

HOW AND WHERE IS WATER USED FOR?

Freshwater from lakes, rivers and groundwater is a vital resource for agriculture, manufacturing, transportation and countless other human activities. But we pollute the same water and, through air pollution, the water in the atmosphere. Agriculture uses most of the available freshwater in the world. In the Philippines, the agriculture sector accounts for 88% of the total surface water withdrawals⁴. Changes in landscape due to agriculture, forestry and urbanization bring about changes in water run-off and the ground's storage capacity. In many places where lack of food threatens human survival, it is the lack of water that limits food production.⁵

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SOME IMPORTANT WATER-RELATED CONCEPTS:

Groundwater Some rain falling onto the ground penetrates the ground and fills the pores or holes/cracks in soil and rocks. The subsurface area where all the available soil and rock spaces are filled by water is called the zone of saturation, and the water in these pores is called groundwater.

Groundwater normally moves from points of high elevation and pressure to points of lower elevation and pressure. This movement is quite slow, typically only a meter or so per year and rarely one foot per day. Most aquifers are like huge slow-moving underground lakes.⁶

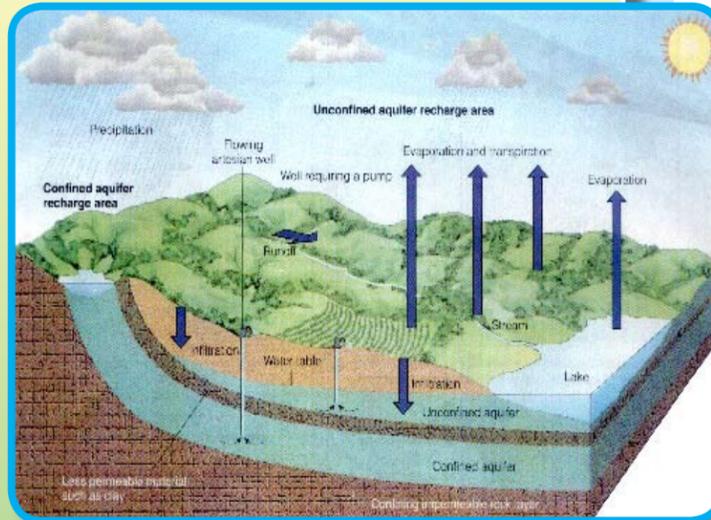
Groundwater can have a major impact on the volume and quality of surface water supplies. If groundwater quality and flow deteriorates, so too can the lakes and rivers connected with it.

Water Table The water table is the upper surface of the zone of saturation – where every hole in the soil and rocks is already filled with water. The water table falls in dry season and rises in wet season.

If the withdrawal rate of an aquifer exceeds its natural recharge rate, the water table around the withdrawal well is lowered, creating a waterless volume known as cone of depression which will lead sometimes to subsidence or ground settling because the reduced water level & pressure causes some of the pore spaces to compress/compact.

Aquifers Porous, water-saturated layers of sand, gravel, or bedrock through which groundwater flows and that can yield an economically significant amount of water. About 97% of the world's freshwater (liquid) is stored under the ground in aquifers. It is not sustainable to be too dependent on aquifers because it takes many years to recharge them.

Recharge area Most aquifers are replenished naturally by precipitation that seeps through the soil and rock in what is called natural recharge. Any area of land through which water passes into an aquifer is called a recharge area. It is particularly vulnerable to any pollutant that could be in the water.



of demand. In particular, by 2025 Davao City will experience a deficit of 69 million cubic meters (45% of the demand) of groundwater. This will likely happen considering the growing population and economic activities in the City. Added to this is the unabated destruction of water recharge areas in the uplands. At present the Davao City Water District gets 98% of its water supply from groundwater. Thus, the City will soon get its drinking water from surface water such as the Panigan-Tamugan River in Baguio District.

Table 1. Water Demand of Major Cities in the Philippines in MCM/year

	YEAR	TOTAL	Metro Manila	Metro Cebu	Davao	Baguio	Angeles	Bacolod	Iloilo	Cagayan de Oro	Zamboanga
Demand	1995	1,303	1,068	59	50	12	11	37	9	29	28
Demand	2025	3,955	2,883	342	153	87	31	111	47	98	203
Groundwater Availability Average		759	191	60	84	15	137	103	80	34	54
Surplus/Deficit	1995		877	1	34	3	126	66	71	5	26
Surplus/Deficit	2025		2,692	-282	-69	-73	106	-8	33	-64	-149
Surplus/Deficit	1995		-82%	2%	69%	21%	1148%	179%	788%	18%	92%
Surplus/Deficit	2025		-93%	-82%	-82%	-83%	343%	-7%	70%	-65%	-73%

Source: JICA Master Plan on Water Resources Management in the Philippines, 1998, taken from World Bank's Philippines Environment Monitor 2003.

Recently, Sun Star newspaper quoted a study conducted in Central Visayas that half of the towns and cities in Cebu Province, excluding Metro Cebu, has no access to potable water.

More than half of the world's population is in Asia but it has only 36% of the world's water resources⁹, thus there is more pressure on the continent's water resources. UN data show that 65% of the Asian population is not yet served with a water supply system¹⁰.

WATER QUALITY DEGRADATION: ITS EFFECTS ON FRESHWATER AVAILABILITY

Alterations of the land and its vegetation can change the processes that control water quality. Today there are less trees or permanent crops to hold more soil and water and filter pollutants, but more agricultural crops that are dependent on synthetic and petroleum-based pesticides and fertilizers.

The assessment of freshwater resources by UN and the Stockholm Environment Institute identifies the use of pesticides and chemical fertilizers as threat to water resources for they may leach into the soil, work their way into the groundwater and eventually degrade coastal areas. Christopher Wilkinson of the US EPA¹¹, considers groundwater contamination by pesticide and or pesticide residues as probably the single biggest environmental issue of this decade.

Groundwater and surface water have become polluted now by wastes coming from agriculture, industries, mining, landfills, and households. Hence, the availability of freshwater resources is reduced by pollution. According to the United Nations some 2 million tons of wastes/day are dumped into waters affecting mostly the poor population of developing countries by being exposed to polluted water sources. Another study concluded that the principal cause of water scarcity is quality degradation¹² because the amount of available water is a function of the quality of the water which may limit its use. Pollution in water does not only reduce the amount of usable supply but it also causes economic losses for the economy.

The country's annual economic losses caused by water pollution are estimated at P67 billion. (47 billion for tourism, 17 billion for fisheries production, and 3 billion for health).¹³

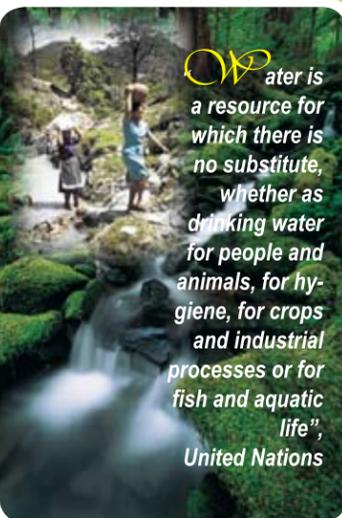
SOME KEY FACTS ON WATER:

- 40% of the world's people depend on water that originates in another country. Nile waters flow through 9 countries, Tigris-Euphrates is shared by Turkey, Syria and Iraq.
- 3,011 freshwater species are listed as threatened, endangered, or extinct, 1,039 of which are fish. Four of the five river dolphins and two of the three manatees are threatened, as are around 40 freshwater turtles and more than 400 inland water crustaceans¹⁴.
- The number of freshwater fish species in the Philippines is 230, 26 of these are already threatened¹⁵.
- While the total freshwater fish catch in Asia increased by more than 50% in 2000 when compared to its 1990 level, the Philippines on the other hand is showing a negative trend. The country's fish catch in 2000 is 37% lower than its catch in 1990¹⁶.

IS THERE A WATER CRISIS? LET THE FIGURES FROM UN TELL YOU THE ANSWER.

- The world is facing a worsening series of regional and local water crises, according to the United Nations and the Stockholm Environment Institute. All the signs suggest that it is getting worse and will continue to do so, unless corrective action is taken.
- The world now uses almost four times more freshwater than it did in the 1950s primarily because of increases in agricultural and industrial uses. As a result, per capita availability of water supplies worldwide is now 1/3 lower than it was in 1950s.⁷
- Two thirds of the world population -- close to 5.5 billion people -- will live in areas where economic growth and social progress may be hampered by the availability of freshwater by the year 2025, if current water usage and management policies continue.
- By the middle of this century, at worst 7 billion people in 60 countries will be water-scarce, at best 2 billion people in 48 countries.
- The UN World Water Development Report 2003 says "...of all the social and natural resource crises, we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet earth.
- Despite efforts of United Nations organizations, international banks, and some national governments over the past several decades, human health is still at substantial risk due to water quality problems in many areas of the world.⁸

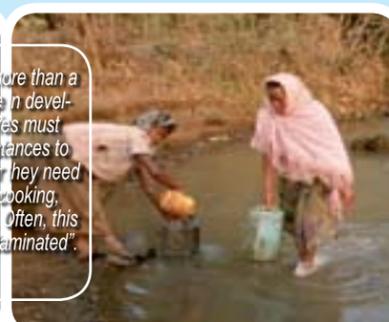
Table 1 below shows that by 2025 the availability of groundwater in many cities of the country will be outstripped by the volume



Water is a resource for which there is no substitute, whether as drinking water for people and animals, for hygiene, for crops and industrial processes or for fish and aquatic life".
United Nations



Each day, more than a billion people in developing countries must walk long distances to get the water they need for drinking, cooking, and bathing. Often, this water is contaminated".
www.water.org



Freshwater is a finite resource that has too often been treated as though it were infinite and free".
Porter and Welsh, 1996.

- The amount of groundwater withdrawn annually is about 20 % of global water withdrawals. About 1.5 billion people depend upon groundwater for their drinking water supply.
- The global average per capita water use in 2000 was 633 m³/year¹⁷.
- A person needs 4-5 gallons of water per day to survive¹⁸ but the per capita water consumption in developed countries (125 to 200 gallons per day) is on average about 10 times more than in developing countries (15-38 gallons per day and around 5 gallons only for those without access to running water).¹⁹
- The average African family uses only 5 gallons of water each day²⁰.
- There were more than 2,200 major and minor water-related disasters that occurred in the world between 1990-2001. Asia and Africa were the most affected continents with floods accounting for half of these disasters²¹
- In 2000 about 2.4 billion people still lacked access to improved sanitation and 1.1 billion lacked access to safe drinking water²².
- An estimated 6,000 children die each day from diseases associated with poor sanitation and hygiene and one in two hospital beds in the world is occupied by someone with a preventable water-borne disease.²³
- To provide 2,800 calories/person/day (needed for adequate nourishment) requires an average of 1,000 cu.m of water²⁴.
- It takes 4,000 liters or 4 cu m of water to produce 1 kg of rice.²⁵ And in China it takes 1 ton of water to produce 1 kg of wheat²⁶.

WHAT WE CAN DO?

Because our demands on water continue to grow, but our supplies don't, drinking water counts on everyone lending a hand to get involved in every effort to protect and conserve our finite water resource.

- Trees don't grow overnight. Protect surface and groundwater by protecting standing trees and by planting more permanent and deep-rooted, trees;
- Practice and promote organic farming, diversified cropping especially in recharge areas to prevent or at least minimize contamination of surface and groundwater sources;
- Some personal things we can do to conserve water: if you can't finish your glass of water, give the rest to a thirsty plant or pet instead of throwing it down the drain;
- Turn off the tap while you wash your hands, and you'll save 2-3 gallons; while you brush your teeth and you'll save 2-5 gallons of water; use basins in washing the dishes;
- Water plants before 8am or after 6pm to prevent the sun from evaporating the water before it can soak into the ground;
- To retain as much moisture as possible, put cut grasses/ plants or leaves around the plants and dig shallow basin / canal around trees or shrubs to prevent run-off;
- Use rainwater for watering plants, washing cars, bathing pigs;
- Re-use water – bath water for cleaning and flushing the toilet;
- Dispose your wastes properly, not on rivers and other bodies of water;
- Support the implementation of Davao City Water Code and Philippine Clean Water Act.

(Endnotes)

¹ Illustrated Encyclopedia of Science and Nature. Earth and Its Features. Time Life Asia, 2002.
² PICOP stands for – Paper Industries Corporation of the Philippines
³ <http://www.unep.org/GEO/yearbook> (March 13, 2005)
⁴ <http://earthtrends.wri.org> (March 25, 2005)
⁵ Miller, G Tyler 1996. Living in the Environment 9th Ed.
⁶ Ibid
⁷ Gareth Porte and Janet Welsh Brown, 1996. Global Environmental Politics 2nd Ed. Westview Press 1996.
⁸ World Resources Institute, 1996
⁹ Website of the UNESCO/IHP Regional Office of Latin America and the Caribbean, cited in The United Nations' World Water Development Report 2003
¹⁰ WHO/UNICEF Joint Monitoring Programme, 2002.
¹¹ US EPA stands for United States Environmental Protection Agency
¹² The Quality Degradation Effects on Freshwater Availability: Impacts of Human Activities by Norman E. Peters and Michel Meybeck.
¹³ World Bank. Philippines Environment Monitor 2003.
¹⁴ <http://www.unep.org> (March 8, 2005)
¹⁵ <http://earthtrends.wri.org> (March 25, 2005)
¹⁶ Ibid
¹⁷ <http://www.unep.org> (March 10, 2005)
¹⁸ The Sphere Project Handbook "Humanitarian Charter and Minimum Standards in Disaster Response" cited in www.water.org (March 25, 2003)
¹⁹ <http://europa.eu.int/comm/research/water-initiative/pdf/water-for-life> (March 20, 2005)
²⁰ World Resources Institute, 1998-99 and 1996-97. "A Guide to Global Environment."
²¹ CRED 2002 in United Nations' World Water Development Report: Water for People, Water for Life. 2003
²² UN website (March 20, 2005)
²³ <http://europa.eu.int/comm/research/water-initiative/pdf/water-for-life> (March 20, 2005)
²⁴ <http://www.unep.org> (March 20, 2005)
²⁵ According to a study by the International Rice Research Institute (IRRI) Los Baños Laguna.
²⁶ <http://news.bbc.co.uk> (March 25, 2005)
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 For the Pictures taken from: **Earth** - www.astro.washington.edu/weblinks/Earth/earth.gif
Water - <http://water.edu/watercycle.html>
Forest - www.plantzafrika.com/ (March 20, 2005)



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Watershed Issues In Brief

WATER for Life:

CLEAN AND ABUNDANT WATER FOR ALL

WHAT IS THE 'WATER CYCLE'?

All the water in the world goes round and round in a great cycle called the hydrologic (water) cycle (Figure 1). Rain falls (precipitation) onto the land, rivers and lakes and into the oceans. The Sun's rays heat the earth and water evaporates (evaporation) back into the atmosphere. As the water in the atmosphere cools, it condenses (condensation) to form rain clouds and later falls (precipitation) again as rain. Groundwater moves from the recharge area through an aquifer and out to a discharge area (well, spring, lake, stream or ocean) as part of the hydrologic cycle. Human activity interacts at all stages in the cycle. Having 1.36 billion metric tons of water, the earth is called "the water planet".¹

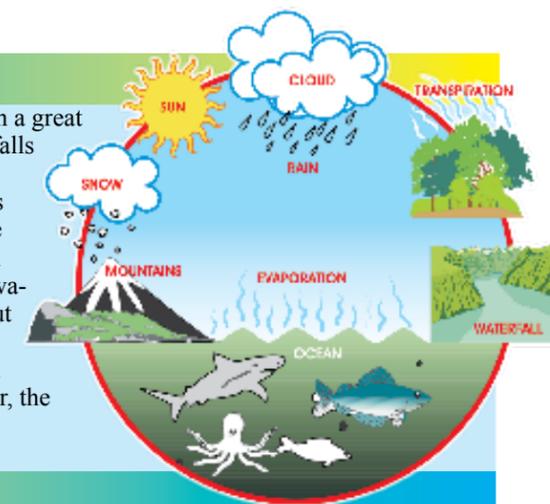


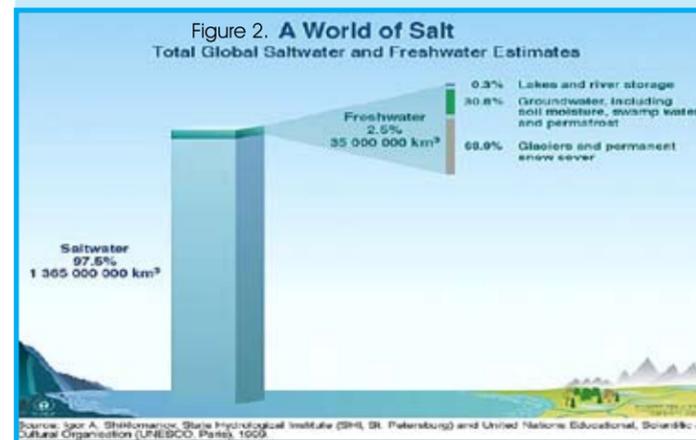
Figure 1. WATER CYCLE

WHAT'S THE ROLE OF THE FORESTS AND TREES IN THE WATER CYCLE?

Forests are the best land use for water recharge areas because of the absence of livestock and human activities. They can also collect more rainwater to feed the aquifer below. Trees are known to absorb large quantities of water and thus play an important role in minimizing or preventing floods. According to a PICOP² study, a dipterocarp tree (lauan, miyapis, tangile, nato, yakal, apitong) with a 40 centimeter-diameter and 30 meters in height can hold up to 70 gallons of water. A study by the San Francisco Water District in Mt. Magdiwata Watershed, shows how trees improved the surface water discharge after a reforestation program. A 2-liter per second increase in the river discharge was recorded. Aside from holding more water, forest tree species hold more soil too than agricultural crops. Thus, with undisturbed or well-managed natural forests, the quality of water run-off and recharge is good as there will be less soil with it. Forests therefore, provide clean water.

HOW MUCH FRESHWATER DO WE HAVE ON EARTH³ ?

Of the 1.36 billion MT of water the world has, only 2.5% is freshwater or what we can drink (Figure 2). The rest is salt-water. If all the freshwater is further classified 68.9 %, is in the form of ice and permanent snow cover in mountainous regions, the Antarctic and Arctic while 30.8% is stored underground in the form of groundwater (shallow and deep groundwater basins up to 2,000 meters, soil moisture, swamp water and permafrost). Freshwater in lakes and rivers account for 0.3 % only of the world's freshwater and the total usable freshwater supply (ground and surface) for ecosystems and people is just less than 1% of all freshwater resources. We cannot increase the amount of freshwater the world has, all we can do is change the way we use it.



MARCH 22, 2005
TO MARCH 22, 2015 IS
DECLARED BY THE UNITED
NATIONS GENERAL ASSEMBLY AS
**INTERNATIONAL DECADE
FOR ACTION:
WATER FOR LIFE**

MARCH 22 IS
**INTERNATIONAL
WATER DAY**

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