

## Research on Water Disputes

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### Abstract

Water is the source of all life and without it no one can survive. But at the same time as it is unevenly distributed on our planet, if the governments cannot properly manage the water, it will be a scarce natural resource. As a primary social and financial resource, water has the power to destroy, and to create. The Figures for water loss are staggering. Within seven years, from 2003 to 2010, parts of Turkey, Syria, Iraq and Iran lost 144 cubic kilometers stored fresh water. Two billion people live in areas where drinking water is constantly reduced, while the number is expected to rise to five billion by 2025. The drought, which aggravates the observed global warming and which unfortunately is expected to intensify in the coming years, already estimated to have cost the lives of 1.8 million people annually worldwide, particularly because of inadequate water consumption.

These crises are posed by water scarcity and are ranked as a global risk, higher and from wars. Dramatically and data of NASA show this problem. Experts warn that modern world will be jeopardized because of water scarcity. That's why governments must fight and cooperate to protect water resources and present its significance for the world.

### Introduction

#### Objectives

The overall goal of this research was to highlight the importance of water for the survival of modern world, and also to present the causes of international disputes. Also, the aim of the work is to describe the wars that have taken place or are prevented today and to highlight the need for proper management of water. As it is understood, this study tries to be a useful tool to enrich the literature and reflection of water conflict and the need to prevent the reduction of water.

#### Organization

This study presents the water conflict and its consequences for the entire world. There is a back ground which must systematically be considered and analyzed. This study has 6 chapters. In second chapter the importance of water is presented. Especially, in this chapter first of all an introduction of significance of water is presented, so that everyone can understand how important water is. Also, this research studies the role of water as natural, environmental, social and financial resource. In third chapter the problem of reduction of water resources is presented and evaluated. This problem can be understood by analyzing the importance of sanitation-water supply, describing, explaining and evaluating the risks for reduction of water resources and economic, political and diplomatic causes of water conflict.

Additionally, in fourth chapter depletion of freshwater is further analyzed. In fifth chapter the study tries to present the phenomenon of water conflict, which is a very big problem for modern societies. The seriousness of the problem can be understood, by quoting the historical description of water conflict, describing the areas where water conflict was averted and explaining the efforts for international agreements on water. The study is completed in sixth chapter with the prospects for water resources. In this chapter, we have the objections to privatization of water supply companies, which create serious problems in local societies, as well as the proposals and conclusions of the study of water conflict in the entire world.

### The Importance of Water

#### Introduction

Water is a key source of wealth and development of modern

societies. It is a natural and economic resource, which is unique and irreplaceable (it cannot be replaced by another natural resource). Water significance into daily life is simply indispensable. Water resources consist also a prerequisite for a robust financial development, since the era of the ancient civilizations. Water resources in many areas of the world are inadequate and their failure prevents the development of nations.

Water is undoubtedly an important factor in the development of societies and the lives of people but most stocks are inadequate. The waste disposal reduces the stock of natural resources and enhances the rarity especially in areas poor in water resources. The recognition of the true value of water is the only guarantee for protection and prevention of reduced water resources. As for the use and recognition of the value of water, it is also necessary the readjustment of water pricing. An operational cost accounting system serves to improve the distribution of water and further encourages savings. The EU through the implementation of the Water Framework Directive aims to waters long-term and sustainable water management (Figure 1).

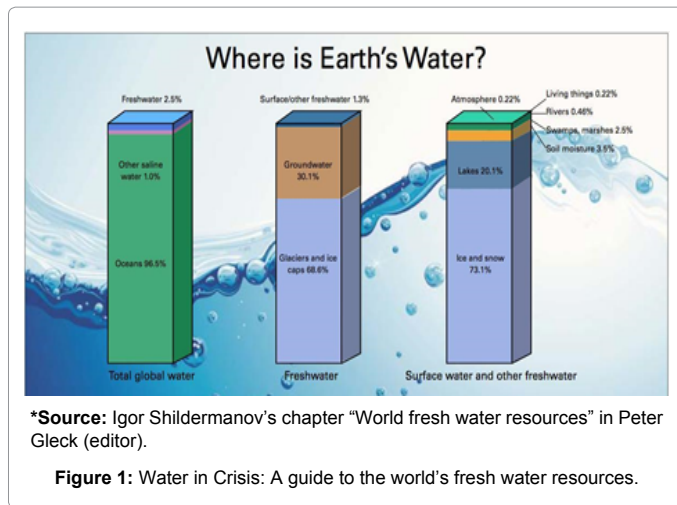
The abundance and balance of ecosystems depends on water resources. The water in the different phases is not allocated uniformly in all regions of the earth. The spatial inequalities of groundwater, which occupy vast areas, relative to the surface water, appear locally or follow a specific course. This characteristic is rather intensified by the surface terrain. Important role in the unequal distribution of water resources plays variability of weather conditions and changing weather conditions during the year. In recent decades there are internationally important issues around the adequacy and management, which even lead to regional warfare and disrupting interstate relations. Key factors

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of this tension are the increase in consumption due to population growth, changing conditions, life requirements and the thoughtless consumption.

The most serious of world risk are:

- Transnational conflicts with regional implications (geopolitical risk).
- Extreme weather events (environmental risk).
- Failure by national governments (geopolitical risk).
- Crashing due to crisis states (geopolitical risk).
- High unemployment or underemployment (economic risk).

Finally, the most dangerous consequences are:

- Considerations for Water (social risk).
- Rapid and massive spread of infectious diseases (social risk).
- Weapons of mass destruction (geopolitical risk).
- Transnational conflicts with regional implications (geopolitical risk).
- Failure to adapt to climate change (environmental risk).

### Water as natural resource

The water can be seen as a natural, economic and environmental resource, according to the main criterion, and the type of management. Its main feature is that it is unique and irreplaceable. It is irreplaceable because it is a basic condition of human existence and life on the planet. Unfortunately, in many world regions water resources are inadequate and this fact hampers the development of nations. It should, however, be understood that sustainable management of water resources is a basic parameter of sustainable development of the states and for this drastic initiatives are needed.

The land has an area of 520 million square kilometres, of which 71% is covered by water. Most of this water is salt and cannot be used. The ocean water is the most important, as it helps to regulate the climate of the planet and is the largest living space of many living organisms. Only a percentage of about 3% is fresh water that 2/3 of is stored in areas of the ice, the snow-capped mountains, rivers, lakes and in the ground. That's why we cannot have access to it. The rest is used in agriculture,

in the industry and for our daily needs. It is also the main component of our global beings and we need large quantities to satisfy our needs.

Water is not in the same way shared by nature on the planet's surface, both among the population and the distribution of its use by sectors. In 1999, United Nations Environment Programme reported that 200 scientists in 50 countries of the world have indicated that water scarcity will be one of the biggest problems of the new millennium. In our days water stocks fail to meet the basic needs of the population while quality is also degraded. These are two serious problems that require proper management of water. Proper and systemic administration can provide water and protect water against pollution.

The water in our planet is considered as a renewable natural resource and concerns all water supplies. Despite this, in countries with severe drought the available reserves are limited, they cannot be renewed and also they have zero supply, although there is an increased demand. The climatic conditions contribute to the unequal distribution of water in our planet. Ten countries are getting 60% of stocks of fresh water and the most important of these countries are Brazil, Russia and China. Twenty-nine other countries, mainly in Africa and in the Middle East face the problem of lack of water. The drought in countries of Africa and Central Asia leads to insufficient water resources which will supply the water distribution networks.

Water is a natural resource and is an important financial resource. The management also is a serious global problem. The amount of water available to seasonal and geographical level cannot meet the respective needs. This problem promotes over exploitation and stock depletion and causes conflict between competing states. Pollution and waste of water are still considered significant problems. All these problems jeopardize supplies, environmental balance and the quality of life of citizens.

Sustainable management of water resources requires significant scientific and technological efforts and the substantial and methodical international collaboration of researchers. All of them should understand the natural water cycle, the evaluation of ways of safeguarding resources, the protection of its quality and the development of the most appropriate and economical inspection. Also, they shall minimize the waste disposal loads. The water technologies can also contribute to the promotion of economic activity and job creation. The Members-States of the European Union have adopted a common water policy (EU 2000/60/EC) which is implemented by directives that protect this essential resource [1]. In the case of sustainable management of water resources, the EU Directive 2000/60/EC is very important and innovative and is called "Directive Framework on water."

The main objective of this directive is the management of water resources and the effort to ensure the necessary quantities of water to meet existing needs, without harming the environment. The EU Framework Directive on water is a bold and progressive text that will have a lasting impact on the future management of water and aquatic ecosystems in Europe. The main environmental objective of the Directive is to succeed within the next 15 years good condition for all surface and underground waters in Europe [2].

The implementation of the Framework Directive affects many partners, as individuals consumers, the main areas where people use water, such as agriculture and industry, supply and water treatment, scientists, environmentalists and all who are involved in land-use planning at the local, regional, national and international level [2].

### Water as environmental, social and financial resource

Water is an essential resource for life, “it is an indispensable resource for the economy, and also plays a fundamental role in the climate regulation cycle”. The management and protection of water resources is a main point of EU’s water policy over the past thirty years. The more recent policy document is the ‘BLUEPRINT TO SAFEGUARD EUROPE’S WATER RESOURCES’ (COM/2012/0673) which tries to protect the good quality water, of sufficient quantity. “The “Blueprint” outlines actions that concentrate on better implementation of current water legislation, integration of water policy objectives into other policies, and filling the gaps in particular as regards water quantity and efficiency. The objective is to ensure that a sufficient quantity of good quality water is available for people’s needs, the economy and the environment throughout the EU [3].

Water is one of the most valuable natural resources, which has significance for life, because it is an essential component of all organizations and an important energy carrier. The stocks of drinking water currently stand at 2.6% of total single aquatic reserves of land (UNEP, 2006). In recent years the growth of the world population, the intensification of agriculture, the development of industry and tourism lead to an increased demand for water. Also the contamination of water resources from waste, climate change and human interventions in the natural environment have resulted in a continuous reduction of water stocks.

According to the UN’s Environment Agency, UNEP, the global renewable freshwater reserves currently estimated at 40,000 cubic kilometers. But this water is distributed unequally and cannot be used of the people in its return to the sea.

A person needs about 70 L of clean, fresh water daily. In 55 countries of the world, however, the ratio of water per capita is much lower. In Chad, Nigeria or Mali, the individual daily consumption does not exceed 10 L. (Figure 2).

The ability of public or private management of water depends on the identification of water as a social good or as a commodity. In 2010, the UN declared that access to clean water and sanitation is a human right (UN News Centre, 2010). A decade ago, it was adopted by the European Directive-Water Framework, which include:

- determines that water is not a commercial product like any other, but should be considered heritage,
- allows countries to provide water services reasonable price for those who need it,
- encourage all citizens to participate in the protection and water management [4] (Figure 3).

On the 6<sup>th</sup> World Water Forum 2012, the European Parliament states that water is a shared resource of humankind and access to drinking water is a fundamental human right [5].

Water is an inalienable public and ecological resource, essential for life, human society and ecosystems. Water resources must be accessible to all citizens in an equitable manner, without compromising and without destroying ecosystems. Its management must be geared to sustainability, and not to profit maximization [2].

In the entire world there are huge amounts of water but few of them can be used, as the largest proportion of this water is salty. The water needs are covered in different ways and have economic costs. Water in the past was known as a free commodity. Water in the past was known as a free commodity, but today with the exponential growth of population there is an emerging necessity for bigger and more sophisticated water distribution networks. The development of agriculture and other economic activities, dictated that water is one of the most important economic assets. In many areas the price of water, as an economic good, is not only determined by the cost and the scarcity [6]. Water has an economic value in all its competing uses and should be recognized in order to permit an assessment of the actual value [7].

The depreciation of the value of water leads to exhaustion and systematic degradation of water bodies and increases water problems in our days. Those who consume the largest quantities pay less. The devaluation of water worthy also leads in providing low transport services. Water, to be produced as a commodity needs investments. The use of these investments requires both a large and a small operating cost [6].

Water as a natural resource is an important financial resource and its management can be a serious global problem. Increasingly water is not able to meet respective needs of states and their inhabitants. This correlation leads to overexploitation and depletion, causing

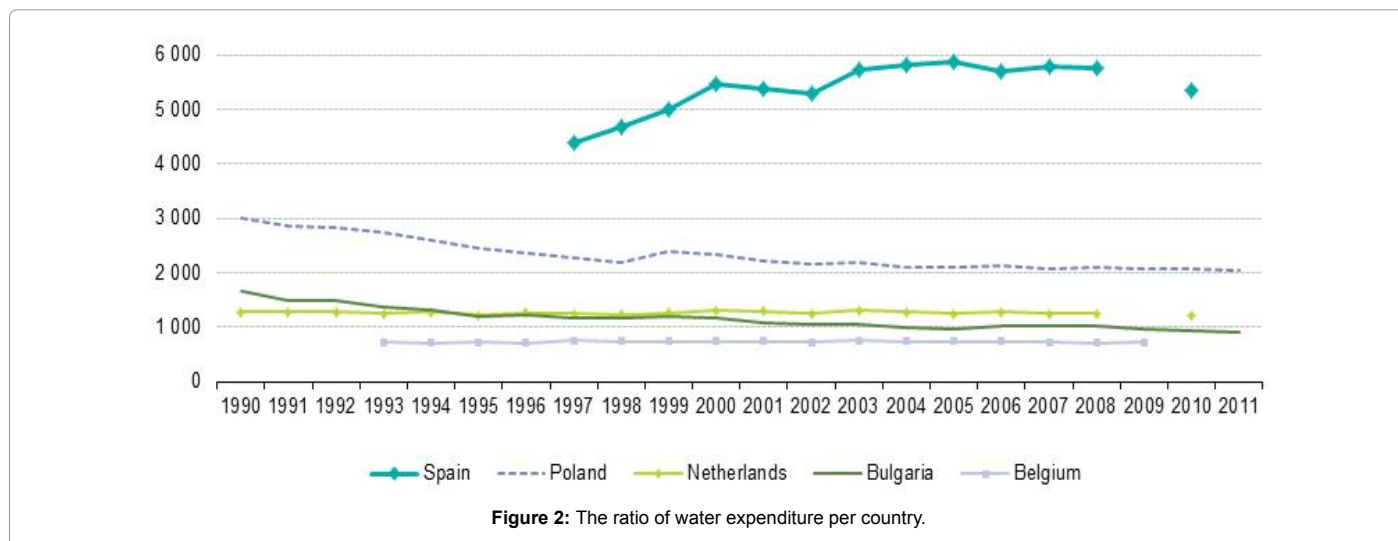
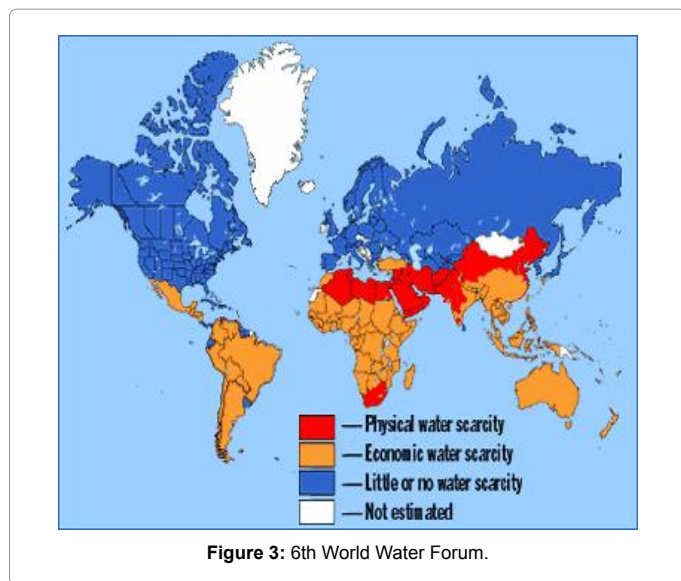


Figure 2: The ratio of water expenditure per country.



even conflicts between competing users or countries. Even when it is abundant, water is polluted and wasted. All these negative factors jeopardize supplies, environmental balance and the quality of life of everyone.

Today the water must be treated not only as an economic resource but also as a social good that is in failure. For this reason, governments must try to check this problem [8]. Water must be used rationally, because the depletion of quality deterioration is possible to deprive them of future generations. The current generation has an obligation to deliver an environment rich in natural resources and not a degraded environment.

## Reduction of Resources

### The importance of sanitation-water supply

The use of water is important for both sanitation and water supply. Urban drains are the works of collection and transport wastewater and storm water of an urban area until their disposal. Urban waste water or sewage or wastewater are water, mixed with solids, which are discharged with normal use of hygiene, from commercial or industrial areas. Along with these are moved frequently and industrial liquid waste, i.e., waste water from industrial processes. Rainwater is water, which flows after rainfall.

The sewer is a set of pipes that collect and carry wastewater or stormwater, equipped with the appropriate standard and special structures, which facilitate the flow of the network and allow its maintenance. The importance of sanitation projects for public health and the quality of life in urban areas is almost self-evident. In areas without sewerage networks soil pollution occurs, groundwater aquifers and surface water bodies, appearance of odors due to septic conditions of sewage and risks are created for public health [2].

Similarly in areas, where an efficient network of storm sewer is lacking, in the case of storm the streets turned into streams, life is paralyzing, cars and houses are flooded and often lives are lost. Consequently the sanitation projects are particularly important infrastructure necessary for the operation of an urban area, and they are important for living standards. Along with the water supply and road projects are the major infrastructure projects [9].

Many times however, their significance is ignored, because they are underground works and they are not available for viewing. Besides drainage projects have direct economic benefits and the service which is offered is not easy to be invoiced.

There are also psychological factors that create aversion to these projects and downplay them. All these reasons had delayed the dissemination of drainage works. The typical municipal sewage works can be broadly classified as follows:

- Sewer network
- Sewage treatment plant
- Pipeline disposal of treated effluent
- Network stormwater
- Perimeter flood-preventing ditches
- Arrangements watercourses within the perimeter of the urban area.
- The perimeter of the projects generally extend to the settlement limits as they are defined by the existing building conditions or the approved master plan. Water consumption is divided into residential, industrial, public and municipal. These components show a large consumption variations from region to region and the factors which influence them are:
  - Climate
  - The level of life
  - The existence or not of the sewerage network
  - The type of commercial, industrial and tourism activities
  - The availability of irrigation water
  - The water supply network pressure
  - Water quality
  - The cost of water and
  - The management policy of the water supply system (Figure 4)

In organized water supply systems, the management services of these supply system retain statistical data of water consumption, upon which can be based an assessment of how efficient they are. But it must be noted that it should always be a projection consumption in future, as



the effort to improve the quality of life, the development of the city and the construction of the network drain lead to increased consumption [9].

Domestic water consumption has particular importance since the availability of drinking water for various uses in the household improves quality of life. Also, its waste reduces the stock of natural resources and enhances the rarity especially in areas which are poor in water resources [10] (Figure 5).

Many scholars also emphasized the inter-relationship between water and energy “more evident than in the Asia-Pacific region, home to 61% of the world’s people and with its population expected to reach five billion by 2050”. Finally, it can be noted that in The WHO and UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) any person can study data for water supply and sanitation and data from household surveys.

### The risks for reduction of water resources

As Kofi Annan emphasizes, “Communities will always face natural hazards, but today’s disasters are often generated by, or at least exacerbated by, human activities. At the most dramatic level, human activities are changing the natural balance of the earth, interfering as never before with the atmosphere, the oceans, the polar ice caps, the forest cover and the natural pillars that make our world a livable home”.

There are a lot of water related hazards which affect millions of people. These hazards create a lot of problems for human security and cannot help the operation of socio-economic activities. In Johannesburg Plan of Implementation (JPoI) and Millenium Development Goals (MDGs) is noted the need have stressed the need for closer interaction between hazard risk reduction and sustainable development. For this reason most scholars believe that water policies must protect water supply and prevent risk reduction.

Between 1991 and 2000 over 665,000 people died in 2,557 natural disasters of which 90% were water-related events (WMO, 2004). In 2003 alone, over 254 million people were affected by natural hazards, an increase of 180 per cent compared to 1990 (CRED). Losses stemming from disasters have greater impact in developing countries as compared to developed countries. More than 95% of all deaths caused by disaster occur in the developing countries (UN, 2015).

In World Water Development Report–Water for people, Water for life (WWAP, 2003), is noted that the water sector has limited the capacity for effective integration of disaster risk reduction concerns.

In this case is believed that “the intrinsic links between disasters risk reduction and the broader water agenda and in particular relevant policies and strategies related to the emerging Integrated Water Resource Management (UN, 2015).

One of the most important risks is desertification. Desertification, as defined at the World Environment Summit (1992), is land degradation in arid, semi-arid and sub-humid areas resulting from the action of many factors including climatic variations and human activities. The desertification is the process whereby the productive land is degraded and gradually became inhospitable for growing vegetation, creating denuded areas (Figure 6).

The degradation is caused by desertification and refers to reduction or loss of productivity of agricultural land and forests. The main reason for desertification is erosion, which will degrade hilly areas. The main responsible of this process is considered the man with his operations in the environment. With his operations, man leads to:

- Manipulate water resources and wind currents
- Provoke mechanical soil erosion
- Deterioration of physical, chemical and biological properties of natural resources
- Loss of natural vegetation.

The degradation of fertile land and the loss of productivity of agricultural land and forests are a major threat to humanity. The looming climate change due to global warming is expected to exacerbate the problem. Desertification is a global problem. An estimated 170 countries are directly affected by desertification, while considered another 50 countries indirectly are affected. According to a study [11] conducted by the International Centre for the Study of Dry-arid Areas in Texas, about 70% of dry areas of land, display characteristics of desertification.

According to data presented at the Rio Conference on the environment in 1992, more than 1/3 of the land is affected by desertification, and agricultural land is subject to the greatest risk. According to estimates by the Global Monitoring Institute (Worldwatch Institute), annual losses of soil each year from around the world are estimated at 24 billion tons [12] (Figure 7).

The cereal production rate decreased globally from 3% in 1970 to 1.3% in the decade 1983-1993, and one of the factors that caused

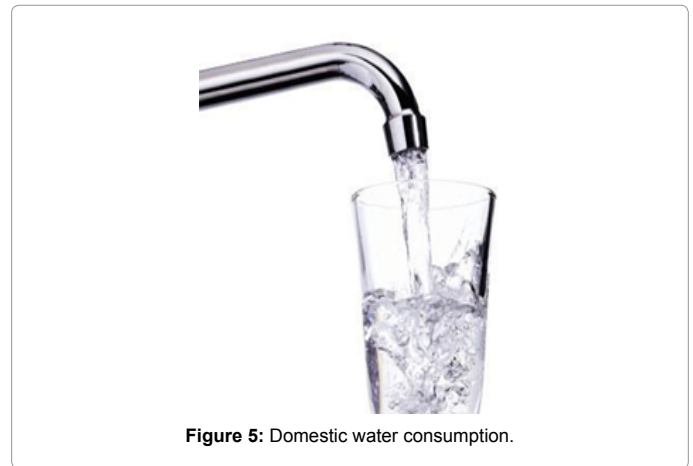


Figure 5: Domestic water consumption.

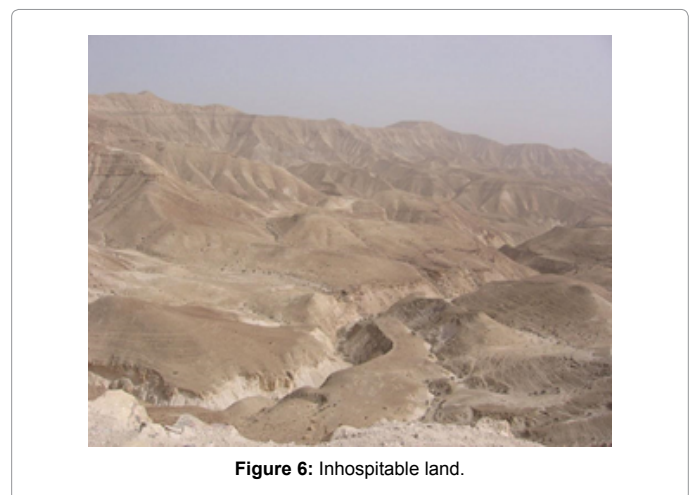


Figure 6: Inhospitable land.

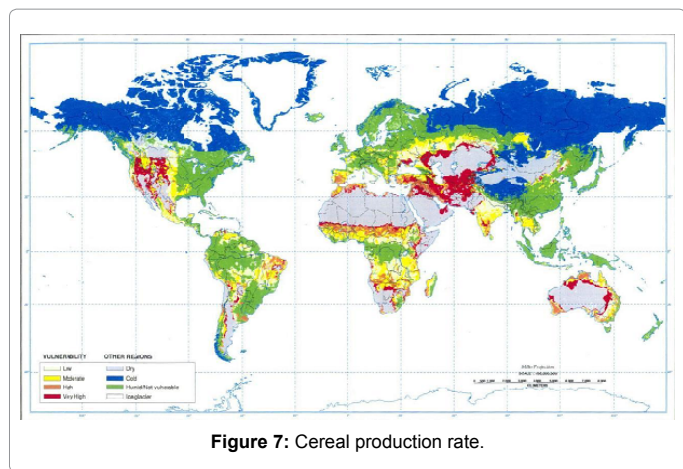


Figure 7: Cereal production rate.

this reduction is the irrational management of soil and water [13]. For these reasons, the desertification of the land is now one of the main environmental issues at the global, national, regional and local level [14,15].

Vast expanses of Asia subject to high risk of desertification. Seventy one per cent (71%) of agricultural land is considerably degraded and is desertified or high risk of desertification. In an overall area of land 4.3 billion hectares, Asia has about 1.7 billion hectares of arid, sub-humid, semi-arid and arid conditions (UNCCD, 1992) extending from the shores of the Mediterranean up to the shores of the Pacific. Many Asian-implement national action plans to combat desertification, with China to pioneer. Approximately 27% of the total area of China has been affected by desertification. The economic consequences of desertification in China is estimated at US \$ 6.5 billion a year [16] (Figure 8).

An important problem of desertification is also evident in Africa. It is estimated that 73% of agricultural land is seriously degraded and thus the 2/3 of the continent is desert and arid regions (UNCCD, 1992). This region is affected by frequent and severe droughts. The problem of desertification is intensified by the fact that many African countries have been isolated by the international community with a high level of poverty and the existence of large dependence of people on natural resources. Desertification in Africa beyond the natural factors (climate, soil, etc.) linked directly to poverty, migration and the search for food (Kosmas, 2011) The increasing industrial activity, the expansion of tourism, the intensification of agriculture have contributed significantly to land degradation and desertification of land in Mediterranean Europe. In particular, the areas most threatened by desertification in Southern Europe are the south-east of Greece, Southern Italy, Sicily, Corsica and the south of the Iberian Peninsula (Figure 9).

Desertification leads to the reduction of water resources. The use of water is essential for agriculture, industry, public health and welfare. The ecosystems and the economy of the countries are determined by the changes in the availability of water. Inevitably, the demand for water is greater when its availability is low and everything is pressure to overexploitation of water, treating it as a public good. Different cultures and economic activities require significant amounts of water in different periods of the year and then land users understand the consequences of changes in water availability. The availability of water completes the impact of changes in the bio-physical system, which affects the amount of water supplied to the socio-economic and cultural systems, which determine the demand and needs. In almost all regions of the world

with desertification, river flows is steadily decreasing. In this way is understood that reduction of water resources or false management of them are very dangerous for all the world.

**Causes of water conflict (economic, political, diplomatic)**

Water conflict is a term describing a conflict between countries, states, or groups, which try to manage water resources. As United Nations recognize that water disputes result from opposing interests of water public or private users.

Water is an essential element for human life and human activities, which are directly related to the availability and quality of water. Water, however, today it is a limited resource and in the future may be decrease in water resources due to climate changes. Many also foresee that in future there will be wars not for oil but for water. Because the demand for water resources and drinking water might exceed supply, it is possible to question the control and distribution of water. In several areas there may be a dispute over access on water resources and their management, which can lead to diplomatic tensions or conflicts (Figure 10).

Eleven per cent (11%) of the world population, or 783 million people are still without access to improved drinking water sources. Apart from life, water is essential for proper hygiene, provision of



Figure 8: Desertification.

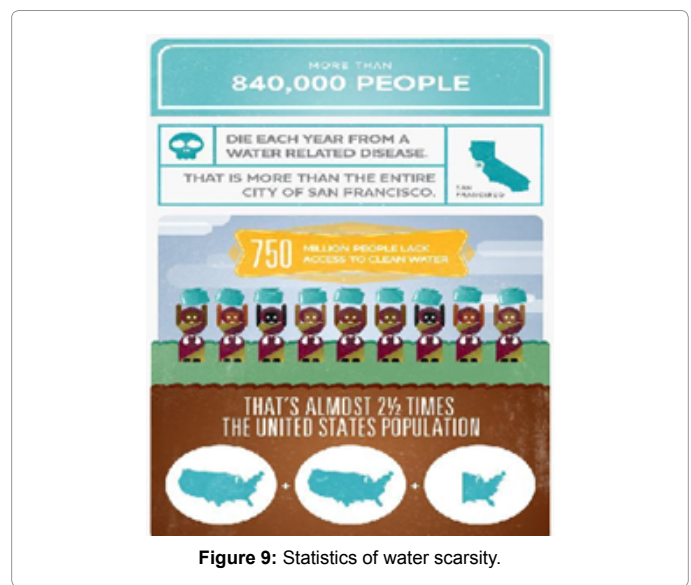


Figure 9: Statistics of water scarcity.



**Figure 10:** Causes of Water Conflict.

commercial services and the production of commercial goods. Water resources which shared by a community, or at transnational boundaries may cause a dispute. Governments can argue over who gets access to a river, used as an international or transnational level.

The variety of differences makes difficult the resolution process. Local differences, the local and international law, commercial interests, environmental changes and human rights make it difficult to solve these problems. In time of armed conflict, water becomes the means of survival for populations to be protected or indeed, a crucial weapon. Nine per cent (9%) of the world population consumes 3/4 of the available stock. The rest people give battle to control rivers and lakes. The technology helps those who can afford to pay tribute to it. Investments, differences in water consumption or even in rainfall variation, may distinguish the rich from the poor.

One major political cause which generates tensions, is that some countries derive at excessively river water, which then cross more countries. In all the world there are more than 214 rivers that pass through at least two countries. The governments and global law cannot impose a regulation, which will determine the distribution and use of international waters.

The importance of water is so great for human survival as conflicts for sovereignty over water resources will be the main problem in future for many people. The problem is that the population of planet increases rapidly but Earth is unable to meet the needs of man in water which will be increased by 40% over the next twenty years (Kerdelas, 2005). A popular myth often encountered nowadays, is that the next big wars will be over water. "The waters of the Nile will be the cause of the next war in our region, not politics" said Boutros Boutros Ghali, a former Secretary General of the United Nations.

Experts warn that the planet due to the reduction of water supplies will become a series of "water wars", as each state will try to acquire sole control of valuable stocks. Already in the Arabian Peninsula, in Cyprus, Israel, Jordan, Malta and West Bank both superficial and underground freshwater stocks will be soon finished. It is understood that economic, political and diplomatic causes create problems to the management of water and governments and global law cannot solve it, so that the main differences of countries for the water are very dangerous for global peace.

## Depletion of Fresh Water Resources

### Contradicting water uses

The demand for fresh water resources is accelerating, and

competition for fresh water is increasingly of concern to planners and policy makers. At present 70% of the world's fresh water withdrawal is used by agriculture, while 20% is used in industry and only 10% is used for municipal consumption.

The projected growth of urban populations will increase localised pressure on water resources for urban consumption, while increasing the demand for feed production in distant areas to support urban linked industrial animal production systems. The demand for water resources has exceeded population growth by a factor of two or more over the last hundred years.

#### • Increased Use of Irrigation

Approximately 20% of the world's arable land is used for the production of livestock feed, with over 30% of the world's cereal production going to livestock. The current global expansion of cropland is very small, at around 0.1% annually, while production is increasing at around 1.9%. This increase in production is a result of intensification, and a key component in intensification is irrigation. Already some 40% of the world's food supply is grown under irrigation, and there is increasing pressure to increase irrigation despite recognised problems with management and failure of irrigation systems, often associated with salinisation and/or waterlogging (affecting some 20% of the irrigated land).

The problem is compounded by inefficient use of water, with an estimated 60% loss through seepage and evaporation from delivery channels and bare soil between crop rows.

The impact of increased use of water for irrigation is a decrease in the quality and quantity of downstream water, with implications on both ecosystem functioning and on downstream use for agriculture, industry and municipal supplies. However, as the demand area, the farmland, is often distant from the critical urban/industrial demand areas, these linkages are often overlooked.

#### • Use of Fresh Water in Industrial Animal Production and Processing Systems

The demand for fresh water for consumption by livestock in industrial units, and for maintaining clean and hygienic production sites is considerable. Given that production sites are almost invariably near urban/industrial centres, this demand is in direct competition with demand for industry and municipal supplies.

In many cases, even where lower quality water would be suitable, the only supply is from treated mains water, treated to domestic standards. The demand on fresh water has a direct impact, a reduction in the overall availability of fresh water among competing users. It also has an indirect impact through decreasing the water available for diluting effluents, and hence increasing the levels of pollution in downstream systems.

Discharged wastewater is generally loaded with nutrients (N and P) and organic compounds. When discharged directly onto surface water, the large quantities of wastewater easily exceed the natural cleaning capacity of the system, causing pollution and increasing biological oxygen demand.

The potential for reducing water demand includes:

- Collecting solid wastes instead of flushing with cleaning water;
- Increasing efficiency of water use through "good housekeeping"; and

- Reuse of purified waste water for some of the cleaning operations

### Climate change and water resource management

From urban and agricultural water supplies to flood management and aquatic ecosystem protection, global warming is affecting all aspects of water resource management in Europe. Rising temperatures, loss of snowpack, escalating size and frequency of flood events, and rising sea levels are just some of the impacts of climate change that have broad implications for the management of water resources.

Reducing the emissions that cause climate change is a critical step we must take, but water resource managers and elected officials must act now to adapt to the effects of the warming that have already occurred or are unavoidable.

#### • Global warming is already affecting water resources

Many water supply sources (rivers, lakes, groundwater basins, etc.) are already overallocated, suffer degraded water quality, and are often not in sufficient condition to support endangered species. Climate change will exacerbate these water challenges, leading to insufficient water for people and the environment and making it increasingly difficult to meet the needs of both. Implementing actions now to improve water quality and supplies, protect aquatic ecosystems, and improve flood management not only makes sense, but early action will also help reduce future impacts related to climate change. Even if greenhouse gas emissions are reduced today, there is already warming “in the pipeline” that will create additional impacts. Adaptation is not a solution to climate change, but given the importance of our water resources, immediate action is needed to avert significant societal impacts.

#### • Protection of aquatic ecosystems

Global warming threatens to permanently alter wetland and riverine ecosystems through fundamental changes in hydrology and temperature. Already stressed by decades of habitat loss, water supply diversions, and polluting runoff, climate change may be the final straw imperiling many fish and wildlife populations. Increases in temperature alone will drastically reduce cold water habitat for salmon and trout species, threatening the extinction of fish populations throughout the world.

Failure to restore and protect aquatic habitats will result in declining wildlife populations and lead to new listings under the Endangered Species Act. This will in turn result in a new wave of water resource conflicts pitting protection of species against the need for water supplies, thereby undermining water resource management in general. Taking the following steps to restore and support aquatic ecosystems will help mitigate the impacts of climate change and reduce the conflicts between water supply and wildlife protection:

- Provide for at least the minimum flows, as well as temperatures, necessary to support basic ecosystem functions in water resource planning.
- Plant trees and reduce impermeable surfaces in cities to reduce water runoff.
- Remove barriers to upstream migration and provide the necessary flows to enable fish access to the upper watersheds where temperatures are cooler.
- Restore degraded rivers and floodplain habitats to provide

wildlife corridors through urbanized areas and critical habitat for sensitive species.

- Protect existing wetlands, headwaters, and forests from development and degradation and restore previously existing wetlands where possible to provide habitat and improve stream hydrology.

#### • Improve flood management and public safety

Experts predict that global warming will increase the frequency and intensity of flood events. Today, flood managers must consider challenging issues such as the potential loss of life from floods, the skyrocketing cost of flood damages, the massive pollution and waste generated by damaging floods, and the competition between operating dams for flood safety and water supply. Climate change will only increase these challenges.

At global level, land use development in floodplains has put millions of people and billions of euros in infrastructure at risk. To date, state agencies have been slow to react to these challenges and to provide guidance to change floodplain management. However, events like Hurricanes Katrina and Rita and recent floods in Central Europe are forcing elected officials and agencies to recognize the need for action and to begin discussing major policy changes. The following adaptation recommendations can improve public safety while providing additional benefits to water supply and wildlife.

- Reduce stormwater runoff by requiring low impact development measures for new developments, and create incentives for retrofitting existing developments to capture and retain surface flows.
- Reoperate existing reservoirs factoring in the likely changes in hydrology due to climate change to reduce or mitigate flood management impacts.
- Improve monitoring, forecasting, and early warning systems for storm events.
- Preserve and restore wetlands, flood plains, dunes, and other natural barriers to reduce impacts of storms.

#### • Protection of water resources quality

Changes in precipitation, flow, and temperature associated with global warming will exacerbate water quality problems. For instance, longer dry seasons and loss of snowpack will reduce stream summer base flows, resulting in the concentration and increased residence time of pollutants.

Conversely, the increase in the frequency and intensity of rainfall events related to global warming will overload the capacity of sewer systems and wastewater treatment plants, resulting in more combined sewer overflows and stormwater runoff, which increase water pollution from sediments, nutrients, pathogens, pesticides, and other pollutants. Sea-level rise will adversely affect groundwater aquifers by causing an increase in the intrusion of salt water into coastal aquifers and making less freshwater available for human use.

Taking the following steps will help protect water quality and water supplies and provide additional wildlife and flood protection benefits:

- Adopt Low Impact Development (LID) measures such as permeable surfaces and vegetated infiltration basins for new developments, and retrofit existing developments to reduce storm flow runoff and increase infiltration of rainfall.



- Protect and restore streamside vegetation buffers, wetlands, and headwaters to help filter pollutants and reduce the inflow of urban and agriculture runoff and pass the Clean Water Restoration Act, which would restore pollution protections under the Clean Water Act to many of these same resources.
- Restore and improve environmental and public health monitoring and surveillance systems in order to evaluate climate-health baseline relationships.
- Upgrade stormwater and combined stormwater and sewage systems to prepare for more frequent and heavier rainfall events and investigate opportunities for the beneficial reuse of stormwater and wastewater.
- Adopt minimum stream flow water quality standards to protect aquatic ecosystems.

## Water Conflict

### Historical description of water conflict

In the course of human history complex relationships between water and conflict are presented in various parts of the world. In the past water was a basic commodity for human life, but it was not a cause for war. Studying our history, it is understood that access to water resources, attacks on water systems, and the use of water bodies, have led to several wars (Figure 11).

The ancient history and mythology presented conflicts for water. even today disagreements about water management and control of water systems lead to international conflicts. Risks associated with water and violence are major and stem from the pressures on water resources. Today there are growing concerns despite the differences between nations, but also at national level, about the intensity in Africa and in parts of Asia that share international rivers. However, states have not signed international agreements to manage these water (pecinst.org).

“As demand for water hits the limits of finite supply, potential conflicts are brewing between nations that share transboundary freshwater reserves”. More than 50 countries on five continents might soon be caught up in water disputes unless they move quickly to establish agreements on how to share reservoirs, rivers, and underground water aquifers.

The risks posed by water scarcity are ranked as a global risk, higher



Figure 11: Conflicts for water.

and from wars and data of NASA displaying these phenomena. Experts warn but governments cannot find solutions.

Data on water loss are staggering. Within seven years, from 2003 to 2010, parts of Turkey, Syria, Iraq and Iran along the Tigris and Euphrates river, lost 144 cubic kilometers stored fresh water. Part of this loss is due to the drying of soil, weather conditions in 2007. Equally large reserves of water evaporated from lakes and reservoirs. But most of the water was lost 90 cubic kilometers or 60%, due to decreases in the groundwater.

For centuries war and conflict has been tied to the protection of water resources. With the risk of water shortages around the world becoming more and more of an issue, water has become the fuel of certain conflicts in many regions around the world. “Water Wars” are becoming inevitable in the world’s future as the misuse of water resources continues among countries that share the same water source. International law has proven itself inadequate in defending the equal use of shared water supplies in some parts of the world. The rapid population increase has greatly affected the amount of water readily available to many people [17].

The Middle East region is occupied mainly by deserts, the population is growing and few water resources are constantly decreasing. The Middle East is expected to be one of the first areas on the planet which will create tension on the water. In the Gaza Strip, the underground water resources are depleted and their level is reduced by 15-20 cm per year, while the quality of drinking water is pumped continuously deteriorating due to impurities in seawater.

The level of the Dead Sea dropped more than nine meters, mainly due to an agreement between Israel and Jordan in 1981. The huge political importance of the work of the great Anatolian dam, which diverts the waters of the Tigris and Euphrates can “strangle” literally by water scarcity both Syria and Iraq. The Turkey threatens to cause war with Syria and Iraq with the Program Southeastern Anatolia. It is a network of dams 13 (under construction), which would substantially restrict the flow of the Tigris and Euphrates rivers crossing from both countries.

In rest of Asia access to water is also a major problem for the peoples of Asia. In Indochina, the tension has taken unexpected dimensions as China, Thailand and Laos progressing in giant dam constructions which will cause Water diversions of rivers in the Mekong region, which will create dangerous ecological disasters in Cambodia and Vietnam and will change life for more than 60 millions. Also, Mekong River is threatened by dams built in China and in Laos, as well as from irrigation projects which are made by Thailand. The Cambodian and Vietnamese governments are already warning of the imminent future conflicts. Also, Africa is the continent facing the most severe shortage of drinking water in world. It is worth noting, moreover, that in Africa belong the 19 of the 25 countries of the world with the highest percentage of population without access to safe drinking water (Figure 12).

The North African countries where lack of water is into a greater degree and political instability may be caused is Algeria and Tunisia. The consumption water in these countries exceeds 10% of inventory. Egypt, Ethiopia and Sudan belong to the group of the eight most “thirsty” countries bordering the Nile. The problem will get exploded in Egypt, where in thirty years of the 67 million population will have exceeded 100. Ethiopia does not, warns the UN, eight million people are expected to awesome face famine this year because of drought (Figure 13).



Figure 12: Ethiopia.

Asian Development Bank has more than seventy possible points cause conflict with water. These include the following:

- River Columbia (conflict between Canada and the US).
- The Colorado River (conflict between Mexico and the US).
- The river Senepas (conflict between Ecuador and Peru).
- The river Senegal (conflict between Mauritania and Senegal).
- The river Zambezi (conflict between Zambia, Zimbabwe and Botswana).
- The sources in the Sahara Desert (Reaction Egypt, Chad, Niger and Sudan).
- The River Nile (conflict between Egypt and Ethiopia).
- The river Tagus (conflict between Tagus and Duero).
- The river Syr Darya (conflict between Uzbekistan and Tajikistan, Kazakhstan) (Figure 14).
- ✓ The river Ganges (conflict between India and Bangladesh).
- ✓ The Jordan River (the conflict between Israel and Jordan).
- ✓ Rivers Tigris and Euphrates (conflict between Turkey, Syria and Iraq).
- ✓ The Mekong River (conflict between Cambodia, Laos, Thailand and Vietnam) [18].

It must be noted that Water conflicts can also get different sizes, with management decisions which are limited to narrow political objectives. For example, NuevoLeon and Tamaulipas states were involved in a feud water for access to the stockpiled in water dam EN Cuchillo, which is located River SAN Juan, a tributary of the Rio Grande/Rio Bravo.

Earth is unable to meet the needs of man in water which will be increased by 40% over the next twenty years. Apart from the areas which due to their geographical location, suffer for centuries from lack of water, environmental pollution, sharp increase in demand and false policies are expected to create serious problems even in areas now considered “safe” and they will possibly lead to dangerous water conflict [19].

### Description of areas where water conflict was averted

Today there is a bleak picture of water scarcity in Africa, Asia, and the Middle East regions that are not only struggling with unstable governments, but also rapidly growing populations. Water stressed

conditions are also appearing in developed countries, as Australia, Spain, and South Korea. There are a lot of risks to peace and upstream dams, barrages, canals, and irrigation systems can help fashion water as a political weapon—a weapon that can be wielded overtly in a war or subtly in peacetime to signal dissatisfaction with a co-riparian state. Even denial of hydrological data in the critically important monsoon season—when flooding is common—can amount to the use of water as a political tool [20].

In the past there are a lot of problems about the management of water. These problems were very serious and created a hostile climate between many countries. Egypt, Sudan, and Ethiopia are primarily examples of nations that could have come to the brink of war because of the fighting on the use of the Nile. However, since 1997, the development program of the United Nations have encouraged these and other nations to work together to identify water needs and devise means to share the waters of the Nile. Academic studies have come to a similar conclusion: of the 1,700 interactions between states for trans boundary basins that occurred between 1946 and 1999, none resulted in an official war. It was reported that only 37 led to military action any kind, and only 56 in “hostilities”. While there was “verbal hostility” in 414 cases, these Figures exceeded the 628 cases given the “mutual verbal.” Just over 600 interactions resulted in multilateral or bilateral agreements or international treaties.

In the Delta region of the Okavango, the governments of Botswana, Angola, and Namibia are in cooperation with international organizations, donors and society citizens to develop a management plan. One of the largest and most important in the world, living in the delta over 140,000 people, half of whom live in villages with less than 500 inhabitants, their livelihoods are dependent on the water of the delta. The Okavango Delta is also one of the major world destinations for tourists who ecology attracts. The unmanaged and uncontrolled



Figure 13: Safe water.



Figure 14: The Amazon river.

expansion of human activities and buildings, unclear ownership of resources, and the increasing use of water resources for irrigation threaten the character of the delta and productivity basin in total [20].

Because governments are facing these entangled problems have been weakened by many years of civil conflict and lack of adequate human and financial resources, encourage participation civil society in the negotiations and have left some of the development efforts have typically undertaken by government agencies for them. They have the advantage of acting and organized in cooperation with other the same organizations as the 'opponent' country. This fact contributes to the strengthening of resolving future or present water issues though if data sharing is accepted as reliable and significant.

Cooperation on water issues is common even in the Middle East, and even where the lack of healthy relations between Israel, Jordan, Syria, Lebanon, and Palestinian Authority contribute to the non-functioning formal mechanisms for negotiations. During the discussions on peace in the 90's, the Water was a key element of the negotiations, though the press did not sponsor the never as important as other issues such as refugees, land and acts terrorism. Consequently, even when peace talks failed, technical Staff from all countries continued to cooperate on practical issues for water use, with the consent of their governments, because the mutual benefits were quite significantly [20] (Figure 14).

The water wars are rare, but requires increased cooperation due to the rapid increasing water demand. The only fact recorded war for water happened 4,500 years ago between two Mesopotamian city states Lagash and Umma. Between 805 and 1984, in contrast, more than 3,600 treaties on water were signed. Both thirds of 1831 have recorded international events on water occurring around the world during the last 50 years have resulted in cooperation and signed 157 treaties on water. However, the possibility of conflict remains, and ability of future "water wars" cannot be ignored. Creative collaborative efforts described above should be continued and expanded since the water wars avoided.

### International agreements on water

The issues of the increasing lack of water, degraded water quality, rapid population growth, the unilateral development water, and abnormal growth levels commonly referred to as potentially disruptive factors in co-riparian relations on water. The combination of these factors has led academics and designers politics to warn of impending conflict on common water resources.

The Report of the United Nations "Water for Life, Water for People" (2003), identifies 263 international transboundary basins, which can be a cause of conflicts for water. These areas cover 45% of the land surface on the planet and affects 40% of the world population and 145 countries. The crisis of water between Lebanon and Israel, negotiations between Lebanon and Syria on Orontus agreements and Nahr el Kabir, and the agreement between Lebanon and Israel on the Hasbani water plan and source Wazzani (in which the UN involved, the US and the EU) demonstrate the importance of water management as a catalyst for cooperation rather than a cause of conflict.

The principles of integrated management of water resources refer to natural boundaries of watersheds as basis for the creation of management plans. In case that these physical limits belonging to more than one countries, it is necessary to conclude suitable transnational agreements which must be in compliance with Framework Directive 2000/60 on the water but also with international Conventions such as the UN. The border areas are inevitable problem areas for many countries, especially when there is no common water resources between

neighboring states. About 50% of the world is transnational basins and there are about 200 transnational agreements today. Agreements aimed at smoothing tensions and disputes concerning the use of shared water resources and must comply with international law and relevant international conventions.

Recognizing the benefits of cooperative frameworks for water management, the Policy makers have been involved in efforts to create organizations during the last century in a range of geographical scales. Overall, the international community has developed guiding principles and laws on international management Freshwater. At a finer scale, local organizations and individual governments have developed protocols and treaties regulating the management and protection of certain international organizations for water. Together, these developments have encouraged the greater understanding and have launched a task coordinated management within the global international water basins.

The new Framework Directive on Water 2000/60 of EU introduces the first time the concept of integrated management watersheds and reported on where the borders of the river basins beyond these states. The Directive wishes to contribute to fulfilling the obligations community towards international conventions management of transboundary waters, such as the Convention United Nations on the Protection and Use of Transboundary Rivers and International Lakes [21].

The Framework Water Directive contributes to compliance by the Community of international conventions and particularly the UN Convention Protection and Usage Bilateral Lakes and International Lakes.

The known as the Helsinki Convention promotes cooperation between Member States Economic Commission for Europe of the UN (UNECE) for an integrated approach with a view to sustainable development. This international convention was signed in 1992 Helsinki for the use and protection of interstate waters. It approved by 32 European countries and it is a useful tool for cooperation in management of transnational water. Greece ratified the treaty in 1996 and Bulgaria in 1992. Articles Convention propose principles and guidelines to be followed by the States concerned to achieve sustainable level agreements.

The Convention commits the States for preventing and reducing pollution. It also strengthens the cooperation in two-sided and multi-faceted level maintenance of water resources and protection of the environment. The Helsinki Convention introduced two basic concepts for transnational relations, the meaning of "equitable exploitation" of transnational water resources taking into account the actions probably cause "transnational effect" [22].

European governments have faced local water issues through such agreements as the Convention on Environmental Assessment Impact in a Transboundary Context (Convention on Environmental Impact Assessment in a Transboundary Context) (1991) and the Convention on the Protection and Use of cross-channel and international lakes (Convention on the Protection and Use of Transboundary Watercourses and International Lakes) (1992). Similarly, in the south African context, Member States of SADC, have established the Protocol on the Common Channels in South African Development Community (Protocol on Shared Watercourses in the Southern African Development Community) (2000) (Figure 15).

In 1957, the creation of Mekong Commission to coordinate surveys lower catchment Mekong (Mekong Committee for Coordination of

Investigations of the Lower Mekong Basin) was the first example of the involvement of the UN in a program to develop an international river catchment basin. The new agreement Mekong was signed in 1995, after a relatively short negotiation period benefited from the common database, the long established relationships, and intimacy key actors with the benefits of the relevant international jurisprudence. The agreement Mekong clearly indicates the mutual obligation to cooperate. It establishes the Commission's Mekong River as an international body which administers the agreement and seek to cooperate in all aspects of water resources management In 1944, the United States and Mexico was signed a treaty which aimed at distribution of the waters of the Rio Grande between Fort Quitman County Hudspeth southeast of El Paso and the Gulf of Mexico, as well as the waters of the River Colorado and Tijuana along the California-Mexico border.

International hydrological river basins in Africa with conditions issues water (Figure 16).

International hydrological river basins in the Caribbean with the Treaties water issues (Figure 17).

It is understood that global agreements are needed to protect water resources and prevent water conflict. Finally, all countries should together act for the correct use of water.

### Prospects for Water Resources

#### Objections to privatization of water supply companies

For 20 years, proponents of privatization of water supply services, treating water as a commodity, global promised increased investments and high efficiency in the management of global water. So, in 2010, 12% of the world population had water from private companies. It is noteworthy that this is not only happened to those parts of the world that there was physical or economic scarcity, but in the US and particularly in Europe.

In 1989 Margaret Thatcher privatize the water supply in England and Wales. It is among the first countries in Europe that have implemented this policy with regard to water. Water quality can be improved, but with a "strong" return, after the first nine years prices

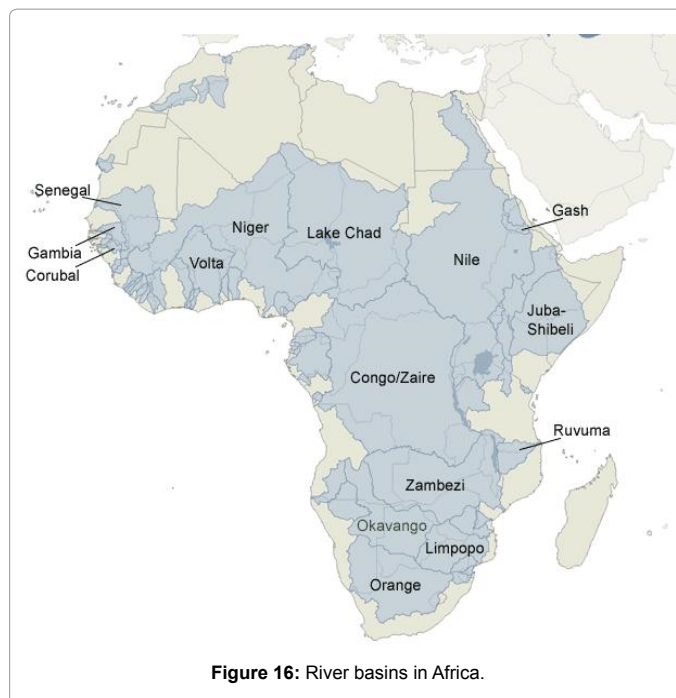


Figure 16: River basins in Africa.

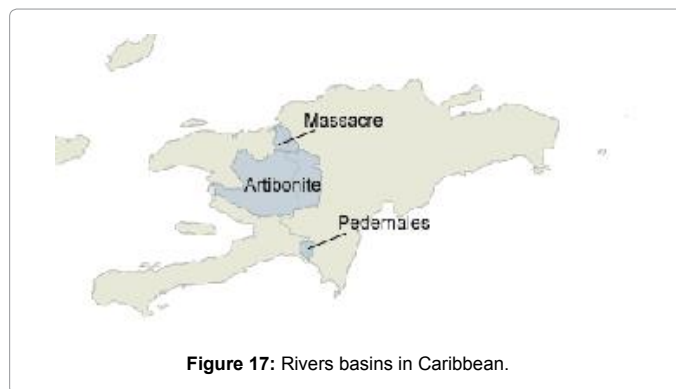


Figure 17: Rivers basins in Caribbean.

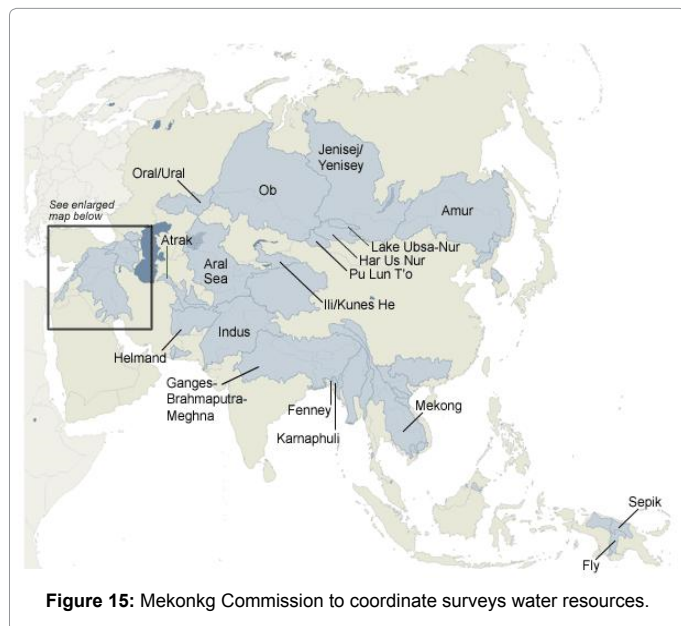


Figure 15: Mekong Commission to coordinate surveys water resources.

rose by almost 50%. So, despite the improvement of water quality, the risk of being homes without water because of this increase was greater. Currently there are four private water companies, but the cost of water is very high, although one would expect to have decreased due to competition. Until today there is much controversy on the issue of privatization of water and the impact on English society.

Argentina was one of the first countries which decided to privatize the water supply system. In 1993 the government handed over the municipal water supply to a consortium of multinational and local companies. The World Bank was quick to congratulate the opening of Argentina describing it as the most promising investment. But the joy did not last long. Companies are placed in sites; 'key' government friends with huge salaries, while to bear the high costs imposed tariff increases affecting millions of poor [10].

In many cases the companies to increase their profits reduced maintenance costs, and did not proceed to the replacement of old pipes, resulting in water flooding the poorest neighborhoods. With the economic crisis that followed, consumers could no longer pay their water bills and in 2005 multinationals Suez and Aguas de Barcelona were withdrawn from the program. In South Africa the privatization of

the water supply network resulted in one of the worst cholera epidemics in poor neighborhoods of Johannesburg 2000-2002.

In 2008 in France, Paris municipality has decided not to renew the contract with Veolia and Suez companies owned the network since 1985, but to take over the municipality's water supply.

In 2010 founded the municipal company Eau de Paris and the municipality manages to save 35 mil. per year while going to a reduction of tariffs by 8%. In Germany the water services public domain everywhere except in Berlin, while Netherlands by a Law of 2004 declared illegal all participation by a private body in water services.

The same problem was ended in Chile, where a lot of people marched over public water. The mining industry uses significant amounts of water resources and is one of the main pillars of the Chilean economy. Copper exports account for one third of government revenues. The movement calls for the elimination of the Water Code adopted by the dictatorship of Augusto Pinochet (1973-1990) and privatized water even what was in lakes, rivers etc. This "code" provides that water rights can be sold without taking account of local needs [7].

Recently EC make concrete legislative proposals to recognize the Human Right (HR) to water and sanitation as defined by the UN. This victory is for the supporters of the Right to Water and also for democracy in the European Union. This vote adds support to the 1.9 million signature collected, backs up what the candidates to the Presidency of the European Commission previously agreed, and the report of the Economic and Social Committee as they all call on the Commission to act. The European Commission can't ignore the demand for concrete legislation [7].

The European Parliament rejected all the amendments that were watering down the spirit of the demands of the ECI. Michel Barnier said that he understands why "people are so angry and upset when they are told that drinking water could be privatized, against their will."

The identification of water as a social good or as a commodity is fundamental because it directly dictates the ability of public or private management. The debate over the private or public water management is not new, as it is conducted for decades worldwide. In recent years however, this debate is no longer just theoretical. There are research results arising from specific management models of different applications in many different countries of the world.

## Proposals

Cross-border cooperation around water, which comes from a guidance sustainable growth despite the common pressure, has a long and successful history. This Forced development encourages countries to adopt harsh, prolonged negotiations as the Hydrological Basin Initiative Nile (NBI). Here aggressively is organized a water strategy for peace that can provide Water dividends to stakeholders. It can build confidence and it can be used as an avenue for dialogue when entries sides are stalemate on other issues. Frontier Bodies of water have proven adaptable, even when the conflict is conducted on other issues. The strategy It may also establish habits of cooperation between states, even in countries with little experience [18].

Water can also be a key focal point in the negotiation of the fee of a conflict, even if the war is not caused. For example, while the water did not cause wars between India and Pakistan, an agreement River Indus has played a central role in recent bilateral negotiations to end the conflict.

Moreover, pacification through Water issues can forge bonds between people, or between experts. Finally, a water strategy for peace can create common local objectives and institutionalized cooperation at a wider range of issues.

Water is a strong unifying resource, but because of its importance in our human life and the ecosystem, the management generally dispersed among office institutions worldwide. The UN is no exception, expertise is widespread throughout the system, including such organizations such as the UNDP, the UNEP, as UNESCO, UNICEF, the FAO, and the financial Committees of the UN, and partners such as the World Bank. Separating impressive historical expertise has prevented the UN from taking the leadership in mitigating the conflict on water. To remedy this problem, the UN system should incorporate the political and coordinate but diffuse extensive expertise on water conflict issues, and cooperation between agencies [23].

UN should develop an integrated, systematic diplomacy program for prevention of water issues. Managing natural resources located within the area a river basin is a valuable option for guiding and collaborative management of development processes in the light of environmental variables. In order to turn environmental policies into existent actions are necessary to have suitable management bodies, which are normally complex. The foundation of these bodies means the creation of a mixed public-private system which must not only be financially independent, socially oriented and sensitive to environmental aspects, but must also act in a democratic and participatory level. This interest has now become an imperative, considering the largest competition for multiple water use and the need to control water pollution and to protect environment [23].

## Conclusions

The competition for the water usually has two faces:

- Cheap access to water, which is usually associated with its use in agricultural activities, tourism or urban activities, whether this is done in the expense of other needs, such as maintaining water systems in good condition or local needs.
- Right to water, which is associated with either the weakness of poor social smooth groups to have access to good quality drinking water or water for basic their needs, or the conflict between uses different users, when most have overcome the resistance of water bodies and the water is not sufficient for all purposes.

As it is noted in previous chapters water must be considered as social resource. A systematic review of global research for water management applications, even in developed countries has shown that the case of cost reduction with the privatization of management is not confirmed. Similarly, the case of finance, technology transfer and new technologies privatization also is not confirmed. The asking prices of the companies to do this are unsustainable. The same survey found that in fact the issue is not simply: public or private. The subject is the Community ownership, control and management. The proper functioning of the local water supply requires the democratic control and management and the ability for all people to use it.

The technology is becoming very important for use of water. Provides to states lacking (in Africa, traditional wells are replaced by hydraulic drills, equipped with pumps), helps save water (IT systems regulate watering growers in the US and Europe especially in Spain do economy by 70%).



**Figure 18:** Hungry Horse Dam.

It also offers biological treatment units, smart sprinklers, tanks that collect household waste water and reuse in applications where need not so clean water (to Japan), converters rainwater drinking (costing quite yet), waste exchange networks between large factories that use them as raw materials (done in Denmark, with great success), and diagnostic procedures in the distribution.

Networks, which prevent malfunctions and losses. The futures's expertise is expected to finalize their natural cleaning mechanisms and filtering of waste water. Over 58 billion Euros will be spent around the world over the next twenty years in special plants and equipment (Figure 18).

The role of UN in the effort to protect water resources is very important. With the introduction of preventive diplomacy program that focuses on Water, UN could coordinate their extensive experience but diffuse. One Such a program would assess the water catchment areas that are at risk and would support the early warning procedure for areas with potential conflict [20].

The program will also strengthen the capacity to generate between institutions of nations. Through a Global Water Fund, UN could improve their management skills and facilitate problems, reduce duplication effort (dual bilateral approaches), and they can also establish trust and prevent conflict.

Increasing pressures on the aquatic environment necessitates implementing sustainable development and management of water resources, through design, implementation and optimal operation of infrastructure and management operations of both supply and demand, eg. through saving measures and reuse of water [18].

A rational development policy should also take into account and manage extreme events and crises such as problems of water scarcity and floods, but also longer-term environmental objectives, such as the long-term protection of water and their related ecosystems, improving quality and their environmental status and course of tapering discharged contaminants and the progressive elimination of toxic waste. In this way they can protect water resources, environment and our lives.

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