goal of this policy includes the enhancement of the national efforts towards the rational use of available water for household and industrial consumption (Food and Agriculture Organization of the United Nations, 1999). The objectives of this policy are as follows:

– development of the water resources of the country for economic and social benefits of the people, on an equitable and sustainable basis; allocation and apportionment of water, based on comprehensive and integrated plans and optimum allocation

principles that incorporate the efficiency of use, equity of access, and sustainability of the resource;

- managing and combating drought and floods;
- conserving, protecting, and enhancing water resources and the overall aquatic environment on a sustainable basis (Food and Agriculture Organization of the United Nations, 1999).

Thus, the policy of water management in Ethiopia deals mostly with the issues of managing and conservation of water in order to ensure equal provision of the country's population which requires a quality water for household and industrial use.

The fundamental principles of this policy include as follows:

- access by every Ethiopian to sufficient water of acceptable quality, to satisfy a basic human need;
- water resources development shall be underpinned on rural-centered, decentralized management, participatory approach as well as an integrated framework;
- promotion of the participation of all stakeholders, user communities;
- particularly women's participation in the relevant aspects of water resources management (Food and Agriculture Organization of the United Nations, 1999).

According to this policy, the individual farmers, cooperatives, and stakeholders are stimulated to work together on the issues of optimal use of water for irrigation of the farms.

3.4 Water Use in Ethiopia

In terms of their value for development, water resources are the second most important after oil and gas. The understanding that when used wisely, water provides crops, health, prosperity, and abundance for the peoples and nations of the Earth, and that lack of water or wasteful use of water resources leads to poverty, disease, soil erosion, waterlogging, environmental degradation and conflict between people, is the basis to include issues on the use and conservation of water resources on the agenda of a large number of international organizations.

The largest sector in terms of water use in Ethiopia is agriculture. 93% of all water withdrawal is used to maintain agricultural activity. Another sector of water use in Ethiopia is its population. About 80% of people are forced to collect water at a distance less than 0.5 km; 52% of them get water at a distance of less than 100 m. Nearly 20% of households have to travel from 0.5 to 2 km in order to find water. In the dry season, the Ethiopians especially those residing in rural places must overcome longer distances to find water. Approximately 39% of the population is capable to get water for less than 8 hours a day; 48% get water for 16 hours a day, and finally, 13% get water more than 16 hours a day (Sharma & Bereket, 2008, p. 432). Recently, Ethiopia could achieve its Millennium Development Goals by increasing safe drinking by 57% since 1990. However, about 28% of the population still uses contaminated and dirty water to drink (USAID, 2020).

3.5 Water-Scarcity Related Shocks in Ethiopia

The lack of water in the country has a significant impact on the development of local communities, industries, and the agricultural sector. Mostly the food crops are produced due to rain-fed agriculture, thus, the farmers' activity is strongly dependent on the weather conditions. It should be noted that the country exports about 85% of its products abroad. In Ethiopia, water shortage affects the electricity provider. About 90% of the country's electricity is generated by hydropower stations. The high dependence on water resources means that Ethiopia is economically and socially vulnerable to climate shocks, including droughts, and water scarcity. For example, about 5% of the decrease in rainfalls can lead to a 10% drop in the agricultural output and reduce the country's GDP by 5% (Taye & Dyer, 2019, p. 115).

Water scarcity generates political conflicts between countries. For example, Sudan and Ethiopia are fighting with Egypt for the Nile waters. In 2011, Ethiopia decided to build the "Hydase" hydroelectric power plant on the right tributary of the Nile. As planned by the Ethiopian authorities, this hydroelectric power station will become the largest on the African continent. "Hydase" will be able to cover Ethiopia's electricity needs and even allow exporting electricity to other countries. Meanwhile, the Egyptian authorities initially opposed the project, believing that the operation of the hydroelectric power station would lead to a reduction in freshwater flow to Egypt. In March 2015, Egypt, Ethiopia, and Sudan

signed the Declaration of Principles for the Sharing of the Nile Waters, designed to help the parties come to an agreement (Suslova, 2018).

4 Methodology

The basis for the study is the use of a set of methods. The structure of the work includes the division into three parts - theoretical, methodological, and practical. The theoretical part deals with issues related to the water scarcity in Ethiopia, the main impacts and influences on industry, agriculture, well-being, opportunities how to solve or implement some suggested programs, special for Ethiopia.

The methodological part describes the value of research results and the methodology in which it's used to fulfil the practical purpose of the work, which is to analyze the impacts and influences of water scarcity on the well-being of Ethiopia and suggest some ways for improvements to reach the goal of this work. It's the content of the practical part of this work. The goal of the study is to investigate the economic consequences and perspective of water scarcity in Ethiopia.

The goal of the paper requires solving several objectives which derive from the topic of the study. They are as follows:

1) To outline the problem of a global water crisis.
2) To highlight the challenges of water scarcity in Ethiopia.
3) To determine the effect of poor water management on the reduction of water resources.
4) To characterize the water-scarcity-related shocks in Ethiopia.
5) To describe Ethiopia’s governmental policies on water scarcity.
6) To analyse the economic impacts of water scarcity in Ethiopia.

4.1 Academic Implications

The issue of water scarcity is a problem that requires an urgent solution. Taking into account the negative prognosis about worsening situation with water

resources for the future it is necessary to take measures earlier. Most studies are focused on the factual representation of the water scarcity data around the globe.

The theoretical results of the study can be used for further extended study of this issue. It can be useful for students, teachers of start-ups, and anyone interested in this topic describing and analysing the impacts of water scarcity on Ethiopia´s development in the areas such as; industry, agriculture, demography, health services, etc. By showing how it is possible to solve these global environmental problems (not only in developing countries of Africa) can be useful for all who are interested in good usage of water.

Besides, there is the possibility to use all the information about Ethiopia's situation for business opportunities in the country. Especially for investors in spheres of agriculture and industry.

4.2 Used Methods

The methods used in this work are description, analysis, empirical investigation, induction, and synthesis. The main method of qualitative research is the official information on the websites and various articles about the country and support programs helping and solving this issue – water scarcity in Ethiopia. The methods implemented in the course of study are primary and secondary ones.

The primary methods of study include data collection and quantitative analysis of the information about volumes of water usage, scarcity, purification measures, stress, etc. The data are collected from the statistical sources which represent the information about the tendencies of water consumption and demand in different countries around the world. The results of the paper are analysed with the help of general scientific methods including induction, deduction, extraction, analysis, and synthesis.

In the course of the paper, these methods are used in order to estimate the GDP of Ethiopia, index of industrial production, agricultural growth, and other

rates. Among the primary methods used: time series, consumption of water in Ethiopia in dynamics, weighted and standardized anomaly are used. They will help to evaluate the water scarcity risk associated with Ethiopia.

The secondary methods of the study include the use of scientific publications, academic sources, Internet articles, and other materials dedicated to the study of the water crisis problem worldwide.

Conclusion to Chapter 4

Chapter 4 is a methodological part of this work. It works with primary and secondary data. They provide procedures that help create this work in a well-organized system of logical sequences. Due to this, it is possible to answer all sets of the study questions and conclude the given goal. It is important to assess the suitability of the data for solving a given research problem. They affect the suitability of the data in particular units of measure (other than required), data classification (summary classes defined differently than necessary), timeliness of data (the difference between the time of data collection and publication). For the accuracy of the data, account must be taken: a source of the document (original or derived source), the purpose of the document (distortion of data in the interests of a particular purpose), and data quality (an indication of the method of data collection, data analysis process, etc.)

5 Analysis on the Economic Impacts of Water Scarcity in Ethiopia

This chapter analyses the impact of water scarcity in Ethiopia. It emphasizes the fact that there is a direct connection between secure access to water resources and the economic development of society. Water is one of the main economic commodities. Access to water can completely change people's lives. In places with a lack of water; access to health care and decent work is usually much harder to sustain.

5.1 Effect on Water Scarcity on Ethiopia’s National Economy

The overall political, economic, and security situation in the country has been affected over the last two decades mainly by several basic factors. Firstly, Ethiopia has been a landlocked country without access to the sea since 1991. Secondly, since the same year, Ethiopia has been experiencing a period of unprecedented economic and demographic growth. Furthermore, it is one of those countries that are characterized by considerable religious and ethnic diversity with traditionally close ties to the Middle East. Fourth, Ethiopia has gained the position of regional power that has become a magnet for foreign investors and superpower interests in the region ((MZV, 2019)).

Ethiopia can be characterized as a land of paradoxes in the last twenty years. On one side, it is characterized by enormous economic growth for long time, On the other side, it is still one of the poorest countries in the world, where public sector wages have stagnated for many years, where unemployment is very high, over-bureaucratized public administration and insufficient education system. The combination of social factors with religious tensions, ethnic rivalry, and regional differences creates room for deep social frustration, especially among the younger generation, who make up the largest part of Ethiopia's population, about 95 million people (Záhořík, 2016).

Water scarcity affects both human health and the economy. Although the economic losses are less recognizable, they are more pronounced. Water is needed not only for agricultural and industrial production. Especially in developing countries, its lack causes greater complications for households, where they need a lot of time and energy to obtain a sufficient amount of water with acceptable quality. Children in these places miss school due to water transport, and it influences their education. Whole families have to move outside their family traditions and cultural customs to places where adults are forced to do different professions than they used to do. Migration from rural areas to cities, where experienced farmers do any urban work, is a typical picture these days. Migration and soil degradation are just some of the negative phenomena, also the loss of employment due to the uneven distribution of water contributes to the destabilization of the economic environment in the country. Water can therefore have both a direct and indirect impact on economic stability and growth. Securing water resources, investing in water infrastructure, and qualified administration directly create jobs and a favourable economic environment in rural and urban areas. The currently perceived business and financial risk associated with the scarcity or instability of water resources can be seen in the future as a challenge in creating government strategies. Water as a commodity can act as a focal point around which new jobs, new technologies, innovative approaches associated with the circular economy, and the efficient use of wastewater can be created.

On the other hand, the development also puts pressure on resources, including water. Pollution or excessive water consumption are accompanying signs of economic growth. It is estimated that $ 50-60 billion need to be invested over the next twenty years to meet the world's water demand. If the private sector also participated in the investment, then the return on investment (ROI) would be reflected within the next three years (Kvaček, 2019).

5.2 Impact of Water Scarcity on Ethiopia’s Agriculture

Most part of the agriculture production is represented by coffee, sugar cane, corn, sorgo, barley, legumes, oilseeds, sheep, goat, and cattle breeding. Ethiopian

agriculture employs most of the available workforce, but the methods practiced are still at a primitive level. Above all, the harvest depends on the amount of rainfalls. The government is aware of this situation and is trying to create conditions for the entry of foreign investors. The agricultural sector in Ethiopia accounts for 45% of GDP, employs 85% of the working population, and creates about 85% of the country's exports. Production intended for commercial purposes amounts to only 5% of total agricultural production. Ethiopia continues to suffer from chronic food shortages and the country is dependent on food aids.

One of the most developed areas is animal production is the production of milk and dairy products. Most of the production is processed by traditional methods and is intended for own consumption. The local market will satisfy more than 90% of demand, but with a very low level of efficiency, for example, the average daily milk production is only 1.4 Litter per dairy on one cow (in the Czech Republic it is 21 l). Ethiopia is thus forced to address its dairy needs through imports, which have tripled in the last years.

Likewise, current meat production is at a minimum level. The total number of cattle is estimated at 55 million, of which only 1.5% was for beef production (in the case of 30 million sheep and the same number of goats, it was only 0.5%). Business practices have not changed much since then - the trade in live cattle, or the export of low-quality meat, which in turn results in the lack of quality refrigeration equipment during transport, predominates. Ethiopian exports are concentrated in the Middle East, more than half of which are in the UAE. However, the share of meat exports in total Ethiopian exports is negligible, accounting for only 2%. These facts indicate a high potential for the development of animal production and offer an opportunity for the entry of foreign suppliers and investors. The development of commercial agriculture and related agro-industry is also one of the priorities of the government's Economic Transformation Plan for the period 2015-2025; the government is aware of the low levels of the sector and seeks to overcome them by investing in infrastructure, technology, and research. Agro-industrial parks are being set up to link agriculture and industry. The main idea of these parks is to connect with the surrounding small producers, who will become suppliers of raw

materials and have attitudes to water sources. In the case of agro-parks as well as separate production plants, the government seeks to create conditions for attracting (not only) foreign investors, including in particular exemption from customs duties and other fees on imports of means of production, income tax exemption for a certain period depending on the subjective activities, exemption from export duties and other non-tariff incentives. However, the investor must be prepared for the obstacles that typically occur throughout the Ethiopian economy: irregular electricity supplies, lack of water from public water mains, and in the case of agriculture and livestock production, irregular availability of inputs for production, where supplies from local growers in throughout the year (UNO, 2019).

Agricultural activity is by far the largest consumer of water in Ethiopia. An estimated 93 % of all water withdrawals in the country (surface water and groundwater) are for agricultural use, much higher than the global average of 70 %. However, water withdrawn for agriculture represents only an estimated 4 % of the overall country's available renewable water resources. While Ethiopia has relatively abundant water resources, it is considered 'water stressed' due to rapid population growth over the last decade. Estimates of renewable annual groundwater per year range from 13.5 to 28 billion m^3, of which only about 2.6 billion m^3 are currently exploitable. Natural variability in rainfall patterns and distribution, punctuated by extreme climatic events, has thrust many regions of the country into conditions of extreme water scarcity, degraded water quality, and chronic food insecurity. At the other extreme, flooding is a significant problem in some parts of Ethiopia. Compounding the unpredictable nature of the country's rainfall is the shortage of existing water-related infrastructure. Ethiopia achieved its Millennium Development Goal target of 57 % access to safe drinking water, halving the number of people without access to safe water since 1990. Yet access to improved sanitation remains stubbornly low at only 28 % nationwide up by 3 % in 1990. Despite these strides, safe water, sanitation, and hygiene (WASH) coverage remain insufficient. Inadequate access to safe water and sanitation services and poor hygiene practices negatively impact health and nutrition; the diarrheal disease is one of the leading causes of under-five mortality in Ethiopia (Societe Generale, 2020).

The Government of Ethiopia aims to increase access to safe water supply and basic sanitation in rural and urban areas. At the same time by planning to invest more resources into water-related infrastructure. For example, under the One WASH National Program, the Government of Ethiopia aims to increase access to a safe water supply to 98 % for rural areas and 100 % for urban areas and provide all Ethiopians with access to basic sanitation. We support the Government of Ethiopia's efforts by incorporating water, sanitation, and hygiene activities into its health, education, humanitarian assistance and democracy, and governance programs, and water resources management into its agriculture and food security activities (CZDA, 2019).

5.3 Influence of Water Scarcity on Ethiopia's Industries

Ethiopia is developing relatively fast thanks to large investments in infrastructure. The state is strongly involved in the economy - state-owned enterprises in major sectors. In many sectors, only local investments are allowed. More than 70% of the population is still employed in agriculture. According to the Ethiopian constitution, the state owns all the land and provides tenants with long-term leases. But it is still one of the poorest countries in the world with a low index of inequality between rich and poor. Corruption is rampant in the country. The main income of the state consists of airlines and export commodities - coffee (27%), oilseeds (17%), vegetables, including kata (17%), gold (13%), flowers (7%), live animals (7%), raw leather products (3%) and meat products (3%). The manufacturing industry accounts for only 8% of GDP.

The main industries are food processing, beverages, textiles, leather, garments, chemicals, metals processing, and cement. The manufacturing sector still has a low impact on total exports (around 15% in 2017) but is expected to grow in the coming years. Recently, a large number of companies outsourced their textile production from Asia to Ethiopia (World Projects, 2018).

The tertiary sector leads Ethiopia's foreign exchange earnings, primarily thanks to the state-run Ethiopian Airlines. It accounted for 37.1% of GDP in 2019

and is estimated to employ 24% of the workforce. Tourism and telecommunications are growing at a steady pace and are expected to play a major role in the country's growth process. Though the Ethiopian government is in the process of privatizing many of the state-owned businesses and moving toward a market economy, the public sector still holds a predominant role in the economy, with sectors such as telecommunications, financial, insurance services, air, land transportation, and retail considered as strategic, thus expected to remain out of the privatization process for the foreseeable future. Besides, under the country's constitution, the state owns all land and only provides long-term leases to tenants. In 2020, the COVID-19 pandemic particularly hit the sectors of tourism, air transport, hospitability, and manufacturing. The farming sector suffered from a locust infestation, and coffee shipments suffered from reduced production caused by security problems and population displacement (Societe Generale, 2020).

5.4 Potential Risks of Water Scarcity for Ethiopia's Social-Economic well-being (e.g., growing costs for urban consumers)

The lack of water causes that the population is unevenly distributed and the vast majority of them have lived in small settlements for quite some time. The process of urbanization began only in the years 1967 - 1975 when the number of urban inhabitants tripled. But the foundations were laid during the Italian occupation when the first infrastructure was built - roads, power plants, and water mains. Today, migration to urban areas continues, which is usually motivated by the hope of a better life. The reason is a poor standard of living in the countryside, low wages, low agricultural productivity, and malnutrition (especially among children). Although cities offer better living conditions, they also suffer from poverty and poor hygiene (sanitation - waste management). In Addis Ababa, for example, 55% of the population lives in slums with difficult access to safe water, a problem throughout the country. Half of the population does not have this basic need available. The difference is also evident in education. The literacy rate in Ethiopia is 82%. In contrast to rural areas, 69% of urban children already attend primary school. However, access to education is improving.

Ethiopian healthcare, which is qualitatively poor, is even more troubled. The country has only 119 hospitals and 412 health centers. That is why many patients continue to seek help from traditional healers. Many diseases are caused by poor hygiene and malnutrition. Infant and maternal mortality rates are high in rural areas. But the country is succeeding in reducing the incidence of AIDS and contraceptive use. Female circumcision is widespread in the country and has been illegal since 2004. Nevertheless, it is still practiced, but gradually this practice, which is supposed to protect a woman from promiscuity or rape (unfortunately a relatively common crime), is declining. Male circumcision is common. About 76% of the male population is circumcised. The government is trying to involve women in the economy by equalizing them.

Except that, social and health services are still underdeveloped in Ethiopia. While health care facilities are very poor mainly in rural areas, where the vast majority of the population lives, social problems dominate in cities as well. It is no exception that inhabitants often live in poorer conditions than before their arrival from rural areas because big cities have the same problems and they are connected with water scarcity. Without water it is impossible to go to school, to teach, to develop other institutions for education and activities (UNO, 2019).

5.5 Ways to Improve the Problem of Water Scarcity in Ethiopia

There are a lot of supporting programs for helping Ethiopia to find new water sources and effectively use them. Especially European countries and the USA run a great variety of developing programs. The Czech Republic offers some of them. For example (Člověk v tísni, 2016):

1) Ensuring access to drinking water for residents of Guguma, Teso, Bargo, and Huluka in the Sidama II zone.

This project is a part of the Czech Republic's long-term development activities in the southern part of Ethiopia. The aim is to ensure access to safe drinking water in the Guguma, Teso, Bargo, and Huluka localities in the Sidama zone. The project also

includes practical training of staff in the operation and maintenance of the water supply system. There are also community meetings and training of local people to raise public awareness of good hygiene habits, which should help reduce the incidence of infections caused by poor water and poor hygiene, especially children.

The project aims to improve the living conditions of poor farmers through better agricultural practices, better nutrition, and the development of economic activities. To achieve this, the project effectively combines several components, such as improving the efficiency of existing community services and their accessibility for farmers (e.g. Farm Training centers and Cooperatives), introducing sustainable farming practices, appropriate processing, storage, and marketing of products, and increasing crop diversification with a focus on crops with high nutritional value. In total, the project has already established six cooperatives in the field of production and provision of services.

2) Ensuring sustainable management of water resources:

Surface water in Ethiopia is not suitable for drinking without proper treatment, poses a health risk to the entire population and more than 80% of infectious diseases originate in contaminated water. Contaminated surface water should only be used for commercial purposes, irrigation, and for domestic animals. The aim of this project is therefore to ensure equal access to safe and affordable drinking water for all residents of selected areas, as well as adequate sanitation and hygiene facilities. In addition to the provision of drinking water sources, project interventions focus on improving the management of water resources, their inventory and increasing the professional capacity of regional and subordinate authorities as well as individual water companies.

3) Improving the quality of life of the people of the Sidama zone by ensuring the availability and sustainable management of water resources:

The project aims to provide available sources of drinking water for 15,000 inhabitants of selected municipalities in the Sidama zone and at the same time increase the level of hygiene and sanitation. This goal is gradually being achieved by building wells and building water infrastructure, modernizing sanitation facilities, training the community in hygiene and sanitation, and establishing consumer associations that will be in charge of water management. In 2019, among other things, the project documentation necessary for the introduction of water resources in the five districts of the Sidama zones was prepared.

4) Improving health, hygiene and sanitation in selected towns and villages in Sidama, Ethiopia

The project focuses on improving the health status of target communities and the prevention of infectious diseases of the population. Improving hygiene and systemic sanitation processes will be led by the People in Need team through a systemic change approach to healthcare, during which the project will focus on existing health centers and schools and methods of behaviour change. The main message of the project will focus on the campaign for washing hands, keeping latrines clean and used, as well as protecting young children from infectious diseases.

There are some actions from the USA side. The States offer some supporting programs within water scarcity and well-being issues as well. Some of them are (USAID, 2020):

1) Access to Water:

The aim is to Increase the availability of improved sustainable drinking water sources, increase access to better sanitation products and services, catalyse enhanced sanitation and hygiene behaviours, and build capacity for enhanced knowledge and data management, while also expanding sustainable water use for agriculture.

2) Empowering New Generations to Improve Nutrition and Economic Opportunities:

It teaches how to use nutrition cooking demonstrations and other platforms to conduct community, to promote hand washing, safe water and food storage preparation and handling and use of latrines, and to ensure that participants understand the relationship between nutrition, illness and washing practices in the Somali Region. Next, it shows how to create sustainable, comprehensive, and coordinated interventions to improve the nutritional status of women and young children. It focuses on strengthening nutrition programs and policy, health care services, community-oriented nutrition and livelihood care and practices, access to clean water, and a rigorous learning agenda.

3) Integrated Family Health Program through Evidence to Action:

Strengthen and promote increased use of high-impact family planning, maternal, new-born and child health practices, products, and services. The activity provides an integrated package of family planning and reproductive health, maternal, new-born and child health interventions. Investments directly support the Health Sector Development Plan and the Health Extension Program with a focus on delivery of key services and products through a continuum of quality care from the health centers to the health post and community level in rural, urban and hard-to-reach parts of the country. The activity promotes hygiene and sanitation through the health extension workers.

4) Agriculture and food security programs:

Promote the development and the marketing of wash products in areas where residents have irregular access to water and sanitary goods and services. The activity takes an innovative, market-led approach to creating effective, consumer-centric products and services which are suitable for the conditions in which they live. Consumers will use the products to improve health, thereby reducing mal-nutrition and ill-health, particularly among women and children. As an outgrowth

of the initiative, we promote the development of robust supply chains which provide economic opportunities to women and youth. Above all, they construct and rehabilitate potable water sources and sanitation facilities through public works activities, promote hygiene education, provide water-harvesting technologies to smallholder farmers, and promote watershed management activities.

The most actual topic is construction of The Great Ethiopian Rebirth Dam, sometimes referred as the Great Renaissance Dam. It is said to be the largest man-made reservoir in Africa and the largest hydroelectric plant on the continent. It has been under construction since 2011 and it is almost completed. It is expected to produce nearly six and a half megawatts of electricity, double the country's current energy production. The construction is taking place on one of the important tributaries of the Nile, which will at least temporarily reduce the supply of Nile water to other countries further downstream of the Blue Nile, i.e., Sudan, and especially Egypt, which draws 90 % of its drinking water from the Nile. Cairo is therefore trying to slow down the gradual filling of the dam as much as possible, to limit the inflow of water into Egypt as little as possible (Kožmírová, 2018).

Conclusion to Chapter 5

Ethiopia, due to climate vulnerability and rapid population growth, to countries with the highest incidence of hunger and a large part of the population suffers from chronic malnutrition. The country is dependent on food aid and faces potential food risk. It is essential to increase agricultural production and create sustainable agricultural development for all, to promote food security and access for all adequate food. It is also necessary to strengthen product value chains. An obstacle to the country's further development is the persistence of insufficient and unequal access for all to meet basic needs. There is still a need to further increase the population with access to drinking water and sanitation, incl. sanitary facilities, need for improvement hygienic habits of the population and focus on the prevention of infectious diseases in particular.

The development of the country, especially its agricultural production and rural parts, is highly dependent on natural fluctuations; frequent devastating phenomena are droughts, flash floods, other natural disasters, reduced ability of the landscape to retain water due to loss vegetation cover, etc. These phenomena, resulting from climatic conditions and climatic changes have a direct impact on the livelihood of the population and its economic situation. The country's vulnerability to climate change is high and requires action reduction. Natural fluctuations and their consequences, large population growth, inefficient, unsustainable, unsustainable farming methods and insufficient landscape management are the causes of depletion of natural resources, soil and forests, which leads to soil degradation, its erosion, reducing its profitability and making it more vulnerable to climate fluctuations. Support for the protection and restoration of the landscape (soil, forests), the protection of ecosystems and biodiversity and other related activities, including systemic prevention natural disasters.

6 General Conclusion

This work focused on water scarcity in Ethiopia and its impacts on the agriculture, economy, industry and socio-demography aspects. It analyzed general information about the Ethiopia, so-called the horn of Africa. It described living conditions, basic facts like situation in economy, economic data and comparison with the world according to the OECD measurement.

The structure of the work is represented by three chapters. Introduction contains information about relevance of the paper, its aim, objective, research question, methodology and defence statements. The literature review chapter is focused on the study of issues associated with water consumption and water scarcity in Ethiopia and the related shocks.

The second chapter contains methodology that includes determination of the academic implications of the study and description of the method used to investigate the problem of the paper. The part, analytical part of the work, is dedicated to the study of the economic impacts of water scarcity in Ethiopia. The major impacts are focused on Ethiopia’s national economy, its agriculture, and industries. The potential risks for the economic development of the country are determined and ways to improve the situation are provided.

As stated above, the aim of this work was to investigate the economic consequences and perspective of water scarcity in Ethiopia.

Generally said, Ethiopia is one of the world's least developed countries (LDCs) with a high annual rate population growth - about 12 % of increase since 2010- (Societe Generale, 2020).

Despite good economic growth in recent years, the need to reduce poverty remains a fundamental challenge, namely especially in rural areas where the majority of the population lives. The condition and number of technical educational institutions is insufficient, there is a lack of materials and equipment, teacher

training is not adequate to the needs, the problem is also poor employment of graduates. Unemployment thus persists, especially among women, girls and young people. The essential need for the sustainable development of the country is security inclusive approach to quality education at all levels of the system, including vocational education (TVET, Technical Vocational Education Training).

The employment gap between men and women is high, girls' participation in school is limited by socio-economic and cultural factors, and the real influence of women in decision-making processes is rather low. There is thus a need to promote gender equality, empowering all women and girls and promoting respect for human rights. In general, an obstacle to the country's further development is the persistence of insufficient and unequal access for all to meet basic needs. There is still a need to further increase the population with access to drinking water and sanitation, including sanitary facilities, need for improvement hygienic habits of the population and focus on the prevention of infectious diseases in particular.

African countries represent many potential opportunities for investors, the area of industry, agriculture or scarce resources are very attractive. To start any activities it is necessary to do constant research in water underlying, to map that everywhere in Ethiopian territory. For these purposes there exist various supporting programs for developing countries in Africa, within humanitarian aids programs or programs of ministries of foreign affairs under a given country. Czech Republic is no exception.

It helps to Ethiopia very actively and runs plenty of supporting water scarcity solution programs, educational programs specialized in children education, girl’s education, education in sustainable agriculture or soil usage etc.

The main goal of the plans and development efforts is to bring Ethiopia to the status of a lower country middle income by 2025. Emphasis is placed in particular on a rapid, sustainable and equitable economic growth by increasing the productivity of manufacturing and agricultural production and on overall development rural areas. Furthermore, the creation of a climate-resilient green

economy, improvement, is emphasized its productivity and competitiveness and increasing the production capacity of the manufacturing sectors. High weight is attached to the promotion of investment in quality infrastructure, the transformation of the domestic private sector, as well as strengthening the capacity and resilience of institutions. Attention is also paid to the development of inclusive democratic society, including support for the strengthening of equal participation of women and girls in society. The most important partnerships are focused on environmental priorities (drinking water supply and sanitation), social development (especially education), to a lesser extent health and agriculture (CZDA, 2019).

In the priority area of water supply and sanitation are seen good results and the programs tries to manage to make a significant contribution to building the capacity of specific communities and local governments in the management of water resources and their maintenance. Emphasis was also placed on educating and promoting hygiene habits. Humanitarian aid in Ethiopian area complemented development activities with emergency water supplies for drought-affected people and the construction of temporary sanitation structures for refugees from neighbouring countries.

Agricultural projects focused on adapting agriculture to a specific type of landscape climate change and the sustainable management of natural resources (prevention of erosion and slowing down deforestation, better protected land), building sustainable livelihoods for farmers, including promoting their access to local markets and capacity building of rural communities and local government.

The transfer of know-how to ordinary farmers proved to be a risk moment of sustainability (multiplier effect). Humanitarian activities have strengthened the resilience of the local population and its basic resources subsistence against repeated droughts.

There are still many tasks to do, but one of the most important is, sustainable management of natural resources ensuring universal and equal access of the population to safe and affordable drinking water. Maintaining adequate

sanitation and hygiene facilities for all, with special regard to the needs of women, girls, and young children sustainable drinking water supply systems. Activities in the field of water management and technical infrastructure development will lead to the fulfilment of this goal. The capacity of the new sources will be designed to cover the demand for drinking water while growing the population. Emphasis will also be placed on the capacity building of office staff in the field of managing water resources. In the field of sanitation, activities will focus on both the construction of new and the modification of existing sanitation equipment, as well as in the field of training and teaching on the principles of sanitation and hygiene on the basis of knowledge research and practices of target communities.

The first results of the big water scarcity solution will be shown in further following years. Thanks to the realization of mentioned programs and construction of the Grand Ethiopian Renaissance Dam, there could be seen first success, development in analysed areas (agriculture, industry, economy, etc.) and that what is the most important goal - a better-living conditions for all Ethiopian people.

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