Freshwater! Drop by drop a Scarse and Badly Dictributed Resourse

The Water we daily drink is one the most important natural resou rce for the life in our Planet. However this vital resource is becoming scarce and contaminated. According to the United Nations (UM) about 1 .1 billion persons do not have access to potable water nowadays, and 2 .6 billions do not have proper basic sanitation. Obviously that talking about water the Meteorology is closely link to it. Thus, this text brings all information and water characteristics, its importance and aspects for further reflection, bringing an opportunity for general awareness of all the needs for a sustainable use of this resource avoiding misuse and waste. A worse scarcity case would be not having potable water for the humanity survival.

Life emerges from Earth at about 3.5 billion years. Since then the biosphere changes the environment for a better adaptation. In the early Earth, according to specific temperature and pressure conditions, water accumulated in the surface, in both solid and liquid state, establishing the hydrological cycle.

Among the natural resources, water is the most important element for the species subsistence, which depends on its availability for metabolic functioning. Almost all aspects of human life depend on the water, reason for what the mankind has developed in proximity to water sources.

The importance of water to life on Earth is undeniable. There are no living been in this planet that can renounce to the presence of water to its existence.

Therefore, the understanding of the key cycles and the life on Earth rely, among few other aspects, on the knowledge of water.

As seen in all natural resources, the water is threaten by pollution, several the contamination derived from human activities, including alteration related to climate changes.

In this context, on understanding the increasing scarcity and threat that this precious good is facing, there is a need to change the way we manage and consume water, once it is not an exhaustive resource, as people in general might perceive.

Even Brazil, that holds an important portion of the global freshwater resources, cannot squander it without control. This could drive to serious scarcity in the future and the risk water lacking to the population.

Thus, in this text we present the major characteristics and priorities that define this important and crucial substance and show actions and techniques that can be applied for water conservation and sustainable use.

What is water?

If we ask this question, people in general will say that water is a precious liquid and that cannot be missing in our lives. Chemically a broad definition would be: "W*ater is a clear, colorless, odorless, and tasteless substance, formed by two atoms of hydrogen and one of oxygen - H_2O".*

Water can occur in three states: solid, liquid and gaseous (vapor). These different states of molecular configuration depend on environmental conditions, overall pressure and temperature.

What does water contain?

Water is considered universal solvent, with an extraordinary capacity of dissolving other substances. Sea water contain, at minimum, 40 kind of different metals; as well, inland freshwater holds almost all elements existing in the nature, being the mineral salts in its composition responsible for satisfying our thirsty. In the commercial 'mineral water' labels one can observe the amount of elements present in the water, which in fact will define it taste.

Another interesting information is that, in a normal rain the water pH – hydrogen ion potential – is higher than 5.0 (pH is an index to characterize acidity), while in the called 'acid rain' the pH is generally lower than 4,5. A portion of the rain acidity is due to the presence of sulfur, nitrogen and carbon compounds. Those gases are normally originated from fossil fuel (petroleum, coal), burning in industries and transportation.

Water: Essential for Life

The developed process to synthesize proteins for the first one alive still the same is used by vegetables until the present, according to more accepted theory. When breathing thanks to Chlorophyll, the plants assimilate carbon of the dioxide carbon (CO_2) and water vapor (H_2O) to the formation of the glucose ($C_6H_{12}O_6$); leaving it exempts in air the oxygen. Whereas in the animals, the process is inverse; when breathing they become to combine the oxygen with carbon and hydrogen, being thus restituted the carbonic gas and the original waters.

Gaia Theory is what best shows the integration among waters, parts don't live of the planet (rocks, oceans and atmosphere), and alive parts (plants, microorganisms and animals).

As already chemist Lavoisier said "In the life anything if it creates and anything if it loses everything it transforms". Along millennia with a lot of water, the minerals developed likeness, the vegetables sensibility; the animals developed the instinct, the savage, the intelligence and finally the man in the 30th millennium he is learning how to discern.

THE NATURAL SPRINGS OF WATER SUPPLY

The natural sources of water supply: Water of the rain, superficial waters (rivers, streams, lakes) and underground waters (watery, manantial, etc.).

The sources of water constitute an unit, being fundamental part of the ecological system and indispensable for the economical development.

Without a doubt, of the volume of existent water in the planet, only 1% is available for the man's activities and its distribution on the Earth is unequal.

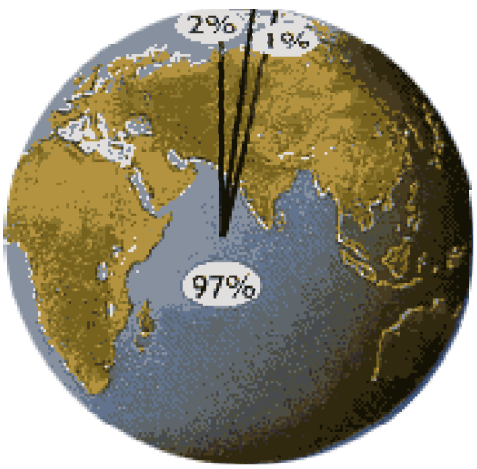
WATER AND ITS SPACIAL DISTRIBUTION

In spite of the lay people's imprecise statement that water is "ending", however the global distribution of water is highly uneven from its origin, just happening the increment of a tiny fraction, named juvenile water, that it is expelled by volcanos. The water that today we used is the same that our ancestors drank. The one that has been altered is growing demands on freshwater resources, and of its distribution in the natural and artificial pools and the loss of the quality, what elevates the cost and increases of the social exclusion.

It should be stood out that, although the total amount of water in the Earth is constant, its distribution for phases have been modifying along the time. At that time of maxim glaciation, the medium level of the oceans was about 140 m below the current level.

Those waters are distributed in aerial pools (atmosphere), superficial (oceans, seas, rivers, lakes, ponds, swamps and artificial deposits) and of sub-surface (groundwater), and they become complete in a closed circuit, forming the Water Cycle or Hydrologic Cycle.

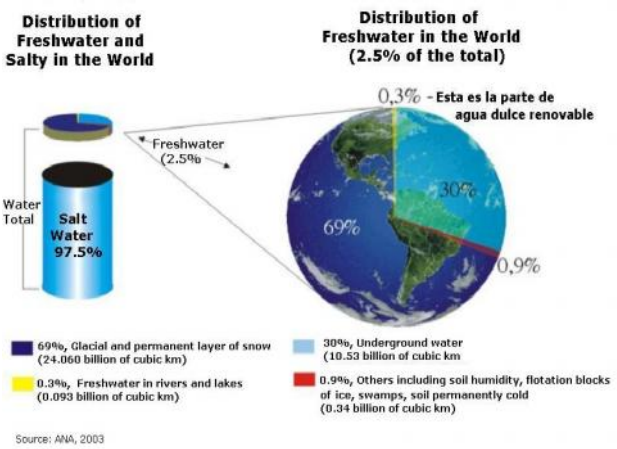
Although most of the planet is covered by water, the vast majority is not available for human consumption, because approximately 97% are salt water, found in the oceans and seas, and 2% form inaccessible glaciers. In other words, only 1% is fresh that could be already appropriated for human and animal use. And of this total one 97% are stored in groundwater sources.



Fonte: USP/SAM

The Earth's total volume is of about 1.386 billion km^3 that would be equal a volume sphere of 1,385 km of diameter.

It is distributed by the three main pools, in the following approximate percentages: oceans 96.54%, continents (involving rivers, lakes, groundwater, soils, glaciers, etc.) 3.459%, and atmosphere 0.0009%. Other important information is that the amount of the salt water from oceans (1.338 billion km^3) is approximately 38 times the amount of the present freshwater on continents and atmosphere (35 million km^3).

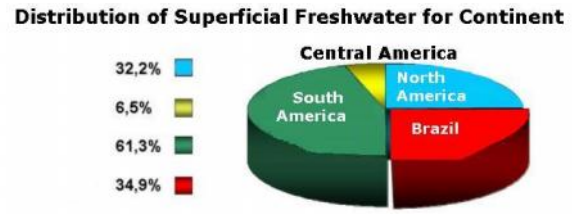


The water of the continents concentrates practically on the polar ice caps, glaciers and in the underground, being distributed the portion remaining, very small, for lakes and swamps, rivers, superficial area of the soil and biosphere. The groundwater is about 30% of the freshwater in the continents, but it almost totality locates in superior depth to 800 m, while the biosphere contains a very small fraction of the water of the continents being about 1/2,500.

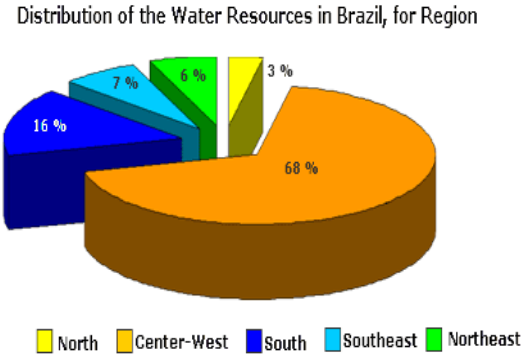
In brief, almost totality of the freshwater of the continents presents, with enormous difficulties of use, the inconvenience only to be annually renewable in a very small fraction, and is tended accumulated along thousands of years.

With respect to distribution of freshwater on American continent, it is observed that more than 60% are located in South America, where Brazil almost possesses 35%. Other interesting information standing out is that of the superficial freshwater total in the world Brazil represents more than 13%.

Brazil, although being the country holder of the largest hydric availability of the planet, responsible for almost totality of the nasal discharge medium of South America, possesses an unequal distribution of its hydric resources, with its largest basin (Amazonian) located in an area with reduced demographic density, while smaller basins have been degraded by inadequate form of the land use change. So, Brazil already confronts problems with water supply due to urban growth and degradation of the water quality in those more populous basins.



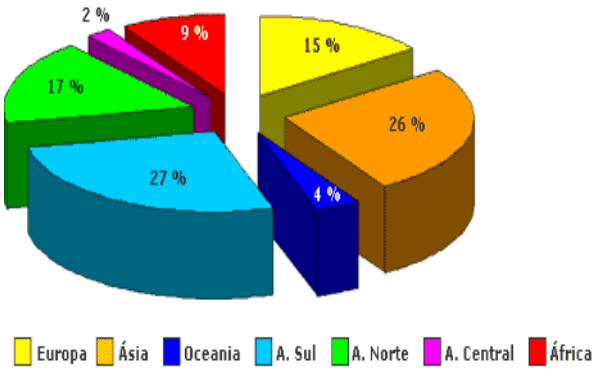
The graph below display the distribution of the hydric resources in Brazil, by region, observing that regions with smaller demographic density are those that have largest percentile. North region, where it locates great part of the Amazon basin, with 68% of the hydric resources, possesses lowest demographic density of the Brazilian regions (2,6 peoples/km²), following by Center-West region (16% of the resources) with a demographic density of 5,8 peoples/km², while Southeast region, the most populous, with 67,7 peoples/km², has only 6% of the hydric resources.



Source: IBGE.

According UN, in the last 50 years the water availability for inhabitant reduced 60% in the planet, while in the same time the population increased 50%. The consumption of water bends every 20 years, while the estimates indicate that 50% of the liquid that supplies the great cities are wasted.

The relative distribution of the hydric resources renewable in the world doesn't feel in an uniform way but in a quite unequal way. According to the Hydrological International Program of the United Nations for Education, Science and Culture (UNESCO), now 6 billion people use about 54% of the available freshwater in rivers, lakes and watery. In Asian continent, that possesses 26% of the freshwater, live 60% of the world population, while in South America, where only 6% of the population live, it is had 27% of the freshwater.



Source: UNESCO.

Another organ of the United Nations, Organization for Food and Agriculture (FAO) indicates that the main forms of the freshwater use are: irrigation by agriculture (70%), industry (22%) and domestic use (8%).

WATER QUALITY

There are two ways to characterize the hydric resources: a linked one to the amount and other the quality of these resources, where these characteristics are intimately related. It is verified that water quality depends directly of the amount of existent water to dissolve, to dilute and to transport the substances.

Water quality is defined through their physical, chemistries and bacteriological characteristics, which are determined by physical test and chemical and bacteriological analyses, accomplished at laboratory.

The **physical test** determines physical characteristics of the water: color, turbidity, taste, odor and temperature.

The **chemical characteristics** of the water are determined by presence of chemical substances originating from soils through where it passed, or that it received contribution of their tributaries. That determination is only made by analytical methods and the results are supplied by substance concentration in mg/l (milligram per liter). Those substances are: calcium, iron, magnesium, etc.

The bacteriological analyses are determined if water presents conditions of potability. The decisive element is the presence, or no, of coliforms, mainly fecal ones that, in the drinking water, should not exist. However, if the water be submitted to a treatment, in its rude state, it can contain the maximum of 4.000 fecal coliforms per 100 milliliters.

TYPES OF WATER ACCORDING ITS COMPOSITION AND QUALITY

The composition of the waters varies according to the soil type and climate of the regions where arise and traverse. So, with base on amount of salts dissolved in the waters, it can be classified in **saline, salty or fresh**.

Each class possesses certain uses, as for instance, saline waters can be used in some activities, even industrial, but they are not for the human supply.

As well as freshwater, recommended for the domestic use, should not be wasted in less demanding activities as in the cooling of industrial equipments, for instance.

CONAMA (National Council for the Environment) in resolution 20/86 classify waters in Brazil according its salinity. The waters are considered **FRESH** when present smaller salinity or same to 0.5%. The variation from 0.5% to 30% in the concentration of the dissolved salts, takes those waters to be considered as **salty**. Already the waters that present salinity same or superior to 30% are considered **salines**.

Depending on the use conditions, the water can be classified in five types:

PURE WATER - If it be considered as pure the water composed exclusively by hydrogen and oxygen, it will be reached the conclusion easily that doesn't exist water absolutely pure in the nature. This because, through where passes, it is going dissolving and transporting substances that incorporate during its way. The pure water will only be found when produced artificially at laboratory, and its purpose is, almost always, the production of remedy, or some other more sophisticated industrial process.

DRINKING WATER - it is what one can drink. It is fundamental for the human life, and it is obtained through treatments that eliminate any impurity.

World Health Organization (WHO) classifies as drinkable the water with mineral tenor of until 500 mg per liter (mg/l). In Brazil is considered acceptable the water with mineral tenor of up to 150 mg/l. In areas less provided, as Northeast, that percentile one until it can pass to 200 mg/l.

SERVED WATER - it is the water that was used by man and it was dirty. It is the sewer.

POLLUTED WATER - it is the one that received substances that left it darkens, or that altered its color, odor or taste, turning it unpleasant. It is the water that suffered change in its physical and chemistry characteristics.

POLLUTED WATER - it is the one that contains toxic substances or microbes capable to produce diseases. The contamination can be invisible to our eyes or imperceptible to the palate. It is the water that causes damage to the health.

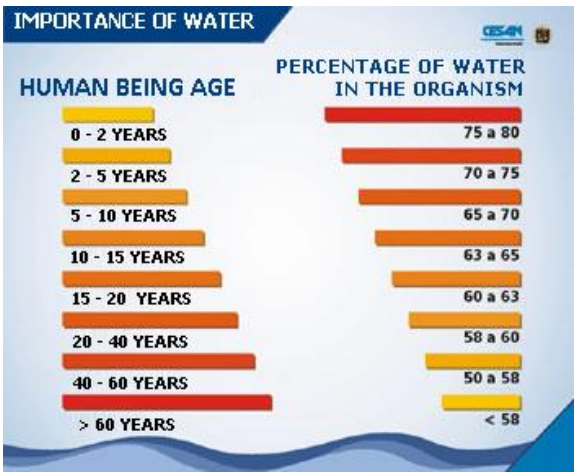
WATER FOR PEOPLE AND FOR LIFE

The human being can be up to 5 minutes without breathing, until 35 days without eating, but dies in 5 days if it doesn't ingest liquids. The water is essential to the life. Every alive being of the planet, depends on a continuous water flow and of the balance among water that organism loses and one that it restores.

As well as the water irrigates and feeds the Earth, that has 71% of her surface formed by water; the blood irrigates and feeds our

body that is also constituted by 70% of water. When our body loses liquid, it increases the concentration of sodium that one find dissolved in water. When perceiving that increase, brain organizes the production of hormones that provoke the thirst. Not to drink water, the human being enters in dehydration process and can die from thirst in about two days.

The human body possesses a lot of water, and can even to say that he is a tank of water that several substances are dissolved. To have an idea, a baby in the mother's belly has 95% of his weight in water; the newly born has 80% and adult people has about 70% of water; as dehydration is one of the particularities of the old age, senior has just about 40% of the weight in water.



Source: Clinical Hospital of UNIFESP.

The water on our body is as a navigable river because propitiates in the cells, in the blood of the veins and arteries, in the interstitial liquid and in the lymph that runs on lymphatic vases, favorable conditions for transport and action of several indispensable molecules to the life. Truly, when drinking water, we are also restoring salts minerals as sodium, potassium, calcium, among other dissolved in her.

All water that we drank is not stopped in our organism, because she is always in constant movement; adult can shifts of 5% to 10% of the water consumed per day.

We lost water on temperature control of the body when we sweated and on metabolism of the own breathing; the amount depends on ambient temperature and intensity of physical exercises that we do.

We can eliminate from 1 to 20 liters of urine per day, and this control is made by kidneys and urinary apparel. Daily an adult loses about 1.5 liters of water: by urine - 1 liter; by perspiration - 200 ml; by breathing - 100 ml and by evacuation - 200 to 300 ml. To supply this lack and to maintain the good organic working, the mechanism of the thirst is activated.

WATER AND METEOROLOGY

Meteorology has to do everything with theme of the water because one of the most important parameters is the rain, that all of us knew. There is until a sub-area of the meteorological science that specifically studies those subjects: Hydrometeorology.

The water is necessary not only as a punctual support for fauna and flora life, but also as motor of a group of cyclical movements of renewal and transformation that generates the named water cycle or hydrologic cycle.

Hydrologic cycle is characterized as the natural behavior of the water: origin, form, transformations and relationships with alive beings.

Three great compartments of the hydrologic cycle keep waters for different times: atmosphere, terrestrial surface and underground. This way, waters constantly circulate by planet through evaporation, condensation and precipitation phenomena.

All water of our planet is in continuous cyclical movement among liquid, solid and gaseous phases. The cycle represents interdependence and continuous movement of the water in their different phases. The components of the hydrologic cycle are:

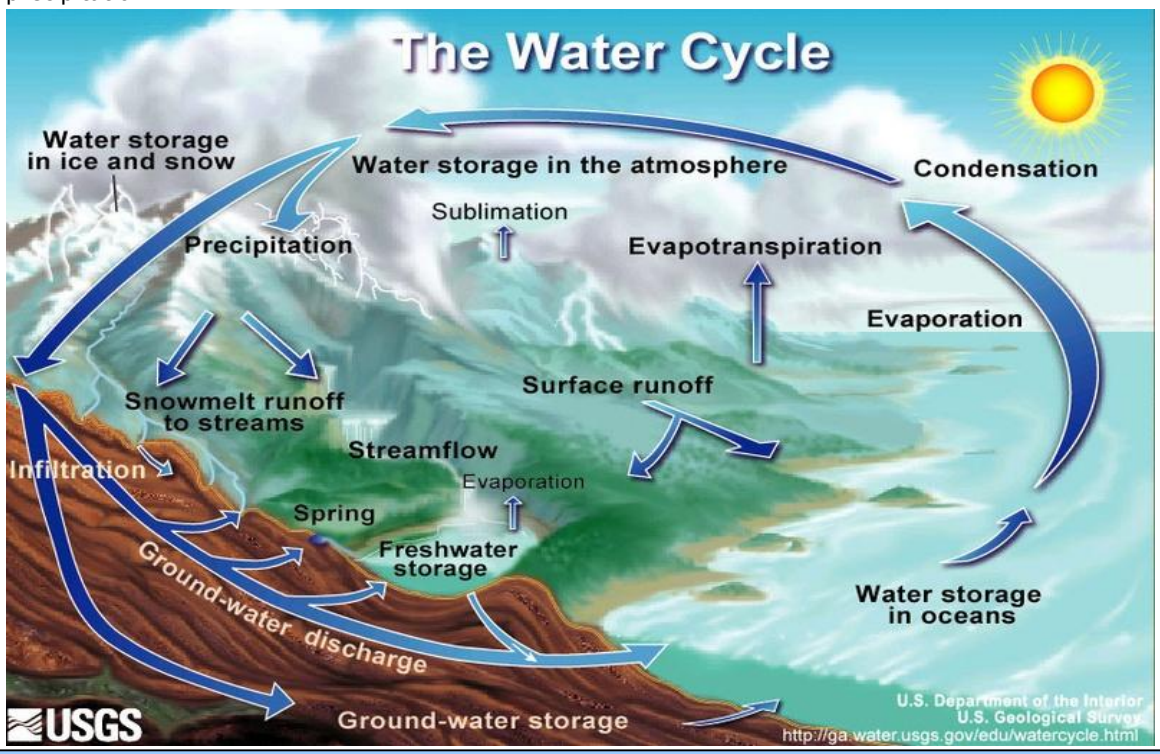
- Precipitation – is any product of the condensation of atmospheric water vapour that is deposited on the earth's surface. It can be liquid (rain) or solid (snow or ice);
- Evaporation – Process of transformation from liquid water to gaseous phase (water vapour). Most of the evaporation feels starting from oceans, very away, occurs evaporation in lakes, rivers and dams;
- Evapotranspiration – Term used to describe the sum of evaporation and plant transpiration from the earth's land surface to atmosphere;
- Infiltration – Process by which water on the ground surface enters the soil;
- Percolation – Process where water enters by soil and by rocky formation until aquifer;
- Drainage – Movement of the water displacement of the surfaces during precipitation.

In each one of those "circles" of the hydrologic cycle water stay certain times; they can stay some days in atmosphere, weeks or years in soils, rivers and lakes, from 100 to 3,000 years in the oceans and even more than 10,000 years in the polar caps and in the underground.

Water has as interesting characteristic her extraordinary mobility degree: it passes from liquid to gaseous state, returns to the liquid state, could pass again to the solid state and continues like this in a permanent process of changes that links with energy, originating from Sun.

It is also main responsible by current form of the terrestrial surface because destroys rocks of the mountainous areas and, as glaciers, rivers, waterfalls, or rapids, transports material continually resulting from this erosion by lowest areas, depositing them on valleys, meadows, lake bottom or ocean.

In other words, water is master of recycled, auto-conversion and auto-purification. This process happens because the waters oceanic or continental pass to the gaseous state by evaporation due to the energy which receives from sun. Evaporation levels depend of the temperature and amount of vapor or humidity that is found in the surrounding air. There is also an important evaporation that comes from plants, that in this case is called transpiration.



The inverse process to the evaporation is the condensation. The vapour returns the turn into water when air saturated with humidity absorbs more humidity through other substances or when there is a drop in the temperature of the air saturated with humidity. The vapour condenses in the air and form minuscule drops of water; these for its time form the clouds.

Air that contains vapour or clouds is transported by wind of a place to other, by this reason, the wind plays an important part in the possibility that it rains or not in a place.

As minuscule drops that constitute the clouds don't have possibility to fall in the soil by small size, it is possible that they turn again in vapour. It is made calculations that each millions of those minuscule drops can form so only a rain drop.

These big drops are ones that fall on terrestrial surface in precipitation form. According to the climatic conditions, the drops join, sometimes, with ice crystals and form snow flakes that can turn into water as fall on surface or precipitate in hail form. When it rains, water doesn't drain for surface only, but party is absorbed by soil.

The possibility that soil absorbs water depends on several circumstances, among them, degree of soil porosity, existent vegetation and layers that result impenetrable. For instance, on the cities, the asphalt doesn't allow water to be absorbed by soil. In whole this process there is also possibility that natural sources of water are created, particularly when rain is kept in the rocky layers.

Like this, the amount of existent water in our Planet doesn't increase nor decreases. The abundance of water is relative. It is necessary to take into account the estimated volumes of water accumulated and medium time that it stays on terrestrial environmental.

For instance: in the rivers the estimated volume of water is about 1,700 cubic kilometers and the residence time in the river source is of two weeks. Glaciers and snow have 30 million cubic kilometers and water should be frozen for thousands of years. Atmospheric water has volume of 113 thousand cubic kilometers and stays for 8 to 10 days in the air.

The alive beings also participate on the water cycle, vegetables and animals constantly absorb water form environment and return it in form of feces and urine, besides, through the breathing and transpiration water returns to the environment in vapour form.

MULTIPLE USES OF THE WATER

The water is used, in the whole world, mainly in the supplying of cities and domestic uses, energy generation, irrigation, navigation, fishing among others.

Generally, water uses understand the activities human in its set. So, the water can serve for consumption or as input in some productive process.

The availability of this resource is each lesser time, on the other hand, because it must be shared by distinct activities and another one, because is not used of rational and efficient form. Thus, for example, industry and mining use technologies that demand great amounts of water, and in consequence they generate great amounts of residual water that are returned to the water sources, in large extent, without previous treatment.

At agriculture, the water demand also is very great, especially in sites where rains are not constant. Moreover, use irrigation systems that waste enormous volumes of water. The chemical fertilizers and pesticides also contribute for the contamination of the water courses.

Therefore, in synthesis the man uses water mainly for following purposes: domestic, public, industrial and agricultural.

Domestic Use

The water is used in innumerable daily activities and personal hygiene. It serves to take bath, to prepare foods, to wash wares and clothes, and to satisfy thirsty.

It must be of first quality and fill the potability requirements.

The access to the potable water supply is vital for the health. The water is not only essential to drink, but also it is necessary for good hygiene and sanitation, which help to protect the health of the families and communities. The water is a resource frequently disputed, because it has many users competing for its access and because many people do not possess enough water for its necessities.

Water treatment to become it potable is basic for the public health, but it represents costs for the company of supplying (public and private) as for the consumers.

Public Use

The water is used for the cleanness of public areas, irrigation of parks and gardens, fire prevention, recreation etc. The activities of leisure are several that the water provides, since the practical one of nautical sports (yacht, rowing, etc.), until relaxing exercises as swimming and baths of rivers and waterfall.

Industrial Use

The water is used to generate energy, move machines, cool parts, manufacture drunk and foods etc.

In Brazil, the water is the main source of electric energy generation. For this, the rivers are dammed and the force of the waterfall puts into motion the turbines, generating electricity.

The factories use water in diverse processes as in the cleanness and cooling of machines. And, more directly, as raw material, in the foods and paper industries and, clearly, of mineral water.

Rural Use

In a general way, water is used for irrigation of plantations and creation of animals. Currently, most of the freshwater of the planet (about 70%) is used to irrigate plantations in sites where the amount of rain is not enough. It is exactly in this area where it must be made efforts to reduce the exaggerated consumption, with practical of irrigation that does not waste the water - irrigation for dripping, for example.

WATER: SUPPLY IN BRASIL

According to World Heath Organization (WHO), the human being would need for its basic necessities of only 40 liters per day. For the parameter of the United Nations (UN), the consumption of a person would have to be of 180 liters per day. In accordance with data of the Brazilian Research of Basic Sanitation (PNSB), the daily volume of water distributed for general net, in 2000, was of 260 liters for inhabitant . This volume, however, varied as region of Brazil, being that in the Southeast reached 360 liters person/ day, while northeastern was in 170 liters person/ day. Most of this water is distributed for the population after some treatment. The analysis of the ratios between volumes of water distributed with and without treatment is similar in the majority of Brazilian regions, with exception of the North region where more than 30% of the distributed water do not receive nothing type of treatment. Comparing the data of 1989 with the ones of 2000, it is possible to verify that the volume of water distributed for the population increased, passing of 200 liters to 260 liters inhabitant/day.

In Brazil, in a residence with four fixed inhabitants, the expenses of water with shower use represent 46% of the consumption. The sanitary vase can arrive 12% of the consumption and the kitchen 14%. More than 14 million people in Brazil does not have access the nets of water distribution and the contamination is increasing.

The access to the water of good quality and adequate amount must be a priority, mainly in the urban areas, and is directly to link the population heath. It must be emphasized that diverse illnesses have its origin in the contaminated water and represent more the half of the hospital internments in the public net of health.

IBGE data inform that only 2% of the Brazilian cities (about 116 cities) did not count, in 2000, with any service of water supply for general net. Most of these cities were situated in the North and Northeast regions. Although to have had a reduction, in these regions, of the number of cities without supplying, it had, in the last decade, an increase of its proportional weight: passed of 50% for 56% in Northeastern and 21.7% for 23.3% in North region, indicating that the investment carried through of the expansion of the general net of water supply did not occur in the same ratio that in the too much regions.

These data are related to the existence or not of net, independently of the covering, efficiency and number of domiciliary connected to it. This picture had as base the National Research of Basic Sanitation (PNSB) data, published in 2002, combined with information of the Census 2000 and institutions of the government and university.

According Census 2000, 10% of the Brazilian domiciles in urban areas (that represent about 3.9 million families or 14.4 million people) were not served by water supply net. The majority of these domiciles, however, counted with canalized water come from other sources, such as fountain and wells. And great part of this population lived in peri-urban areas - that are immediate neighborhoods of the cities - and still counted on sources with reasonable quality, but that present trends of degradation in function of the urban expansion on these areas, without the well -taken care of had ones with the sanitation services, as sewer nets. In agricultural areas, the situation was sufficiently differentiated, because 43% of the rural domiciles did not make use of no type of canalized water and only 18% of the agricultural domiciles were on to the supplying net .

The increase of the access to the water duly treated must be faced as priority and followed of reduction programs of losses in the nets, because is estimated that the water wastefulness in the public systems of supplying is about 45% of the offered volume. For reduction of these losses are necessary programs that involve fiscalization of clandestine linkings, substitution of old nets, maintenance of hydrometers, research of leak, among others procedures. Beyond the structural measures to minimize the losses in the nets, fiscalization of uses and of occupation in the areas of sources is necessary, to prevent the degradation of the water sources, together with explanation campaigns next to population on adjusted use of these important natural resources.

IMPORTANCE OF THE WATER IN THE CURRENT SOCIETY AND THE NATURE

Source: CORSAN.

Since always the water was considered basic for survival of the human civilizations and in general for maintenance of the balance of the nature. In the arts it was used as life symbol. Today knows that it is constituent basic of the organic matter, decisive for all the dimensions of the sustainable development of the planet.

The man does not survive many days without water, and it isn`t of if admire, because the first acts of conscientious management of the water uses centered in the direct use for man. This management generated of a form or another one, scarcity and insufficiency of the available water for natural processes. Thus, it is necessary that the management of the water is guided to assure the good functioning of aquatic ecosystems as well as terrestrial ecosystems. The management of water supply thus is completed by management of the water search.

The increase of the water search must the demographic growth, industrial development and expansion of the irrigated industry. The World Water Council (WWC) foresee that use of the water will increase in 40% and will be necessary an additional one of 17% for food production in 2025.

We see, therefore that water supply must be balanced in the space and the time for the constant evaluation of the search and its true motivations. The water necessities (search) must be evaluated and evaluated the respective impact on aquatic ecosystems and terrestrial ecosystems of them dependents (possible offers).

The water regimen in the nature is not constant, having excess cycles and lacks. This fact has taken investments in the retention of great water masses that in turn can generate asymmetries in the space distribution of water-bearing the natural ones with regulation necessity supply national. Moreover, these water masses are used to advantage for some economic uses, for contradictory times: fishing, navigation, production of electric energy, irrigation and water supply.

The available volume of water, vital element for the human use and other types of species, has been reduced. Great part of the used water is launched without treatment in the hydrological system: for example, one 1 m^3 of contaminated used water aggravates and spoils more than 10 m^3 of pure water.

It is estimated that about 2050 more than four billion people - almost half of the world population - will be in countries with necessity permanent and chronicle of water. The industry is one of the greater users of water, consuming 21% of the available water total in the planet, while the domestic use is around 10%.

Today, about 500 million people live in countries with chronic water scarcity, and approximately 2.4 billion inhabit in countries where hydric system is threatened. The peoples who inhabit the regions more droughts are in Africa and Asia. Almost 4,000 km^3 of freshwater are consumed per year, giving a average of 1,700 liters per person daily. The domestic consumption is in approximately 170 liters per person every day.

The domestic use of the water has shown wastefulness evidences, because most part of this water is lost in leaks, arriving 40% of loss. The water that drip of the faucets can imply in bigger wastefulness of what the used one to drink and to cook, to pointing out that about 30% of domestic waters is lost in the discharges of the sanitary vases.

In developing countries, 20 liters of water per person are considered a luxury. However, the inhabitants of the developed countries consume these 20 liters alone to water its gardens, for example.

Some numbers of the water use in the agricultural and cattle production world-wide deserve to be mentioned:

- To cultivate one kilo of rice are necessary 1,900 liters of water.
- One kilo of potato consumes 500 liters of water.
- One kilo of wheat consumes 900 liters of water.

- One kilo of soy consumes 1,650 liters of water.
- The sheep and ox meats also have a high volume of the water use: one kg of meat consumes 15,000 liters of water.

The possible solution would be to cultivate and to create animal with lesser water use, what it would consist of an efficient measure to not only supply with foods the world-wide population, as to rationally efficient and water use. However, agriculture is each industrialized time more.

In relation to the industrial process properly said, the water consumed in the weighed industry, - between which we can cite chemistry and petrochemical, metal, wooden one, paper and cellulose, food processing and machines -, consume about 20% of all freshwater of the Planet, what it represents annually 130 m^3 per person.

To have an idea at developed countries, 59% of all the water are used in the industrial process. At underdeveloped countries or development, the problem of the pollution of waters is more acute and serious because the rivers become true sewers the opened sky, whose industrial garbage without treatment is main responsible one - about of 70% of the sewer is industrial garbage -, and 30% remains being urban sewers.

A serious problem for life quality of the population is the effluent ousting of domiciliary sewer and responsible industries by manufacture of pesticides and fertilizers, highly toxic, without any treatment, in rivers and dams that supply the cities and irrigate the plantations. The more polluted will be water, greater amount of chemical products will be necessary to become drinking waters for human consumption, as well as greater will be the possibility of contamination of the agricultural products, being able to provoke diseases as diarrhea, yellow fever, hepatitis, amebiasis, among others.

Brazilian Demand of the Water Use

The biggest demand for water in Brazil, as it happens to most part of the countries, is agriculture, especially irrigation, with about 65% of the total. The domestic use represents for 18% of the water, after industry and, finally, cattle raising.

Historically, Brazil always privileged the use of this resource for energy production, in detriment of others, as human supplying. Code of Waters, 1934, the government called attention for necessity of the use industrial of water and for implementation of measures that facilitated, particularly, its potential of water power.

But, multiples use of waters of the hydrographic basins - navigation, irrigation, fishing and supplying, beyond water power - had unchained conflicts in the regions where pressures on demand are great.

In 1997, because of these problems, was intentionally Law for the Waters that establishes National Politics of Water Resources (PNRH) and creates National System of Management of Water Resources (SNGRH). In this new reading of the importance of water, in situations of use scarcity and conflicts, the human supplying and use for animal become priorities, as he had been established for Brazil's 1988 Constitution. Moreover, the law foresees management of the water uses for hydrographic basins and generation of financial resources to be employed with priority in the proper basin, by means of the charging for water use where has conflicts or scarcity.

As much in city as in the field, different users of the water competes between itself for this resource and they worry solely in to collect and to use water that needs, without thinking about effect that cause to the other users and the environment in its set.

Therefore, the use each more intense time of water resources comes compelling to the adoption of regulation measures and modification of the water courses what generates variations in ecosystems and microclimates, with damages to flora, fauna and habitat.

So far human, fauna and flora come surviving to change situations, but if contamination to increase the capacity of regeneration and adaptation will diminish, causing the extinguishing of species and environments that before constituted in life source. So, it is urgent a process of planning to prevent and to reduce these damages will occur.

As water is part of the environment, therefore, its conservation and good use are essential to guarantee the life in our planet.

MENACE TO WATER RESOURCES

Amongst the natural resources, water today is threatened of the planet. Threatened for scarcity and also threatened in its quality.

The intense and increase aggressions to the environment come more compromising each time the quality and amount of the available water resources.

In many countries knows that people who live in zones deprived count with a deficient water service for human consumption. This must to the physical and geographic characteristics of settlings, in which to implement adequate sanitary infrastructure would represent costs very raise that population cannot assume.

Moreover, there is a generalized drinking water scarcity as much in cities as in the field, where it has covering limited at domiciles. A deficient service of potable water supply affects health of the populations. Therefore, it is important to have with an adequate system of supply.

THE SCARCITY

The expansion and development of the cities provoke exhaustion of the sources where they are supplied, compelling them will search it others each time more distant, becoming sufficiently expensive.

Water scarcity is resulted of the consumption each bigger time, bad use, deforestation, pollution and wastefulness.

WASTEFULNESS

Unfamiliarity and lack of orientation of the people are main responsible ones for water wastefulness, which happens, most of the time, inside of the proper residences.

The concrete acts of water wastefulness are: to leave the open tap while one brushes teeth or one beard; while soap is used, in the bath; while washes the dishware; to wash car or sidewalk with hose; to sprinkle the garden when the sun already upright.

Also it is wastefulness to be in house with a tap dripping or pipe leaking water. The problems of leak in the public system also are responsible for good parcel of water wastefulness.

WATER BAD USE

One of the activities that more wastes water is irrigation for canals and aspersion. In the first method, the water intensely is evaporated and in the other is indiscriminately dispersed, also causing evaporation.

It is necessary that new methods of irrigation are used so that really is used to make use good each available drop of this precious liquid.

DEFORESTATION

Deforestation in the fountain provokes gradual disappearance of the source. In the river margins, streams, lagoons and dams provoke serious problems as silting of the water bodies, carry material of all size and species, inclusively pesticides, generally used agriculture.

Without tree root protection, the margins of the water bodies are removed, providing overflow and consequences and disastrous floods.

POLLUTION

It can occur due natural causes, as torrents, that bring solid material and dissolved salts in water bodies, and rains that, "washing the atmosphere", deposit dusts and gases in the water.

But, who more has contributed to pollute the water is man, when he uses the water resources as sewer collector of the cities and effluent of the industries loaded of toxic products and metals heavy.

Pesticides used in agriculture, garbage launched in the water or in river margins and dams, and vacant, corrals and pigsties constructed in the neighborhoods of the water bodies also are pollutant.

Exactly occurring of eventual form, we cannot forget of the accidents with dangerous loads that are launched into water bodies.

BETWEEN WASTEFULNESS AND SCARCITY

Through the centuries, different uses of the water by man had increased excessively, resulting in environmental degradation and pollution. Deterioration of the water sources is related with growth and diversification of agricultural activities, increase of the urbanization and intensification of activities human in the hydrographic basins. The intense use, without well-taken care, puts at risk the availability of this precious resource and generates problems of scarcity in many e regions countries

The current and future problem of water scarcity in the majority of the countries, with exception of those regions where it has natural limitations, more is related to quality of what the amount of available water. The water exists, however each more time compromised in function of the bad use and inadequate management of this resource.

So, new international conflicts, motivated because for water dispute, will have to appear in the next decades. Forecasts show that in regions as Middle East and River Nile Basin, in Africa, water will go to substitute oil as great causer of discord. The reason is scarcity of the precious transparent liquid at these places.

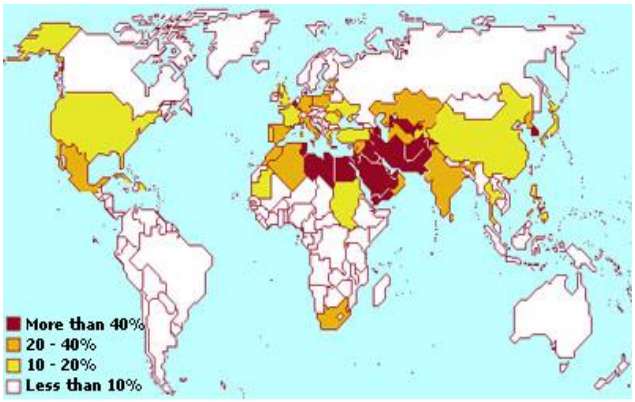
Of the 2.5% of freshwater, only 0.3% is available to human consumption. This value demonstrates clearly the difference between water and hydric resources, i.e., passible water of use as good economic. The water total amount of the planet, therefore, is enough to supply all population with recess. This because water cycle keeps a constant flow of the water volume, at 41.000 km³/year. Of this flow, more than half arrives at oceans before it can be caught and 1/8 reaches very distant areas to be able to be used.

It is estimated that water availability effective is between 9,000 and 14,000 km³/year. Meanwhile, the total water demand foreseen at 2000 was about 4,500 km³/year. Thus, in worldwide, danger of water scarcity does not exist.

Inequality in the water source distribution, however, becomes that some countries are extremely poor and others very rich.

Desert countries like Kuwait, Saudi Arabia and Libyan, and insular small countries, like Malta, Qatar and the Bahamas islands, possess less that 200 m³/year per person, while the recommended by UN is about 1,000 m³/person/year. Regions like Canada, asian Russia, Guyana and Gabon have more than 100,000 m³/person/year. Brazil is in the category served between 10,000 and 100,000 m³/person/year.

Moreover, the water use varies enormously of country by country. The data on as water use is distributed according to domestic expenses, agricultural and industrial are scattered and incomplete. However, it can be an idea of the variability observing that in the Guyana, for example, 1% of the water use is for domestic aims and 99% in agriculture and industrial; already in Equatorial Guinea, the ratio is practically inverted: 81% of the water expense would be for domestic aims and alone 19% for agriculture and industry. Both countries are in regions with more than 100,000 m³/person/year of freshwater.



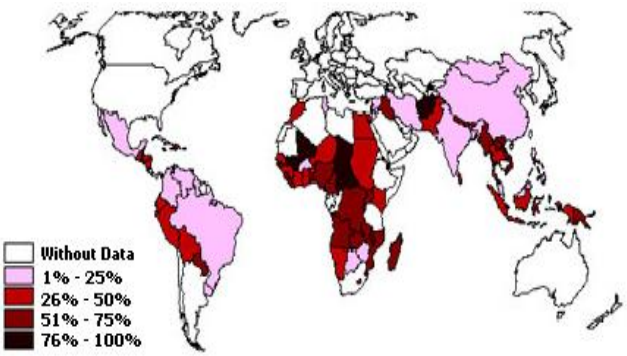
Expense of worldwide water in relation the amount of freshwater available. Source: WMO

To have an idea of the result of the conjunction between natural inequality and water use, the map above shows the water expense by country in relation to the amount of freshwater available. The countries with bigger relative expense of water are concentra ted in Middle East.

These maps, however, do not show the real situation of each country how much to the scarcity or abundance of water. In part, because some countries present rain scarcity during periods of the year and abundance in remaining portion, and others, like countries of the Sahel Zone (Africa), possess areas of the desert-like territory, but are cut by some river of great volume, like Nile or Niger, and thus part of its territory has enough water and part has scarcity.

Moreover, these data do not take in consideration politic and cultural causes that can drastically change the access of the population to drinking waters. Pollution, for example, become that the available water by consumption can exist in very lesser amount than totality of the freshwater available.

Aggravated for factors as wastefulness and lack of public initiative to decide about water problems, it his leaves millions of people without access drinking waters around world. Such factors can cause water scarcity even in countries with great abundance of freshwater, like Brazil. It is estimated that 74% of the worldwide population have access to drinking waters, being that, in Africa, this ratio low for only 46%, arriving extremities like Chad and Mali, with less than 24%.



Worldwide population without access to drinking water. *Source: P. H. Gleick, 1998.*

Basic Facts on Global Situation of the Water

Currently we are more than 6 billion people in the planet, and would have for consumption - discarding the high costs of the desalinization processes - 2.5% of the existing water, that is freshwater. However, being about freshwater, for each liter considered of easy access there is about 350 liters of difficult access, for being, for example, situated in polar glaciers. Even thus, freshwater is considered abundant.

Adopting a global perspective, it is verified that nothing less that 60% of the freshwater of easy access meet in 9 countries, while - in one another extremity - 80 countries need to face varied levels of scarcity. In this same line is calculated that a minority of people is consuming most of the existing water in the planet (86%).

Meanwhile, for nothing less than 1.4 billion people the water are insufficient; and for 2 billion are untreated. This picture explains because 85% of the registered cases of diseases are hydric propagation.

Brazil, Russia, China and Canada are the biggest water detainers of the planet. Kuwait, Israel, Jordan, Saudi Arabia and Iraq, in Asia; Libyan, Algeria, Ethiopia and Cape Verde, in Africa; Hungary, France, Spain and Belgium, in Europe; Mexico and United States, in North America, are examples of countries that face situations of water scarcity.

Brazil possesses, alone, more than 13% of the freshwater superficial of the planet, being considered a rich country in water resources. However, also faces problems related with space distribution: nothing less than 70% of the water volume is found at Amazonia; about 15% are situated in Center-West region. Modest 6% are in South and 6% in Southeast, and lowermost 3% remain for Northeast. This last region is one that more suffers with scarcity; however, other regions had started, in recent years, to present serious problems of supplying, related mainly with water quality. It is not enough to have water in amount, but is necessary also that it has quality.

In addition, the growth of the population - as much vegetative growth how much that caused by migrations - did not take in account criteria related with water availability and its quality. Therefore, regions with water scarcity had started to count on high population amounts, reducing availability per capita; the same it has occurred in regions with quality problems.

Of this form, we can conclude that yes, we have water. The problem is in its localization and population concentrations in regions with low water availability. For example, in Brazil millions of people are Northeast - where climate, rocky formations and soils do not collaborate for water storage; there are millions of peoples in Center-South, region with more favorable conditions than Northeast, but with a population contingent that demand many services and that counts on intense industrial and mineral activity, what also comes causing the exhaustion of the existing natural resources – included water.

At last, there is a latent crisis around a water of decreasing quality and a demand in exponential growth in Brazil, that that is stated by tragedy announced for welfare of the Brazilian future generations.

It more does not advance to cry over spilled water. It is at time to diminish or same to close ours faucets. While this valuable liquid flows for drain of the pollution, wastefulness and occupation of the sources, population growth and consequent increase of the demand for water threaten of collapse the freshwater reserves still available.

Without the conscience of the society on importance by water resource preservation, it is impossible to guarantee water of good quality for our generation and future generations. But it is not enough to have conscience about problem, is necessary to preserve the nature, much-needed to the survival of our planet, that is, the action of preservation becomes still more essential and it must count, therefore, with participation of all society.

And it is in this perspective of the involvement and participation that we consider that must have, between its with priority action, the development of strategies and educative programs that look for to guarantee the preservation of the water resources.

Thus, we are publishing this edition, as form to contribute for this process, so that it serves as instrument of reflection and support to the development of an ampler educative work, carried through to include of integrated way the diverse sectors (users, civil society and service public) at preservation of this so valuable resource: **WATER**.

We finish this matter leaving a reflection in form of music written by Guilherme Arantes, singer and Brazilian composer, who ahead of its so deep and current letter would have always to be remembered and used daily for all we whom we want and must that the rational and equality use of the water occurs, good so essential to all living beings at our **PLANET LAND**.

WATER PLANET

"Water that comes from the
Placid spring of world
And digs a deep canyon
Water that form an innocent
Creek and flows into the
Stream of the brook...

Dark waters of the rivers
That bring fertility to the Hinterlands
Water that bathe villages
And quench the thirst
Of the population...

Waters that fall from the rocks
Veil of cascades,
Roar of thunder
And then sleep calmly
On the bed of lakes
On the bed of lakes...

Water of the creeks When the mother of the waters, Iara,
Is a mysterious song
Water that the sun evaporates,
Heads to the sky
To become cotton clouds...

Raindrops happy rainbow
Over the plantation
Raindrops, So sad,
They are tears In the flood...

The waters that move mills
Are the same waters
That soak the ground
And always return, humble,
To the bottom of the earth
To the bottom of the earth...

Earth! Water Planet
Earth! Water Planet
Earth! Water Planet...

Water that comes from the
Placid spring of world
And digs a deep canyon
Water that form an innocent
Creek and flows into the
Stream of the brook...

Dark waters of the rivers
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Earth! Water Planet
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(Guilherme Arantes)

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