



News Analysis (22 Mar, 2019)

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Water on Asteroid Bennu

Recent, observations by **NASA's OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer)** spacecraft has found that the asteroid Bennu has lots of accessible water.

- OSIRIS-REx mission had arrived at asteroid Bennu after a two-year journey in December 2018.
- OSIRIS-REx was launched from Cape Canaveral, Florida on September 8, 2016.
- The OSIRIS-REx mission is not the first to ever visit an asteroid and attempt a sample return — Japan has done (Hayabusa Mission) it before and Europe (Rosetta Mission) has managed to land on a comet.

Rosetta Mission

- Rosetta Mission was launched by the European Space Agency in 2004 to explore Comet 67P/Churyumov-Gerasimenko and to study the nucleus of the comet and its environment.
- Rosetta was the first mission ever to orbit a comet's nucleus and land a probe on its surface. It was also the first spacecraft to fly alongside a comet as it head towards the inner Solar System

Mission

- The Mission **aims to study asteroid Bennu, collect a sample and return it to Earth in 2023.**
- The mission will spend 2.5 years, mapping its surface and studying its composition.
- In mid-2020, scientists will direct Osiris-Rex to drop down to the asteroid and grab at least 60g of regolith, or "topsoil".
- This will be packed away in a sterile capsule to be returned to earth in 2023.

Mission Objective

The OSIRIS-REx name is an acronym of the mission objectives, which are:

- **Origins:** Return and analyze a pristine carbon-rich asteroid sample
- **Spectral Interpretation:** Provide ground truth or direct observations for telescopic data of the entire asteroid population
- **Resource Identification:** Map the chemistry and mineralogy of a primitive carbon-rich asteroid
- **Security:** Measure the effect of sunlight on the orbit of a small asteroid, known as the Yarkovsky effect. This effect is the slight push created when the asteroid absorbs sunlight and re-emits that energy as heat, could change the trajectory of asteroids.
- **Regolith Explorer:** Document the regolith (layer of loose, outer material) at the sampling site at scales down to the sub-centimeter

Significance of Mission

- **Origins of the Solar System**

- In order to understand the origin and evolution of the solar system.
- As Earth formed, and afterward, objects like Bennu may have delivered the molecules of carbon and water to our planet. By studying Bennu, we can better understand how life originated on earth.

- **Protecting Earth**

- Bennu is one of the most potentially hazardous asteroids currently known to Earth. Bennu has a 1-in-2,700 chance of impacting earth during one of its close approaches to Earth in the late 22nd century.
- Close observations by OSIRIS-REx will help get more information about Bennu's journey and help scientists working on safeguarding our planet against hazardous asteroids.

- **Mining, LaunchPad, and Future Explorations**

- The recent discovery of water will help to explore the possibility of using asteroids as refueling stations for spacecraft on the way to deeper destinations in space.
 - As water can be split into its constituent hydrogen and oxygen which can be used as fuel in rockets.
- Water could also be harvested for providing water to astronauts.
- Asteroids contain a range of valuable minerals, there is a possibility of mining asteroids in the future.

About Bennu

- The asteroid was discovered by the Lincoln Near-Earth Asteroid Research (LINEAR)

survey on September 11, 1999.

- It was originally named as 1999 RQ36.
- The name Bennu comes from an Egyptian deity related to the Sun, often depicted as a gray heron.
- Bennu is a 500-meter wide asteroid in an elliptical orbit around the sun. It is a carbonaceous asteroid composition including a large amount of carbon.

Why Bennu?

- **It's close to Earth**
 - Bennu's orbit is close in proximity to Earth's, even crossing it. The asteroid makes its closest approach to Earth every 6 years.
 - It also circles the Sun nearly in the same plane as Earth, which makes it simple to launch the spacecraft out of Earth's plane and into Bennu's plane.
- **It's the right size**
 - Small asteroids, with diameters of 200 meters or less, spin very fast. This rapid spinning makes it difficult for a spacecraft to match an asteroid's velocity and collect samples.
 - Bennu's size makes it approachable and makes landing possible.

UN World Happiness Report- 2019

The **Sustainable Development Solutions Network for the United Nations** released the **World Happiness Report on March 20**, which was designated as the **World Happiness Day by the UN General Assembly in 2012**.

- This is UN's **seventh annual World Happiness Report**, which ranks the world's 156 countries on **"how happy their citizens perceive themselves to be"**.
- The focus of report was- "**Happiness and Community: how happiness has been changing over the past dozen years, and how information technology, governance and social norms influence communities"**
- The report ranks countries on **six key variables** that support well-being:
 - Income,
 - Freedom to make life choices,
 - Trust,
 - Healthy life expectancy,
 - Social support and
 - Generosity.
- The happiness study ranks the countries of the world on the basis of **questions from the Gallup World Poll**. The results are then correlated with other factors, including GDP and social security.

Findings

- The overall world happiness has **fallen over the past few years**, which has mostly been fuelled by a sustained drop in India, which came in **140th place this year (2019)** compared with **133rd in 2018**.

There has been an **increase in negative emotions, including worry, sadness and anger**.

- India featured in the five countries that had the **largest drop since 2008** in the index, along with Yemen, Syria, Botswana and Venezuela.
- The list is **topped by Finland for the second year in a row** followed by **Denmark, Norway, Iceland and the Netherlands**.
- Among India's neighbouring countries, **Pakistan is ranked 67th, Bangladesh 125th, Bhutan 95th, Sri Lanka 130th and China is placed at 93rd**.
- People in war-torn **South Sudan are the most unhappy** with their lives, followed by **Central African Republic (155), Afghanistan (154), Tanzania (153) and Rwanda (152)**.

Sustainable Development Solutions Network (SDSN)

- The Sustainable Development Solutions Network (SDSN), **launched in 2012**, mobilizes global scientific and technological expertise to promote practical problem solving for the **Sustainable Development Goals (SDGs)** and the **Paris Climate Agreement**.
- It was established under the auspices of the **United Nations Secretary-General**.
- The **SDSN and the Bertelsmann Stiftung** have been publishing the annual **SDG Index & Dashboards Global Report since 2016**.

World Water Day

On March 22 of every year, World observes World Water Day, the theme of which, this year, is “Leaving no one behind”.

- Conceived in 1993 by the United Nations, this Day advocates for the sustainable management of freshwater resources.
- **UN Water created in 2003 is an UN Inter Agency organization that works on water issues and releases thematic report on the theme chosen for World Water Day every year.** It has its headquarter in Geneva, Switzerland.

Key Findings From United Nations World Water Development Report, 2019

- Approximately 2.1 billion people do not have access to clean and readily available drinking water.
- 4.3 billion people do not have access to safe sanitation facilities.

- **Half of the world's population with inadequate access to safe drinking water lives in Africa** and that only 24 percent of the population in sub-Saharan Africa has access to safe drinking water.
- **Refugees and internally displaced people "are among the most vulnerable and disadvantaged groups**, who often face barriers to access to basic water supply and sanitation services.
- **The wealthier generally receive high levels of WASH services at (often very) low cost, whereas the poor pay a much higher price for a service of similar or lesser quality.**
- One in four primary schools have no drinking water service, with pupils using unprotected sources or going thirsty.
- More than 700 children under five years of age die every day from diarrhoea linked to unsafe water and poor sanitation.
- 700 million people worldwide could be displaced by intense water scarcity by 2030.
- **By the year 2050, 45 percent of global gross domestic product and 40 percent of global grain production will be threatened by environmental damage and lack of water resources.**
- Equal access to water for agricultural production, even if only for supplemental watering of crops, can make the difference between farming as a mere means of survival and farming as a reliable source of income.
- **The report underscores that exclusion, discrimination, poverty and inequalities are among the main obstacles to achieving the water-related goals of the 2030 Agenda of Sustainable Development Goal 6.**
- The report points out that tailored responses targeting specific groups can help ensure that affordable water supply and sanitation services are available to all.

Indian Stats

Findings from "Beneath the Surface: The State of the World's Water 2019"- Report by non-profit organisation WaterAid:

- India has a billion people living in water scarce regions during at least one part of the year, and around 600 million in areas of high to extreme water stress.
 - India uses the largest amount of groundwater -- 24% of the global total.
 - **India is the third largest exporter of virtual water (groundwater that is used to grow export-oriented, water-intensive crops) -12% of the global total.**
- For more on 'ground water crisis' in India, [click here](#).

Important Facts For Prelims (22nd March 2019)

Super Worm Equinox Moon

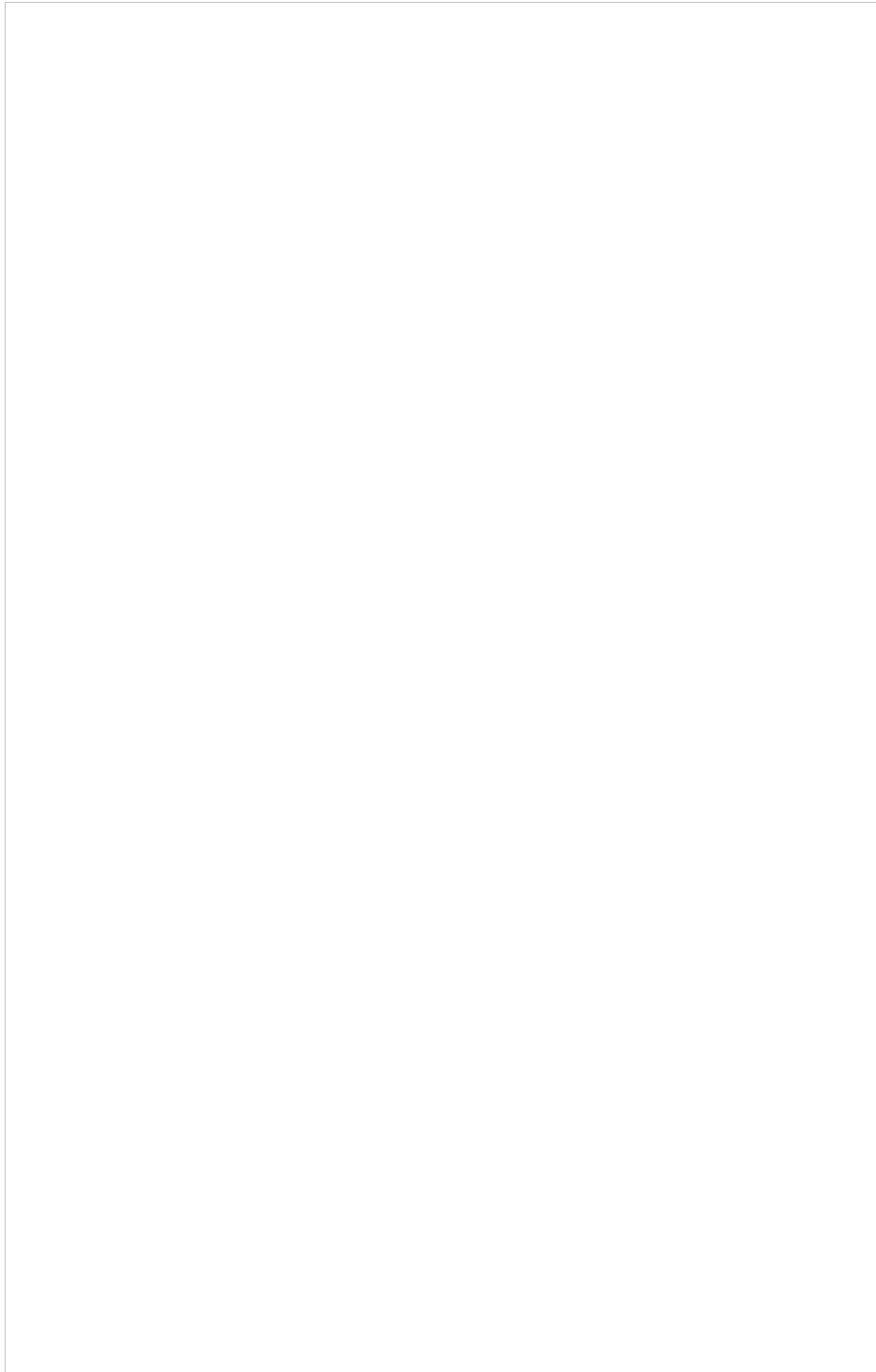
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- The **last supermoon of the year has coincided with the Spring Equinox**. The phenomenon is generally known as 'Super Worm Equinox Moon'.
 - **The full moon of the March is the third supermoon of the year**, following a super blood wolf moon on January 21st and a super snow moon on February 19th.
 - **The full moon is also known as the worm moon** in some parts of the world. It is called so because, in cold climates, the ground begins to warm up at this point and earthworms appear.
 - When the moon is at its closest point to the earth, it is called 'perigee' and when a full moon coincides with a perigee, it is called Supermoon.
 - The **Equinox is the moment** when the **length of day and night become equal** and the **sun's rays fall directly on the earth's equator**. The phenomenon happens **twice a year- once as autumn equinox in September and the other in March as spring equinox or vernal equinox**.

LightSail2

- The **LightSail 2** is a project to demonstrate controlled solar sailing using a miniature CubeSat satellite.
- It will be launched from the Kennedy Space Center, Florida, US in April 2019.
- LightSail 2 is the **second of three satellites** built to demonstrate the **feasibility of powering a spacecraft using solar radiation**.
- This mission is designed to see if LightSail can move into higher orbits around the Earth using **only photons from the sun to push it along**.

Solar Sailing

Solar sails (also called light sails or photon sails) are a proposed method of spacecraft propulsion using radiation pressure exerted by sunlight on large mirrors.



Fall Armyworms

- **'Fall armyworms'** are **native to the Americas** but they have been moving eastwards since 2016, sweeping across Africa, where they caused \$1-3 billion in damage, before arriving in Asia.
- The flying insects **arrived in India** in July and have since spread to Sri Lanka, Bangladesh, Myanmar, Thailand and China's Yunnan province.
- Farming in several Asian countries is under threat from a type of crop-damaging

insects that have munched their way from the Americas and across Africa

- They **feed mostly on maize, for which China is the world's second-largest producer**, and can feed on several species of crops, including rice and sugarcane.
- FAO meeting in Bangkok with officials from affected countries and experts for discussing ways to limit armyworm infestations amid a **“growing sense of alarm”**.
- FAO is working with local authorities and training farmers to manage the pests by crushing egg masses and using biopesticides.
- Chemical pesticides are an option but should be carefully considered due to environmental and health damages.

Food and Agriculture Organization (FAO)

- The Food and Agriculture Organization is an **agency of the United Nations** that leads international efforts to defeat hunger.
 - FAO is also a source of knowledge and information and helps developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices, ensuring good nutrition and food security for all.
 - **Formation: 16 October 1945, in Quebec City, Canada**
 - **Headquarters: Rome, Italy**
 - Every year, **World Food Day (Theme for 2018- Zero Hunger) is celebrated on October 16** to commemorate the founding of the Food and Agriculture Organisation (FAO) of United Nations in the year 1945.
 - The **Sustainable Development Goal (SDG-2) also aims to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture” by 2030.**
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