

2. MODULE WATER

EcoTournament -Planet depends on us

The resulting teaching material was created for the Eco- Tournament platform and includes basic information about the environment and ways to fight against climate change. The knowledge contained in the publication will allow tournament participants to acquire the knowledge to correctly answer the Eco- Tournament tasks. Good luck!



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Introduction

Water is one of the most vital sources for all living things. As we grow and comprehend the world around us, it is important to learn just how vital water is to our bodies and our environment. Although water is a renewable resource, scarcity of quality water is still a big issue in many parts of the world. Water covers 71% of our planet, and the oceans hold about 96.5 percent of all Earth's water. It is easy to think that it will always be plentiful. However, freshwater—the stuff we drink, bathe in, irrigate our farm fields with—is incredibly rare. Only 3% of the world's water is freshwater, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use.

As a result, some 1.1 billion people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year. Inadequate sanitation is also a problem for 2.4 billion people—they are exposed to diseases, such as cholera and typhoid fever, and other water-borne illnesses. Two million people, mostly children, die each year from diarrheal diseases alone. We also need water for various purposes that facilitate the way we live such as to grow food, keep clean, generate electricity, control fire, and more importantly keep us alive.

However there are those who keep wasting it or use a large amount without thinking about the consequences. That is why it is advised to preserve it and there are many ways to conserve water in homes. Some are easier than others and in the process you are helping yourself and the environment from water scarcity. Water is an indispensable element of life and we feel uncomfortable when we are dehydrated even for a short time. When we lose very important blessings like the water we have, we begin to realize how water is a precious substance.

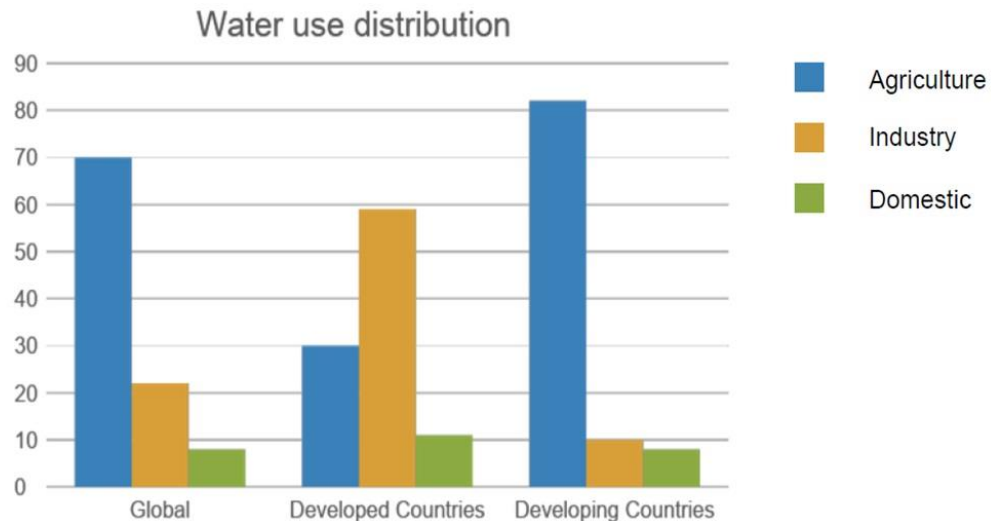
Learning outcomes

- After reviewing this material.
- You will have a better understanding of the importance of water.
- How to use water wisely and preserve it.
- Acquiring knowledge on water situations in other countries, and the world.
- The effect of water on us.



- How to build a better world.

Uses of water



Domestic or personal use:

15 % of water is consumed for domestic purposes. It includes usages like drinking, cleaning, personal hygiene, garden care, cooking, washing of clothes, dishes, vehicles, etc. Since the end of World War II, there has been a trend of people migrating out of the country to the ever-expanding cities. This trend has an important role in our water resources. The government and communities are in a need to provide large water-supply systems to deliver water to new growing populations and industries. Comparing all water consumption in the world, domestic uses about 12 percent of the total water consumed. The amount of water that people need, or use, will depend on its availability and what it is used for. Factors that influence water use include the socio-economic status of the users, whether and how people have to pay for the water, whether water is easy to get, and whether water is used for special activities (e.g. irrigation of vegetable gardens, watering of animals).

Future changes in population and development level will have to be considered. The priority to provide water for drinking is justified from a public health perspective based on the fact that this is clearly a universal need for everyone, especially children. Moreover, there is political support for implementing the services to meet this need. There is also ample documentation of the *direct* links between safe and clean drinking water and public health improvements. Poor water quality and water shortage is linked to diarrhea, cholera, dysentery, and a variety



of other illnesses responsible for high rates of mortality and morbidity in developing countries. Universal access to water for other domestic water needs also contributes to implementing CEDAW because of society's current gendered division of domestic chores. Water is lost during distribution, and this will have to be taken into account when looking at how much water must be provided to a population. There's also an advantage in storing water which is that the quality improves over time.

If water is stored for one day over 50 per cent of the bacteria will die. Suspended solids, which can contain pathogens, will often settle out during storage. By pouring the clear water out carefully, the settled solids can be separated from the water. In addition to water storage vessels, households usually need vessels to transport water. These should be made so that carrying the water is as easy and comfortable as possible. The vessels should be covered with a clean cover or lid, and the water should be poured instead of dipped out.

Agricultural needs:

Agriculture is the largest consumer of water. About 70% of water is used for irrigation. Water is necessary for gardening, farming and fisheries. Plants require water to grow. During the process of photosynthesis, they consume water. To yield crops, fruits, flowers, vegetables they need sufficient water, manure, sunlight and oxygen. Agriculture accounts for about 69 per cent of all water consumption especially in agricultural economies like India. Agriculture thereby becomes the largest consumer of the Earth's available freshwater. By 2050, the global water demand for agriculture is estimated to increase by an additional 19% due to irrigation needs. Increasing irrigation needs are likely to put immense pressure on water storage. It is still not concluded whether further expansion of irrigation and additional water withdrawals from rivers and groundwater is possible in the future. Irrigation is a vital component of agricultural production in many developing countries. In 1997-99, irrigated land provided two-fifths of crop production in developing countries, and accounted for about one-fifth of the cultivated area.

- Food production in developing countries is increasing in response to the demands of an expanding population and rising prosperity. Some of this demand will be met by increased productivity of rainfed agriculture, some by increased imports, but irrigated agriculture will be a major contributor. Water used for irrigation comes from surface water or groundwater. The use of groundwater for irrigation enables the extension of irrigated area beyond that which surface water alone can support. In addition, it



assists with drainage of the soil (by lowering the groundwater table and providing drainage of soil water into tubewells). Groundwater can supplement surface water during periods of low flow, making surface water available for alternative uses. It is also used as a sole source of irrigation water. For example, in India, more than half of irrigated land is supplied with groundwater, providing one-third of the country's food production (Roy and Shah, 2003).

- **Groundwater** has various advantages over surface water: it can be stored in aquifers for years with little or no evaporative loss; the percolation of aquifer recharge water through the ground attenuates pollution levels (making groundwater particularly suitable as a source of drinking-water, especially in areas with no water treatment facilities); groundwater can be withdrawn near the point of use; and it is available immediately on demand, which enables more timely applications of irrigation water. However, groundwater contains dissolved salts that can be toxic to plants and result in soil salinization. Groundwater can be combined with surface water to dilute salt concentrations to levels suitable for use in irrigation. **Surface water** for irrigation is stored either in natural storage capacity (lakes and wetlands) or artificial capacity created through the construction of dams. Dams are usually constructed for the purposes of water storage for irrigation, hydroelectric power generation, flood control, or any combination of these. However, in the case of dual-purpose dams designed to store water for irrigation and hydroelectric power generation, conflicts can arise because increases in demand for irrigation water in the dry season exceed demand for power. This creates difficulties in the specification of the required storage capacity and the timing of water releases.
- The situation is yet more complex for **dams** also designed to provide flood protection. Effective provision of flood control requires storage capacity that is empty, but effective storage of water for hydroelectric power generation and irrigation requires storage capacity that is kept as full as possible (though seasonal flooding and flood prediction can limit these conflicts). Despite potential for conflict, provision of storage capacity for irrigation combined with other uses can have advantages. The combined value of storage capacity for multiple purposes may be required in order to make large dam developments economically viable. Moreover, the provision of storage capacity for non-agricultural uses can provide contingency against failure of irrigation schemes to meet predicted uptake and economic returns, e.g. through potential to develop further power generating capacity.



Industrial needs

Industrial water use differs from domestic water use only in the type of contaminants released in large quantities. For instance, accidental cyanide spills from goldmine operations have long-lasting effects on aquatic ecosystems. Heavy metals and toxic chemicals in large quantities rarely originate from domestic sources. It is either used in creating or to cool the equipment used for creating the product. Industrial water is used for washing, cooling, processing, transporting, diluting or fabricating of a product. The maximum amount of water is used in the production of chemicals, paper and food.

- Other uses are - it is used in transportation, manufacturing, hydroelectric power, removal of body wastes, tourism and recreation. Manufacturing industries are considered to have a considerable share of the total industrial water consumption. Besides, paper and allied products, chemicals, and primary metals are major industrial users of water. Worldwide, the industry consumes around 19 percent of total water consumption. Another industrial water use is pressurized water, which is often used in water blasting, water jet cutters, and high-pressure water guns. These uses not only work well and safe but also do no harm to the environment.
- A special case of industrial water use is water withdrawal for coolant for thermoelectric power plants (both fossil and nuclear powered). Cooling water is used both consumptive (when the water is evaporated in cooling towers) and nonconsumptive (when thermally 'polluted' water is returned to surface waters). While thermal contamination largely can be dealt with in a manner similar to chemical constituents, where the key is the availability of sufficient amounts of diluting water, the challenges to secure cooling water demand will undoubtedly be exacerbated by global warming. In industrialized countries, the industries use more than half of the water available for human use. Industrial water use has widespread among different countries and appears to be completely decoupled from human development. This decoupling probably reflects the tendency for poor countries to become exporters of more water-intensive raw materials and industrial products.
- Water plays an essential role in keeping oil and gasoline affordable and available worldwide. In oil-producing regions, water is pumped down into cracks and crevasses to help oil surface from rock deep underground. This enables the underlying oil reserve in oil wells to be fully utilized. If not used in the production process itself, many industries use water to clean their machinery and buildings. If it has been used to cool off equipment, water will first need to be cooled in a holding pond or container before being released back into the natural environment. Otherwise, harm to fish and

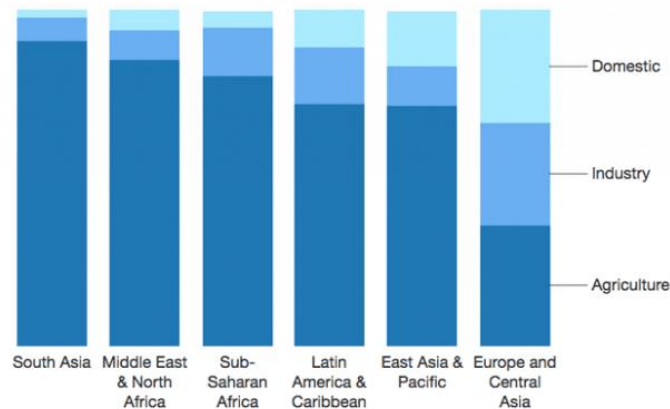


other life could be created. In many cases when the water is not consumed, it can be returned to the water supply and treated. When industrial wastewater contains hazardous material including heavy metals or acid, treatment needs to occur before entering the water supply. Usually, this can happen on site and involves filtration or neutralization.

- When creating electrical power, water is used to push the turbines. The substance also helps keep the electrical power industry's equipment from overheating. When the water's heated and steam forms, the electricity produced can be used as a source of power. The pulp and paper industry uses millions of gallons of water during their manufacturing processes. To keep paper clean and smooth, water is crucial. It also helps prevent the paper-making machinery from getting damaged. Water is also used by smelting facilities and in the production of food and chemical products. It keeps machinery cooled to continue manufacturing products, it washes off materials mined underground and even cleans the carcasses during meat processing.

Globally, 70% of Freshwater is Used for Agriculture

Share of freshwater withdrawals by sector (%) in 2014



What is the problem?

The planet's freshwater resources, if managed sustainably and effectively, can meet water demands of the world's growing population with good quality water. However, water scarcity and water quality degradation present major challenges in securing enough water of good quality to meet human, environmental, social and economic needs to support sustainable development of countries. The widespread water quality degradation across the world is the



most serious water problem, threatening human health and ecosystems' integrity, but also representing a major concern for the water resources sustainability. New water quality challenges such as emerging pollutants and safe wastewater reuse bring even greater concerns, calling for urgent attention. Water scarcity is a natural as well as a human-induced phenomenon. For many countries, water scarcity represents the most pressing challenge to socio-economic and human development at large. Water scarcity due to overuse and the uneven distribution of water resources in both time and space, coupled with the growing water pollution, is becoming a growing concern.

- Poor water quality: not only does it negatively affect human health and ecosystems in multiple ways, but also makes water unfit for different uses and purposes and hence reduces the water resources availability.
- Water pollution: As water treatment technologies are often expensive, wastewater management is inadequate or inexistent in most developing countries. Urgent action is needed to improve wastewater management.
- Water scarcity: A regional water crisis, often triggered by drought, can result in famine, forced migration, and other humanitarian emergencies. The impacts of water scarcity affect families and their communities. Without clean, easily accessible water, they can become locked in poverty for generations.
- Water shortage: it is one of the most common problems facing the world. Water is wasted on people's hands due to misuse, leakage of taps, and pollution of chemicals, sewage water, organic and agricultural contaminants.

What are the causes?

There are numerous threats to our water resources. According to World Health Organization (WHO) sources, a combination of the rising global population, economic growth, and climate change means that by the year 2050, more than five billion (52%) of the world's projected 9.7 billion people will live in areas with freshwater scarcity. Researchers estimated that about 1 billion more people will be living in areas where water demand will exceed surface-water supply. Whether related to climate change or not, according to one UNICEF report nearly 75% of all natural disasters between 2001 and 2018 were water-related. This includes droughts, but also floods – which can destroy or contaminate clean water sources for communities. This not only cuts people off from clean drinking water, but also opens up the risk for waterborne diseases like diarrhea. The frequency of these events are expected to increase as we continue to feel the effects of climate change. From the many causes we



have :

- Climate change: climate change is one of the main reasons behind the global water crisis. The areas most vulnerable to the impacts of climate change, such as Somalia's decade-plus of drought or increasingly severe monsoons in Bangladesh, are often water-stressed to begin with.
- Natural disasters: Whether related to climate change or not, according to one UNICEF report nearly 75% of all natural disasters between 2001 and 2018 were water-related. This includes droughts, but also floods which can destroy or contaminate clean water sources for communities.
- Wastewater: Many areas of the world have poor systems for dealing with wastewater, water that is affected by human use, like washing dishes at home or used in an industrial process.
- Lack of infrastructure: It's not that countries willingly mismanage their water supplies. Whether through deliberate destruction or unwitting mismanagement, many governments lack the infrastructure to properly invest in their water resources, allowing clean water to reach those that need it most.

Water and Sustainable Development Goal of the UN

One of the most important recent milestones has been the recognition in July 2010 by the United Nations General Assembly of the human right to water and sanitation. The Assembly recognized the right of every human being to have access to enough water for personal and domestic uses, meaning between 50 and 100 litres of water per person per day. The water must be safe, acceptable and affordable. The water costs should not exceed 3 per cent of household income. Moreover, the water source has to be within 1,000 metres of the home and collection time should not exceed 30 minutes.

The United Nations has long been addressing the global crisis caused by insufficient water supply to satisfy basic human needs and growing demands on the world's water resources to meet human, commercial and agricultural needs.

Sustainable Development Goal (SDG) 6 is to “Ensure availability and sustainable



management of water and sanitation for all". The targets cover all aspects of both the water cycle and sanitation systems, and their achievement is designed to contribute to progress across a range of other SDGs, most notably on health, education, economics and the environment. Evidence-based policy-making is a key step in which countries can advocate for a rational, rigorous and systematic approach that informs the policy process and supports decision making. Nevertheless, policy-making in the SDG era can be complex, requiring policy makers and development actors to assess and combine many pieces of evidence from different agencies and sectors. Moreover, many questions may arise throughout setting evidence-based policy-making processes. Deciding on exactly which piece of evidence might "fit-for-purpose" for a particular policy process can be contentious, especially if there seems to be different or in specific situations conflicting evidence. Lack of evidence and data on SDG 6 is also a challenge as, at many times, even a clear and practical assessment of missing data is not available. There is a need to provide tools, processes, and support for UN Member States to accelerate progress against SDG 6.

Throughout the world, about 1.7 billion people live in a watershed where water is used faster than the watershed can be replenished. According to some estimates, if such trends continue, one in four people, or more, might experience water shortages on a regular basis by the year 2050. Compounding the problem of water scarcity is the lack of reliable sanitation throughout the world. More than two billion people worldwide lack basic sanitation services, such as simple latrines or toilets. More than 890 million of those people live in regions where "open defecation" occurs. This means that human waste is left in the open. Adding to the issue is the fact that 80 percent of wastewater throughout the planet is emptied into the ocean or rivers without proper waste removal. Alarmed by these problems, the UN established SDG 6 in an effort to make adequate sanitation and water services available to all people by the year 2030.

As many as 800 million people, or more, would require the construction of facilities to provide consistent clean water and waste removal. To succeed in their vision, the UN developed a series of targets. These targets include restoring and protecting river ecosystems throughout the world, eliminating sources of water pollution, and increasing international cooperation to bring services throughout the world. In an effort to reach the targets outlined by SDG 6, some water companies have installed smart meters in places where water scarcity is a concern. These meters track and charge for every drop of water used in a household, which has led to higher water conservation in countries like The Gambia and Tanzania. The CEO of one such company, eWATERpay, claims that these meters have reduced water waste by 99 percent.



Such efforts take time and require many countries to work together. While some strides have been made, based on information from a 2017 UN study, not enough has been done to ensure that this goal will be met by 2030. Managing these targets properly is the only way to make certain all people will benefit from clean water and effective sanitation in the years ahead.



The situation of water in the world

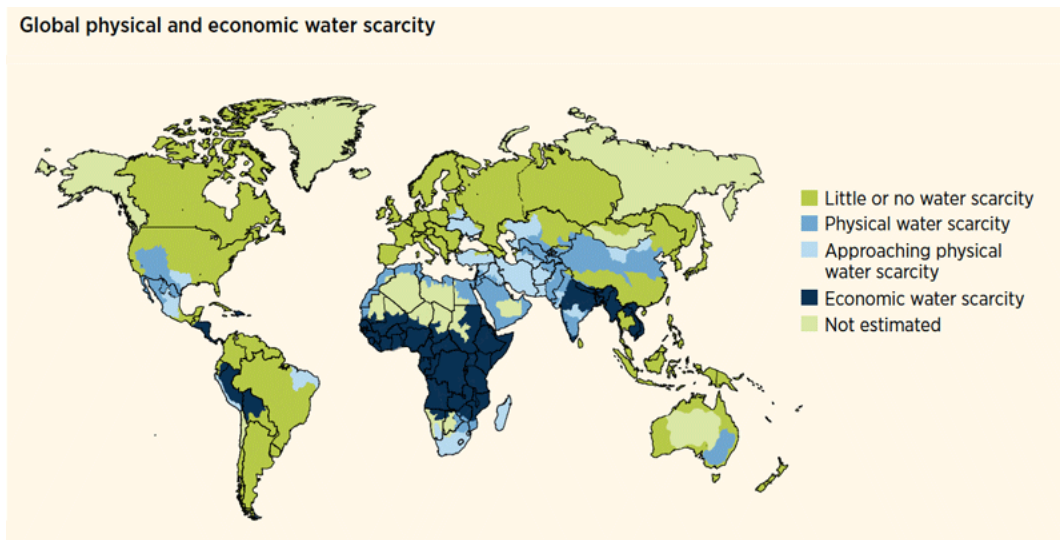
Even in countries with adequate water resources, water scarcity is not uncommon. Although this may be due to a number of factors – collapsed infrastructure and distribution systems, contamination, conflict, or poor management of water resources – it is clear that climate change, as well as human factors, are increasingly denying children their right to safe water



and sanitation. Water scarcity limits access to safe water for drinking and for practising basic hygiene at home, in schools and in health-care facilities. When water is scarce, sewage systems can fail and the threat of contracting diseases like cholera surges. Scarce water also becomes more expensive. Water scarcity takes a greater toll on women and children because they are often the ones responsible for collecting it. When water is further away, it requires more time to collect, which often means less time at school. Particularly for girls, a shortage of water in schools impacts student enrolment, attendance and performance. Carrying water long distances is also an enormous physical burden and can expose children to safety risks and exploitation.

The Middle East and North Africa (MENA) is the worst off in terms of physical water stress, according to most experts. MENA receives less rainfall than other regions, and its countries tend to have fast-growing, densely populated urban centers that require more water. But many countries in these regions, especially wealthier ones, still meet their water needs. For example, the United Arab Emirates (UAE) imports nearly all of its food, alleviating the need to use water for agriculture. The UAE and other wealthy MENA countries also rely heavily on the desalination of abundant ocean water, albeit this process is an expensive, energy-intensive one. Meanwhile, places experiencing significant economic scarcity include Central African countries such as the Democratic Republic of Congo, which receives a lot of rain but lacks proper infrastructure and suffers from high levels of mismanagement. Even high-income countries experience water stress. Factors including outdated infrastructure and rapid population growth have put tremendous stress on some **U.S.** water systems, causing crises in cities including Flint, Michigan, and Newark, New Jersey.

Our planet is also very efficient at keeping this water. Water, as a vapor in our atmosphere, could potentially escape into space from Earth. But the water doesn't escape because certain regions of the atmosphere are extremely cold. (At an altitude of 15 kilometers, for example, the temperature of the atmosphere is as low as -60° Celsius!) At this frigid temperature, water forms solid crystals that fall back to Earth's surface. While our planet as a whole may never run out of water, it's important to remember that clean freshwater is not always available where and when humans need it. In fact, half of the world's freshwater can be found in only six countries. More than a billion people live without enough safe, clean water. Also, every drop of water that we use continues through the water cycle. Stuff we put down the drain ends up in someone or something else's water. We can help protect the quality of our planet's freshwater by using it more wisely.



With the combination of pollution and over consumption, droughts and water scarcity are no longer considered rare or extreme events in **Europe**. Approximately 20% of European land and 30% of European people are currently affected by water scarcity every year. In early July 2022, Italy declared a state of emergency in five northern regions due to extreme droughts and lack of rainfall. The northern agricultural region Po valley, which includes the peninsula's largest water reservoir, has been particularly affected, with 30% of national agricultural production threatened by the drought. Water scarcity is predicted to become more prominent as our climate changes. Regions across Europe are already seeing drastic impacts on drought frequency and changing weather patterns such as rainfall and storm intensity as a direct result of climate change. The southern and south-western regions of Europe are predicted to experience up to a 40% river decline under a 3°C temperature rise scenario, causing fears of widespread water insecurity. Southern European countries such as Spain, Greece, Cyprus, Italy and Turkey are projected to face increased water shortages over the next decade, with knock-on effects for other industries such as reduced hydropower resources in the Mediterranean region.

Vietnam's water shortage, especially during the long drought seasons, is widening the gap between rich and poor farmers. Access to a sufficient amount of clean water for agriculture is becoming a luxury in the Southeast Asian nation adjacent to the Mekong River. Over 13 million Vietnamese do not have sufficient access to clean water for their daily activities, including 2.5 million people in rural areas, where many farmlands are located. Contaminated water accounts for nearly 80 percent of diseases in the country, including cholera, typhoid, dysentery and malaria each year. But contamination is not the only water-related crisis afflicting Vietnam, as the country is grappling with a shortage of water - having only 4,400m³



water resources per capita each year, a far cry from the world average of 7,400m³ per capita. Water resources from Vietnam's 2,000 plus rivers go mainly into boosting the country's source of food security: agriculture. Organisations have been pitching in to develop irrigation and drip systems to help the farmers use water efficiently. The World Bank, for instance, developed an improved irrigation system that allegedly benefited 215,000 farming households and drove up average yields by up to 15 percent and, in turn, farmers' income. A study showed that a total of VND 100,000 billion has been spent on developing over 8,000 irrigation systems and 2,000 pumping stations. However, while these systems did help rice yield to spike by up to 35 percent, the study added that the irrigation system did not significantly help poor farmers. "Simply providing irrigation water to the poor will not improve their situation unless they make good use of the irrigation water, regardless of how well the irrigation system is functioning," the researchers wrote.

When water is in short supply, it is "the poorest people that suffer the most", the researchers say, but "even in rich countries like the **UK** the authorities are struggling to deal with the impact of the climate crisis". In the rainy UK, we think of flooding as the "main impact" from climate change, meaning "water scarcity is sometimes overlooked," Mr Watt said. "But it's going to become a bigger problem." England's Environment Agency has previously warned that water scarcity is a "ticking time bomb". An EA spokesperson told Sky News climate change is "posing increasing risks to the quantity of water available". It plans to "transform the way we use and look after England's water supplies" and secure resilience. People in England will have to reduce their current water use from 140 litres a day on average to 110 to keep supply and demand in line, as climate change alters temperatures, evaporation and the demand of water from plants, the EA estimates.

Water scarcity is a persistent issue in **Australia** given the relatively dry and variable climate and now the emergence of climate change. Water is a valuable commodity particularly within agriculture, which accounts for around three quarters of total use. Water is also of value to other industries, households and increasingly environmental agencies. The rainfall in northern Australia is equivalent to eight and a half times the annual runoff in the MDB, but only 20% enters the rivers and streams, and 15% recharges groundwater resources. The rest ultimately evaporates. The report concluded that, despite the huge volumes of water in the wet season, 'the north can be described as being water limited'. This is because there may be little or no rain during the dry season; rainfall is highly variable between years; it mostly occurs near the coasts and on floodplains making it hard to capture; and the very high rates of evaporation require very large and deep storages.



Climate change is impacting precipitation. In broad terms, while the wettest regions of the U.S. are getting wetter, the drier areas are getting drier, and there are some seasonal shifts in water patterns—rising temperatures mean the snowmelt that feeds many rivers begins and ends earlier, contributing to summer water shortages. As the U.S. water supply decreases, demand is set to increase. On average, each American uses 80 to 100 gallons of water every day, with the nation's estimated total daily usage topping 345 billion gallons—enough to sink the state of Rhode Island under a foot of water. By 2100 the U.S. population will have increased by nearly 200 million, with a total population of some 514 million people. Given that we use water for everything, the simple math is that more people mean more water stress across the country.

The situation of water in Jordan

Jordan is the second most water scarce country in the world. Jordan's annual renewable water resources are less than 100 m³ per person, significantly below the threshold of 500 m³ per person which defines severe water scarcity.

While more than 98% of the population has access to an improved water source, only 93% access a safely-managed source and 86% to a piped network. In urban areas, water is usually available once a week, and less than once every two weeks in rural areas, with reduced frequency during the summer. Only 77.3% of existing sanitation systems are safely managed and only a third of schools have basic sanitation services.

To meet its needs, Jordan has been over pumping from its aquifers for decades. As reported in Nature magazine last year, today Jordan is over-pumping from 10 of its 12 aquifers, and groundwater is being drawn out at twice the rate that it can be replenished.

It's hard to even know how much is being drawn by thousands of illegal private wells. Climate change is expected to exacerbate the country's water shortage. A study by Stanford University's Jordan Water Project estimated that under current conditions, rainfall in Jordan could decrease by 30 percent and temperatures increase by 6 degrees Celsius (10.8 degrees Fahrenheit) by the end of the century. Jordan is running out of water. The arid country has limited rainfall and a population that has doubled in the last 20 years, reaching over 10 million today. In 2019, it was ranked the fifth most water-stressed country in the world by the World Resources Institute. Middle Eastern countries make up most of the list's top 10. Residents of Jordan, one of the driest countries in the world, have long been accustomed to a household water supply of only about 36 hours a week. But recently, even that meager flow has been



curtailed by the debilitating combination of a warming planet and swelling demand.

The flow in the Jordan River is less than 10 percent of its historical average, and the Yarmouk River, a major tributary, is greatly diminished. Jordan's once-rushing waters feed into the Dead Sea, a saltwater lake that is disappearing. The rivers are uneasily shared with neighbors: Israel and Syria upstream have diverted water for years for their own use. Increasing supply from these sources is challenging, particularly with Israel, which has had a chilly peace with Jordan for decades now. All of this has led to an overreliance on extracting groundwater from aquifers below the earth's surface. The aquifers are being drained at roughly twice the rate at which they can be replenished naturally and now account for about 60 percent of the country's water supply. Omar Salameh, a spokesman for the Ministry of Water and Irrigation, said the government was well aware of the dangers of exhausting the groundwater supply. But as the population has grown – in no small part because of waves of refugees from Syria and other countries facing conflict – the government has come under pressure to meet soaring demand, he said.

The population is now estimated to exceed 11 million, up from 8 million just a decade ago, including more than 760,000 people registered with the United Nations as refugees. "We don't have other alternatives," Mr. Salameh said. For those with means, solutions and workarounds are available, at a price. But those without must simply go without. Many Jordanians turn to private water tankers. But the prices charged by those tankers, which are ubiquitous in wealthier neighborhoods of the capital Amman, rose to new heights this past summer.

Buildings and homes keep water tanks on the roof, which are replenished by the government and rationed through the week. Wealthier households often have multiple tanks, which they can also fill with water purchased from the private trucks. The vulnerable are hardest hit by the water shortages. The poor cannot afford to buy from private trucks and have less capacity to store water. All households have to buy their own tanks, and if one is damaged, the consequences are dire. Ibtisam Yousef Abdelrahman, 55, a Palestinian who lives in the Wihdat refugee camp in southeast Amman, shares a two-room apartment with her husband, daughters and two grandchildren.

They received a new tank from UNICEF during the pandemic to replace a damaged, rusty steel one. But in mid-September, the UNICEF tank broke, and the precious water gushed into the street.



The average amount of water available each year to a resident of Jordan is well below the “absolute water scarcity” threshold of 500 cubic meters set by the United Nations. Mr. Salameh said it is about 80. There is one potential quick fix: buying more water from Israel, a pioneer in desalination techniques. Cooperation on water was an important element of the 1994 peace treaty between the two countries, and they signed a water-for-energy agreement at the United Nations climate conference in the Egyptian Red Sea resort of Sharm el Sheikh on Tuesday. Protests broke out in Amman last year when the plan, which was brokered by the United Arab Emirates and would involve Jordan sending solar energy to Israel in exchange for water, was first announced.

An overreliance on Israel water is unpalatable to many Jordanians, who oppose the occupation of the Palestinian territories. But water is a critical national security issue in Jordan, and shortages threaten to destabilize a stalwart U.S. Arab ally that has been an oasis of calm in a turbulent neighborhood. Iyad Dahiyat, a former water ministry official, said the water portfolio is as important as the military given the threats to Jordan posed by climate change. One recent study predicted that severe and potentially destabilizing water shortages will become common in Jordan by 2100 unless the country makes significant changes.

Dr. Ruckstuhl and other experts say the government needs to raise water prices based on household income to account for the soaring cost of delivering it to homes and businesses. But many Jordanians are already struggling with unemployment and high prices and that would be an added, and unpopular, burden.

The situation of water in Morocco

Owing to its geographical location, Morocco has considerable climate differences within its territory and variable rainfall depending on the region and season. With a view to supporting its development and streamlining water management, Morocco has, for decades, been committed to managing its water resources by constructing major water infrastructure (dams, efficient water irrigation systems, etc.) to meet its household, industrial, and agricultural consumption needs. Morocco has about 22 billion cubic meters of conventional renewable water resources per year equivalent to 730 cubic meters/capita/year. Morocco has about 100 dams of various sizes with a total storage capacity of 15 billion cubic meters. 83% of withdrawals were for agriculture and 17% for municipal and industrial uses. However, water resources are not divided equally in space and time, with most of the water resources available in the North and rainfall limited to the winter. In addition, the quality of water



resources is degraded through pollution.

Morocco is among the world's most water stressed countries. Recent events showed that engineering solutions are no longer sufficient to shield the economy against climate shocks and highlight the need for complementary policies, as outlined in the New Development Model, that would reflect the true value of water resources and incentivize more efficient and rational uses." said Jesko Hentschel, World Bank Maghreb and Malta Country Director. These reforms include pricing scarcer water resources at their appropriate value, developing efficient water allocation mechanisms through for instance a tradable quota system, and producing and publishing accurate and extensive data on water resources and use. Morocco has perhaps managed this dilemma better than many of its neighbors, dramatically improving food and economic security through agricultural development, while increasing its water withdrawals only 12 percent since 1977. Yet now Morocco expects to reach "absolute water scarcity" (having less than 500 cubic meters per person per year) by 2030. And while Morocco has faced less of the mass protests or domestic upheavals of its North African neighbors, it has witnessed so-called thirsty protests, triggered by water cutoffs in the south.

Morocco is suffering the most severe drought in three decades, and the government has decided to toughen the measures initially taken to reduce water shortages. The new measures include the implementation of restrictions on the flow of water distributed to consumers, and a ban on the irrigation of green spaces and golf courses with drinking water. Morocco is suffering the most severe drought in three decades, and the government has decided to toughen the measures initially taken to reduce water shortages. The new measures include the implementation of restrictions on the flow of water distributed to consumers, and a ban on the irrigation of green spaces and golf courses with drinking water. It is also prohibited to wash streets and public places with drinking water and the illegal extraction of water from wells, springs, watercourses and water transport channels, avoiding the use of drinking water for washing cars or machines, as well as the filling of public and private swimming pools, which from now on will have to be carried out on an annual basis through a recycling system.

In order to solve the problem of groundwater depletion, one of the main causes of this crisis, the government is exploring different ways, while tightening restrictive measures to try to curb this shortage, accelerating different projects that would reduce the effects of this drought. Following this line of action, the Ministry of Equipment and Water launched an awareness campaign last Thursday, with the aim of making the population aware of the problematic



situation that the country is going through.

Therefore, the statement issued by the Ministry stressed that: "Morocco is in a state of water emergency, as at a time when water resources are decreasing, it is known that the water consumption curve is higher among users". He emphasised the need to "stop the practice of any form of water wastage in order to preserve current resources and ensure equitable distribution of water for the benefit of all". Hamid Rachel, an environmental expert, stressed the need to manage demand and make the most of water, especially in the agricultural sector. To this end, he proposed different solutions such as the reuse of treated wastewater for irrigation of green spaces and communication and awareness-raising among the population in order to create awareness of the importance of preserving water resources.

Rachel also wanted to assess the measures that the Moroccan government was taking against this drought, stating that the national programme for drinking water supply and irrigation is managing to face different obstacles, especially in the large cities. But politicians are not satisfied with the measures being taken, considering them insufficient. They believe that the water situation requires a radical overhaul due to climate change. Therefore, during the debate on the government's plan, the chairman of the Infrastructure, Energy, Minerals and Environment Committee, Mohamed Malall, said: "There have been imbalances and faltering programmes in recent years, whether in dams or water facilities and joint programmes between authorities, and the duty is to intervene to deal with what can be dealt with, especially to accelerate it.

The MPs said the situation calls for addressing the mistakes of Moroccan plans in this area, which have been accumulating for 15 years and have come at a huge water cost. According to Mbarek Sibai, head of the Popular Movement Party parliamentary group, the regime went as far as doubling the cost of water, allocating it to crops that were to be exported in their entirety, without providing a minimum level of self-sufficiency and food security for Moroccans. Observers believe that this criticism is mainly due to the fact that this strategy did not take into account the depleted water reserves, the enlargement of the base of the hill reservoirs and the formulation of a soil and water resources protection policy, measures that could have remedied this situation, which is now so serious.

For this reason, the head of the Eco-Manarat Association for Development and Climate, Mustafa Benrami, warned last Friday that the situation is worrying because of the impact that climate change is having on water. He regretted that Morocco, despite its significant natural



water resources, and due among other things to overexploitation through the random digging of wells, has reached this dramatic situation. But the reality is that the Moroccan authorities have already earmarked more than \$1 billion to finance relevant measures aimed at protecting Morocco's animal and plant capital, while seeking to efficiently manage water scarcity, financing wheat and fodder market supply operations and reducing the financial burdens on farmers.

The situation of water in Tunisia

Tunisia has achieved the highest access rates to water supply and sanitation services among the Middle East and North Africa. As of 2011, access to safe drinking water became close to universal, approaching 100% in urban areas and 90% in rural areas. Tunisia provides good quality drinking water throughout the year.

A Mediterranean climate prevails in Tunisia, with great variability going from humid in the extreme north to extremely arid in the southern part. Tunisia has limited water resources; the total internal renewable water supply is estimated at 4195 million m³ per year with 3420 million m³ surface water and 1595 million m³ groundwater per year. Most of the exploitable renewable surface water is mobilized in 37 dams, 258 small hilly dams and 913 hilly lakes with a total storage capacity of 2708 million m³ (MINAGRI, 2018). About 77.4 % of the total water withdrawals are used by agriculture for irrigation.

Water resources in Tunisia are characterized by scarcity and a pronounced irregularity. By adopting an integrated strategy for the use of water based on scientific and technical studies, Tunisia has been able to develop a complex and diverse water infrastructure allowing the country to mobilize and exploit available water resources. At the same time, Tunisia has put in place systems and legislation to assure access to drinking water for the majority of the urban and rural population and to provide supplies for agricultural irrigation, as well as the industrial and tourism sectors. Exploitation of conventional water resources is very advanced and it is expected that water demand, driven by population increases and improvements in living standards could reach its maximum around the year 2030. Tunisia's water balance is negative, which means that the country uses more water in agriculture, industry and households than is available in the long term through inflows or rain. This overuse of water primarily applies to groundwater. As a result, groundwater levels are decreasing each year throughout the country.

A river of blackened sludge used to pour into the Mediterranean Sea, contrasting with, five



years later, a clear turquoise sea and clean, sandy beach. For the first time in years, in 2020, Tunisia's health authorities opened Raoued Beach just north of Tunis for swimming, giving the local economy a boost. Fishermen echoed their approval for the changes they saw in the marine environment. What looks like a miracle was in fact the diligent work of engineers and scientists to clean up the water. 96% of a batch of samples of seawater collected at Raoued in 2020 complied with levels of bacteria considered safe for public health; 97% for the level of detergents. These improvements were the result of channeling treated wastewater underground through pipes to a submarine outfall—the technical term for a pipeline under the sea—stretching 6 kilometers offshore before discharging its effluent 20 meters down the surface. At this depth, farther out in the Gulf of Tunis, treated human sewage and other liquid waste disperses, diluting the pollution associated with daily modern domestic life and farming methods.

Cleaning the wastewater for reuse on land also expands Tunisia's capacity to adapt to the increasing water scarcity the country has been experiencing as a result of climate change. Investing in a new, environmentally safe system for disposing of treated wastewater preserves the country's lovely Mediterranean coastline and benefits communities that reside, work, and play along it. Its coastal and marine ecosystems were being threatened by pollution from agricultural drainage and municipal discharge. When the Gulf of Tunis was identified as the biggest pollution "hot spot," the government made it a priority.

The National Sanitation Utility (ONAS) and government ministries developed a program aimed to address this challenge. A poorly maintained, 30-year-old sewage system that was in place could no longer cope with the volume of waste being generated. Open and above ground, its channels carried wastewater from the Chotrana treatment plant, just south of Raoued, to the El Khelij river, discharging it as the river hit the beach. People complained about the smell and dangers to health. Visible filth hindered the area's potential for tourism and other development. Even though it was treated, the quality of the wastewater was too poor for agriculture. Millions of Tunisians face the spectre of thirst due to frequent water cuts by authorities, prompting President Kais Saied to pressure the government into finding urgent solutions to the water crisis.

The importance of saving water



Water being the most critical form of life and being central for most areas in the industrial sector, needs more support. The Western Cape has a fast growing population where the demand for clean and sufficient water is increasing every day. People should use water sparingly at all times to save the basis of our living.

Saving water has become an essential practice for all areas around the province including areas where water may be less of an issue. Saving water should come naturally as a response to the challenges arising. Sign displays should not be ignored as they may help as reminders of water conservation. Parents should educate children about the simple water-saving methods around the home.

- The industries also consume a great deal of water on a large scale. For almost every step of your process, you need water. The product that we use every day is essential to manufacture. If we look beyond human uses, water plays a vital role in every life of the living creatures. It is the birthplace of marine animals. Every organism needs water to survive, from a small insect to a whale. We thus see how water is required, not only for humans but also for plants and animals. To function the Earth depends on water. We cannot be egoistic and use it for our uses without taking care of the environment. Water is necessary not only for our survival but also for a healthy and happy life. Everyone has seen the situation of water-deprived countries like Africa, where people lead miserable lives. All have to wake up to the urgent need for water conservation.
- Adequate water intake helps your kidneys work more efficiently and helps to prevent kidney stones. Drinking plenty of water during physical activity is essential. Athletes may perspire up to 6 to 10 percent of body weight during physical activity. Hydration also affects your strength, power, and endurance. You may be more susceptible to the effects of dehydration if you're participating in endurance training or high-intensity sports such as basketball. Negative effects of exercise in the heat without enough water can include serious medical conditions, like decreased blood pressure and hyperthermia. Extreme dehydration can cause seizures and even death. Eating fiber isn't the only way to prevent constipation.
- Failing to conserve water can eventually lead to a lack of an adequate water supply, which can have drastic consequences. These include rising costs, reduced food supplies, health hazards, and political conflict. It helps to preserve our environment. Reducing our water usage reduces the energy required to process and deliver it to



homes, businesses, farms, and communities, which, in turn, helps to reduce pollution and conserve fuel resources. It makes water available for recreational purposes. It's not just swimming pools, spas, and golf courses that we have to think about. Much of our freshwater resources are also used for beautifying our surroundings—watering lawns, trees, flowers, and vegetable gardens, as well as washing cars and filling public fountains at parks.

- Failing to conserve water now can mean losing out on such uses later on. It builds safe and beautiful communities: Firefighters, hospitals, gas stations, street cleaners, health clubs, gyms, and restaurants all require large amounts of water to provide services to the community. Reducing our usage of water now means that these services can continue to be provided. Water conservation requires forethought and effort, but every little bit helps. Don't think that what you do does not matter. We can all make changes in our lifestyles to reduce our water usage. The trick is making water conservation a way of life—not just something we think about once in a while.

How can you help?

- Check your toilet for leaks: Put a few drops of food coloring in your toilet tank. If, without flushing, the coloring begins to appear in the bowl., you have a leak that may be wasting more than 100 gallons of water a day. Leaky toilets are one of the most common causes of unexpected high water use for consumers in the UK. A leaky loo wastes between 200 and 400 litres of water per day - that's a jaw dropping 72,000 to 146,000 litres of water wasted every year - from just one leaking toilet.
- Stop using your toilet as an ashtray or wastebasket: Every cigarette butt or tissue you flush away also flushes away five to seven gallons of water. Try to avoid flushing away cotton wool balls, make up tissues or disposable nappies. Simply throwing them in a bin will cut down on the amount of water wasted with every flush and protect our sewers.
- Put a plastic bottle in your toilet tank: Use a displacement device (a water-filled bottle) in the toilet tank to reduce the amount of water required to flush. By displacing water, a plastic bottle can help your family conserve water and cut back on utility bills. How it works - The primary purpose of filling a 20-ounce plastic bottle with water is to



displace water volume in the toilet tank.

- Take shorter showers: A typical shower uses five to ten gallons of water a minute. Limit your showers to the time it takes to soap up, wash down and rise off. A short shower with an efficient showerhead uses less water than a bath, which is usually around 80 litres. But beware since many power showers may actually use more than a bath. Baths and showers are accountable for the highest usage of water consumption in the home, at around 34%.
- Turn off the water while brushing your teeth: Before brushing, wet your brush and fill a glass for rinsing your mouth. Just by turning off the tap while you brush your teeth in the morning and before bedtime, you can save up to 8 gallons of water! That adds up to more than 200 gallons a month, enough to fill a huge fish tank that holds 6 small sharks! The same is true when you wash dishes.
- Use your automatic dishwasher for full loads: Running your dishwasher less often saves water and money. dishwashers can increase sanitization for a better clean than you can achieve in the sink. The appliance also allows you to skip rinsing, scrubbing, and drying your dishes, saving time as well as more than 7,000 gallons of water per year, according to Energy Star.
- Water during the cool parts of the day: Early morning is generally better than dusk since it helps prevent the growth of fungus. Early watering, and late watering, also reduce water loss to evaporation. Watering early in the day is also the best defence against slugs and other garden pests.
- Use a broom to clean driveways, sidewalks and steps: Using a hose wastes hundreds and hundreds of gallons of water. This simple habit saves 150 gallons or more each time, or up to 10 gallons per minute. Be sure to instruct your gardener or landscape maintenance company to put down the hose and pick up a broom.
- Don't run the hose while washing your car: Use buckets and tubs to wash your car or the dog, rather than a continuous running hose. A related issue is that a standard garden hose uses a lot of water. On average, a hose uses about 10 gallons of water for every minute of use. By contrast, the average car wash requires about 40 gallons of water to wash one car.



- Plant drought-resistant trees and plants: Many beautiful trees and plants thrive without irrigation. Selecting drought-tolerant plants conserves water usage while still providing beauty and function in the landscape. With climate change concerns, unpredictable droughts and high energy prices across the country, nearly everyone is looking for ways to conserve resources and cut costs.
- Reuse water as much as possible: Water reuse can provide alternatives to existing water supplies and be used to enhance water security, sustainability, and resilience. Most of the uses of water reclamation are non-potable uses such as washing cars, flushing toilets, cooling water for power plants, concrete mixing, artificial lakes, irrigation for golf courses and public parks, and for hydraulic fracturing.
- Don't let the faucet run while you clean vegetables: Rinse your vegetables instead in a bowl or sink full of clean water. Wash your fruits and vegetables in a bowl of water rather than under a running tap. You will save water and will do so further by watering your houseplants with the remaining water.

Conclusion

The issues facing Earth are big, but imagine the difference we could make if we all took steps to address them. Learn about the small but important changes you can make in your daily life to reduce your greenhouse gas emissions, save water, help wildlife, and limit pollution. Water crisis is ever emerging in India and needs to be properly addressed. The onus of conservation lies with us, the people. Understanding the concept and use of water, we can think of sustainable use. Water is the basic necessity for the functioning of all life forms that exist on earth. It is safe to say that water is the reason behind earth being the only planet to support life. This universal solvent is one of the major resources we have on this planet. It is impossible for life to function without water. After all, it makes for almost 70% of the earth.

Further, our daily activities are incomplete without water. Whether we talk about getting up in the morning to brush or cooking our food, it is equally important. This domestic use of water makes us very dependent on this transparent chemical. In addition, on a large scale, the industries consume a lot of water. They need water for almost every step of their process. It



is essential for the production of the goods we use every day. If we look beyond human uses, we will realize how water plays a major role in every living being's life. It is the home of aquatic animals. From a tiny insect to a whale, every organism needs water to survive.

Therefore, it is necessary to use, protect and plan natural resources in a sustainable way. With the conscious use of water, we can prevent the pollution and depletion of our water resources by taking simple measures without impairing our quality of life. We must act in the awareness that the lives of future generations are in our hands. The prerequisite for this is to leave potable water and a livable environment to future generations.

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