

# When water is a threat to life

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AFTER oxygen, water is the most vital substances to sustain life on earth. Its supply is also abundant. Covering almost 70 percent of the earth's surface, this compound rules every step of our life. A drop of water is simply another name for life. A molecule of this life sustaining compound is made of one oxygen atom and two hydrogen atoms. But this water can become life-threatening. With the increasing rate of pollution, water has become a serious health hazard for us. Moreover, the sustainability of water resources is becoming a major issue. To increase public awareness about the water-related problems as well as to promote several activities on water resources, a day has been set by the

UN as the World Water Day with a theme selected for each year. The observance of the day began from March 22 since 1993. Water pollution has a wide definition, which may be described as any physical, chemical or biological change in water quality that adversely affects living organisms, or makes water unsuitable for its desired uses. This pollution may be caused by two processes- natural and anthropogenic or man made processes. At present, natural pollution of water is insignificant compared to its anthropogenic pollution. Surface water bodies, such as rivers, streams and lakes, support a variety of life forms including fish, whose ability to survive in their natural habitat is dependent on the quality of water in these water bodies. This water quality is

mainly determined by one common indicator called Dissolved Oxygen or DO. DO means the sufficient amount of oxygen needed for aquatic life. It is the parameter which represents the purity of water. The reduction in the level of DO significantly hampers normal aquatic life, thus threatening the whole ecosystem indirectly. Pollution of surface water bodies results from the discharge of wastes from a variety of sources including municipal sewage, industrial wastewater and agricultural wastewaters. The wastes that are discharged into these water bodies may include organic wastes, persistent chemical wastes, heat wastes, radio wastes etc. By far the greatest volume of discharge into rivers and streams is that of oxygen demanding

organic waste that consumes the available DO in oxidizing the waste. When oxygen demanding wastes are discharged into a river or stream, the rate at which oxygen is consumed in oxidizing that waste may exceed the rate at which oxygen is replenished from the atmosphere. This can lead to depletion of oxygen resources, with DO concentrations falling far below the required levels. When this level drops below 4-5 milligram per liter, reproduction by fish and other macro organisms is impacted. Further depletion of DO may lead to anaerobic conditions with loss of biotic diversity. The water pollution problem in Bangladesh has become a topic of great concern. A study shows that about 80 million people from Bangladesh are exposed to a high level of toxicity from the water contaminated with arsenic. The situation is even worse in the capital Dhaka. According to a study conducted by World Bank, four major rivers near Dhaka -- the Buriganga, Shitalakhya, Turag and Balu -receive 1.5 million cubic meters of wastewater every day from 7,000 industrial units in surrounding areas and another 0.5 million cubic meters from other sources. The Buriganga, which was the pride of Dhaka, is now one of the most polluted rivers in Bangladesh because of careless dumping of industrial and human waste. Serious water-borne diseases are taking away many precious lives. All we can hope is an active step against these pollutions. The success of water day will depend on that.

The writer is a Civil Engineering Student at BUET.



A boy collect plastic waste in the River Buriganga.



Solar flare and Earth's magnetic field.

## Hot plazma bursts from Sun

DR. MOFIZ UDDIN AHMED

A recent NASA report shows that a solar flare is heading towards Earth. It could disrupt power grids, GPS and airline flights. It is the highest in the last five years which shakes the Earth magnetic field. Scientists say such storms don't pose a threat to people, just technology. What is a solar flare? A flare is a sudden, rapid and intense variation in brightness. A solar flare occurs when magnetic energy that has been built up in solar atmosphere suddenly released. The amount of energy releases is equivalent to the millions of hydrogen bombs exploding at the same time. The first solar flare recorded was on September 1, 1859. As the magnetic energy is being released particles, including electrons, protons and heavy ions of a hot plasma are accelerated in the solar atmosphere. There are typically three stages of a solar flare. First is the precursor stage where the magnetic energy is triggered. Soft x-ray emissions are detected in this stage. The second is the impulsive stage, when plasma jets are accelerated to energies exceeding 1 MeV. During impulsive stage, radio waves, hard x-rays and gamma rays are emitted. Finally,

the third stage is the decay stage, when soft x-rays can be detected. The duration of these stages can be as short as a few seconds or as long as an hour. Solar flare extend out to the layer of the Sun is called the Corona. The Corona is the outermost atmosphere of the sun. It is hot plasma which is the ionized state of matter. 99% of matter in the universe is in plasma state which is the fourth state of matter. The other states are: solid, liquid and gas. The temperature of the hot plasma is in the order of a few million degrees of Kelvin. The Corona is not uniformly bright. The bright loops are connected with the strong magnetic areas which are called active regions. Sunspots are located within these active regions. Solar flare occurs in the active regions. The frequency of solar flare coincides with the Sun's eleven years cycle. The radio and optical emissions from flares can be observed with telescopes on the Earth. Energetic emissions such as x-rays and gamma rays require telescopes to be placed in space since these emissions do not penetrate Earth's atmosphere. The author is a Plasma Physicist and Professor at BRAC University.

RAISING UP

IT'S IN THE STAPLE

MESSIER 9

### Greek volcano reawakens

**Santorini volcano is slowly inflating, a possible precursor to an eruption.**

THE Greek islands of Santorini, site of one of history's most colossal volcanic eruptions, are rumbling again. Since January 2011, earthquakes have shaken the landscape and the Santorini volcano's surface has lifted by about 140 millimeters possibly because magma is rising from the deep and filling an underground chamber, scientists report in an upcoming Geophysical Research Letters. It's far from certain whether Santorini will erupt, the researchers say. Even if it does, the eruption won't be anything like the infamous blast that occurred around 1600 B.C., says Andrew Newman, a geophysicist at the Georgia Institute of Technology in Atlanta. That eruption showered ash across the eastern Mediterranean, possibly contributing to the decline of the Minoan civilization and perhaps giving rise to the legend of the lost city of Atlantis. "We do not think a Minoan-type eruption is likely," Newman says. If Santorini does erupt, it will probably be a small eruption like those seen there over the past few hundred years, most recently in 1950. Those eruptions have built up a pair of islands in the center of the now-drowned remains of the volcano, or caldera.

Source: Science News

### White rice increases diabetes risk!

**The risk of type 2 diabetes is significantly increased if white rice is eaten regularly, claims a new study.**

THE risk of type 2 diabetes is significantly increased if white rice is eaten regularly, claims a study published today onbmj.com. The authors from the Harvard School of Public Health look at previous studies and evidence of the association between eating white rice and the risk of type 2 diabetes. Their study seeks to determine whether this risk is dependent on the amount of rice consumed and if the association is stronger for the Asian population, who tend to eat more white rice than the Western world. The authors analysed the results of four studies: two in Asian countries (China and Japan) and two in Western countries (USA and Australia). All participants were diabetes free at study baseline. White rice is the predominant type of rice eaten worldwide and has high GI values. High GI diets are associated with an increased risk of developing type 2 diabetes. The average amount of rice eaten varies widely between Western and Asian countries, with the Chinese population eating an average of four portions a day while those in the Western world eat less than five portions a week. A significant trend was found in both Asian and Western countries with a stronger association found amongst women than men. The results also show that the more white rice eaten, the higher the risk of type 2 diabetes: the authors estimate that the risk of type 2 diabetes is increased by 10% with each increased serving of white rice (assuming 158g per serving). White rice has a lower content of nutrients than brown rice including fibre, magnesium and vitamins, some of which are associated with a lower risk of type 2 diabetes. The authors report, therefore, that a high consumption of white rice may lead to increased risk because of the low intake of these nutrients. In conclusion, the authors state that "higher white rice intake is associated with a significantly elevated risk of type 2 diabetes." This applies for both Asian and Western cultures, although due to findings suggesting that the more rice eaten the higher the risk, it is thought that Asian countries are at a higher risk. The authors recommend eating whole grains instead of refined carbohydrates such as white rice, which they hope will help slow down the global diabetes epidemic. In an accompanying editorial, Dr Bruce Neal from the University of Sydney suggests that more, bigger studies are needed to substantiate the research hypothesis that white rice increases the chances of getting type 2 diabetes.

Source: Science Daily

### Rainbow star cluster

HUNDREDS of thousands of glittering stars shine in a globular cluster known as Messier 9 at the center of our galaxy in a new photograph from the Hubble Space Telescope. Hundreds of thousands of glittering stars shine in a cluster at the center of our galaxy in a new photograph from the Hubble Space Telescope. The cluster is called Messier 9, and contains hordes of stars swarming in a spherical cloud about 25,000 light-years from Earth. The object is too faint to be seen with the naked eye, and when it was discovered by French astronomer Charles Messier in 1764, the scientist could only resolve it as a faint smudge that he classified as a nebula ("cloud" in Latin). Now, though, the Hubble Space Telescope is powerful enough to make out more than 250,000 individual stars in Messier 9, in a new picture released today (March 16). The bluer points indicate hotter stars, while the redder stars are cooler. Messier 9 is what's known as a globular cluster, containing some of the oldest stars in the galaxy in a clump that is thought to have formed together when the universe was much younger. These stars, which are about twice as old as the sun, are made of different materials than our star. They tend to lack the sun's heavier elements, such as oxygen, carbon and iron, which were only present in larger quantities when the universe was older. Hubble's new photo is the most high-resolution image ever taken of Messier 9, and reveals the ancient cluster as never before. So many details of the stars are visible, despite the fact that the whole image spans an area no bigger than the size of the head of a pin held at arm's length. The more than 20-year-old Hubble Space Telescope launched on April 24, 1990. Since then, it has been visited five times by space shuttle crews for repairs and upgrades, and is still in great shape, scientists say.

Source: Live Science

CHAMPION BITER

DID YOU KNOW?

### Power-packed jaws of Australian saltwater croc

**All crocodilians have essentially the same musculoskeletal design, Erickson explains, just different snouts and teeth.**

In Greg Erickson's lab at Florida State University, crocodiles and alligators rule. Skeletal snouts and toothy grins adorn window ledges and tables -- all donated specimens that are scrutinized by researchers and students alike. Lately, Erickson, a Florida State biology professor, and his colleagues have been pondering a particularly painful-sounding question: How hard do alligators and crocodiles bite?

Source: Science Daily

### Are we at Milky Way's centre?

No. The Milky Way is not all around us because we do not live in the middle of the Milky Way; our solar system resides midway between the edge and the center of the Milky Way galaxy. If we could travel at the speed of light (186,000 miles per second), it would take us about 25,000 years to reach either the rim or the center of the Milky Way. Our solar system makes up only a tiny part of the Milky Way. To compare, if the entire Milky Way would be the size of the United States, our solar system would only be the size of an American penny.

### The globular cluster Messier 9 shines in this new photo from the Hubble Space Telescope.