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WHAT IS SUB-REPLACEMENT FERTILITY IN DEMOGRAPHY

Relevant for: Geography | Topic: Demography of the World - Population Trends

This refers to any fertility rate below the replacement rate that would cause the population of a certain group of people to decrease over time. A population's fertility rate falls below the replacement rate when adults fail to produce enough offspring to even replace themselves. The sub-replacement fertility rate is generally considered to be anything below the replacement fertility rate of 2.1 children per woman in developed countries. The replacement rate, however, differs across the globe. For instance, it is much higher in developing countries where the infant mortality rate is much higher than in the developed world due to various reasons.

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India can take up its fight against terrorism at the United Nations Security Council in various ways

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CABINET OKAYS NATIONAL MINERAL POLICY 2019

Relevant for: Geography | Topic: Distribution of Key Natural Resources - Minerals & Oil Resources of the World

The Union Cabinet on Thursday approved the National Mineral Policy 2019.

The policy is aimed at bringing about more effective regulation to the sector as well as a more sustainable approach while addressing the issues of those affected by mining.

“The aim of [the] National Mineral Policy 2019 is to have a more effective, meaningful and implementable policy that brings in further transparency, better regulation and enforcement, balanced social and economic growth as well as sustainable mining practices,” the government said in a statement.

Reconnaissance permit

Some of the features in the policy include the introduction of the right of first refusal for the reconnaissance permit (RP) and prospecting license holders, encouraging the private sector to take up exploration and the auctioning of virgin areas on a revenue- sharing basis.

In a separate decision, the Union Cabinet gave its ex-post facto approval for the creation of a special purpose vehicle (SPV) for the disinvestment of Air India and its subsidiaries and joint ventures.

The SPV, named Air India Assets Holding Ltd. (AIAHL), has been created for the purpose of warehousing the accumulated working capital loan not backed by any asset along with four subsidiaries (Air India Air Transport Services Ltd. (AIATSL), Airline Allied Services Ltd. (AASL), Air India Engineering Services Ltd. (AIESL) and Hotel Corporation of India Ltd. (HCI), according to the statement issued by the government.

The Cabinet also gave its approval for the creation of a SPV for the disinvestment of Air India

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NORTHEAST INDIA THROWS UP ASIA'S OLDEST BAMBOO FOSSILS

Relevant for: Geography | Topic: Physiography of India including Geology

The scientists came across the fossils on their digs in north-east India. | Photo Credit: [Gaurav Srivastava](#)

Northeast India, a bamboo hotspot, has thrown up several bamboo fossils. One of them at around 28 million years old, is the oldest Asian bamboo fossil ever unearthed.

Scientists from institutes including Lucknow's Birbal Sahni Institute of Palaeosciences came across the fossils on their digs in northeast India. At Assam's Makum Coalfield, they came across three culm (bamboo stem) fossils, one almost a metre long. At the Subansiri Formation of Doimara in Arunachal Pradesh, the team also came across two bamboo leaf fossils.

The team compared these culm and leaf fossils to extant bamboo species at the bamboo garden in China's Xishuangbanna Tropical Botanical Garden and samples at the Botanical Survey of India (Kolkata). The leaf fossils belong to two different bamboos, *Bambusium doimaraense* and *B. arunachalense* (named after where they were unearthed from), approximately 10 million years old (dating to the age of the sandstone deposits, in the late Miocene-Pliocene).

The culm fossils have been named new species too: *Bambusiculmus tirapensis* and *Bambusiculmus makumensis*. These are around 28 million years old and date to the late Oligocene period. According to the scientists who published their work in the *Review of Palaeobotany and Palynology*, the culm fossils are the earliest evidence of bamboos in Asia (so far, bamboo fossils from Asia date back only to the Neogene (3 to 23 million years ago)).

These fossil finds raise two important points, according to lead author Gaurav Srivastava (Birbal Sahni Institute). "The earliest bamboos in Asia probably originated in eastern Gondwana, which comprises India too," he says. "Independent molecular studies also suggest this. This is not surprising because northeast is a centre of diversity for bamboos, as is nearby southern China."

Secondly, based on vegetation reconstruction and climate prediction studies, ancient bamboos probably evolved during a warm and humid period, he adds. "However, they seem to have adapted over the years and modern bamboos are found in both warm and cold climates now," he says.

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For long, most people were under the assumption that cigarette filters are biodegradable however, cellulose acetate fibre - the predominant filter material - does not readily biodegrade due to the acetyl groups on the cellulose backbone

A living member of species of tortoise not seen in more than 110 years and feared to be extinct has been found in a remote part of the Galapagos

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RELAXATION OF RULES TO AID RED-FLAGGED ANDAMANS TOURISM PROJECT

Relevant for: Geography | Topic: Factors responsible for location of Tertiary sector Industries incl. Tourism in world & India and related issues

The Environment Ministry has amended laws that now allow a proposed tourism project in the Aves island, of the Andaman and Nicobar island (A&N) territory, to come up.

The project was the only one of three high-profile proposed tourism projects that did not get a clearance from an expert committee on coastal clearance in February. This was because the proposed Aves island project was located 20 m away from the High Tide line (HTL) and existing rules required such projects to be at least 50 m away.

An official said that while the new rules did ease the way for the Aves island project, it was also done to broadly align the changes in coastal zone regulations in the country's mainland States with the island regions. "What is important is that there is no other industrial development in the A&N and tourism is a major thrust area that we have to consider. However, there continue to be stringent provisions on how infrastructure and development projects can be executed," an official, who did not want to be identified, told *The Hindu*. These were "high end" eco tourism projects and had to strictly adhere to the island management plan, the official added.

In December, the government had issued a coastal regulation zone notification that largely allows tourism and development projects located near coasts in mainland States to come up closer to the sea. It also issued an Island Zone Protection Notification in January 2019 to allow similar relaxations in the A&N Islands.

In January, an expert committee of the Union Environment Ministry "deferred" clearance to a 100 crore proposal by the Andaman and Nicobar Islands Integrated Development Corporation Limited to develop an island resort, as well as put up "premium tents" and "tree houses," on the grounds that it did not account for the biodiversity of the islands' coast.

After site visits, the committee in February recommended two of them— at Lalaji Bay on Long Island and at Smith Island — for island protection zone clearance, with caveats. However, the Aves Island project was still red-flagged primarily because of the 50 m clause. In light of the March 8th notification, the committee is likely to re-look the project.

The Centre has been working on a long-term plan to make several of the A&N islands more conducive to tourism. Last year, the Home Ministry revived an Island Development Agency that would coordinate infrastructure projects to aid tourism in the A&N islands as well as Lakshadweep.

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Continuing drought will further burden the already depleting groundwater resources of the country, according to associate professor Vimal Mishra

A living member of species of tortoise not seen in more than 110 years and feared to be extinct has been found in a remote part of the Galapagos

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INSTEAD OF DISRUPTING INDIAN STANDARD TIME, NORTHEAST CAN TWEAK ITS OFFICE HOURS

Relevant for: Geography | Topic: The Earth, its Evolution and Origin of Life on Earth

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The writer is chairman, Economic Advisory Council to the PM. Views are personal.

“By heading towards the East, Phileas Fogg had gone towards the sun, and consequently his days were four minutes shorter for each degree of longitude covered in this direction.” That name is a giveaway. This is a quote from *Around the World in Eighty Days*, the William Butcher translation. India is a large country. The distance between the eastern border and western border traverses 29 degrees of longitude. In practice, this leads to a difference of two hours between the east and the west in the rising/setting of the sun. I was born in Shillong and spent the early years of my life there. We used to be up and about by 5 am. By 8 pm, we were fast asleep. Recently, I revisited Shillong. Having lived in Delhi for several years, I have got used to waking up a bit later and sleeping a bit later. In Shillong, the sun and the birds woke me up at 5 am and for the duration of my stay, I went to sleep at 8 pm.

The issue of multiple time-zones for a country like India keeps resurfacing. It has resurfaced again with a paper in *Current Science* in October 2018 by scientists from the CSIR-National Physical Laboratory. The paper is titled, “Necessity of ‘two time zones: IST-I (UTC + 5:30 h) and IST-II (UTC + 6:30 h)’ in India and its implementation”. It focuses more on the implementation part. UCT stands for universal coordinated time, earlier known as GMT and still popularly known as that.

Let me quote from the paper. “The people, legislators and industrialists from Northeast part of the country have been demanding a separate time zone for a long time as they genuinely face problems with the existing Indian Standard Time (IST). The existing IST is said to be badly affecting their lives as the sun rises and sets much earlier than the official working hours. Early sunrise leads to loss of many daylight hours by the time offices or educational institutions open. In winter, this problem gets even more severe as the sun sets much early and therefore, more consumption of electricity is required to keep life active. Very recently, the Gauhati High Court also dismissed a public interest litigation seeking a separate time zone for the Northeast. We relook into the possibility of introducing two time zones in India which are feasible and implementable. The proposed recommendations of two time zones are based on: One, importance of sunrise and sunset timings on the biological activities of living beings; two, simple analyses of synchronising the sunrise and sunset timings across the country to the usual office hours of 9:00 a.m. to 5:30 p.m; three, minimisation of the spatial extension at the proposed border of time demarcation so as to avoid any kind of railway accidents; four if the proposed time-zones would be beneficial for the electricity saving; and five, the technical implementation mechanisms of the proposed two new time-zones in the country.” The paper’s conclusion is that its feasible to have two time zones in the country. The present IST (IST-I) is fine for the rest of India. But there should be an IST-II for Assam, Meghalaya, Nagaland, Arunachal Pradesh, Manipur, Mizoram, Tripura and Andaman and Nicobar Islands.

As I said, this is not a new issue. It has simply resurfaced. Before everything got standardised, there were two types of confusion. First, there wasn’t a single official time. There was Bombay Time (UTC + 4.51) and Calcutta Time (UTC + 5.30). Indeed, many towns/cities had their own

individual times, not just Bombay or Calcutta. The IST wasn't standardised until 1905/06. Even then, Calcutta Time officially lasted till 1948 and Bombay Time lasted quasi-officially till 1955. Second, since the railways were constructed by private companies, they had their own timetables, not invariably synchronised with the "official" times. Till the first decade of the 20th century, time-tables like Bradshaw often had two sets of times for trains, local and standardised.

This history probably explains why the paper discusses implementation issues in the railways. However, because the issue isn't new, the matter has been explored in the past and there must be compelling arguments for a retreat from standardisation. A paper citing the energy efficiency argument (with multiple time-zones) surfaced in the 1980s. In 2001, a Department of Science and Technology Committee examined the issue. Then, in 2004, the then Minister of Science and Technology told Rajya Sabha, "Since the expanse of the Indian State is not large, no need has been felt for different time zones." That of course is not an argument against a relook.

However, there is Ockham's Razor though that's more about postulates/theories — pluralitas non est ponenda sine necessitate. Taking a few liberties with the translation, why complicate and multiply unless it is necessary? Yes, the sun does rise and set at different times. But what is sacrosanct about the office timing of 9am to 5.30 pm? Without disrupting the IST, surely it is possible to have working hours, and office-hours in the Northeast from 8 am to 4.30 pm? Tea-gardens still follow that practice. That's akin to daylight saving for the Northeast, a simpler course of action. Why not that?

Indeed, in response to a question in Lok Sabha, in December, after the Current Science paper was published, the current Minister of Science and Technology endorsed what the then minister had said in 2004 — there is no case for multiple time-zones.

This article first appeared in the print edition on March 14, 2019, with the title 'A simpler time'. The writer is chairman, Economic Advisory Council to the PM. Views are personal.

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SOLAR TSUNAMI CAN TRIGGER THE SUNSPOT CYCLE

Relevant for: Geography | Topic: The Earth and the Solar System

It is believed that the “solar dynamo” — a naturally occurring generator which produces electric and magnetic fields in the sun — is linked to the production of sunspots. What kick-starts the 11-year sunspot cycle is not known. Now, a group of solar physicists suggests that a “solar tsunami” is at work that triggers the new sunspot cycle, after the old one ends.

The extreme temperature and pressure conditions that prevail some 20,000 km below the sun’s surface cause its material to form a plasma consisting primarily of hydrogen and helium in a highly ionised state. The plasma is confined with huge magnetic fields inside the sun. Explains Dr. Dipankar Banerjee from the Indian Institute of Astrophysics, Bengaluru, and one of the authors of the paper published in *Scientific Reports*, “The [sun’s] toroidal magnetic field, from which sunspots get generated, wraps around the sun in the east-west direction.”

These magnetic fields behave like rubber bands on a polished sphere. They tend to slip towards the poles. Holding these fields in their place requires that there is extra mass (plasma mass) pushing at the bands from higher latitudes. Thus, a magnetic dam is formed which is storing a big mass of plasma. At the end of a solar cycle, this magnetic dam can break, releasing huge amounts of plasma cascading like a tsunami towards the poles.

These tsunami waves travel at high speeds of about 1,000 km per hour carrying excess plasma to the mid-latitudes. There they give rise to magnetic flux eruptions. These are seen as the bright patches that signal the start of the next cycle of sunspots. The tsunami waves can traverse the required distance in a few weeks, unlike in earlier models.

To arrive at this simulation, the group used data from the Kodaikanal observatory of sunspots recorded over 100 years and the Cheyenne supercomputer belonging to National Center for Atmospheric Research (NCAR), Boulder, U.S. Mausumi Dikpati of NCAR and first author of the paper said in an email to *The Hindu*, “Cheyenne has 1,45,000 processors, and is a 4.5 petaflop machine. Each of these processors can perform 184 million arithmetic operations per second,” says Mausumi Dikpati of NCAR, the first author of the paper.”

She adds “We used about 100,000 processor cores of the supercomputer to perform about 100 simulations to conclude our results. This means in each of these hundred simulations, we performed about 66,000 trillion arithmetic operations per hour.”

Adds Dr. Banerjee, “The solar cycle and sunspot activity are intimately connected with space weather. The model provides a sound physical mechanism supporting why we should expect the next sunspot cycle 25 to begin in the year 2020, followed by a strong increase in space weather shortly after the trigger of a series of new sunspots in that year.”

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More native species grow under its canopies, and soil here is more moist and carbon-rich

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AN OSTRICH MENTALITY WILL ONLY INCREASE OUR WATER WOES

Relevant for: Geography | Topic: Distribution of key natural resources - Water Resources incl. Rivers & related issues in world & India

March 22 is World Water Day , and India has been reminded — once again — that the country's current water development and management system is not sustainable. In this regard, India faces a turbulent future. According to a new report, *Beneath the Surface: The State of the World's Water 2019*, by WaterAid, a non-profit organisation, 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. Twenty-four per cent of all India's water use is extracted ground water. This is alarming. India is the country that draws out more groundwater than any other in the world — more than that of China and the US combined. Because of this, the rate of groundwater depletion has increased by 23% between 2000 and 2010.

While India's groundwater extraction is a serious cause for worry and has been in focus for years now, nothing much has been done to redress the situation since it's a politically and electorally sensitive issue. A draft Groundwater Bill, 2017, proposed a new regulatory framework that recognised the fundamental right to water, the need for decentralised control and protection of aquifers, and sought to give control to local users. But the legislation was not passed. Yet there are examples of farmer-led projects in drought-prone districts that have succeeded in ensuring success in self-regulation of groundwater use. These need to be replicated across the country.

While a sustained focus on groundwater exploitation is important, two other issues need similar attention.

First, India's increasing use of virtual water, which is groundwater that is used to grow export-oriented, water-intensive crops. According to the WaterAid report, India is the third largest exporter of virtual water — 12% per cent of the global total. In 2014-15, the country exported 37.2 lakh tonnes of basmati, using around 10 trillion litres of water. This means India virtually exported 10 trillion litres of water. Replacing such crops with less water-intensive ones will mean a huge saving of water.

Second, the role of corporations in water conservation. Companies must improve their practices and ensure that access to water for basic human needs is prioritised in the communities and regions in which they work. Retailers must ensure that their supplies come from sustainable sources, and help suppliers make the business case for more water-efficient processes. But this cannot be done if consumers don't think about what they are buying and where those things come from.

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PREVENT DEGRADATION OF OCEAN AND ITS ECOSYSTEM: VICE PRESIDENT

Relevant for: Geography | Topic: Distribution of key natural resources - Ocean Resources in world & India

Vice President's Secretariat

Prevent degradation of ocean and its ecosystem: Vice President

Asks scientists to step up research on ocean and marine energy

Interacts with Scientists of National Institute of Oceanography

Posted On: 24 MAR 2019 4:33PM by PIB Delhi

The Vice President of India, Shri M. Venkaiah Naidu has called for fully tapping the enormous potential of the Blue Economy for the country to achieve higher economic growth.

Observing that the objective of the Blue Economy is to promote smart, sustainable and inclusive growth and employment opportunities through maritime economic activities, the Vice President wanted appropriate programs to be initiated for sustainable harnessing of ocean resources.

Interacting with the Scientists of National Institute of Oceanography (NIO), in Dona Paula, Goa today, Shri Naidu pointed out that India was meeting most of its oil and gas requirements through imports and urged the scientists to step up their research in areas such as ocean energy and marine energy. "Scientists should study the potential of renewable energy derived from the ocean-- from wind, wave and tidal sources", he added.

Asking the Institute to act as a nodal centre for Blue Economy related research and technology development, Shri Naidu said there was a need to focus on ocean centric technology to harness the marine resources for sustained growth of India. Development of technologies for deep sea mining, underwater vehicles and underwater robotics for extraction of minerals should be initiated. "NIO should also undertake research on development of drugs from the sea", he added.

The Vice President said that a focused approach in some of the areas such as minerals from the ocean, energy from ocean can make India a global leader and serve our national goals. 'However, while pursuing the "blue growth", every effort must be made by all the stakeholders, including private and public sectors, to prevent further degradation of the ocean and its ecosystems', the Vice President cautioned.

In view of global warming, resource degradation and marine pollution, we have to conserve and sustain our oceans as time is running out, Shri Naidu said and advised CSIR-NIO to play a major role through its ocean observation studies in understanding different ocean processes due to climate change.

Shri Naidu lauded NIO for providing specialized services to society in addressing ocean-related problems. He also expressed happiness that the institute helped in preparing India's claim for an extended continental shelf with an area of about a million square kilometres.

The Vice President also attended a presentation on various aspects and applications of Oceanography and visited laboratories and exhibition galleries at NIO. He applauded the good work being done by the Scientists and Scholars of NIO, especially in the field of conservation.

Following is the text of Vice President's address:

"I am delighted to visit this institute and address all of you. After becoming the Vice President, I have decided to visit various scientific and research institutions to interact with scientists for a better understanding of the work being undertaken by them and share my thoughts.

I am glad to interact with all of you and get a deeper appreciation of the excellent work being done by you. Oceans are of vital importance for the wealth and the well-being of present and future generations. They hold 97 per cent of the planet's water, while two per cent is found in glaciers and ice caps and only one per cent comprises earth's fresh water.

We are aware of the fact that oceans produce more than 50 per cent of the world's oxygen and absorb 40 per cent of the carbon dioxide, buffering the impact of global warming, underlines the crucial role played by them. Thus, they help in regulating the global climate.

Oceans cover 72 per cent of the surface of our blue planet and provide humankind with food, minerals, energy, fresh water and oxygen. They regulate climate, emission absorption and shoreline protection and support livelihoods as well as job creation. Indeed, oceans are our life support system.

Currently, it is estimated that more than three billion people depend on marine and coastal resources for their livelihoods. Enhancing more than 80 percent of global trade, marine and coastal environments constitute a key resource for economic development.

Considering the importance of oceans on the life and sustenance of humanity, the United Nations has taken steps to declare the period 2021–2030 as the Decade of Ocean Science for Sustainable Development. Further, the Sustainable Development Goal 14 (SDG-14) proposed by UN, which deals with life below the waters, emphasizes the importance of oceans in modulating and sustaining life.

With this background, it is important to prioritize our efforts in ocean science and technology to achieve the national goal of transforming India to be the third largest economy in the coming 10-15 years.

I am happy that CSIR-National Institute of Oceanography an autonomous body of the Department of Science and Technology, Government of India is doing research on different aspects of Ocean such as the impact of climate change, marine biodiversity, coastal hazards such as coastal erosion and storm surge, marine hazards like tectonics and slumping of seabed.

I understand that foundation of ocean science is mostly based on observations. To take up ocean observation studies, scientists like you need appropriate tools and platforms. I am told that research vessels are an ideal platform to do ocean observations. Research vessels and their equipment represent a significant technological asset.

I am glad that two dedicated ocean-going vessels, RV Sindhu Sankalp and RV Sindhu Sadhana

are managed by CSIR-NIO. With these two dedicated vessels, I am sure that CSIR-NIO will be able to carry out all the relevant studies in India's Exclusive Economic Zone, which constitutes 2/3rd of our land area.

From the presentations made to me by different groups, I understand that CSIR-NIO is playing a major role in understanding science of the North Indian Ocean such as dynamics of its circulation, basin-wide bio-geo-chemistry and tectonic framework of basin evolution.

I am informed that the efforts of CSIR-NIO led to establishing India as a pioneer in poly-metallic nodule mining with an allocated mining site of 75,000 sq. km in the central Indian Ocean.

I am glad that CSIR-NIO helped to prepare India's claim for extended continental shelf with an area of about a million square kilometres and this institute launched India's Antarctic research programme in the early 1980s.

I am also happy to note that the CSIR-NIO provides specialized services to society in addressing ocean-related problems, in addition to its planned research projects. I am happy to learn that this institute has successfully carried out more than 1300 projects funded by oil & gas companies, ports, power plants, chemical industries, municipalities and industrial estates.

I understand that CSIR-NIO has also carried out Marine Environmental Impact Assessments for several prestigious and nationally important developmental projects such as Sea Bird Project of Indian Navy at Karwar and others involving offshore prospecting for oil and gas by ONGC, HPCL, IOC and BPCL among others.

Dear sisters and brothers, development along the coast has been increasing over the years. I have been informed that the Government of India has already planned development of ports and allied facilities through Sagarmala. Different coastal economic zones are planned. The Sagarmala project, which seeks to modernize ports through IT enabled services, is expected to give an impetus to the economy.

With India looking towards oceans for the economic growth through the Blue Economy, important institutions like NIO will have to step up their research in areas such as ocean energy and marine energy. It should be noted that India is meeting most of its oil and gas requirements through imports. Scientists should study the potential of renewable energy derived from the ocean-- from wind, wave and tidal sources.

The objective of the Blue Economy is to promote smart, sustainable and inclusive growth and employment opportunities through maritime economic activities within the Indian Ocean region.

All of you will agree that, India should fully tap the enormous potential of the Blue Economy to achieve higher economic growth trajectory and initiate appropriate programs for sustainable harnessing of ocean resources, research and develop relevant sectors of oceanography.

However, while pursuing the "blue growth", every effort must be made by all the stakeholders, including private and public sectors, to prevent further degradation of the ocean and its ecosystems.

In view of global warming, resource degradation, and marine pollution, we have to conserve and sustain our oceans as time is running out. Hence, CSIR-NIO should play a major role through dense ocean observations and high-resolution ocean models over the Indian Ocean to meet the challenges in understanding different ocean processes due to climate change.

The Institute should also act as a nodal centre for Blue economy related research and technology development. There is a need to focus on ocean centric technology to harness the marine resources economically for sustained growth of India. Development of technologies for deep sea mining, underwater vehicles and underwater robotics for extraction of minerals should be initiated. NIO should also undertake research on development of drugs from the sea.

I strongly feel that focused approach in some of the areas such as minerals from the ocean, energy from ocean can make India a global leader and serve our national goals.

I wish all the success to each one of you ,the scientists and staff of CSIR-National Institute of Oceanography in your future missions.

JAI HIND!"

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