

PERFECT 7

WEEKLY

CURRENT AFFAIRS

May: 2019 / Issue-04

IN-FLIGHT CONNECTIVITY

Prospects and Challenges

- Structure and Dynamics of Indian Monsoon
- Right to Legal Aid : A Constitutional Expectation
- CTBT and India : An Analysis
- Credit Rating Agencies in India : Are They Credible
- Road Accidents in India : An Overview
- Rare Earth Metals : Current Status, Constraints and Opportunities



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ADMISSIONS OPEN FOR **NEW SESSION 2019-20**

**MUKHERJEE NAGAR
(DELHI)**

GENERAL STUDIES
Pre-cum-Mains

10 June | 5:30 PM

**OLD RAJENDRA NAGAR
(DELHI)**

GENERAL STUDIES
Pre-cum-Mains

10 June | 6:00 PM

**PRAYAGRAJ
(ALLAHABAD)**

GENERAL STUDIES
Pre-cum-Mains

10 June
7:30 AM & 6:00 PM

**LUCKNOW
(ALIGANJ)**

GENERAL STUDIES
Pre-cum-Mains

24 June | 6:00 PM

**LUCKNOW
(GOMTI NAGAR)**

GENERAL STUDIES
Pre-cum-Mains

11 June | 6:00 PM

GREATER NOIDA

GENERAL STUDIES
Pre-cum-Mains

10 June | 3:30 PM

BHUBANESWAR

GENERAL STUDIES
Pre-cum-Mains

10 June
7:30 AM & 6:00 PM

LAXMI NAGAR (DELHI)

GENERAL STUDIES

PCS
Regular Batch
3 June | 7:30 AM

IAS Regular Batch
Pre-cum-Mains
12 June | 10:30 AM
Weekend Batch
8 June | 11:00 AM

SCHOLARSHIP TEST
9 JUNE | 12 PM

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SCHOLARSHIP
Registration Mandatory



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(इण्टर के बाद IAS/IPS की तैयारी करें)

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16 JUNE
11:00 AM

Eligibility: Age Limits: 15-19 Years Age Group 12th Passed / Appearing Students

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DHYEYA IAS : AN INTRODUCTION



The guiding philosophy of the institute, throughout, has been creation of knowledge base. Dhyeya IAS inculcates human values and professional ethics in the students, which help them make decisions and create path that are good not only for them, but also for the society, for the nation, and for the world as whole. To fulfill its mission in new and powerful ways, each student is motivated to strive towards achieving excellence in every endeavor. It is done by making continuous improvements in curricula and pedagogical tools.

The rigorous syllabi not only instills in them, a passion for knowledge but also attempts to teach them how to apply that knowledge in real-life situations. The programmes lay emphasis on well-rounded personality development of the students and also in inculcating the values of honesty and integrity in them.

Vinay Kumar Singh
CEO and Founder
Dhyeya IAS



Dhyeya IAS is an institution that aims at the complete development of the student. Our faculty are hand-picked and highly qualified to ensure that the students are given every possible support in all their academic endeavors. It is a multi-disciplinary institution which ensures that the students have ready access to a wide range of academic material.

Our brand of education has broad horizons as we believe in exposure. Our students are encouraged to widen their knowledge base and study beyond the confinements of the syllabus. We aim to lend a gentle guiding hand to make our students recognize their inner potential and grow on their own accord into stalwarts of tomorrow's society.

Q H Khan
Managing Director
Dhyeya IAS

PERFECT 7 : AN INTRODUCTION



With immense pleasure and gratitude I want to inform you that the new version of 'Perfect-7', from the Dhyeya IAS, is coming with more information in a very attractive manner. Heartily congratulations to the editorial team. The 'Perfect-7' invites a wider readership in the Institute. The name and fame of an institute depends on the caliber and achievements of the students and teachers. The role of the teacher is to nurture the skills and talents of the students as a facilitator. This magazine is going to showcase the strength of our Institute. Let this be a forum to exhibit the potential of faculties, eminent writers, authors and students with their literary skills and innovative ideas.

I extend best wishes for the success of this endeavor.

Qurban Ali

Chief Editor

Dhyeya IAS

(Ex Editor- Rajya Sabha TV)



We have not only given the name 'Perfect 7' to our magazine, but also left no stone unturned to keep it 'near to perfect'. We all know that beginning of a task is most challenging as well as most important thing. So we met the same fate.

Publishing 'Perfect 7' provided us various challenges because from the beginning itself we kept our bar too high to ensure the quality. Right from the very first issue we had a daunting task to save aspirants from the 'overdose of information'. Focusing on civil services exams 'Perfect 7' embodies in itself rightful friend and guide in your preparation. This weapon is built to be precise yet comprehensive. It is not about bombardment of mindless facts rather an analysis of various facets of the issues, selected in a systematic manner. We adopted the 'Multi Filter' and 'Six Sigma' approach, in which a subject or an issue is selected after diligent discussion on various levels so that the questions in the examination could be covered with high probability.

Being a weekly magazine there is a constant challenge to provide qualitative study material in a time bound approach. It is our humble achievement that we feel proud to make delivered our promise of quality consistently without missing any issue since its inception.

The new 'avatar' of 'Perfect 7' is a result of your love and affection. We feel inspired to continue our efforts to deliver effective and valuable content in interesting manner. Our promise of quality has reached you in around 100 issues and more are yet to come.

Ashutosh Singh

Managing Editor

Dhyeya IAS



PREFACE

Dhyeya family feels honoured to present you a pandora box 'Perfect 7'. 'Perfect7' is an outstanding compilation of current affairs topics as per the new pattern of Civil Service examination (CSE). It presents weekly analysis of information and issues (national and international) in the form of articles, news analysis, brain boosters, PIB highlights and graphical information, which helps to understand and retain the information comprehensively. Hence, 'Perfect 7' will build in-depth understanding of various issues in different facets.

'Perfect7' is our genuine effort to provide correct, concise and concrete information, which helps students to crack the civil service examination. This magazine is the result of the efforts of the eminent scholars and the experts from different fields.

'Perfect 7' is surely a force multiplier in your effort and plugs the loopholes in the preparation.

We believe in environment of continuous improvement and learning. Your constructive suggestions and comments are always welcome, which could guide us in further revision of this magazine.

Omveer Singh Chaudhary
Editor
Dhyeya IAS

Perfect 7

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Founder & CEO
Vinay Kumar Singh

Managing Director
Q.H.Khan

Chief Editor
Qurban Ali

Managing Editor
Ashutosh Singh

Editors
Omveer Singh Chaudhary,
Rajat Jhingan, Jeet Singh, Avaneesh Pandey,
Shashidhar Mishra

Editorial Support
Prof. R. Kumar, Baghendra Pratap Singh

Lead Authors
Rama Shankar Nishad, Ajay Singh, Ahamad Ali,
Dharmendra Mishra

Authors
Sanjan Gotam, Ashraf Ali, Vivek Shukla,
Swati Yadav, Ranjeet Singh, Anshu Chaudhary,
Giriraj Singh

Chief Reviewers
Prerit Kant, Anuj Patel, Rajhans Singh

Copy Readers
Baghendra Pratap Singh, Pankaj Rathour

Design & Development
Sanjeev Kumar Jha, Punish Jain

Promotion & Advertisement
Gufran Khan, Rahul Kumar

Layout & Graphics
Vipin Singh, Krishna Kumar,
Nikhil Kumar, Ramesh Kumar, Sachin Kumar

Computer Operators
Krishna Kant Mandal, Tarun Kanoujia

Articles Support
Mrityunjay Tripathi, Priya Singh,
Rajni Singh, Rajni Tiwari, Lokesh Shukla,
Vishishth Mishra, Ankit Mishra, Ayushi Jain,
Preeti Mishra, Ravi Ranjan, Prabhat

Office Assistants
Hari Ram, Sandeep, Rajeev Kumar, Raju Yadav,
Subham, Chandan, Arun Tripathi

Content Office

DHYEYA IAS
302, A-10/11, Bhandari House,
Near Chawla Restaurants,
Dr. Mukherjee Nagar, Delhi-110009



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Our other initiative



Hindi & English
Current Affairs
Monthly
News Paper



DHYEYA TV
Current Affairs Programmes hosted
by Mr. Qurban Ali
(Ex. Editor Rajya Sabha, TV) & by Team Dhyeya IAS
(Broadcasted on YouTube & Dhyeya-TV)

SEVEN IMPORTANT ISSUES

1. IN-FLIGHT CONNECTIVITY : PROSPECTS AND CHALLENGES

Why in News?

Over the past couple of months, the Department of Telecom has issued licences to BSNL, Airtel, Hughes Communications India Ltd. and Tata Telenet for internet and mobile services on flights. International airlines could start providing internet onboard over Indian skies in the next three months becoming the first to do so, while domestic passengers may have to wait for another 7 to 9 months to start sending WhatsApp texts, browsing Twitter, streaming movies and making phone calls.

Introduction

In a world more connected and tech-driven than ever before, the aircraft was, not too long ago, one of the very few places on Earth where we couldn't access the internet. However, today's people are increasingly accustomed to stay connected anywhere, 24/7 – driven by the need to stay in touch with family, enjoy entertainment and maintain critical business communications. Even when they fly, they want broadband connectivity equal to that they've experienced from terrestrial network and Wi-Fi hotspots on ground. These expectations are pushing up the demand for fast, seamless aircraft connectivity.

In-flight internet access is getting popular day by day. Its demand is being driven by millions of smart phones, tablets and laptop computers. In Inmarsat's annual In-flight Connectivity (IFC) Survey 2016, it was found that

83% of passengers would prefer to fly with an airline offering IFC and over half (55%) of all IFC users have connected more than one device to in-flight Wi-Fi. One of the findings of that survey was that, for passengers who have experienced quality IFC before, Wi-Fi has evolved into a clear decision-making factor when choosing an airline, ranked ahead of loyalty programmes and in-flight entertainment. The flexibility offered by connectivity allows passengers the freedom to multitask onboard, behaving as they would do at home or in the office. The evolution of passenger attitude towards onboard Wi-Fi means that where it was once seen as a novelty or luxury, it is now considered a necessity.

With the advancement in the technology, Mobile Communication on Aircraft (MCA) has also become possible. There is increasing interest in the passengers to use their mobile phones on aircraft. There are over 30 airlines already allowing mobile phone use on aircraft including: AirAsia, Air France, British Airways, Egypt Air, Emirates, Air New Zealand, Malaysia Airlines, Qatar Airways and Virgin Atlantic. Internationally, more than forty jurisdictions, including the European Union (EU), Asia, and Australia, have authorized the use of mobile communications services on aircraft.

What is In-flight Connectivity (IFC)?

IFC mean airlines that have on board internet or Wi-Fi to let passengers

surf tweet, send text or WhatsApp message on their personal electronic devices at reasonably fast speeds in good connectivity zones. It is subject to factors like the number of concurrent users, satellite coverage and weather conditions.

IFC systems primarily use two kinds of technologies. In the first, an onboard antenna picks up signals from the nearest tower on the ground, just like, say, a moving car. Unless the aircraft passes over a big water body with no towers, the connection will remain seamless up to a certain altitude.

Otherwise, satellites can be used to connect to ground stations, similar to the way satellite TV signals are transmitted. An issue with deploying satellites for on-board connectivity of internet and mobile communications, however, is that the Telecom Commission- the highest policy making body of Department of Telecom (DoT), is not amenable to allow the use of foreign satellites - as demanded by some airlines in their consultations with the telecom regulator Telecom Regulatory Authority of India (TRAI) — unless they are leased by the Department of Space, making them a part of the Indian Satellite System (INSAT).

IFC Services through Satellite

IFC services are generally provided through the use of mobile satellite service and are referred to as aeronautical mobile-satellite service (AMSS). A mobile Earth station is

installed in the aircraft to establish backhaul link with the ground. When combined with on-board access technology (Wi-Fi or mobile networks), AMSS allows passengers to have telecom connectivity. AMSS networks are composed of three segments:

Space Segment (SS): It consists the satellite system that provides wide coverage.

Aircraft Earth Station (AES) Segment: This segment comprises of the equipment hosted on the aircraft like antenna, VSAT equipment, Wi-Fi APs etc; AES are installed on board aircraft. These are intended to provide non-safety related broadband data communication services (e.g. internet and other type of dataservices) to users on board.

Ground Earth Segment (GES): It consists of the hub/ Earth station for the network at ground which controls the remote mobile Earth stations and also hosts the network operation center (NOC).

IFC Services through Direct-Air-to-Ground Communications (DA2GC) Systems

It utilizes ground-based mobile broadband network for providing a cellular based backhaul to the aircraft. The onboard aircraft equipment includes one or two small antennas mounted below the fuselage, along with a compact and low-weight DA2GC Onboard Unit (OBU) with a transceiver, acting as a hub and ground interface. Ground based mobile broadband network send signals up to an aircraft's antennas. As in terrestrial telecom networks, the aircraft connects to the nearest ground based tower as it travels through different sections of airspace, with no theoretical interruptions except when the aircraft is passing over large bodies of water. This mode therefore may provide a solution for IFC on domestic routes as there are unlikely to be large bodies

of water and the mobile broadband network may be reasonably ubiquitous. DA2GC cannot be seen as a substitute technology of satellite broadband, but may complement it while providing in-flight connectivity.

Indian Scenario

India is the ninth-largest civil aviation market in the world with 550 aircraft and annual passenger traffic of 265 million inclusive of 22% international passengers. This is expected to reach 420 million by 2020. Considering the average per hour productivity of \$10-15 per person and 50% travels are work-related, using IFC for one hour an additional opportunity of \$2-3 billion can be created while on air travel.

Telecom Commission had cleared a proposal for allowing wider in-flight connectivity that is now available in most of the developed markets. The decision will pave the way for travellers to use internet and voice services on mobile phone during flights in the Indian airspace. In a recent move, the Department of Telecom has issued licences to BSNL, Airtel, Hughes Communications India Ltd. and Tata Telenet for internet and mobile services on flights. However, the installation of equipment and their certification means air travellers will have to wait for some more time to access these services. SpiceJet has already announced its plans to provide connectivity and Air India has invited tenders for the same. Vistara has also expressed its keenness. Subsequently, domestic carriers will start providing this service, starting with their international routes to catch up with competitors.

Scope of IFC services

The on-board access technology, when combined with AMSS, allows passengers to have telecom connectivity. The on-board access technology can be Wi-Fi to access internet, e-mail, internal corporate

networks, etc. onboard aircraft. The access technology can also be mobile network which will allow voice and text communications. Internationally, internet services onboard are provided by all the IFC service providers. However, there is a demand for Mobile Communication on Aircraft (MCA) services also.

Pricing Model

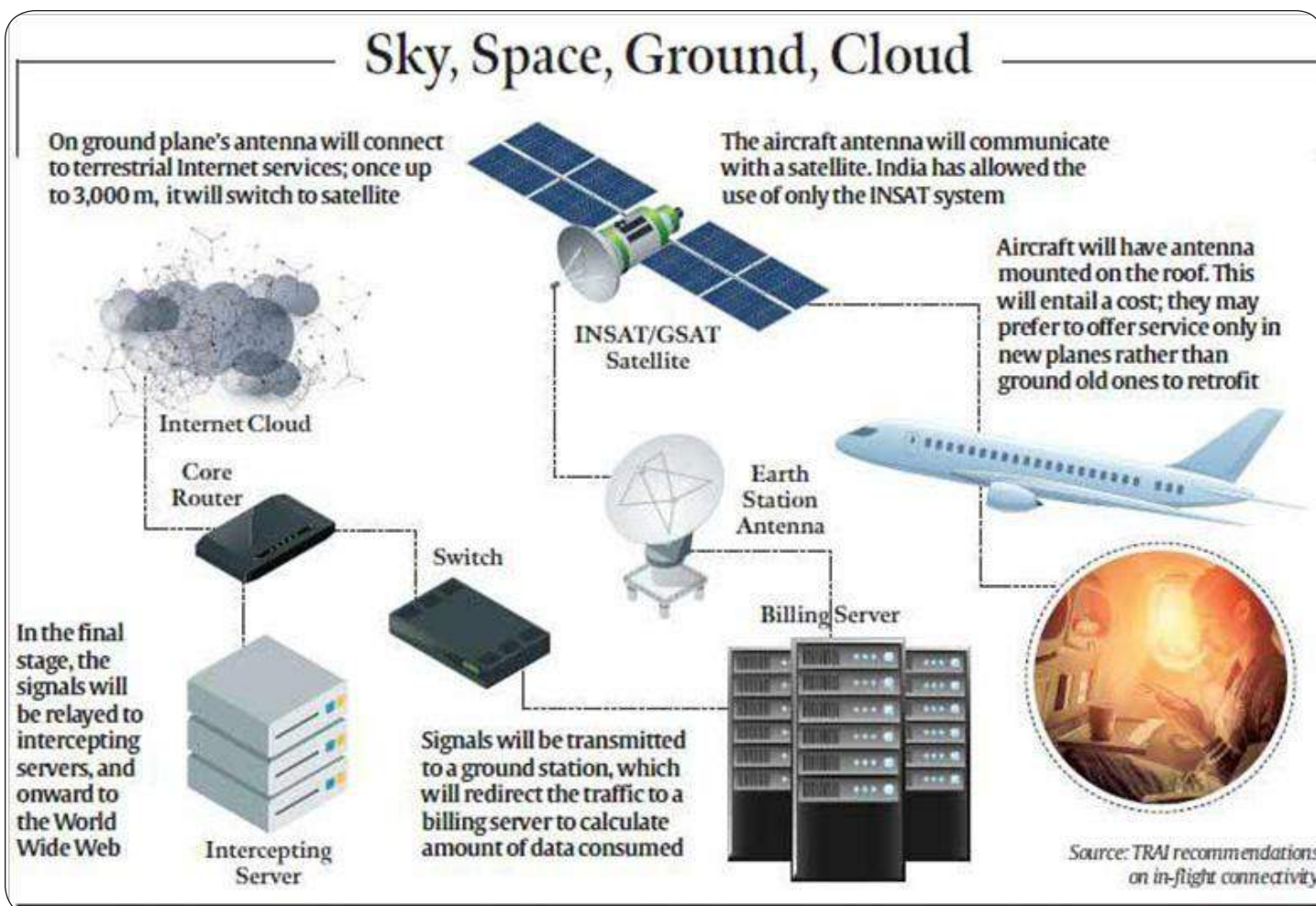
The pricing model could vary from one airline to another; a passenger could be set back by Rs. 200-300 assuming that all passengers on aircraft use the service.

According to the experts, the model will work only if the cost of the service is included in the ticket because the cost of the equipment that is fitted onboard can't be recovered if only a few passengers opt for it.

However, globally, internet access in the air is not exactly cheap. Singapore Airlines offers free data up to 100 MB in First and Business class on its India-bound flights (which can currently be used only outside Indian airspace). For Economy Class, data packs are available starting US \$ 5 (about Rs 335). Price plans may be volume-based or volume- and time-based. Emirates offers 20 MB of free data to passengers — which is virtually nothing — beyond which it charges up to \$ 9.99 (Rs 666) for 150 MB and \$ 15.99 (Rs 1,067) for 500 MB. This is equivalent to monthly broadband packs offered by some Indian telecom companies.

The other models include a free-of-charge service, a limited free session which can be topped-up, free access for premium passengers but a paid one for economy class travellers. The airlines may also get a sponsor who will pay for all or some of the operational expenses in return for advertisement.

Industry experts say telecom service providers like Airtel and others may start providing monthly packages to consumers which will include a



certain amount of in-flight usage. These companies may also collaborate with airlines to provide limited access to all passengers in exchange for advertisement.

Challenges to IFC

Affordability

The high cost of installing equipment may discourage low-cost carriers and even for full-service carriers, the service may come at a premium. Apart from the equipment cost, airlines will have to bear additional fuel costs, given the extra weight and drag aircraft will face due to the antenna. It is expected that foreign airlines that service Indian airports or use Indian airspace will offer IFC before domestic carriers.

Quality of Service

Satellites divide geographical regions into smaller areas to provide

broadband connectivity, which is efficient for fixed residents and low-speed mobility. Providing internet connectivity to high-speed aircraft requires frequent hand-offs, which increases the level of interference and hampers the quality of service. Ground-based base stations have limited transmitting capability and interference occurs due to weather conditions, distance and noise.

Security

Considering cyber threats and the sensitivity of aircraft network, IFC should use separate channels to provide Wi-Fi, which will not interfere aviation communication channels. Security should be given utmost priority.

Way Forward

IFC is subject to factors like the number of concurrent users, satellite coverage

and weather conditions. Most airlines discourage voice calls to avoid inconvenience to fellow passengers. Once launched, these factors would be important factors that decide its success.

However, IFC is great news, but to woo price-sensitive Indian customers, airlines need to provide affordable tariffs. Since cheaper tariff will be a burden for airlines, they need to find a balanced tariff or provide Wi-Fi as an add-on; they can also consider generating revenue from ads, corporate offerings, e-commerce, premium content, etc.

General Studies Paper- III

Topic: Science and Technology-developments and their applications and effects in everyday life.



2. STRUCTURE AND DYNAMICS OF INDIAN MONSOON

Why in News?

According to India Meteorological Department (IMD), southwest monsoon seasonal (June to September) rainfall over the country as a whole is likely to be near normal. Quantitatively, the monsoon seasonal rainfall is likely to be 96% of the Long Period Average (LPA) with a model error of $\pm 5\%$. The LPA of the season rainfall over the country as a whole for the period 1951-2000 is 89 cm. Weak El Nino conditions are likely to prevail during the monsoon season with reduced intensity in the later part of the season. Overall, the country is expected to have well distributed rainfall scenario during the 2019 monsoon season, which will be beneficial to farmers in the country during the ensuing kharif season.

Introduction

India has 'Monsoon' type of climate. The word monsoon has been derived from the Arabic word 'mausim' which means seasonal reversal of winds during the course of the year. This implies a rhythmic change in the direction of winds and in distribution of temperature and rainfall with the change of season.

With the onset of summer season, the Sun shifts towards the North and there is a complete reversal of pressure conditions and wind circulation both in the lower and the upper layers of the atmosphere. Near the Earth's surface, the Inter-Tropical Convergence Zone (ITCZ) establishes itself at about 25°N latitude over India and Pakistan. With the northwards shift of the ITCZ, the westerly jet stream withdraws from the Indian plain. This low pressure ITCZ attracts winds from different directions. The maritime tropical air from southern hemisphere rushes to this low pressure zone after crossing

the equator. This is known as the 'south west monsoon'.

In the upper layers of the troposphere, the conditions are entirely different. An easterly jet stream flows over Northern India. It attracts the tropical depressions towards India. These depressions affect the distribution of rainfall in India. The highest rainfall occurs along the tracks of these depressions.

Phenomena that Impact the Indian Monsoon

El Nino & La Nina

The warming up of the East Pacific, or the status with respect to El Nino, has been known to influence the Indian monsoon, though not in a direct cause-effect mode. While a number of El Nino years have returned a deficit monsoon, others have either taken the Pacific phenomenon in their stride or returned normal-to-excess rainfall.

When things reverse in the Pacific (Eastern part cools down and Western part warms up), it's called a La Nina, which has generally been associated with a good Indian monsoon.

Indian Ocean Dipole

The Indian Ocean too witnesses warming anomalies in cyclical turns — called the Indian Ocean Dipole (IOD) — with known implications for a concurrent Indian monsoon.

When the Western part of the ocean warms up relative to the East, it is called the positive IOD phase, which favours the Indian monsoon (as is likely the case this year).

The reverse is called the negative IOD phase, when the Eastern part of the ocean warms up more than the West. This drains away the moisture from over India and affects the monsoon.

Madden-Julian Oscillation (MJO)

The MJO can be defined as an eastward moving 'pulse' of clouds, rainfall, winds and pressure near the equator that typically recurs every 30 to 60 days. It's a traversing phenomenon and is most prominent over the Indian and Pacific Oceans.

The journey of MJO goes through eight phases. When it is over the Indian Ocean during the Monsoon season, it brings good rainfall over the Indian subcontinent. On the other hand, when it witnesses a longer cycle and stays over the Pacific Ocean, MJO brings bad news for the Indian Monsoon.

Basically, it is linked with enhanced and suppressed rainfall activity in the tropics and is very important for the Indian monsoonal rainfall. It has also been established that if the periodicity of MJO is nearly 30 days then it brings good rainfall during the Monsoon season. If it is above 40 days then MJO doesn't give good showers and could even lead to a dry Monsoon. Shorter the cycle of MJO, better the Indian Monsoon. Simply because, it then visits the Indian Ocean more often during the four month-long period.

Pacific Decadal Oscillation (PDO)

PDO is a long-lived El Nino-like pattern of Pacific climate variability. Both PDO and El Nino Southern Oscillation (ENSO) have similar spatial climate fingerprints yet the major difference is that PDO persists for 20-30 years while the typical ENSO persists for 6 to 18 months.

The PDO, like ENSO, consists of a warm and cool phase which alters upper level atmospheric winds. During a "warm", or "positive", phase, the West Pacific becomes cooler and part of the Eastern ocean warms; during a "cool" or "negative" phase, the opposite pattern occurs.

Shifts in the PDO phase can intensify or diminish the impacts of ENSO according to its phase. If both ENSO and the PDO are in the same phase, it is believed that El Nino/La Nina impacts may be magnified. Conversely, if ENSO and the PDO are out of phase, it has been proposed that they may offset one another, preventing “true” ENSO impacts from occurring.

Global Warming

The effects of global warming on the Indian monsoon could be diverse. Warmer ocean temperatures are expected to evaporate more water vapor into the air above it, increasing moisture fluxes onto the Indian subcontinent by nature of the increased quantity of water vapor in the air.

Additionally, increasing land surface temperatures, which are expected to rise more rapidly than sea surface temperatures, could increase the land-sea temperature gradient, which would be expected to increase precipitation by way of strengthening onshore winds bring moisture onto the subcontinent.

Impact of Monsoon

Indian economy, especially agriculture, is dependent on the quantity of monsoon rain as a large part of the crop comes from monsoon-fed crops. A weak or bad rain is always considered a big set back to India's economy, invariably impacting the country's Gross Domestic Product (GDP) levels. Though improved irrigation and availability of electricity has reduced this dependence to a small extent, it is equally true that hydel power generation, ground water availability and its recharge are nearly entirely dictated by monsoon rains. A major portion of the country's crop area is totally dependent upon them, as they are not equipped with methods of manual irrigation. With such a significant percentage of the country's economy being guided by agriculture, weak monsoon results in crop failure, which in turn lowers production and

translates into price rise, low industrial output and other related issues.

The effects of south west monsoon reverberate well beyond India, too. As the world's biggest grower of cotton and the second largest producer of rice, wheat and sugar, India and its weather influence global prices of some of the world's biggest commodities. Around the world, the prices of cotton T-shirts, sugarcubes, car tires and cups of coffee are all impacted due to Indian monsoon.

Further, as many parts of India receive almost 85% of annual rainfall in the rainy season. Monsoon recharges the underground water reservoirs and the Himalayan glaciers which maintain the continuous flow of many perennial rivers like the Ganges, the Yamuna, the Sind, the Brahmaputra etc., of Northern and Eastern India, Pakistan, Bangladesh, Myanmar etc.

Pre-Monsoon Rainfall and its Importance

Pre-monsoon rainfall from March to May, which is a phenomenon vital to agriculture in several parts of the country, has recorded a deficiency of 22 percent, according to India Meteorological Department (IMD) data. The IMD recorded 75.9 millimetres of rainfall from 1st March to 15th May against the normal rainfall of 96.8 millimetres, which comes to around minus 22 percent.

Pre-monsoon rainfall is important for horticulture crops in some parts of the country. In states like Odisha, ploughing is done in the pre-monsoon season, while in parts of Northeast India and the Western Ghats it is critical for plantation of crops.

Crops like sugarcane and cotton, planted in Central India, survive on irrigation and also require supplement of pre-monsoon rains. In the forested regions of Himalayas, pre-monsoon rainfall is necessary for plantations like apple. Due to moisture, pre-monsoon rainfall also helps in minimising the occurrence of forest fires.

Models Used for Forecast of Monsoon

IMD issues operational forecast for the southwest monsoon season rainfall for the country as a whole in two stages. The first stage forecast is issued in April and the second stage forecast is issued

in June. These forecasts are prepared using state-of-the-art Statistical Ensemble Forecasting system (SEFS) and using the dynamical coupled Ocean-Atmosphere global Climate Forecasting System (CFS) model developed under Monsoon Mission of the Ministry of Earth Sciences.

Until 2016, India's monsoon forecasting system was driven entirely by statistical methods which tried to draw past correlation between monsoon rains and large-scale global phenomena, like the El Nino, and projected that into the present. It was scientific guesswork where we compare past rainfall data with, say, sea surface temperature. Then, make a scatter plot and whatever relationship is there, we presume it will happen in the future as well.

Block Level Forecasting

The India Meteorological Department (IMD) is working at a brisk pace to issue localised weather forecasting to all 6,500 blocks across 660 districts in the country by 2020 and help as many as 9.5 crore farmers deal with the vagaries of weather.

However, the most challenging task would be to enhance the accuracy of weather forecasts and to make agromet advisory services (AAS) more useful and user friendliness.

At present, IMD issues district level advisories. In 2018, it tied up with Indian Council of Agricultural Research (ICAR) to extend weather forecast and AAS at the block level.

That has begun to change finally, after nearly a decade in the works, with India beginning to use supercomputer simulation-driven methods for monsoon forecasting in the last couple of years. These dynamical models simulate the state of the atmosphere and oceans at a particular time and then extrapolate into the future using standard laws of physics. A dynamic weather prediction model involves 3D mathematical simulation of the atmosphere on computer. Dynamic models are especially useful for predicting rainfall over smaller spatial and temporal scale, which is not

possible in the statistical forecasting system which IMD used previously.

Truthfulness of Predictions

IMD claims to have made improvement in its forecasting capabilities over the last 13 years ending in 2015 (2003-2015) over those of the same number of preceding years (1990-2012).

The average absolute error during the period 2003-2015 was 5.92 per cent of the LPA, compared to 7.94 per cent in 1990-2012.

According to information tabled in Parliament, the IMD has been carrying out monsoon prediction with 'reasonable accuracy'. The success rate of forecasts since 1988 has been high.

During 1988-2008, the forecasts were qualitatively correct in 19 years, or 90 per cent of the time. The exception was in 2002 and 2004, both drought years.

However, in some years, the forecast error (difference between actual and forecast rainfall) was more than 10 per cent.

The 2002 drought was due to exceptionally low rainfall in July (46 per cent of LPA) caused by unexpected sudden warming of the Equatorial Pacific that started in June. The exceptionally deficient rainfall of July 2002 was not predicted by any organisation in India or abroad.

Similarly in 2009, the IMD had forecast that monsoons for the year would be normal. But as the months progressed, it became clear that monsoon would be less than normal and India witnessed the worst drought in 30 years.

In another instance, IMD predicted a normal monsoon in 2017, 40% of India's districts faced the threat of drought, whereas 25% of the districts experienced 100 mm and more rainfall within an hour. As many as 16 places in the country recorded over 244 mm

rainfall in a day. For example, Mount Abu had witnessed the extremely heavy rainfall in a day, which is equivalent to half of its annual total rainfall.

Multiple Agencies

In 2006, the government of India created the Ministry of Earth Sciences, which included the Ministry of Ocean Development, IMD, Indian Institute of Tropical Meteorology (IITM) and National Centre for Medium Range Weather Forecasting (NCMRWF). These institutes carry out various functions related to weather forecasting and climate research for surface as well ocean.

As IMD and allied institutes moved out of the Department of Science and Technology (DST) in 2006, the Indian Space Research Organisation (ISRO) established the Meteorological and Oceanographic Satellite Data Archival Centre (MOSDAC) to issue weather forecasts and advisories. Apart from these government agencies, there are private companies such as 'Skymet' that issue weather forecasts.

These companies and all government agencies claim their weather forecast is accurate. However, there is no evidence of any disaster risk reduction due to their forecasts.

Conclusion

The monsoon bounty is crucial for the 60% of gross cropped area in Indian farming that is rain-fed and represents, in the assessment of the National Commission on Farmers, 45% of agricultural output. Thus, the southwest monsoon is a determinant of India's overall prosperity and sustained efforts to make the best use of rainfall are absolutely important for farms, cities and industry.

For farmers, rains are a necessary condition for their survival, despite the possibility of achieving significant

Rainfall Distribution on All India Scale	
Normal	percentage departure of realised rainfall is within ± 10 % of the Long Period Average
Below Normal	percentage departure of realised rainfall is $< 10\%$ of the Long Period Average
Above Normal	percentage departure of realised rainfall is $> 10\%$ of the Long Period Average
All India Drought Year	When the rainfall deficiency is more than 10% and when 20 to 40% of the country is under drought conditions, then the year is termed as All India Drought Year
All India Severe Drought Year	When the rainfall deficiency is more than 10% and when the spatial coverage of drought is more than 40% it is called as All India Severe Drought Year

drought-proofing with irrigation (through large canals, tube-wells and use of water harvesting, drip and sprinkler technologies) and proper crop planning. But as the experience of the last two years shows, bumper harvests are not sufficient to guarantee farm prosperity. The real challenge that farmers are facing today is not production, but prices. The IMD, no doubt, has done a decent job of forecasting rainfall or even adverse weather events. The farmer, however, is equally in need of price forecasting and market intelligence to enable informed planting decisions. That, unfortunately, is still missing.

General Studies Paper- I

Topic: Important Geophysical phenomena such as Earthquakes, Tsunami, Volcanic activity, Cyclone etc., geographical features and their location- changes in critical geographical features (including Waterbodies and Ice caps) and in flora and fauna and the effects of such changes.



3. RIGHT TO LEGAL AID : A CONSTITUTIONAL EXPECTATION

Why in News?

Recently, to provide free of cost legal assistance to family members of the prisoners, Chhattisgarh State Legal Services Authority (SLSA) has launched a state-wide campaign. Under the programme, a committee has been formed in each district of the state to interact with the jail inmates and work on their problem. These types of programmes will help in improving legal awareness among the people who are in need of free legal aid.

Introduction

As political philosopher; Charles de Montesquieu said that; "In the state of nature...all men are born equal, but they cannot continue in this equality. Society makes them lose it and they recover it only by the protection of the law." The protection of law to poor, illiterate and weak is important to ensure equal justice. Legal aid is one of the means to ensure that the opportunities for securing justice are not denied to any person by reason of poverty, illiteracy, etc.

Legal aid is free legal assistance to the poor and weaker sections of the society with the object to enable them to exercise the rights given to them by law. Justice P.N.Bhagwati has rightly said that "the poor and the illiterate should be able to approach the Courts and their ignorance and poverty should not be an impediment in the way of their obtaining Justice from the Courts."

The Constitution of India articulates the significance of broadly accessible legal aid. Under Article 39A of the Constitution of India Part V (the Directive Principles of State Policy) inserted by the Constitution (42nd Amendment) Act, 1976, the State is committed to securing that "the

operation of the legal system promotes justice on a basis of equality" and providing free legal aid "to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or other disability."

In furtherance of the Constitutional mandate enshrined in Article 39A, The Legal Services Authorities Act, 1987 was enacted which allowed any person to seek legal aid under the Act to defend or file a case and if belonging to any of the specified category, viz., member of Scheduled Caste or Scheduled Tribe; or poor (with an annual income of not more than Rs.50,000/- for cases in the Supreme Court and Rs.25,000/- in other courts); or a victim of human trafficking or a beggar; or a woman or child; or if the individual suffers from any disability; or a victim of mass disaster, ethnic violence, caste atrocity, flood, drought, earthquake, industrial disaster; or an industrial workman; or in custody, including protective custody; or facing a charge which might result in imprisonment. In addition, legal aid may also be granted in cases of public importance and special cases considered deserving of legal aid/ services.

The 1987 Act envisaged legal service schemes with respect to paralegals; legal clinics; programmes for unorganised workers, etc. It also made an attempt towards reducing the workload on the courts by providing for setting up of Lok Adalats (under the aegis of National Legal Services Authority) in the court premises to serve as an alternate dispute resolution system. The Legal Services Authorities Act, 1987, as amended by the Act of 1994 (which came into force on 9th November 1995) established a nation-wide network of Legal Services Authorities at the national, state and district levels. The Legal Services

Authorities (Amendment) Act of 2002 led to the setting up of Legal Service Committees at the Supreme Court (SC) and High Courts.

Right to Legal Aid – A Constitutional Commitment

The Constitution of India gives much emphasis on the constitutionalism and rule of law. In India the rule of law is regarded as a part of the basic structure of the Constitution and also of natural justice. The rule of natural justice says that individuals should not be penalized by decisions affecting their rights or legitimate expectations unless they have been given prior notice of the cases against them, a fair opportunity to answer them, and the opportunity to present their own cases.

The preamble of the Constitution of India secures to its citizen, social, economic and political justice. Article 14 of the Constitution makes it clear that the State shall not deny to any person equality before law or the equal protection of the laws within the territory of India. The aim of Article 14 is to ensure equal justice. The guarantee of equal justice is meaningless if the poor or illiterate or weak persons cannot enforce their rights because of their poverty or illiteracy or weakness.

Articles 38 and 39, of the Constitution of India lay down clear mandate in this regard. According to Article 38 (1), the State shall strive to promote the welfare of the people by securing and protecting as effectively as it may a social order in which justice, social, economic or political, shall inform all the institutions of the national life.

Article 39-A directs the State to ensure that the operation of the legal system promotes justice on a basis of equal opportunity and shall, in particular, provide free legal aid by

suitable legislation or schemes or in any other way, to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or other disabilities.

Right to free legal aid or free legal service is an essential fundamental right guaranteed by the Constitution of India. It forms the basis of reasonable, fair and just liberty under Article 21, which says, "No person shall be deprived of his life or personal liberty except according to procedure established by law".

In *State of Maharashtra v. Manubhai Pragaji Vashi*, the Supreme Court has made it quite clear that it is now well established that the failure to provide free legal aid to an accused at the cost of the State unless refused by the accused, would vitiate the trial. In *M.H Hoskot v. State of Maharashtra*, Justice Krishnalyer observed that providing free legal aid is the State's duty and not government's charity.

International Covenant on Civil and Political Rights also under Article 14 (3) (d) guarantees to everyone: "Right to be tried in his presence, and to defend himself in person or through legal assistance of his own choosing; to be informed, if he does not have legal assistance, of this right; and to have legal assistance assigned to him, in any case where the interests of justice so require, and without payment by him in any such case if he does not have sufficient means to pay for it".

Free Legal Aid -Various Dimensions

A Paramount Duty of the Welfare State

Being a welfare state, India is taking its long strides towards social justice. In order to mitigate economic inequalities and social disabilities, incorporation of social justice becomes necessary in the administration of justice.

UP CLEARS 46L CASES IN 3 YRS			
CASES DISPOSED OF BY NATIONAL LOK ADALAT			
States	2015-16	2016-17	2017-18*
UP	17,60,458	16,54,965	11,94,296
TN	6,19,584	4,40,500	3,73,314
Maharashtra	1,10,034	2,39,029	1,54,554
MP	7,20,380	3,08,365	1,21,574
Odisha	5,58,486	5,75,842	1,18,564
Gujarat	1,17,433	58,275	1,32,205
Andhra	1,04,774	95,756	1,18,949
West Bengal	17,856	21,020	89,910
All India	61,58,529	49,77,002	29,28,339

Source: Law Ministry (*2017-18 figures till December)

An Essential Factor for the Survival of Healthy Democracy

Denial of justice because of poverty amounts to negation of social justice and violation of the principle of our democracy. In order to transform political democracy into social democracy, provision of legal aid is urgently required.

Necessary Requirement for the Implementation of Rule of Law

Equal access to justice for the rich and the poor alike, must be seen as an essential part of maintenance of the rule of law. There could be no rule of law unless the machinery of law is readily accessible to all.

A True Spirit of Equality

The concept of legal aid is the very spirit of equality and its movement is dedicated to the principle of equal justice to the poor. Equal justice requires a systematic approach in removing the prevailing inequalities and injustices in our society. Legal aid is a vital limb of our Constitution and becomes for this reason, an interpretative doctrine reflecting the desired fulfilment of the basic objectives of equality. Denial of justice to needy person is nothing but a negation of equality.

An Integral Part of Natural Justice

One of the principles of natural justice namely, Audi Alteram Partem

(let the other side be heard as well) may become a mere formality in the absence of legal aid.

A Social Movement

Legal aid movement has become a social movement and its ultimate aim is to establish social righteousness by mitigating and ameliorating legal incapacity and hardships of weaker sections of the society. The movement of legal services is gaining momentum day by day. It needs cooperation of all persons and bodies, governmental or non-governmental, in the implementation of National Legal Services Scheme and to provide justice at the doorsteps of the poor.

Challenges

Access to legal services continues to be a challenge for a substantial segment of the Indian population due to geographical, resource and infrastructure constraints. Since legal representation is costly and out of reach for the disadvantaged, the need for legal aid arises. The problem has been compounded by the failure to mainstream legal-aid services, particularly for the marginalized sections at the panchayat levels. Marginalised communities, especially rural and tribal population; senior citizens; persons with low income; persons with disabilities; victims of drug abuse, human trafficking; prison

inmates- the rightful recipients of legal aid- are unable to avail it. India has an expansive history of legal aid, backed by decades of legislation, jurisprudential interpretation and numerous state-funded programs. But the absence of a structured and economically viable format has hindered lawyers in actively offering legal assistance to those in need of it. The 'pro bono' (Latin, For the public good) culture is still a work in progress. While legal aid is provided and organized by non-governmental organizations, law schools, bar associations and also individual advocates, the demand for legal aid clearly exceeds the supply. India's tremendous diversity; population; socio-cultural barriers; liberal laws and jurisprudence in relation to legal aid; and economic growth coupled with the expectations that come with growth have made it a unique and challenging environment for meeting the demand for legal assistance.

Legal Education and Legal Aid: Connecting the Dots

It has been widely acknowledged by legal aid experts that legal education can play a larger role in the country's legal aid movement and that exclusion of law schools from legal aid programs would be self-defeating not just for the cause of legal aid, but also the legal profession. The service-mindedness acquired by law students from performing legal aid work is a useful tool in influencing the social sensitivity of the Bar in the long run. Ironically, the rationale of involving law students in the delivery of legal services, particularly to poor and weaker sections, neither occurred nor found favour with our legal educational reformers for a long time. Even the legal aid authorities, failed to recognize the potential of using legal educational institutions and law students to participate in the

budding legal aid movement in the country. It was only in 1997 that the Bar Council of India (BCI) made legal aid a compulsory practical paper to be taught in law colleges all over the country, thereby granting a fresh lease of life to the cause of legal aid.

In this context, it is relevant to take note of the Access to Justice Project of UNDP India titled "Study of the Law School based Legal Service Clinics" undertaken in the year 2011 in the 7 states of India. The purpose of the study was to understand the functioning of legal aid cells established by law colleges in these states and suggest ways to improve their functioning to be effective instruments of access to justice. In an alarming finding, despite 82% of the colleges having designated faculty to conduct legal aid activity, only a miniscule of them were providing academic credit to the faculty for the workload/lecture hours; and to the students in terms of grades or marks. This naturally reduced the enthusiasm and motivation needed to conduct legal aid activities making them burdensome or additional work for teachers and students of law. Although majority of the colleges had a good track record in conducting legal literacy programmes, the methods for the same were not entirely useful, being limited to 'public talk' by lawyers with limited or no follow up service.

Of late legal aid clinics/camps have emerged as an important component of legal education with many reputed law schools/colleges actively organizing the same, yet many law schools tend to have an ad hoc approach towards legal aid activities. In the other words, the success of these efforts is largely dependent on the enthusiasm of the faculty and the students.

Way Forward

In a democracy, where rule of law is supreme; it is essential to ensure that

even the weakest amongst the weak, poorest among the poor, in the country does not suffer injustice arising out of any abrasive action on the part of State or private person. As a way forward there is need to ensure capacity building for legal aid movement. This requires strengthening the skills of stakeholders of legal aid; law teachers, lawyers, law students, volunteers such as aaganwadi workers, members of local panchayat, etc. to act as intermediates between rural people and legal service institutions. In state of Maharashtra v. Manubhai Pragaji Pragaji vashi, the Supreme Court has highlighted the necessity for capacity building and held that in order to provide the "free legal aid" it is necessary to have well-trained lawyers in the country. This is only possible if there are adequate number of law colleges with necessary infrastructure, good teachers and staff.

The major drawback of legal aid movement in India is the lack of legal awareness. People are not aware of rights and protection available under the law. It needs to be realized that the promotion of awareness regarding legal aid is not the exclusive duty of the legal fraternity. It is equally the concern and responsibility of the society at large. Constitutional commitment for legal aid can only be cherished if society comes forward to care for its vulnerable population.

General Studies Paper- II

Topic: Structure, organization and functioning of the Executive and the Judiciary; Ministries and Departments of the Government; pressure groups and formal/informal associations and their role in the Polity.



4. CTBT AND INDIA : AN ANALYSIS

Why in News?

Recently, in a renewed effort, the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) has offered India an 'Observer' status and access to state-of-art International Monitoring System (IMS) data.

Introduction

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is the treaty banning all nuclear explosions - everywhere, by everyone. The treaty was negotiated at the Conference on Disarmament in Geneva and adopted by the United Nations General Assembly (UNGA) in 1996.

But, despite more than 20 years after the UN opened the Comprehensive Test Ban Treaty (CTBT) for signature on 24 September 1996, it has still not entered into force. It is the only multilateral treaty to have met such an uncertain fate. The call for a CTBT was made long ago, in the early 1950s, as a first step towards nuclear disarmament. The United States supported the negotiations when these finally began in 1994 and then President Bill Clinton was the treaty's first signatory; today, there are 183 countries that have signed up and of these, 164 have ratified the treaty. Yet the CTBT's entry into force remains an elusive goal. This was mainly due to the fact that Article XIV of the CTBT states that the treaty can enter into force only when all of the 44 states possessing nuclear weapons capabilities and research reactors sign and ratify the treaty. Of these 44 states, the treaty awaits formal ratification from the US, China, Israel, Iran and Egypt (which have already signed) and both signature and ratification from India, Pakistan and North Korea, in order to implement a legally binding global ban on nuclear testing. Though short of signing the CTBT, India has endorsed the basic objective of the treaty by

declaring a unilateral moratorium on nuclear testing.

Nuclear Test

Between 1945 and 1996 when the CTBT was adopted, over 2000 nuclear tests were conducted by the United States (1000+), the Soviet Union (700+), France (200+), the United Kingdom and China (45 each). Three countries have carried out nuclear explosions after the 1996: India and Pakistan in 1998 and the Democratic People's Republic of Korea (DPRK) in 2006, 2009 and 2017.

Significance of the Treaty

The CTBT with its 183 signatories and 164 ratifications is one of the most widely supported arms-control treaties. This near universal support is due to the treaty's non-discriminatory nature, where everyone has the same obligation never to conduct a nuclear explosion. As another mark of progress, the prohibition against testing has emerged as an established global political and behavioural norm. The international condemnation of North Korea as the only country that has conducted nuclear tests in this millennium is a vivid illustration.

After each of the North Korean nuclear tests, all CTBT State Signatories received the same high-quality information about the location, magnitude, depth and time of the event within hours of detection by the CTBTO system of monitoring stations.

Further, CTBTO has evolved from a mere blueprint to the custodian of the world's largest and most sophisticated multilateral verification system through the International Monitoring System (IMS). Over 300 stations in 89 countries have been built to monitor for signs of nuclear explosions around the globe and round the clock. The IMS monitors the Earth's crust, listens in the atmosphere and in the oceans and sniffs the air for traces of radioactivity.

While scanning the globe for signs of a nuclear test, this monitoring system produces data that have many spin-off applications, from disaster early warning to scientific research on the Earth's inner structures, climate change or meteors, to name just a few of the potential uses.

In addition to it, CTBTO is also making contributions to the nuclear safety field. After the March 2011 Fukushima nuclear accident, CTBTO data provided timely information on the radioactive emissions from the crippled plant and their global dispersion.

The IMS has also facilitated a rich international exchange of data and expertise and boosted technological advancements pertaining to infrasound and noble gas monitoring. Additionally, the CTBTO has an active programme of engagement with the international scientific community who can tap into a wealth of data generated by the IMS, and civil and scientific applications are booming.

In spite of all these achievements, the CTBT has yet to become global law due to its demanding entry into force clause, which requires the signature and ratification of all 44 countries listed as nuclear technology capable.

What is CTBTO?

The abbreviation stands for the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization. The organization promotes the treaty so that it can enter into force. It also establishes a verification regime to monitor adherence to the Treaty.

CTBT and India's Journey

India underscored the need for a test-ban treaty long before the establishment of the CTBT. In 1954, Prime Minister Jawaharlal Nehru was the first leader of a state to call for an "immediate standstill" agreement on

nuclear testing between the United States and the former Soviet Union. However, ignoring India's efforts, the Partial Test Ban Treaty (PTBT) was signed by the United States, the Soviet Union, and the United Kingdom in August 1963, which did little to halt the actual number of nuclear tests that presently figures at 2055. Thereafter, the worsening security concerns with China's nuclear test in 1964, the 1965 India-Pakistan war and U.S. intimidation in the 1971 war drove India to conduct a peaceful nuclear test in 1974 to keep the nuclear testing option open. However, India still continued supporting the idea of a nuclear test-ban policy—this is evident from a June 1978 statement calling for a ban on nuclear weapons testing at a Special Session of the United Nations General Assembly (UNGA), followed by a call in 1982 for a freeze on nuclear weapons production. In 1988, India proposed an Action Plan that advocated a ban on development of new weapons systems, and recommended nuclear disarmament in a time-bound framework of 22 years. Believing that the CTBT was a cardinal aspect of the disarmament process, India continued to support multilateral negotiations and jointly co-sponsored a consensus resolution on the CTBT at the UNGA in 1993.

However, India's efforts towards a test-ban treaty, as a vehicle to eventually achieve total nuclear disarmament, were thwarted in 1995 with the indefinite extension of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). India protested that not only did the NPT profess unequal obligations between the nuclear-haves and have-nots, but it also did not mandate the original nuclear weapon states (NWS) to adopt equal obligations towards universal nuclear disarmament. Simultaneously, the China-Pakistan illicit nuclear nexus heightened security considerations and compelled India to eventually conduct a series of nuclear tests in

May 1998. Immediately after the tests, India declared a unilateral moratorium on nuclear testing and has continued to adhere to that position. Following the 1998 nuclear tests, India expressed a flexible position on the CTBT and specified its readiness to discuss a de jure formalization of its voluntary moratorium on future nuclear testing. However, India made it clear that its support for the CTBT could not exist in any "vacuum" and "depended on a series of reciprocal activities" from the P5 nations (US, China, France, UK and Russia) : namely to refrain from conducting future tests under the guise of safety purposes, and to preclude all horizontal and vertical proliferation.

Fissile Material Cut-off Treaty

A fissile material cut-off treaty (FMCT) is a proposed international agreement that would prohibit the production of the two main components of nuclear weapons: highly-enriched uranium (HEU) and plutonium. Discussions on this subject have taken place at the UN Conference on Disarmament (CD), a body of 65 member nations established as the sole multilateral negotiating forum on disarmament. The CD operates by consensus and is often stagnant, impeding progress on an FMCT.

Why India hasn't Joined CTBT?

India has pursued a consistent and principled policy on nuclear disarmament and the CTBT. It is a policy rooted in the conviction that nuclear weapons are weapons of mass destruction and the elimination of nuclear weapons will enhance the security of all people and all nations.

Since its inception, India has had a number of reservations about the CTBT. While it has stood by its demand for a nuclear weapons-free world, various principled, procedural, political, and security concerns have stood in the way of its support for the CTBT.

India's principled opposition drew from its emphasis on universal and complete nuclear disarmament in a time-bound manner. India has traditionally believed this to be the end

goal with the test ban just being a path to get there. But it did not insist on a complete disarmament clause in 1994, acknowledging that it was a "complex issue."

The turning of the tides came with the indefinite extension of the NPT in 1995, which did not result in a firm commitment to nuclear disarmament by the P5 as sought by the 'have nots'. After the NPT extension, India felt that apart from the Fissile Material Cut-Off Treaty (FMCT), the only way to hold the P5 to a time-bound elimination of nuclear weapons clause was through the CTBT. While some of these concerns were incorporated into the CTBT text, the 'time bound' aspect was not. India saw the attempt at a test ban becoming an end in itself, while exacerbating technology differences between the 'haves' and 'have nots'. For instance, one of India's concerns was the possibility of those already possessing nuclear weapons upgrading their arsenals through sub-critical and laboratory simulated testing.

Added to this mix was a crucial domestic political factor: the run-up to the Indian general elections of 1996. The political parties did not want to risk alienating the voting population since foreign policy decisions like these could be misinterpreted as capitulation to the West.

On the security front, India thought that it faced uncertain dangers from Pakistan and China, which had conducted nuclear tests even while the CTBT was being negotiated. As party to the CTBT, India would be waiving the possibility of testing and developing its own nuclear weapons whereas China would be able to retain its arsenal as per the NPT. This was compounded by the fear of nuclear collusion between China and Pakistan.

All of this culminated in then Indian envoy to the United Nations in Geneva, Ambassador Arundhati Ghose's statement in 1996 in which she said, "...India will not sign this unequal treaty, not now, nor later."

Further, there are also those, particularly from India's scientific and security bureaucracies, who continue to believe that accepting the CTBT would hinder India's strategic nuclear program development and the option to test must be kept open. Others consider the hold up of CTBT ratification by the United States Congress and by China as diplomatically convenient for India in that this precludes an official Indian stand on the matter.

Apart from this, there is no public debate on the CTBT in India – certainly none displaying the vigour with which it continues to be debated in the West.

Gains for India by Signing CTBT

If India decides to sign the CTBT, the diplomatic gains from such announcement will be immense. At a time when India is increasingly accepted as an emerging global power and as a responsible member of the nuclear community, a voluntary decision to sign the CTBT would enhance our stature further. At a more pragmatic level, this type of move will greatly strengthen India's case

for being admitted to the Nuclear Suppliers Group (NSG) and other international groupings. Unreasonable and impractical demands have been made over the last couple of years that India should first join the Non-Proliferation Treaty (NPT) before being considered for membership of the NSG. Such arguments wouldn't stand against the fact that besides having always followed all the NPT guidelines in spirit, by signing the CTBT, we will go well beyond what even some NPT weapon states have done.

Importance of CTBT

The CTBT is the last barrier on the way to develop nuclear weapons. It curbs the development of new nuclear weapons and the improvement of existing nuclear weapon designs. When the treaty enters into force it provides a legally binding norm against nuclear testing. The treaty also helps prevent human suffering and environmental damages caused by nuclear testing.

Conclusion

India's 1998 nuclear test was "fully successful" in testing fission and thermonuclear weapons capable of yields up to 200 kilotons. This implies

that India might not require additional nuclear tests, unless there is a significant deterioration in its security environment. Despite the change in governments over the years, India has continued to uphold its commitment to a unilateral moratorium on nuclear testing, signifying a political consensus on its stated position on the CTBT.

A nation aspiring to be a world power must not shy away from taking bold initiatives at crucial periods. As Shakespeare wrote, "There is a tide in the affairs of men which, taken at the flood, leads on to fortune." Such an opportunity is available to India to fortify its place as a leader in the community of nations, that too without flexing its military or economic muscle.

General Studies Paper- II

Topic: Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests.

Topic: Important International institutions, agencies and fora- their structure, mandate.

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5. CREDIT RATING AGENCIES IN INDIA : ARE THEY CREDIBLE

Why in News?

Recently, credit rating firms severely criticized by the Reserve Bank of India (RBI) for failing to identify financial troubles and loopholes in various companies, especially in the case of Infrastructure Leasing & Financial Services Limited (IL&FS).

Introduction

Credit Rating Agencies (CRA) is basically a company which assigns credit ratings in India. CRA rates a debtor's ability to pay back the liable debt by making timely interest payments and the vulnerability to default. Debt instruments rated by CRAs include government bonds,

corporate bonds Certificate of Deposits (CDs), municipal bonds, preferred stock, and collateralized securities, such as mortgage-backed securities and collateralized debt obligations. CRA analyses and assess the relative credit risk of specific debt securities or structured finance instruments and borrowing entities (issuers of debt) and in some cases the creditworthiness of governments and their securities. Credit ratings are compiled primarily for investors about companies and governments.

The Securities and Exchange Board of India (Credit Rating Agencies) Regulations, 1999 empowers SEBI to

regulate CRAs operating in India. In fact, SEBI was one of the first few regulators, globally, to put in place an effective and comprehensive regulation for CRAs. SEBI's CRA regulations have been used as model by other regulators in the emerging economies. SEBI has also prescribed a Code of Conduct to be followed by the rating agencies in the CRA regulations. However, SEBI administers the activities of CRAs with respect to their role in securities market only. Though the SEBI has introduced so many amendments in the Securities and Exchange Board of India (Credit Rating Agencies) Regulations, 1999, but still a strong regulatory mechanism could not be developed.

In addition to SEBI, the following regulatory agencies are involved in the regulatory mechanism of CRA's in India:

- a. Reserve Bank of India (RBI).
- b. Insurance Regulatory and Development Authority (IRDA).
- c. Pension Fund Regulatory and Development Authority (PFRDA).

The panel appointed by government of India which includes the officials from the finance ministry along with financial sector regulators like RBI, SEBI and IRDA, has taken the view very recently that SEBI would remain the lead regulator for CRAs in addition to the above three. The panel suggested that while SEBI will set the minimum behavioral standards, the banking, insurance and pension regulators can impose higher discipline on CRAs for their respective sectors, depending on their requirements and capacities. Thus, the RBI, IRDA and the Pension Fund Regulatory Development Authority (PFRDA) can even accredit raters for meeting their rating requirements.

Role of Credit Rating Agencies

CRAs play an important role in modern financial systems. Their primary role is to reduce information asymmetry in credit markets by providing investors an opinion on the ability of an instrument to meet its obligations. Since CRAs get access to the management of the company and confidential information about its working, they argue that they provide a more informed opinion. In addition, their investigation into affairs of companies is likely to reduce duplication of efforts by different persons in determining the creditworthiness of a debt instrument. Thus, investors who rely on such ratings benefit from reduced informational asymmetries and costs associated with determining the credit worthiness of issuers.

CRAs also have utility for issuers. They encapsulate extensive information relating to the debt instrument and issuer in rating symbols, and also lend some of their reputational capital to the issue. The issuer is thus able to concisely communicate the quality of their issue and indicate to the market that an independent assessment has been made regarding the creditworthiness of the issued instrument. Thus, issuers of rated securities benefit from the wider access granted by suitable credit ratings to the market of investors. Finally, CRAs function as gatekeepers for financial markets, and provide tangible benefits to financial market regulators by reducing the costs of regulation. Regulators such as RBI use CRAs to improve the awareness and decision-making of their regulated entities. For instance, credit ratings are used to determine the capital adequacy of banks, the resolution of stressed assets, etc.

Further, CRAs have been 'hardwired' into the financial system in several jurisdictions and financial actors are legally bound to acquire ratings from CRAs while undertaking specific types of transactions. Some financial regulators mandate that certain instruments must be rated mandatorily before they are issued. Others require their regulated entities to only invest in rated securities. Various commentators argue that this extensive integration of CRAs into the financial system transforms their role from financial gatekeepers to purveyors of regulatory licenses. Since they play such an important role in financial markets, there is a greater need to ensure that credit ratings are regulated in an appropriate manner, and are as reliable as they are influential.

Advantages of Credit Rating

Different benefits occur from use of rated instruments to different class of investors or the company and works as indicator. Some are explained as under:

A. Benefits to Investors

1. Credit rating gives an idea in advance to the investors about the potential strength of the issuer company. Based on rating investor decides about the investment. A highly rated credit gives an assurance to the investors of safety of investments and minimizes his risk.
2. Credit rating symbols indicate both the returns expected and the risk attached to a particular issue. It becomes easier for the investor to understand the stability of the issuer company just by looking at the symbol because the issue is backed by the financial strength of the company.
3. Investors need not to take a dvice from the stock brokers, merchant bankers or the portfolio managers before making investments. Investors today are free and independent to take investment decisions themselves. They base their decisions on rating symbols attached to a particular security. Thus ending middlemen in his/her investment.
4. As it is mandatory for every issuer company to be rated for their debt obligations and investment potential, at any particular time, wide range of credit rated instruments are available for making investment thereafter..
5. Absence of any link between the rater and rated firm ensures dependable credibility of issuer and attracts investors. As rating agency has no vested interest in issue to be rated and has no business connections or links with the Board of Directors. In other words, it operates independent of the issuer company; the rating given by it is always authentic.
6. Easy understanding of investment proposals. Investors require no

analytical knowledge on their part about the issuer company. Depending upon rating symbols assigned by the rating agencies they can proceed with decisions to make investment in any particular rated security of a company.

7. CRA relieve investors from botheration of knowing the details of the company deeply like its history, nature of business, financial position, liquidity and profitability position, composition of management staff and Board of Directors etc. Credit rating by professional and specialized analysts reposes confidence in investors to rely upon the credit symbols for taking investment decisions.

B. Benefits to the Companies

A company who has got its credit instrument or security rated is benefited in the following ways.

1. A company with highly rated instrument finds it easy to raise resources from the public and attracts investment.
2. Investors always intend to make investments in such instrument, which ensure safety and easy liquidity rather than high rate of return. A company can cut the cost of borrowings by quoting lesser interest on those fixed deposits or debentures or bonds, which are highly rated.
3. A company with highly rated instruments has to make least efforts in fetching funds through public. It can reduce its expenditure on press and publicity. Rating facilitates best pricing and timing of issues.
4. Companies with highly rated instrument enjoy better goodwill and corporate image in the eyes of customers, shareholders, investors and creditors. Customers feel confident of the quality of

Sortable Table Key	Moody's	Fitch	S&P
Highest grade credit	Aaa	AAA	AAA
Very high grade credit	Aa1, Aa2, Aa3	AA+, AA, AA-	AA+, AA, AA-
High grade credit	A1, A2, A3	A+, A, A-	A+, A, A-
Good credit grade	Baa1, Baa2, Baa3, Baa4	BBB+, BBB, BBB-	BBB+, BBB, BBB-
Speculative grade credit	Ba1, Ba2, Ba3	BB+, BB, BB-	BB+, BB, BB-
Very speculative credit	B1, B2, B3	B+, B, B-	B+, B, B-
Substantial risks - In default	Caa1, Caa2, Caa3, Ca	CCC, CC, C, RD, D	CCC+, CCC, CCC-, CC, C, D

goods manufactured and credit worthiness.

5. Rating motivates the promoters to undertake expansion of their operations or diversify their production activities thus leading to the growth of the company in future. Thus promoting constructive competition.
6. Credit rating provides recognition to relatively unknown companies going for public issues through wide investor base. While entering into market, investors rely more on the rating grades than on 'Big name recognition'.

Issues with Credit Rating Agencies

Credit rating suffers from the following limitations

1. **Non-disclosure of significant information:** Firm being rated may not provide significant or material information, which is likely to affect the investor's decision as to investment, to the investigation team of the credit rating company. Thus any decisions taken in the absence of such significant information may put investors at a loss.
2. **Static study:** Rating is a static study of present and past historic data and performance of the company at one particular point of time. Number of factors including economic, political, environment and government policies has direct bearing on the performance of a company. Any changes after the

assignment of rating symbols may defeat the very purpose of risk inactiveness of rating.

3. **Rating is no certificate of soundness:** Rating grades by the rating agencies are only an opinion or indicator about the capability of the company to meets its interest obligations. Rating symbols do not pinpoint towards quality of products or management or staff etc. In other words rating does not give a certificate of the complete soundness or health of the company.
4. **Rating may be biased:** Personal bias of the investigating team might hamper the quality of the rating.
5. **Rating under unfavorable conditions:** Rating grades are not always reflection of the true image of a company. A company might be given low grade because it was passing through unfavorable conditions when evaluated. Thus, misleading conclusions may be drawn for short term turbulence.
6. **Difference and different types in rating grades:** Same instrument may be rated differently by the two rating agencies because of the personal judgment of the investigating staff on qualitative aspects. This may further confuse the investors due to different rating agencies or methods.
7. **Transparency in functioning of CRA:** Despite maintaining a wall between advisory services and rating services of CRAs, still criticism

persists as rating and non-rating entities have common ownership and top management. Therefore it is a key regulatory issue for bringing transparency in the functioning of CRAs especially with reference to investor's protection.

Conclusion

Credit rating is the need of the time since investors should be equipped with easy methods to make their investment decisions. If ratings are assigned in a proper, systematic, transparent way, then it will be a boon for investors and will go a long way in making the investment world a safe place.

In addition to it, credit rating has become an integral part of investor

awareness as it independently provides a vital input that goes into decision making. Based on statutory requirements as well as advantage to be had from having a rating, companies have progressively resorted to having their financial instruments rated. This in turn also has provided a self-check for companies which work towards improving their own performance in return of more favorable terms from lenders as higher rating mean lower interest rates as credit risk is accounted for. Investors too have been looking closely at these ratings before taking decisions.

However, investors should not forget the Contract Law tenet 'Caveat Emptor'. Caveat Emptor means 'let the buyer beware'. It should be forgotten

that everything cannot be guaranteed and investments cannot be risk-free. Investors should observe caution while investing their money and be aware themselves before taking their investment decisions. Investors should self study the facts and information available about the investment products and the creditability of the issuers, before zeroing on their decisions.

General Studies Paper- III

Topic: Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.



6. ROAD ACCIDENTS IN INDIA : AN OVERVIEW

Why in News?

According to a World Health Organisation (WHO) report, road accidents are the leading cause of death among people in the 5-29 age-group worldwide with more than 1.35 million lives lost each year and 50 million sustaining injuries.

Introduction

Deaths and injuries resulting from road traffic crashes remain a serious problem globally and current trends suggest that this will continue to be the case in the foreseeable future. The number of road traffic deaths continues to rise steadily, reaching 1.35 million in 2016. However, the rate of death relative to the size of the world's population has remained constant. When considered in the context of the increasing global population and rapid motorization that has taken place over the same period, this suggests that existing road

safety efforts may have mitigated the situation from getting worse. However, it also indicates that progress to realise Sustainable Development Goal (SDG) target 3.6 – which calls for a 50% reduction in the number of road traffic deaths by 2020 – remains far from sufficient.

Road traffic injury is now the leading cause of death for children and young adults aged 5–29 years, signalling a need for a shift in the current child health agenda, which has largely neglected road safety. It is the eighth leading cause of death for all age groups surpassing HIV/AIDS, tuberculosis and diarrhoeal diseases. The burden of road traffic injuries and deaths is disproportionately borne by vulnerable road users and those living in low- and middle-income countries, where the growing number of deaths is fuelled by transport that is increasingly motorized.

Risk Factors Associated with Road Accident

Speeding

An increase in average speed is directly related both to the likelihood of a crash occurring and to the severity of the consequences of the crash. For example, every 1% increase in mean speed produces a 4% increase in the fatal crash risk and a 3% increase in the serious crash risk. The death risk for pedestrians hit by car fronts rises rapidly (4.5 times from 50 km/h to 65 km/h). In car-to-car side impacts the fatality risk for car occupants is 85% at 65 km/h.

Driving under the Influence of Alcohol and other Substances

Driving under the influence of alcohol and any psychoactive substance or drug increases the risk of a crash that results in death or serious injuries. In the case of drug-driving,

the risk of incurring a road traffic crash is increased to differing degrees depending on the psychoactive drug used. For example, the risk of a fatal crash occurring among those who have used amphetamines is about 5 times the risk of someone who hasn't.

Non-use of Motorcycle Helmets, Seat-belts and Child Restraints

Correct helmet use can lead to a 42% reduction in the risk of fatal injuries and a 69% reduction in the risk of head injuries. Wearing a seat-belt reduces the risk of death among drivers and front seat occupants by 45 - 50% and the risk of death and serious injuries among rear seat occupants by 25%. The use of child restraints can lead to a 60% reduction in deaths.

Distracted Driving

There are many types of distractions that can lead to impaired driving. The distraction caused by mobile phones is a growing concern for road safety. Drivers using mobile phones are approximately 4 times more likely to be involved in a crash than drivers not using a mobile phone. Using a phone, while driving slows reaction times and makes it difficult to keep in the correct lane and to keep the correct following distances. Hands-free phones are not much safer than hand-held phone sets and texting considerably increases the risk of a crash.

Unsafe Road Infrastructure

The design of roads can have a considerable impact on their safety. Ideally, roads should be designed keeping in mind the safety of all road users. This would mean making sure that there are adequate facilities for pedestrians, cyclists and motorcyclists. Measures such as footpaths, cycling lanes, safe crossing points and other traffic calming measures can be critical to reducing the risk of injury among these road users.

Unsafe Vehicles

Safe vehicles play a critical role in averting crashes and reducing the likelihood of serious injury. There are a number of United Nations (UN) regulations on vehicle safety that, if applied to countries' manufacturing and production standards, would potentially save many lives. These include requiring vehicle manufacturers to meet front and side impact regulations, to include electronic stability control (to prevent over-steering) and to ensure airbags and seat-belts are fitted in all vehicles. Without these basic standards the risk of traffic injuries – both to those in the vehicle and those out of it – is considerably increased.

Inadequate Post-crash Care

Delays in detecting and providing care for those involved in a road traffic crash increase the severity of injuries. Care of injuries after a crash has occurred is extremely time-sensitive: delays of minutes can make the difference between life and death. Improving post-crash care requires ensuring access to timely prehospital care and improving the quality of both prehospital and hospital care, such as through specialist training programmes.

Inadequate Law Enforcement of Traffic Laws

If traffic laws on drink-driving, seat-belt wearing, speed limits, helmets and child restraints are not enforced, they cannot bring about the expected reduction in road traffic fatalities and injuries related to specific behaviours. Thus, if traffic laws are not enforced or are perceived as not being enforced it is likely they will not be complied with and therefore will have very little chance of influencing behaviour. Effective enforcement includes establishing, regularly updating, and enforcing laws at the national, municipal and

local levels that address the above mentioned risk factors. It includes also the definition of appropriate penalties.

Indian Scenario

In 2017, a whopping 1.47 lakh people died in road deaths in India, which is equivalent to the entire pollution of Shillong, the capital of Meghalaya. Every year, over a lakh die as a result of road crashes and the proportion of those who get injured is nearly three to four times higher. According to the Ministry of Road Transport and Highways, road accidents in India have declined from 42 per 1,00,000 population in 2010 to 36 in 2017. Even in absolute terms, road accidents have been falling since 2015 and the 2017 figure — 4,64,910, or 53 every hour — is the lowest since 2006. But it is a slightly different story in fatalities due to road accidents. While both absolute deaths and fatalities per 1,00,000 population declined marginally in 2017 — to 1,47,913 (17 every hour) and 11.5, respectively — the number of fatalities per 100 accidents rose from 31.4 in 2016 to 31.8 in 2017. But there is no data available on how many road accident victims lose their lives because of lack of medical attention within the first hour of the mishap, called the "golden hour" when treatment can mostly prevent death.

Between 2008 and 2018, India's rank in road quality rose from 87 to 51. The share of paved roads in our road network has increased from half in March 2008 to nearly two-thirds in March 2016, according to the latest available figures. India has a road network of 5.6 million km, of which national highways contribute just 2% and state highways 3%. Rural roads account for the lion's share, at 70%. While national and state highways almost entirely have a black top surface (with bitumen as a binder) or cement concrete, just over half of rural roads are paved.

Further, reports of worsening potholes after rains are common in cities, due to inefficient drainage and multi-lane highways are built without faping into account the needs of villagers who need to cross it, resulting in accidents. Most of India's roads do not befit the fastest-growing major economy and way too many people lose their lives in accidents.

Brasilia Declaration on Road Safety

At the 2nd Global High-Level Conference on Road Safety, the 2200 delegates adopted the "Brasilia Declaration on Road Safety" through which they agreed ways to halve road traffic deaths by the end of this decade – a key milestone within the new Sustainable Development Goal (SDG) target 3.6.

Key Highlights

- It is a call to rethink transport policies in order to favour more sustainable modes of transport such as walking, cycling and using public transport.
- It highlights strategies to ensure the safety of all road users, particularly by improving laws and enforcement; making roads safer through infrastructural modifications; ensuring that vehicles are equipped with life-saving technologies; and enhancing emergency trauma care systems.
- The Brasilia Declaration encourages WHO and partners to facilitate the development of targets to reduce road traffic crashes and fatalities, and support the definition and use of indicators linked to the SDG targets related to road safety.

Challenges

While India has a national road safety policy in place, it has been ineffective for the want of strong legislation and coordination amongst various ministries. In 2016, the government identified 726 black spots on national highways and allocated Rs11,000 crore to fix them. However, in the last two years only 189 spots have been rectified by the government.

As far as road-user behaviour laws are concerned, barring seat belts, no other law on road safety in India aligns itself with international best

practices. The seat belt law doesn't differentiate between frontal and rear seat occupants, a practice followed internationally.

As per WHO, wearing seat belts reduces the risk of a fatal injury among front seat passengers by up to 50 per cent and for rear seat passengers upto 75 per cent. In India, though the law is in place, its enforcement and communication is weak. Shockingly, the key reason why people don't wear seat belts in the country is that seat belts crumple clothes!

While wearing a helmet while riding a two wheeler is in force by law, it is ineffective as the law bizarrely fails to specify that the helmet must be fastened. In 2016, over 50,000 or a third of road fatalities were recorded among two-wheeler drivers or riders and the maximum deaths resulted because of head injuries.

Another reason for bad driving habits is that most people do not go through formal driving lessons before getting a licence and in several places you can get your licence delivered to your home for a price. Improving driving skills and a proper licensing system can ensure better road behaviour and effective law enforcement.

The fundamental problem with our roads is they are designed for motorists. Pedestrians are not prioritised at all. Pedestrians accounted for 13% of those killed in accidents in 2017 in India.

Government of India's Initiatives

The Ministry of Road Transport and Highways has taken a number of steps to prevent road accidents and road accident fatalities. These include:

- ◆ The government has approved a National Road Safety Policy. This policy outlines various policy measures such as promoting awareness, establishing road safety information data base, encouraging

safer road infrastructure including application of intelligent transport, enforcement of safety laws etc.

- ◆ The Ministry introduced Motor Vehicle (Amendment) Bill 2017 covering entire gamut of road safety. It has recommended a huge hike in various penalties for traffic violations like drunk driving, rash driving and driving without licence, recall of defective vehicle parts by auto companies and making vehicle owners criminally liable for

Road Accident Data Management System (RADMS) in Tamil Nadu: Towards Complete Road Safety Management

Background

In Tamil Nadu about 150 accidents take place per day on average. In 2007, Tamil Nadu announced a Road Safety Policy.

Intervention

As part of the Action Plan, an easy-to-use bilingual software package - known as the Road Accident Data Management System (RADMS) - was developed. The RADMS software, has been deployed at all the police stations of the State. The GIS-based RADMS software geographically maps all road accidents that take place in the State. The system identifies the most accident-prone spots and displays crash trends and other information at the click of a mouse. The RADMS software, developed after detailed consultations between the police, transport and highway departments have been helping the authorities analyze the 'how', 'where' and 'why' of road accidents, and enabling them to plan and implement remedial measures.

Impact

The implementation of road safety measures based on this analytical data brought down the number of accident fatalities in Tamil Nadu from 13.39 per 10,000 vehicles in 2006 to 10.09 in 2010, exceeding the targets set by the State.

Key Takeaways

Each police station could be provided with a hand-held GPS device to enable personnel to enter the details at the accident site itself. The system could be linked with medical facilities for quick attention to accident victims. The creation of a national road accident database along these lines can help markedly improve road safety across the country.

violations committed by juvenile drivers – has lapsed, with the Bill failing to pass the Rajya Sabha test.

- ◆ The Ministry has formulated a multi-pronged strategy to address the issue of road safety based on 4 'E's viz. Education, Engineering (both of roads and vehicles), Enforcement and Emergency Care.
- ◆ Setting up of model driving training institutes in States and refresher training to drivers of Heavy Motor Vehicle in the unorganized sector.
- ◆ As a measure of supplementing the efforts of States / UTs for minimizing the accident potential at the identified locations / stretches through engineering improvement on state roads, Ministry of Road Transport & Highways had taken a decision to sanction road safety works on state roads with an earmarked allocation of 10% of

funds allocated to the state roads under Central Road Fund.

- ◆ Ministry of Road Transport & Highways has constituted a District Road Safety Committee in each district of the country to promote awareness amongst road users under the chairmanship of Member of Parliament (Lok Sabha) from the district.
- ◆ Taking road safety as a serious issue, in 2015, India signed the Brasilia declaration and committed to reduce road accidents and fatalities by half.

Way Forward

The number of road traffic deaths continues to climb, while the rates of death relative to the size of the world population has stabilised in recent years. The progress that has been achieved in a number of countries to

stabilise the global risk of dying from a road traffic crash has not occurred at a pace fast enough to compensate for the rising population and rapid motorization of transport taking place in many parts of the world. At this rate, the SDG target to halve road traffic deaths by 2020 will not be met. Strengthening legislation to mitigate key risk factors is recognized by the majority of governments as an important strategy to improve road safety. There is an urgent need for governments to scale up their road safety efforts in order to live up to their commitments made in the Sustainable Development Agenda 2030.

General Studies Paper- III

Topic: Infrastructure: Energy, Ports, Roads, Airports, Railways etc.



7. RARE EARTH METALS : CURRENT STATUS, CONSTRAINTS AND OPPORTUNITIES

Why in News?

The Union Ministry of Environment, Forest and Climate Change (MoEF&CC) has agreed to a request by the Ministry of Mines (MoM), seeking that clearances to private companies for mining beach sand minerals should be stopped.

Introduction

According to a new research report by Global Market Insights Inc. rare earth metals market is expected to surpass USD 20 billion by 2024. Rare earth elements are integrated into multiple industries that contribute to a nation's economy and security. Some of these elements are considered as strategic minerals because of their use in defense, energy and various industries. In recent years, the variety of high-tech applications of rare earth

elements has burgeoned, especially in lowcarbon technologies and demand for them has grown rapidly – a trend which is expected to continue. Growing demand for magnets in automobiles and energy generation will majorly contribute to the growth of global rare earth metals market over the forecast period. The demand for rare earth magnets is majorly increasing by their consumption in electric and hybrid vehicles and wind turbines. Increasing focus on utilizing clean and renewable energy is giving a substantial pressure on the electricity providers, to generate energy through renewable sources, which in turn will show a positive impact on the growth of this market. At the same time, there is international concern about the security of their future supply, their costs, and the impacts this might have.

What are Rare Earth Elements?

The rare earth elements (REE) are a collection of 17 elements. REEs generally fall into one of two categories: Light Rare Earth Elements (LREEs) and Heavy Rare Earth Elements (HREEs), with varying levels of uses and demand. REE mineral deposits are usually rich in either LREEs or HREEs, but rarely contain both in significant quantities.

Heavy rare Earth elements are Europium (Eu), Gadolinium (Gd), Terbium (Tb), Dysprosium (Dy), Holmium (Ho), Erbium (Er), Thulium (Tm), Ytterbium (Yb), Lutetium (Lu) and Yttrium (Y).

Light rare Earth elements are Lanthanum (La), Cerium (Ce), Praseodymium (Pr), Neodymium (Nd)

and Samarium (Sm). They are referred to as 'rare' because it is not common to find them in commercially viable concentrations.

These are characterised by high density, high melting point, high conductivity and high thermal conductance. A number of rare earth minerals contain thorium and uranium in variable amounts, but they do not constitute essential components in the composition of the minerals.

The principal sources of rare earth elements are bastnaesite (a fluorocarbonate which occurs in carbonatites and related igneous rocks), xenotime (yttrium phosphate) commonly found in mineral sand deposits and loparite which occurs in alkaline igneous rocks and monazite (a phosphate). Apart from these, the rare earths occur in many other minerals and are recoverable as by-products from phosphate rock and from spent uranium leaching.

In India, significant rare earths minerals found in India include ilmenite, sillimanite, garnet, zircon, monazite and rutile, collectively called Beach Sand Minerals (BSM). Monazite is the principal source of rare earths and thorium.

Uses and Consumption

Rare earth materials are utilised in a wide range of critical products enabling many emerging green energy technologies, high tech applications and defence systems such as hybrid cars, plug-in-hybrid electric vehicles (PHEVs), the latest generation of efficient windpower turbines, computer disc drives, missile guidance systems, etc. The lanthanide elements as a group have magnetic, chemical and spectroscopic properties that have led to their application in wide range of end-uses. Cerium finds application in polishing of glass items like lenses and display screens of cathode-ray tubes, liquid-crystal displays and

plasma display panels, in petrol and diesel fuels as fuel additive and along with lanthanum for replacement of cadmium in red pigments. Mixed salts of the cerium group of elements, other than fluorides are used in medicine, non-irritating antiseptic dressings, waterproofing agents and fungicides in textile manufacture. The principal uses of commercially pure cerium compounds that are in the form of nitrate is in the manufacture of incandescent gas mantles and cerium compounds as oxide. It also finds usage as a polishing agent of glass. Cerium compounds are also used in ceramic and glass as colouring pigments and also as catalysts in chemical industry.

The properties of the REE have led to them being successfully applied to numerous geological research problems. The distribution of REE in a series of igneous rocks, for example, can indicate details of their origins and history, as well as their relationship to one another. The same techniques can be applied to cosmic materials. It has been shown that some meteorites (achondrites) were formed by processes very similar to those by which many igneous rocks on the Earth are made (fractional crystallisation).

In addition to it, rare earth elements play an essential role in national defense of any country. The military uses night-vision goggles, precision-guided weapons, communications equipment, GPS equipment, batteries and other defense electronics. Rare earth metals are key ingredients for making the very hard alloys used in armored vehicles and projectiles that shatter upon impact.

Mining Regulations in India

Regulatory framework

The mining industry is regulated both at the Central and state level. The state governments have the power to regulate mines and mineral

development. However, this power is subject to the federal laws and regulations on mining.

Mineral Classification

Minerals are classified into two types – major and minor. All state governments have the power to frame policy and regulate the exploration, extraction and processing of all minor minerals such as building stones, clay and sand. Minerals (other than the minor minerals) are automatically classified as major minerals. The Central government has the power of revision, fixing of royalty, issuing regulations, etc, in respect of major minerals. Metallic minerals are largely classified as major minerals.

The Central government also has ownership over all offshore minerals (ie, minerals extracted from the sea or ocean floor in the Indian maritime zones such as the territorial waters, continental shelf and exclusive economic zones). Further, the central government has the right to allot concessions and collect royalty for mining offshore minerals.

Changes in Mining Rules for REEs

The state governments were given permission to grant mineral concessions, where Monazite is less than the prescribed threshold values (00.75%), to the private sector by auction or competitive bidding, in accordance with the Atomic Minerals Concession Rules, 2016. However, in a notification this threshold limit was reduced to 0%. As monazite is found in various concentrations in all the beaches, this amendment essentially meant a ban on mining by private companies.

REEs and China

China possesses one-third of the world's known deposits of rare earth metals and contributes 97 per cent of the global production and

fully understands the geostrategic importance of REEs and has been making sustained efforts to maintain its monopoly in this field. China contains roughly a third of the world's reserves of rare earth elements, and it has only come to dominate the sector recently. After China discovered new reserves in the 1960s, it took until the early 1990s for it to overtake the United States as the world's premier rare earth elements producer. China's production of rare earth elements is both geographically divided by type and highly concentrated in a handful of mines. Inner Mongolia accounts for nearly 70 percent of China's LREE production. Southern China, where HREEs were first discovered in the 1960s, accounts for most of the country's HREE production.

China's Rare Earths Embargo

China's overwhelming presence in this market affords the country significant influence over the market, a fact that has alarmed many international users, especially the US military, which has come to rely on China for the rare earths it uses in missiles and other advanced military hardware. In a recent event, China is threatening to take the ongoing trade war to the next stage: cut off rare earth metal supplies to US technology and defense industries.

Earlier, China halted shipments of rare earth metals, crucial for the manufacture of everything from guided missiles and hybrid cars to flat-screen televisions and BlackBerry phones, to Japan over a territorial dispute. It also cut down its export quota for rare earth by 72 per cent for the second half of 2010. In 2011, the quota was reduced by 35 per cent for the first half.

India and REEs

Rare earth resources are predominantly found in China, US, Australia and India. India occupies fourth position, with 1.3 million tonnes of rare earth oxide (REO)

content. The Department of Atomic Energy (DAE), however, estimates the total rare earth reserves in India at 10.21 million tonnes. This would put India in the third position above Australia. India has also been engaged in mining and extraction activities for more than five decades. This makes it possible for India to become an important player in the global rare earths industry.

In India, monazite is the principal source of rare earths. It occurs in association with other heavy minerals such as ilmenite, rutile, zircon, etc, in the beachsands and inland placer deposits. Monazite also contains thorium and uranium. Because of the presence of these radioactive elements, mining of monazite sands is carried out only by a government body, the DAE.

India has almost 35 per cent of the world's total beach sand mineral deposits. Rare earth minerals are present along the coastlines of states such as Kerala, Tamil Nadu and Odisha. These minerals include monazite — an atomic mineral that can be processed to yield thorium, which can be combined with a fissile material like plutonium to develop nuclear fuel and is central to India's three-stage nuclear energy programme. Monazite is present in varying grades and concentrations along the coastlines, especially in Kerala.

India's Position

Even the limited production of rare earths has been decreasing. The absence of a domestic market and the fall in exports because of low-cost Chinese production has been the causes of this decline. Most of the products using rare earth materials are currently imported into India in finished form. Currently there is no manufacturing facility in India for any of the intermediate rare earth products. India and China started mining rare earths almost at the same time. While China went ahead in building a strong

domestic rare earths ecosystem, India has been primarily a supplier of rare earth raw materials and some basic rare earth compounds.

The absence of any real links between research and use and the total absence of any kind of rare earth-based product industries in the country places the Indian rare earths industry within the incubation phase. The challenge of moving from the incubation into the growth and mature phases is not a trivial one and requires a substantial change in direction and strategy. If India can put together a national strategy for rare earths and bring about relevant coordination between research entities, the mission organisations and rare earth product producers in industry, there is still some hope that India can become a player of substance in the global rare earths industry. This will take some time to achieve and will require considerable investment in money, time and effort.

Way Forward

Presently, China is the global leader in the REE sector and could continue to be in the forefront in the near future too. Fortunately, both industrially developed and developing states have understood the necessity to break the Chinese monopoly in this sector. It is important for states like India to make appropriate investments in this sector because it offers various commercial, strategic and diplomatic advantages. Also, there is a need for scientists and technologists to find correct alternatives to REEs to reduce the world's overdependence on REEs.

General Studies Paper- I

Topic: Distribution of key natural resources across the world (including South Asia and the Indian sub-continent); factors responsible for the location of primary, secondary and tertiary sector industries in various parts of the world (including India).



SEVEN SUBJECTIVE QUESTIONS WITH MODEL ANSWERS

In-flight Connectivity : Prospects and Challenges

Q1. What do you understand by 'In-flight Connectivity'? Discuss its prospects and challenges in the context of India.

Hints:

- ◆ In-flight connectivity mean airlines that have on board internet or Wi-Fi let passengers surf tweet, send text or WhatsApp message on their personal electronic devices at reasonably fast speeds in good connectivity zones. It is subject to factors like the number of concurrent users, satellite coverage and weather conditions.
- ◆ Over the past couple of months, the Department of Telecom has issued licences to BSNL, Airtel, Hughes Communications India Ltd. and Tata Telenet for internet and mobile services on flights. International airlines could start providing internet onboard over Indian skies in the next three months becoming the first to do so, while domestic passengers may have to wait for another 7 to 9 months.
- ◆ In-flight Wi-Fi connectivity is subject to factors like the number of concurrent users, satellite coverage, and weather conditions. Most airlines discourage voice calls to avoid inconvenience to fellow passengers. Once launched, these factors would be important factors that decide its success.
- ◆ However, IFC is great news, but to woo price-sensitive Indian customers, airlines need to provide affordable tariffs. Since cheaper tariff will be a burden for airlines, they need to find a balanced tariff or provide Wi-Fi as an add-on; they can also consider generating revenue from ads, corporate offerings, e-commerce, premium content, etc.

Structure and Dynamics of Indian Monsoon

Q2. Discuss the structure and dynamics of southwest monsoon in the context of India.

Hints:

- ◆ According to India Meteorological Department (IMD), southwest monsoon seasonal (June to September) rainfall over the country as a whole is likely to be near normal.
- ◆ The warming up of the East Pacific, or the status with respect to El Nino, has been known to influence the Indian monsoon, though not in a direct cause-effect mode. While a number of El Nino years have returned a deficit monsoon, others have either taken the Pacific phenomenon in their stride or returned normal-to-excess rainfall.
- ◆ The Indian Ocean too witnesses warming anomalies in cyclical turns — called the Indian Ocean Dipole (IOD) — with known implications for a concurrent Indian monsoon. When the western part of the ocean warms up relative to the east, it is called the positive IOD phase, which favours the Indian monsoon (as is likely the case this year). The reverse is called the negative IOD phase, when the eastern part of the ocean warms up more than the west. This drains away the moisture from over India and affects the monsoon.
- ◆ The MJO can be defined as an eastward moving 'pulse' of clouds, rainfall, winds and pressure near the equator that typically recurs every 30 to 60 days. It's a traversing phenomenon and is most prominent over the Indian and Pacific Oceans.
- ◆ PDO is a long-lived El Nino-like pattern of Pacific climate variability. If both El Nino Southern Oscillation (ENSO) and the PDO are in the same phase, it is believed that El Nino/La Nina impacts may be magnified. Conversely, if ENSO and the PDO are out of phase, it has been proposed that they may offset one another, preventing "true" ENSO impacts from occurring.

Right to Legal Aid : A Constitutional Expectation

Q3. What do you understand by 'free legal aid'? Discuss why access to legal services continues to be a challenge for a substantial segment of the Indian population due to geographical, resource and infrastructure constraints.

Hints:

- ◆ Legal aid is free legal assistance to the poor and weaker sections of the society with the object to enable them to exercise the rights given to them by law.
- ◆ Since legal representation is costly and out of reach for the disadvantaged, the need for legal aid arises. The problem has been compounded by the failure to mainstream legal-aid services, particularly for the marginalized sections at the panchayat levels. The absence of a structured and economically viable format has also hindered lawyers in actively offering legal assistance to those in need of it.
- ◆ The pro bono (Latin, for the public good) culture is still a work in progress. While legal aid is provided and organized by non-governmental organizations, law schools, bar associations, and also individual advocates, the demand for legal aid clearly exceeds the supply.
- ◆ The major drawback of legal aid movement in India is the lack of legal awareness. People are not aware of rights and protection available under the law. It needs to be realized that the promotion of awareness regarding legal aid is not the exclusive duty of the Legal fraternity. It is equally the concern and responsibility of the society at large. Constitutional commitment for legal aid can only be cherished if society comes forward to care for its vulnerable population.

CTBT and India : An Analysis

Q4. What is 'Comprehensive Nuclear-Test-Ban Treaty (CTBT)'? Discuss why does government of India refuse to sign the CTBT.

Hints:

- ◆ The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is the treaty banning all nuclear explosions - everywhere, by everyone. But, despite more than 20 years after the United Nations opened the Comprehensive Test Ban Treaty (CTBT) for signature on 24 September 1996, it has still not entered into force. It is the only multilateral treaty to have met such an uncertain fate.
- ◆ Since its inception, India has had a number of reservations about the CTBT. While it has stood by its demand for a nuclear weapons-free world, various principled, procedural, political, and security concerns have stood in the way of its support for the CTBT.
- ◆ India's principled opposition drew from its emphasis on universal and complete nuclear disarmament in a time-bound manner. India has traditionally believed this to be the end goal with the test ban just being a

path to get there. But it did not insist on a complete disarmament clause in 1994, acknowledging that it was a "complex issue."

- ◆ On the security front, India thought that it faced uncertain dangers from Pakistan, and China, which had conducted nuclear tests even while the CTBT was being negotiated. As party to the CTBT, India would be waiving the possibility of testing and developing its own nuclear weapons whereas China would be able to retain its arsenal as per the NPT. This was compounded by the fear of nuclear collusion between China and Pakistan.
- ◆ Further, there are also those, particularly from India's scientific and security bureaucracies, who continue to believe that accepting the CTBT would hinder India's strategic nuclear program development and the option to test must be kept open.

Credit Rating Agencies in India : Are They Credible

Q5. Discuss the issues related to the creditworthiness of the credit rating agencies.

Hints:

- ◆ Firm being rated may not provide significant or material information, which is likely to affect the investor's decision as to investment, to the investigation team of the credit rating company. Thus any decisions taken in the absence of such significant information may put investors at a loss.
- ◆ Rating is a static study of present and past historic data and performance of the company at one particular point of time. Number of factors including economic, political, environment, and government policies has direct bearing on the performance of a company. Any changes after the assignment of rating symbols may defeat the very purpose of risk inactiveness of rating.
- ◆ Rating grades are not always reflection of the true image of a company. A company might be given low grade because it was passing through unfavorable conditions when evaluated. Thus, misleading conclusions may be drawn for short term turbulence.
- ◆ Despite maintaining a wall between advisory services and rating services of Credit Rating Agencies, still criticism persists as rating and non-rating entities have common ownership and top management. Therefore it is a key regulatory issue for bringing transparency in the functioning of CRAs especially with reference to investor's protection.

- ◆ Rating grades by the rating agencies are only an opinion or indicator about the capability of the company to meet its interest obligations. Rating symbols do not pinpoint towards quality of products or management or staff etc. In other words rating does not give a certificate of the complete soundness or health of the company.

Road Accidents in India : An Overview

Q6. According to a World Health Organisation (WHO), road accidents are the leading cause of death worldwide with more than 1.35 million lives lost each year and 50 million sustaining injuries. Discuss the associated risk factors in the context of India.

Hints:

- ◆ Deaths and injuries resulting from road traffic crashes remain a serious problem globally and current trends suggest that this will continue to be the case in the foreseeable future.
- ◆ An increase in average speed is directly related both to the likelihood of a crash occurring and to the severity of the consequences of the crash. For example, every 1% increase in mean speed produces a 4% increase in the fatal crash risk and a 3% increase in the serious crash risk.
- ◆ Correct helmet use can lead to a 42% reduction in the risk of fatal injuries and a 69% reduction in the risk of head injuries. Wearing a seat-belt reduces the risk of death among drivers and front seat occupants by 45 - 50%, and the risk of death and serious injuries among rear seat occupants by 25%.
- ◆ In 2017, a whopping 1.47 lakh people died in road deaths in India, which is equivalent to the entire population of Shillong, the capital of Meghalaya. Every year, over a lakh die as a result of road crashes and the proportion of those who get injured is nearly three to four times higher. According to the Ministry of Road Transport and Highways, road accidents in India have declined from 42 per 1,00,000 population in 2010 to 36 in 2017.
- ◆ But all is not rosy. Reports of worsening potholes after rains are common in cities, due to inefficient drainage and multi-lane highways are built without into account the needs of villagers who need to cross it, resulting in accidents. Most of India's roads do not benefit the fastest-growing major economy and way too many people lose their lives in accidents.

Rare Earth Metals : Current Status, Constraints and Opportunities

Q7. What are rare earth materials? Discuss the importance of these materials for India and India's position at global level.

Hints:

- ◆ The rare earth elements (REE) are a collection of 17 elements. They are referred to as 'rare' because it is not common to find them in commercially viable concentrations. REEs generally fall into one of two categories: Light Rare Earth Elements (LREEs) and Heavy Rare Earth Elements (HREEs), with varying levels of uses and demand. REE mineral deposits are usually rich in either LREEs or HREEs, but rarely contain both in significant quantities.
- ◆ Rare earth resources are predominantly found in China, US, Australia and India. India has also been engaged in mining and extraction activities for more than five decades. This makes it possible for India to become an important player in the global rare earths industry.
- ◆ Even the limited production of rare earths has been decreasing. The absence of a domestic market and the fall in exports because of low-cost Chinese production has been the causes of this decline. Most of the products using rare earth materials are currently imported into India in finished form.
- ◆ Currently there is no manufacturing facility in India for any of the intermediate rare earth products. India and China started mining rare earths almost at the same time. While China went ahead in building a strong domestic rare earths ecosystem, India has been primarily a supplier of rare earth raw materials and some basic rare earth compounds.
- ◆ Presently, China is the global leader in the REE sector and could continue to be in the forefront in the near future too. Fortunately, both industrially developed and developing states have understood the necessity to break the Chinese monopoly in this sector.
- ◆ It is important for states like India to make appropriate investments in this sector because it offers various commercial, strategic and diplomatic advantages. Also, there is a need for scientists and technologists to find correct alternatives to REEs to reduce the world's overdependence on REEs.

SEVEN IMPORTANT NEWS

1. NASA is Creating World's First All-electric Airplane

NASA has funded scientists are working on an environmentally friendly electric plane that's powered by cryogenically-liquified hydrogen fuel. The engineers have been given three years and \$6 million (£4.6million) to create the tech which could revolutionize the aviation industry. The aviation industry is often lambasted for not doing enough to help save the environment.

Key Highlights

The technology to power a plane using this fuel doesn't currently exist and that's where NASA comes in with their funding.

The International Air Transport Association (IATA) claims that air travel only accounted for 2% of man-made carbon dioxide emissions in 2017, a lot

of people think the number is actually higher and it is certainly going to increase.

IATA has estimated that more passengers will be getting on planes in 2036 than there are people alive today.

The researchers have also warned that air travel in the US is expected to increase 90 percent in the next 20 years so they want to make a plane that can actively reduce emissions before then.

Why Hydrogen?

Hydrogen is becoming a cost-effective fuel source. However, hydrogen cells on their own may be able to power trains or turbines but they lack the ability to power a jet engine without weighing it down because they take up a lot of space.

One project is undergoing to cryogenically cool hydrogen cells so they can be condensed into a liquid and used as fuel. When this hydrogen liquid is mixed with oxygen in the engine there is a powerful reaction, which results in a lot of energy that can be converted into electricity to drive an electric propulsion system.

The hydrogen chemical energy is converted to electrical energy through a series of fuel cells, which drive the ultra-efficient electric propulsion system. The low temperature requirements of the hydrogen system also provide opportunities to use superconducting, or lossless, energy transmission and high-power motor systems.

2. Nabventures Fund

The National Bank for Agriculture and Rural Development (NABARD) has announced a Rs 700-crore venture capital fund for equity investments in agriculture and rural-focused startups. The fund has been launched by

Nabventures, a subsidiary of NABARD and has a proposed corpus of Rs 500 crore with an option to retain over-subscriptions of Rs 200 crore, called as the 'greenshoe option'.

Key Features

The fund will have a high impact as it will provide a boost to investment ecosystem in the core areas of agriculture, food and improvement of rural livelihoods.

Nabventures is now scouting for equity investments in asset-light, innovative, technology-led start-ups in its focus areas.

What is 'Greenshoe Option'?

A greenshoe option is an over-allotment option. It is primarily used at the time of initial public offering (IPO) or listing of any stock to ensure a successful opening price. In the context of an IPO, it is a provision in an underwriting agreement that grants the underwriter the right to sell investors more shares than initially planned by the issuer if the demand for a security issue proves higher than expected.

It acts as a price stabilising mechanism. From the investor's point of view, an IPO with green shoe option ensures that after listing the share price will not fall below its offer price. ■



3. Sasakawa Award - 2019

United Nations Office for Disaster Risk Reduction (UNDRR) has conferred 'Sasakawa Award - 2019' for Disaster Risk Reduction to Dr. Pramod Kumar Mishra. Dr. P. K. Mishra received the award in recognition of his long-term dedication to improve the resilience of communities most exposed to disasters and his personal commitment to social inclusion as a critical principle to reduce inequality and poverty, enhancing the safety net of the socially and economically marginalized.

About Sasakawa Award

It is the most prestigious international award in the area of disaster risk

management. It was instituted more than 30 years ago and is jointly organized by the UNDRR and the Nippon Foundation. A total grant of USD 50,000 is distributed among the winners which can be either organizations or individuals.

The theme of the 2019 Sasakawa award was "Building Inclusive and Resilient Societies".

About UNDRR

UNDRR was established in 1999 as a dedicated secretariat to facilitate the implementation of the International Strategy for Disaster Reduction (ISDR).

UNDRR has been tasked to support the implementation, follow-up and review of the Sendai Framework.

The Sendai Framework for Disaster Risk Reduction 2015-2030 is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. It was adopted on March 18, 2015 at the World Conference on Disaster Risk Reduction held in Sendai, Japan. ■

4. NGT on Utilization of Treated Wastewater

The National Green Tribunal (NGT) has directed 18 states and two Union Territories (UTs) to submit action plan to ensure utilisation of treated wastewater to reduce pressure on the groundwater resources throughout the country. Till now only nine states and five UTs have submitted the action plan. Accordingly to the CPCB status report, the states which have not submitted action plans include Gujarat, Assam, Bihar, Punjab, Uttar Pradesh and Uttarakhand.

Key Highlights

A bench headed by NGT Chairperson Justice Adarsh Kumar Goel directed the states and UTs to submit the action

plan within three months to the Central Pollution Control Board (CPCB). The states which have still not furnished their action plans are defaulters for violating the directions of the tribunal, for which no valid reason can be seen.

It is well known that the absence of a plan for reuse of treated water affects the recharge of groundwater and also results in fresh water being used for purposes for which treated water can alternatively be used. Proper plans for reuse of wastewater can add to the availability of potable water.

The plans may include a monitoring mechanism in the states for coordination with the local bodies

and this will be the responsibility of the chief secretaries of all the states and UTs.

About NGT

It was established in 2010 under the National Green Tribunal Act, 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. ■

5. CPI Inflation

According to the Central Statistics Office, retail inflation rose to a six-month high of 2.92 per cent in April due to a spike in food prices. The Consumer Price Index-based (CPI) inflation was at 2.86 per cent in the previous month and 4.58 per cent in April 2018. CPI inflation in April is the highest since

October 2018 when the rate was 3.38 per cent.

Why is CPI Inflation Rising?

Rising prices in the food basket, as well as jump in fuel prices, are contributing to the rising inflation. Within CPI inflation, food inflation is expected

to rise in the current year, as last two months witnessed rise in prices of many farm commodities, mainly due to drought in large parts of Western and Southern India, coupled with an early and harsher-than-usual summer. From September 2016 to March 2019, consumer food inflation has

ruled below general retail inflation, averaging a mere 1.3 per cent year-on-year during this period, as against 3.6 per cent for the latter.

What is CPI?

It is a comprehensive measure used for estimation of price changes

in a basket of goods and services representative of consumption expenditure in an economy. It is one of the most important statistics for an economy and is generally based on the weighted average of the prices of commodities. It gives an idea of the cost of living.

Inflation is measured using CPI. The percentage change in this index over a period of time gives the amount of inflation over that specific period, i.e. the increase in prices of a representative basket of goods consumed.

6. Abhyas Target Drone

Defense Research and Development Organization (DRDO) has announced that it had successfully tested the 'Abhyas' High-speed Expendable Aerial Target (HEAT) drone. The pilotless aircraft, designed to serve as a target in live-fire weapons tests. The flight test was tracked by various radars & electro optic systems and proved its performance in fully autonomous way point navigation mode.

The 'Abhyas' has been in development since 2012 and has been displayed by DRDO at international defense expositions since at least 2013.

About Abhyas

Abhyas is designed on an in-line small gas turbine engine and uses indigenously developed Micro-Electro-Mechanical Systems (MEMS) based navigation system for its navigation and guidance.

It has the capability to adjust simulated radar cross section for live-fire exercises and other drills through the use of a lunberg lens in the nose cone, which improves the target's radar reflectiveness.

The design of the fuselage is based is based on Lakshya, a high speed target drone system developed

by the Aeronautical Development Establishment (ADE) of DRDO.

The target drone likely also features sensors, including acoustic missile distance indicators, to allow engineers to gather information on live-fire tests.

Significance

Target missiles and drones serve an important role in the development of a range of interceptors, including surface-to-air systems as well as cruise and ballistic missile defense systems. Abhyas is designed to simulate aircraft for endoatmospheric surface-to-air interception tests as well as air-to-air exercises.

7. Christchurch Call

India has joined France, New Zealand, Canada and several other countries in launching a major initiative 'Christchurch call to action' in Paris to combat terrorism and extremism online and secure the internet. It was named after the New Zealand city where 51 people were killed in an attack on mosques.

Key Highlights

A free, open and secure internet is a powerful tool by which to promote connectivity, enhance social inclusiveness and foster economic growth.

Internet is, however, not immune from abuse by terrorist and violent extremist actors and there was a need for collective efforts globally to secure

the internet from terror groups. The Christchurch attack highlighted the urgent need for action and enhanced cooperation among the wide range of actors with influence over this issue, including governments, civil society and online service providers, such as social media companies, to eliminate terrorist and violent extremist content online.

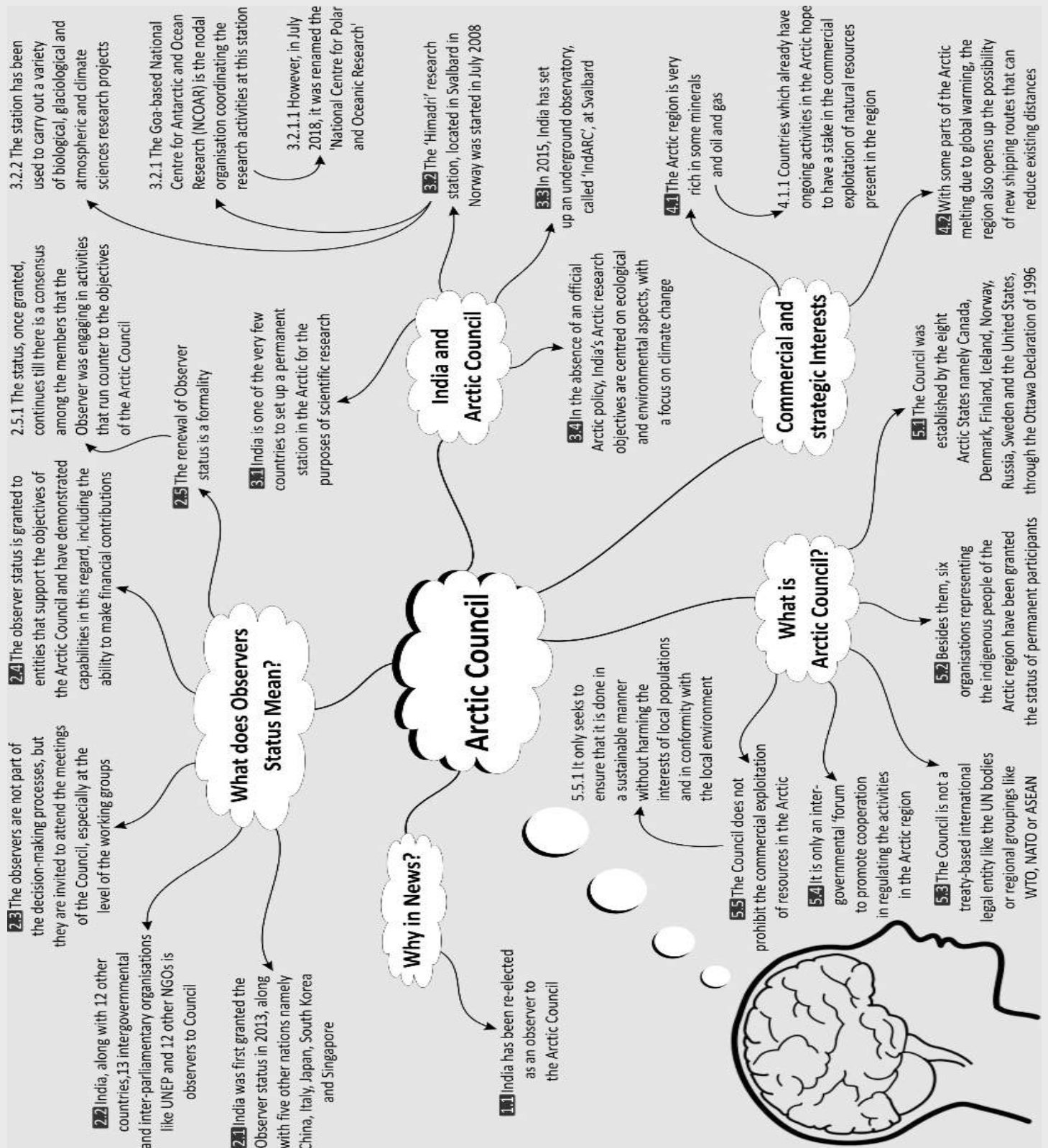
The initiative outlines collective, voluntary commitments from governments and online service providers intended to address the issue of terrorist and violent extremist content online and to prevent the abuse of the internet.

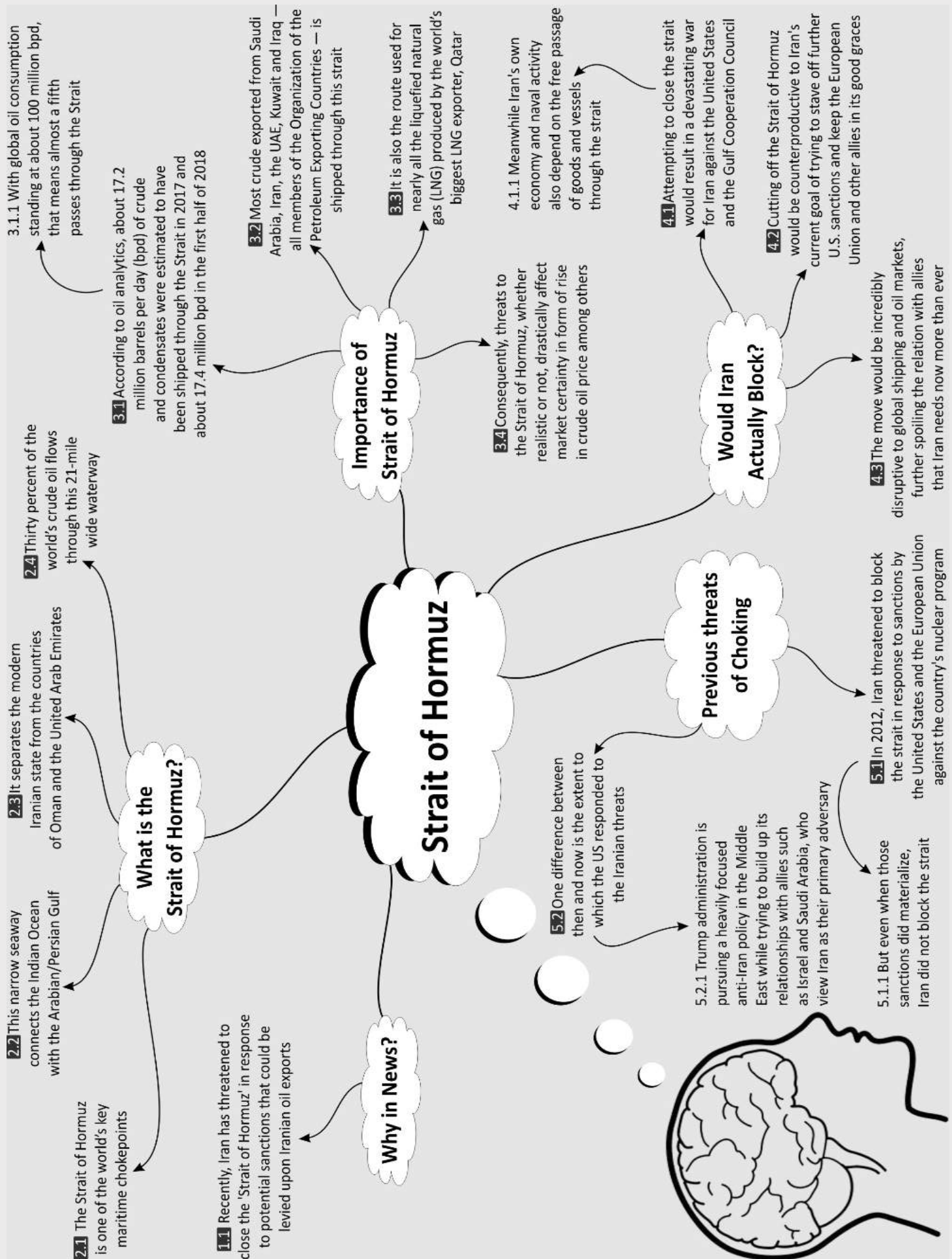
The countries which were of the initiative expressed commitment to ensure effective enforcement of

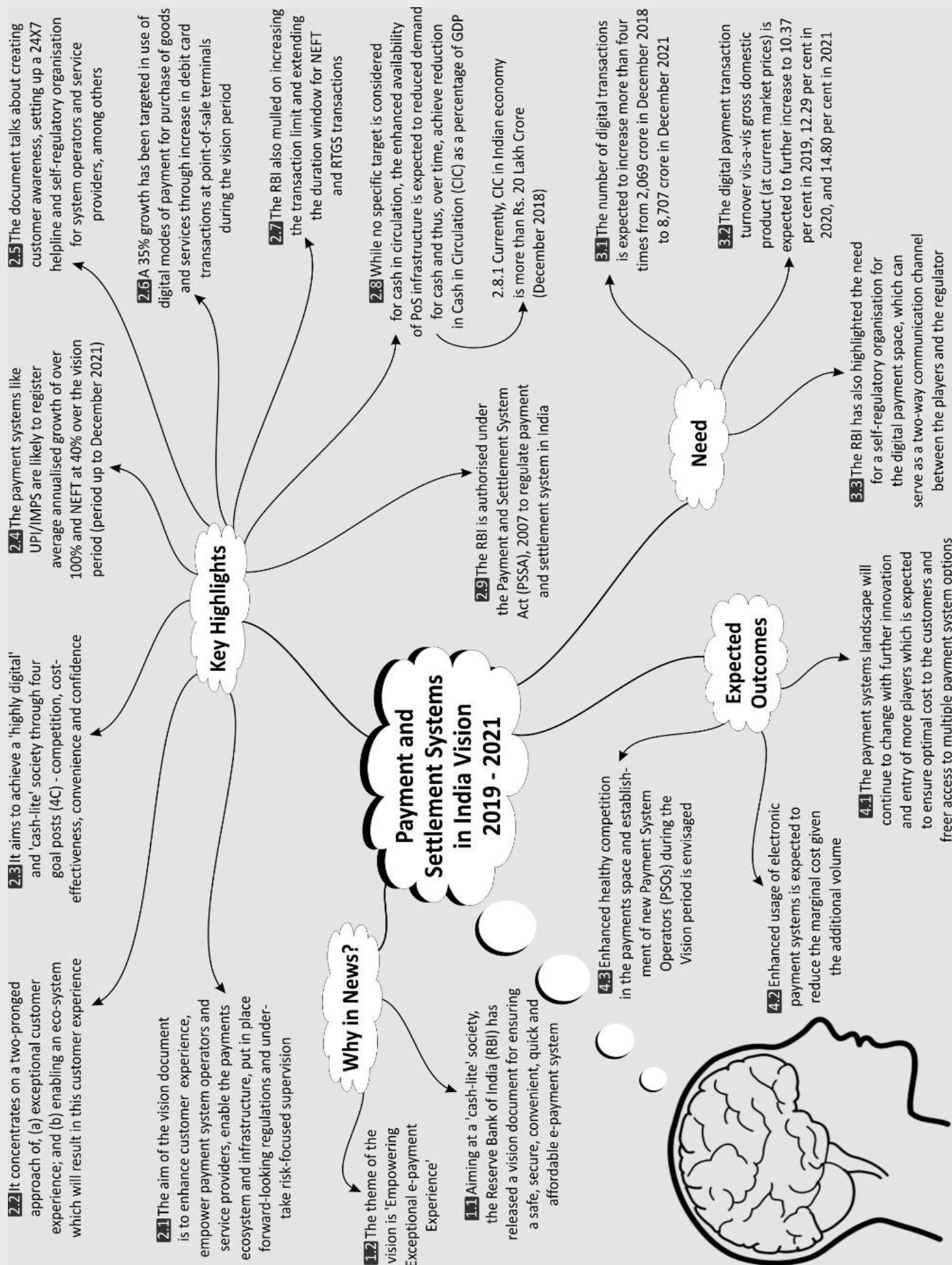
applicable laws that prohibit the production or dissemination of terrorist and violent extremist content, in a manner consistent with the rule of law and international human rights law, including freedom of expression.

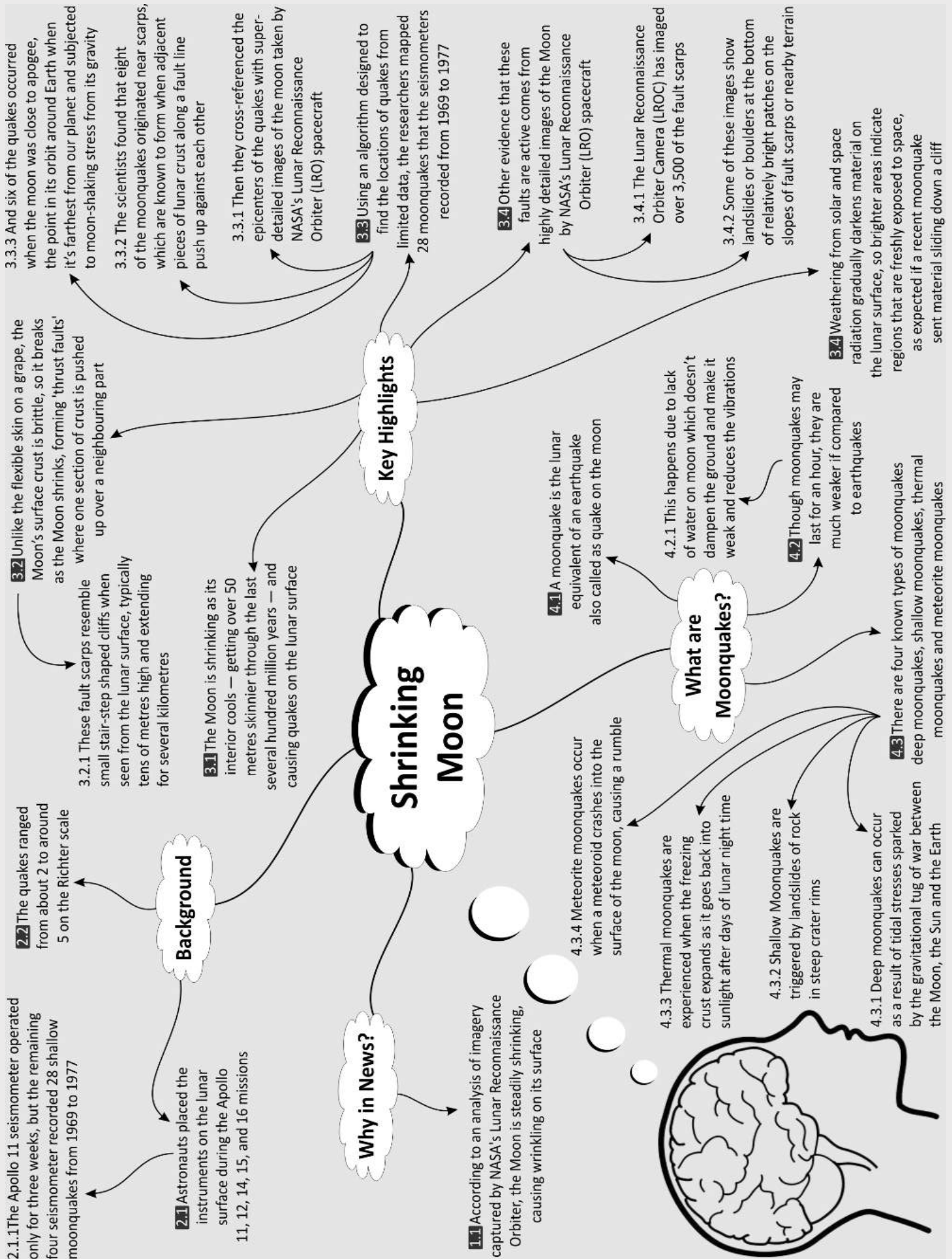
Those who are part of the initiative will also encourage media outlets to apply ethical standards when depicting terrorist events online, to avoid amplifying terrorist and violent extremist content. They will also support frameworks, such as industry standards, to ensure that reporting on terrorist attacks does not amplify terrorist and violent extremist content, without prejudice to responsible coverage of terrorism and violent extremism.

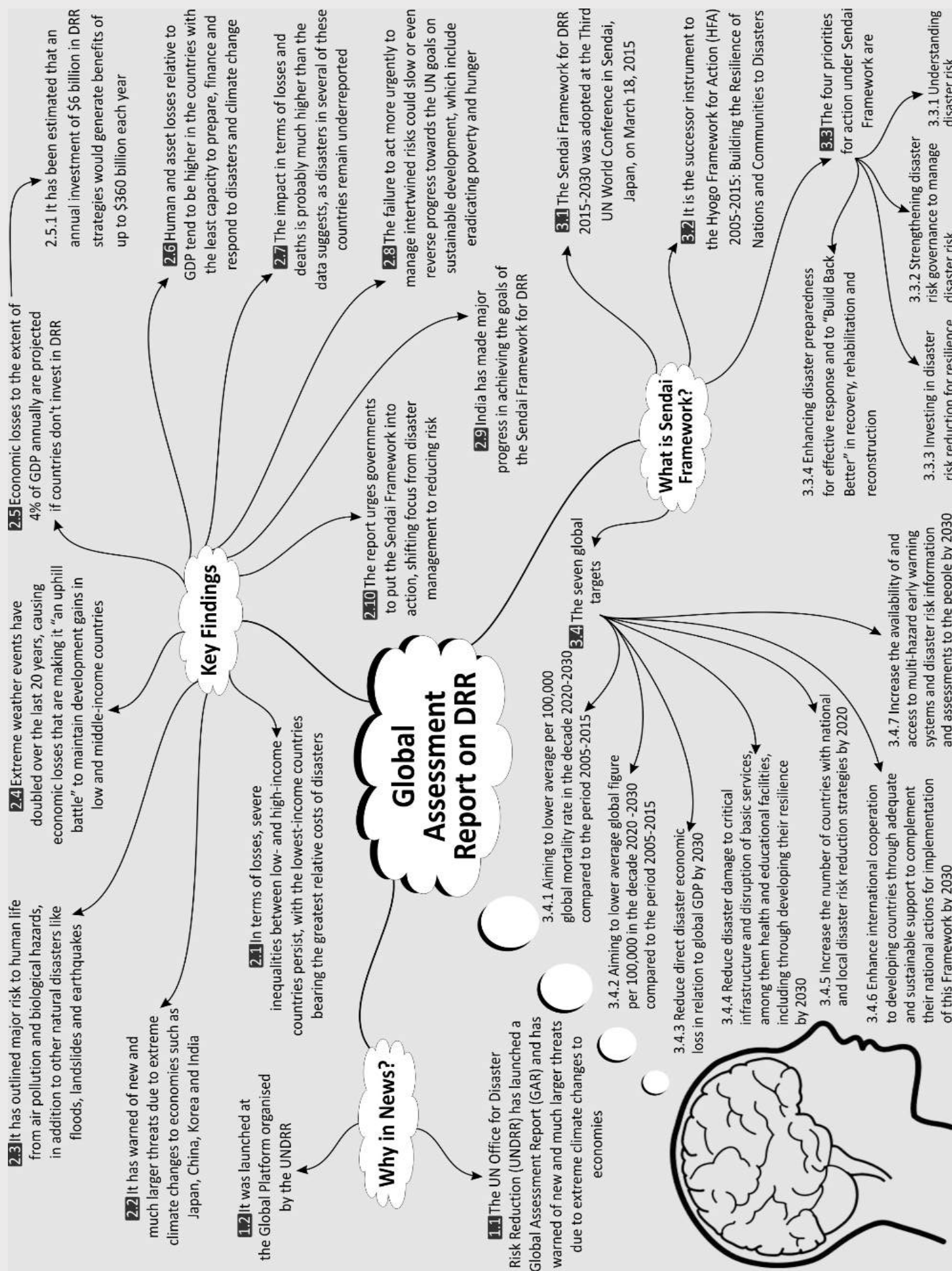
SEVEN BRAIN BOOSTERS

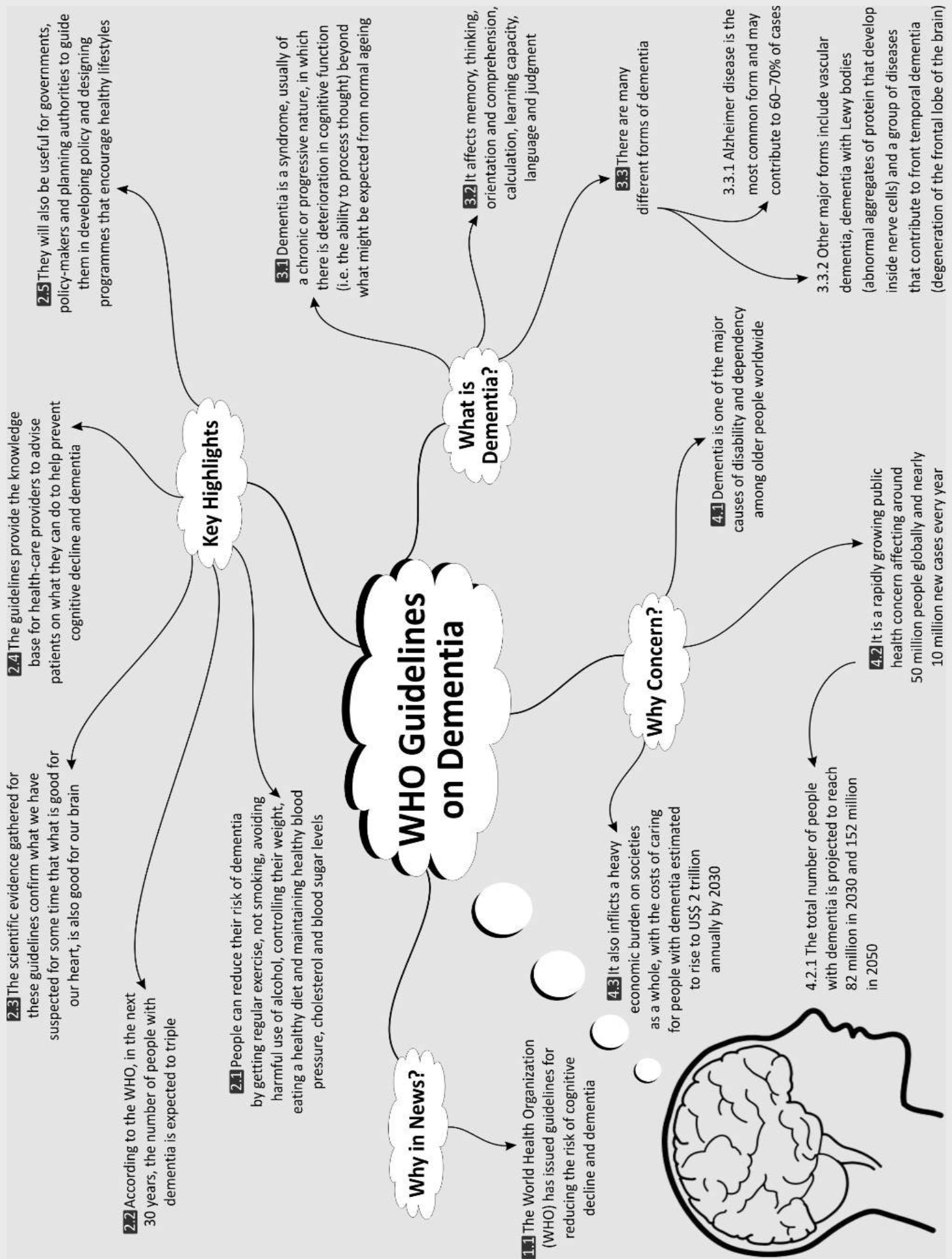


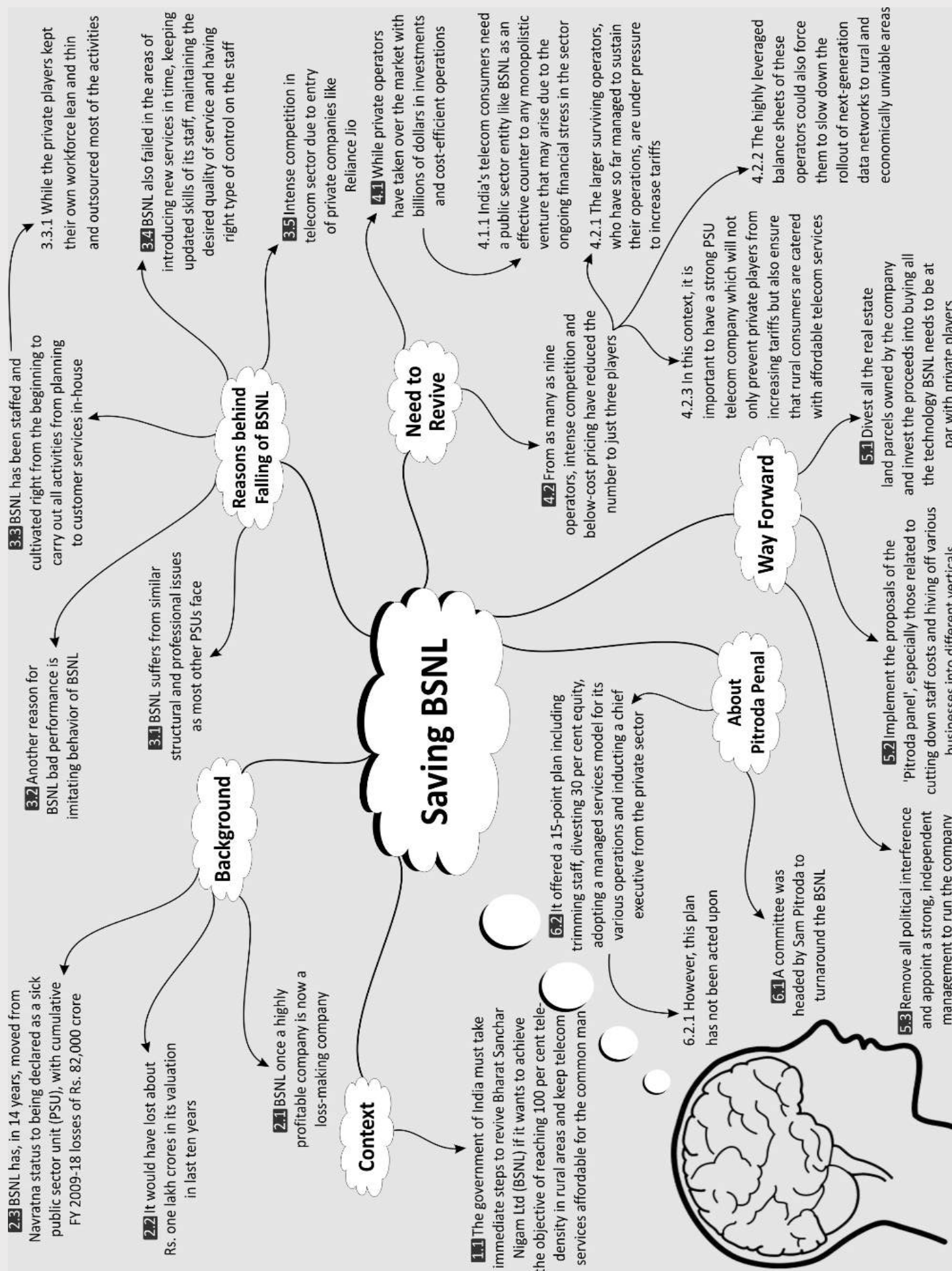












SEVEN MCQ's WITH EXPLANATORY ANSWERS

(Based on Brain Boosters)

Arctic Council

Q1. Consider the following statements in respect of 'Arctic Council':

1. India has been re-elected as an observer to the Arctic Council.
2. The observers can attend the meetings of the Council and take part in the decision-making processes.

Which of the statements given above is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

Answer: (a)

Explanation: Statement 1 is correct. India has been re-elected as an observer to the Arctic Council. India was first granted the Observer status in 2013.

Statement 2 is not correct. The observers are not part of the decision-making processes, but they are invited to attend the meetings of the Council, especially at the level of the working groups.

Strait of Hormuz

Q2. Consider the following statements in respect of 'strait of Hormuz':

1. It separates the modern Iranian state from the countries of Oman and the United Arab Emirates.
2. It is a vital shipping route linking Middle East oil producers to markets in Asia, Europe, North America and beyond.

Which of the statements given above is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

Answer: (c)

Explanation: Both statements are correct. The Strait of Hormuz is one of the world's key maritime chokepoints. It separates the modern Iranian state from the countries of Oman and the United Arab Emirates. Thirty percent of the world's crude oil flows through this 21-mile wide waterway.

Most crude exported from Saudi Arabia, Iran, the UAE, Kuwait and Iraq — all members of the Organization of the Petroleum Exporting Countries — is shipped through the waterway. It is also the route used for nearly all the liquefied natural gas (LNG) produced by the world's biggest LNG exporter, Qatar.

Payment and Settlement Systems in India: Vision 2019 - 2021

Q3. Consider the following statements in respect of 'Payment and Settlement Systems in India: Vision 2019 – 2021':

1. NITI Aayog and the Reserve Bank of India has released this vision document for ensuring a safe, secure, convenient, quick and affordable e-payment system.
2. It proposed to increase the transaction limit and extending the duration window for NEFT and RTGS transactions.

Which of the statements given above is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

Answer: (b)

Explanation: Statement 1 is not correct. Aiming at a 'cash-lite' society, the Reserve Bank of India (RBI) has released a vision document for ensuring a safe, secure, convenient, quick and affordable e-payment system.

Statement 2 is correct. Along with other proposals, which outline the road map for 2019 to 2021, it proposed to examine round-the-clock availability of various payment systems, including NEFT and RTGS.

Shrinking Moon

Q4. Consider the following statements:

1. Moonquakes may last for an hour and they are much weaker if compared to earthquakes.
2. Because of Moonquakes, the surface of Moon is steadily shrinking.

Which of the statements given above is/are correct?

- a) 1 only b) 2 only
c) Both 1 and 2 d) Neither 1 nor 2

Answer: (a)

Explanation: **Statement 1 is correct.** Moonquakes may last for an hour, they are much weaker if compared to earthquakes. This happens due to lack of water on moon which doesn't dampen the ground and make it weak and reduces the vibrations.

Statement 2 is not correct. According to an analysis of imagery captured by NASA's Lunar Reconnaissance Orbiter, the Moon is steadily shrinking, causing wrinkling on its surface. The Moon is shrinking as its interior cools, getting over 50 metres skinnier through the last several hundred million years — and causing quakes on the lunar surface.

Global Assessment Report on DRR

Q5. With reference to the 'Global Assessment Report on DRR', consider the following statements:

1. It has been launched by the UN Office for Disaster Risk Reduction (UNDRR).
2. It has warned of new and much larger threats due to extreme climate changes to economies such as Japan, China, Korea and India.

Which of the statements given above is/are correct?

- a) 1 only b) 2 only
c) Both 1 and 2 d) Neither 1 nor 2

Answer: (c)

Explanation: **Both statements are correct.** The UN Office for Disaster Risk Reduction (UNDRR) has launched a Global Assessment Report (GAR), warning countries of newer and larger impacts of disaster risk on economies worldwide.

It has warned of new and much larger threats due to extreme climate changes to economies such as Japan, China, Korea and India.

WHO Guidelines on Dementia

Q6. Consider the following statements in respect of 'Dementia':

1. Dementia is a syndrome, usually of a chronic or progressive nature, in which there is deterioration in cognitive function.
2. Alzheimer disease is the most common form of Dementia.

Which of the statements given above is/are correct?

- a) 1 only b) 2 only
c) Both 1 and 2 d) Neither 1 nor 2

Answer: (c)

Explanation: **Both statements are correct.** Dementia is a syndrome, usually of a chronic or progressive nature, in which there is deterioration in cognitive function (i.e. the ability to process thought) beyond what might be expected from normal ageing. It affects memory, thinking, orientation and comprehension, calculation, learning capacity, language and judgment.

There are many different forms of dementia. Alzheimer disease is the most common form and may contribute to 60–70% of cases.

Saving BSNL

Q7. Consider the following statements:

1. Bharat Sanchar Nigam Ltd (BSNL) is a 'Navratna status' telecom public sector unit (PSU).
2. But, in the past 14 years the telecom PSU's financial position has been deteriorating.

Which of the statements given above is/are correct?

- a) 1 only b) 2 only
c) Both 1 and 2 d) Neither 1 nor 2

Answer: (b)

Explanation: **Statement 1 is not correct.** BSNL has, in the last 14 years, moved from Navratna status to being declared as a sick public sector unit (PSU).

Statement 2 is correct. Incorporated in 2000 out of the department of telecommunications, BSNL, once a highly profitable company is now a loss-making company once a number two mobile player, last year recorded a loss of Rs 8,000 crore. The telecom PSU's financial position has been deteriorating for a long time.

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SEVEN IMPORTANT FACTS FOR PRELIMS

1. Which international city will host 'United Nations Ocean Conference 2020' to support the sustainable use of the oceans, seas and marine resources?

–Lisbon (Portugal)

2. Which country has started testing its new generation bullet train 'Alfa-X'?

–Japan

3. Which nation hosted the 'Conference on Asian Civilizations 2019' in collaboration with UNESCO?

–China

4. Which state has 35% of India's total Graphite reserves?

–Arunachal Pradesh

5. Which exercise of the Indian armed forces has carried out recently at Teresa Island in Andaman and Nicobar to showcase joint operations capability of the armed forces?

–Exercise Bull Strike

6. Who became the world's first woman to cross Atlantic Ocean solo in a Light Sports Aircraft (LSA)?

–Captain Aaroohi Pandit

7. Who has been re-elected as Indonesia's new President?

–Joko Widodo

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SEVEN IMPORTANT HIGHLIGHTS FROM PIB

1. Redefined Units of Measurement of Kilogram, Kelvin, Mole and Ampere

A resolution to redefine four of the seven base units was passed by representatives of 60 countries at the General Conference on Weights and Measures (CGPM) of the International Bureau of Weights and Measures (BIPM). This decision has now enabled scientists and researchers to base the SI units entirely on fundamental properties of nature, which will ensure their ongoing refinement and improvement for years to come. The fundamental constants are invariants of time and space and successfully replaced the artifact based units and aptly opened up the new era for quantum world by linking all seven base units to fundamental constants/quantum standards.

Seven main units of measurement are in use at present, including the metre for length, the kilogram for mass, the second for time, the ampere for electric current, the kelvin for temperature, the mole for the amount of a substance, and the candela for luminous intensity. More than 100 countries have adopted the metric system of measurements, also known as the International System of Units, which has been in practice since 1889. The system was formalised in 1960 and has been updated several times to account for development in measurement technology.

Key Highlights

The purpose of a system of units is to enable worldwide coherence of measurements. The proposed changes in the unit definition have been designed to have no immediate consequences.

The unit redefinitions represent a profound change of perspective and they are expected to form the foundation of improved measurements for decades to come, as science and technology continues to develop in a way we cannot currently foresee.

Now, a kilogram will be defined using the Planck constant, which relates a photon's energy to its frequency. The Planck constant describes the behaviour of particles and waves on the atomic scale. It depends on three units: metre, kilogram and second. As second and metre are measured and defined using the speed of light, they can be used with the fixed Planck constant to define a kilogram. Although the value of the kilogram will not change, the redefinition will ensure its reliability, and enable far more accurate mass measurements.

2. 'Not all Animals Migrate by Choice' Campaign

Wildlife Crime Control Bureau of India and UN Environment has launched 'Not all animals migrate by choice' campaign to raise awareness on illegal wildlife trade.

Key Highlights

It aims at creating awareness and garnering public support for the protection and conservation of wildlife, prevention of smuggling and reduction in demand for wildlife products. The campaign also complements worldwide action on illegal trade in wildlife through UN Environment's global campaign, 'Wild for Life.'

In the first phase of the campaign, Tiger, Pangolin, Star Tortoise and Tokay Gecko have been chosen as they are highly endangered due to illegal trading in International markets. Tiger is traded for its skin, bones and body parts; Pangolin, the most illegally traded wild mammal on the planet is trafficked for its meat and its scales are used in traditional medicines; Star Tortoise for meat and pet trade and Tokay Gecko in traditional medicine mostly into South East Asia and particularly Chinese Markets.

Second phase will see more threatened species and explore other routes of trafficking.

Need

Illegal wildlife trade is driving species to the brink of extinction. A thriving industry with organized wildlife crime chains spreading across the world, in India, illegal trade in wildlife has seen a sharp rise.

There is an urgent need for awareness, action and stringent enforcement of laws to put an end to all illegal

wildlife trade threatening biodiversity and conservation in the wild. Some of the major wildlife species being smuggled through airports are star tortoises, live birds, shahtoosh shawls, tiger and leopard body parts, ivory, rhino horns, pangolin and pangolin scales, sea shells, sea-horse, sea-cucumber, red sanders, agarwood, deer antlers, mongoose hairs, reptile skins, live snakes, lizards, corals, orchids and medicinal plants.

3. RISAT-2B

The Indian Space Research Organisation (ISRO) has launched an X-band microwave Earth observation satellite, RISAT-2B, into orbit 556 km above Earth.

Key Features

RISAT-2B is a radar imaging earth observation satellite weighing about 615 kg. The images taken by RISAT-2B would be used for applications in agriculture, forestry and disaster management support. But services of such satellites are also in great demand from national security agencies as well.

The RISAT, or radar imaging satellite, is equipped with a sensor known as 'synthetic aperture radar', that takes what are known as 'radar images'.

Very much like the flashlights of the camera, which release visible light to illuminate an object and then use the reflected light to create an image, the synthetic aperture radar send out hundreds of radio signals every second towards the subject (in this case, the earth) and capture the reflected signals to create a radio image,

which can then be used by computers to build a real image. Because the very large wavelength radio waves are not obstructed by clouds, dust or similar other obstacles in the atmosphere, they produce reliable images during day and night and all seasons.

The RISAT-2B satellite uses X-band synthetic aperture radar for the first time; the synthetic aperture radar was developed indigenously. Unlike the C-band that was used by RISAT-1, the shorter wavelength of the X-band allows for higher resolution imagery for target identification and discrimination. Since it has high resolution, the satellite will be able to detect objects with dimensions of as little as a metre.

Background

Two satellites in RISAT series have earlier been launched by ISRO. RISAT-2 was the first one to be launched, in 2009, while RISAT-1, which had got delayed, was launched only in 2012. RISAT-1 is no longer operational.

4. Falling Quality of Poll Debates

The Vice President of India, Shri M. Venkaiah Naidu has expressed his anguish over the low quality of political debates during the just-concluded election campaign with politicians resorting to personalized attacks instead of focusing on larger issues of public concern.

Key Highlights

The politicians should remember that they are only rivals and not enemies and the language should not be abusive. All political parties, people and the press too should seriously ponder over this issue.

He underlined the importance of respecting the institutions of the Prime Minister, Chief Minister, Leader of Opposition and other public representatives. The Vice President has appealed to all, including legislators, political

parties, institutions and people in public life, to uphold high standards and values. And urged the people to select and elect their representatives on the basis of character, calibre, conduct and capacity to strengthen democracy, although four other Cs—caste, cash, community and criminality are trying to be predominant.

He also took dig at the growing trend of defections and freebies offered by political parties.

He also advised the media not to mix views with news and should instead take up constructive activities such as performing an honest audit of the administration's political performance every five years.

The country and the states need able leaders and a stable government.

5. MRSAM Firing Trials

The Indian Navy has achieved a significant milestone in enhancing its Anti Air Warfare Capability with the maiden cooperative engagement firing of the Medium Range Surface to Air Missile (MRSAM).

The test involved the 7,500-ton Kolkata-class (Project 15A) guided-missile destroyers INS Kochi and INS Chennai with each firing a medium-range surface-to-air missile (MRSAM), also referred to as the Barak 8 long-range surface-to-air missile (LRSAM).

The firing trial was carried out by the Indian Navy, Defense Research and Development Organization (DRDO) and Israel Aerospace Industries (IAI). Notably, MRSAM usually refers to the land-based variant of the missile system. By 2023, the Indian Army plans to stand up five MRSAM regiments.

Significance

These Surface to Air Missiles are fitted onboard the Kolkata Class Destroyers and would also be fitted on all future major warships of the Indian Navy. With the successful proving of this cooperative mode of engagement, the Indian Navy has

become a part of a select group of Navies that have this niche capability. This capability significantly enhances the combat effectiveness of the Indian Navy thereby providing an operational edge over potential adversaries.

About MRSAM

It is being developed by DRDO in collaboration with IAI to provide the armed forces with air defence capability against a variety of aerial threats at medium ranges.

Each MRSAM weapon system comprises of one command and control system, one tracking radar, missiles, and mobile launcher systems.

It is equipped with an advanced active radar radio frequency (RF) seeker, advanced rotating phased array radar and a bidirectional data link. The RF seeker, located in the front section of the missile, is used to detect moving targets in all weather conditions.

The missile's explosive warhead, featuring a self-destruct fuse, provides high-probability of kill against enemy targets with minimal collateral damage.

6. Nuclear Electricity can reduce Greenhouse Gas Emissions

The Vice President of India, Shri M. Venkaiah Naidu has said that nuclear electricity could significantly reduce Greenhouse Gas Emissions and has the potential to meet increasing energy demand in the country. Nuclear electricity is generated through very low carbon emitting technologies and can significantly reduce emission of greenhouse gases.

Key Highlights

India's abiding interest in nuclear energy grew out of a deep conviction that the power of atom could be harnessed to help the country to achieve human and societal development. India has consciously made a strategic choice to pursue a low-carbon growth model in the coming decades and added that reducing pollution was a major challenge.

Nuclear energy has the potential to meet the ever-increasing demands of energy in the country, especially at a time "when we as a nation are making attempts to move beyond the polluting fossil fuels."

India has consciously made a strategic choice to pursue a low-carbon growth model in the coming decades and added reducing pollution is a major challenge.

The several favourable geological domains spread across the length and breadth of the country which can host potential uranium, rare metals and rare earth elements (REE)

deposits, it would be possible to achieve self-sufficiency in atomic mineral resources for sustainable growth of our nuclear power programme.

There is a steep demand for power in the country and role of nuclear energy in future would be quite significant and we need to develop new and more efficient technologies to utilise our resources to the maximum.

He also appreciated the efforts of Atomic Minerals Directorate (AMD) in adopting state-of-the-art exploration techniques in search of different strategic minerals. More significantly, the quantum leap in uranium resource augmentation by the AMD from around 1 lakh tonnes during the first 60 years of activities and a subsequent addition of around 2 lakh tonnes in the next 10 years is really commendable.

Around 3 lakh tonnes of uranium oxide reserves and 1,200 million tonnes of beach sand mineral resources are available in India.

With several favourable geological domains spread across the length and breadth of the country which can host potential uranium, rare metals and Rare Earth Elements (REE) deposits, he said it would be possible to achieve self-sufficiency in atomic mineral resources for sustainable growth of the country's nuclear power programme.

7. Vice President has called for Improving Pulses Productivity

The Vice President of India, Shri M. Venkaiah Naidu has called for increasing the acreage and productivity of pulses for achieving self-sufficiency and urged agricultural universities to step up research on improving their yields.

Key Highlights

The pulses are an inexpensive source of plant-based proteins, vitamins and minerals for people. They provide green, nutritious fodder for animal and also enrich soil through biological nitrogen fixation. Some legumes are known to have medicinal and therapeutic properties also. Hence, they were rightly termed as 'Unique Jewels' of Indian crop husbandry.

India is the world's largest producer, accounting for 34% of the area and 24% of production followed by Myanmar, Canada, China, Nigeria, Brazil and Australia.

While the average productivity of pulses has increased to 841 kg/ha, it is well below the global average and in some states, the yield is much higher as compared to others, so there is a need to learn from the best practices from

around the world and within the country to improve crop productivity. The universities, Krishi Vigyan Kendras (KVKs) and the government must come together with long term strategies for producing new high yielding varieties, which are resilient to diseases and climate change. There was also a need to create value addition and proper marketing facilities for pulses.

Climate change is adversely impacting the marginalized people in dry land areas due to the shifts in moisture and temperature regimes, so there is a need of a new paradigm in agricultural research that makes full use of science and technology in conjunction with traditional knowledge to cope with the challenges of climate change and achieve food and nutritional security was necessary.

There is an urgent need for new knowledge, alternative policies and institutional changes to improve productivity from agricultural crops. The agricultural universities, research institutions and Krishi Vigyan Kendras (KVK) can play a big role in improving the lot of the farmers and empowering them.

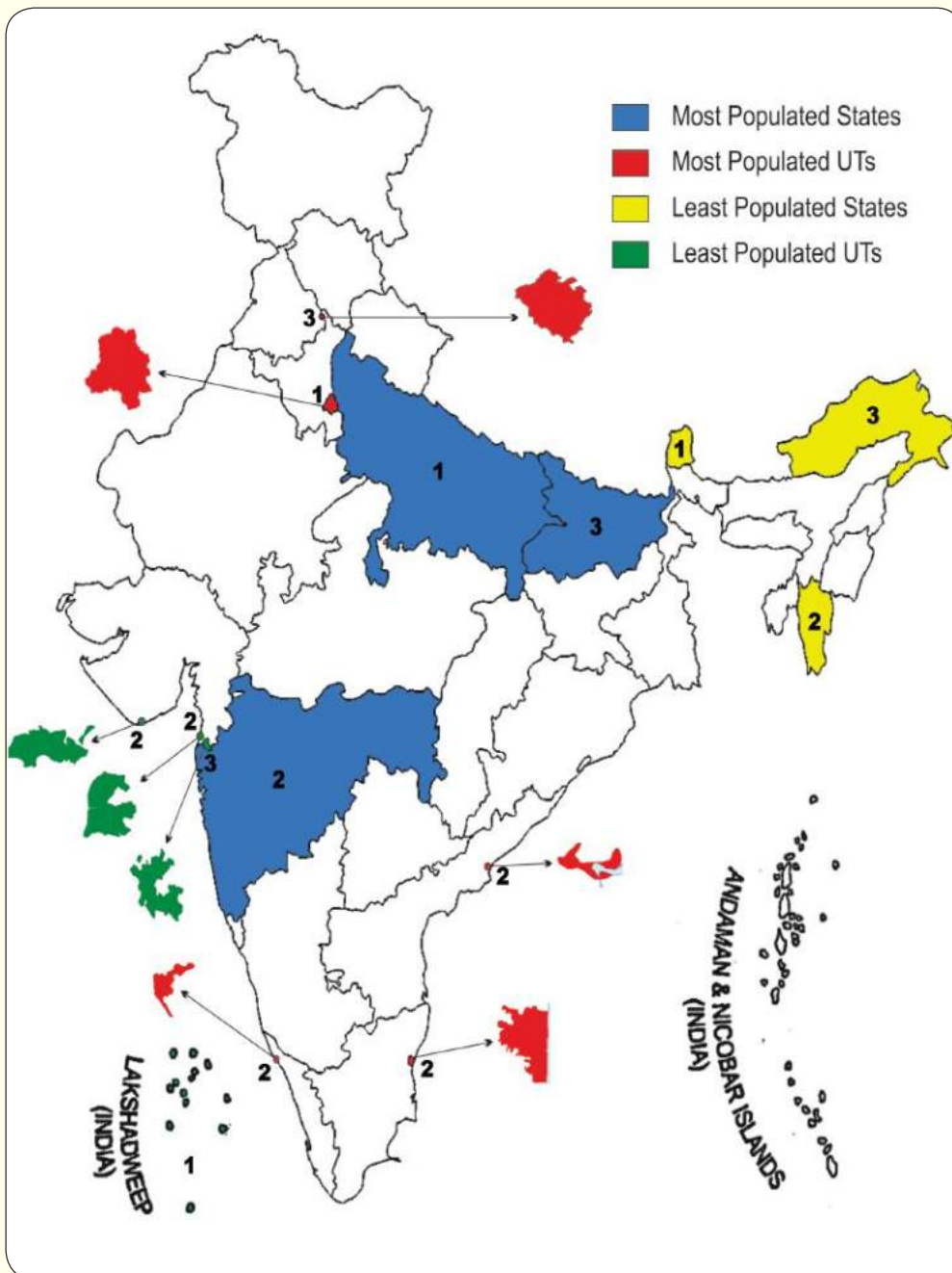


SEVEN IMPORTANT CONCEPTS THROUGH GRAPHICS

1. Total Population of India

Key Facts

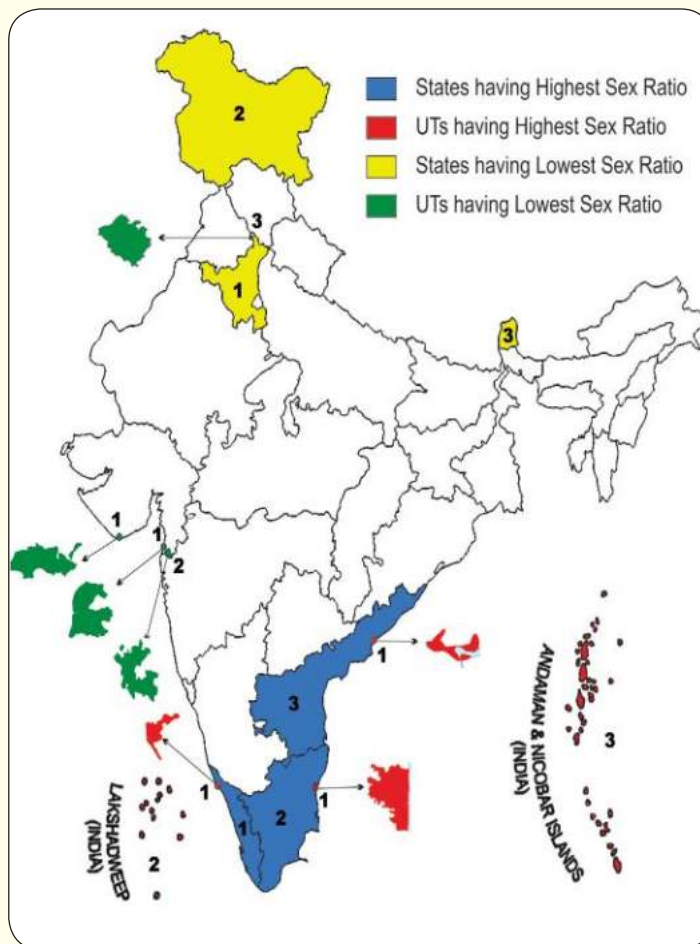
- The population of India, as per Census 2011, is 1,21,05,69,573 compared to a total of 1,028,737,436 in 2001.
- In absolute terms, the population of India has increased by more than 181 million during the decade 2001-2011. The absolute addition to the population during the decade 2001-2011 is slightly lower than the population of Brazil.
- A point that is striking is that while India accounts for a meagre 2.4% of the world surface area of 135.79 million square kms, it supports and sustains a whopping 17.5% of the world population.
- Uttar Pradesh continues to be the most populous state in the country with almost 200 million people living here, which is more than the population of Brazil, the fifth most populous country in the world.
- The combined population of Uttar Pradesh and Maharashtra (the second most populous State), at 312 million, is substantially greater than the population of USA, the third most populous country of the world.
- Top five populated states are Uttar Pradesh, Maharashtra, Bihar, West Bengal and Andhra Pradesh.
- Top five populated UTs are Delhi, Puducherry, Chandigarh, Andaman and Nicobar Islands and Dadra and Nagar Haveli.
- Least three populated states are Sikkim, Mizoram and Arunachal Pradesh.
- Least three populated UTs are Lakshadweep, Daman and Diu and Dadra and Nagar Haveli.



2. Sex Ratio

Key Facts

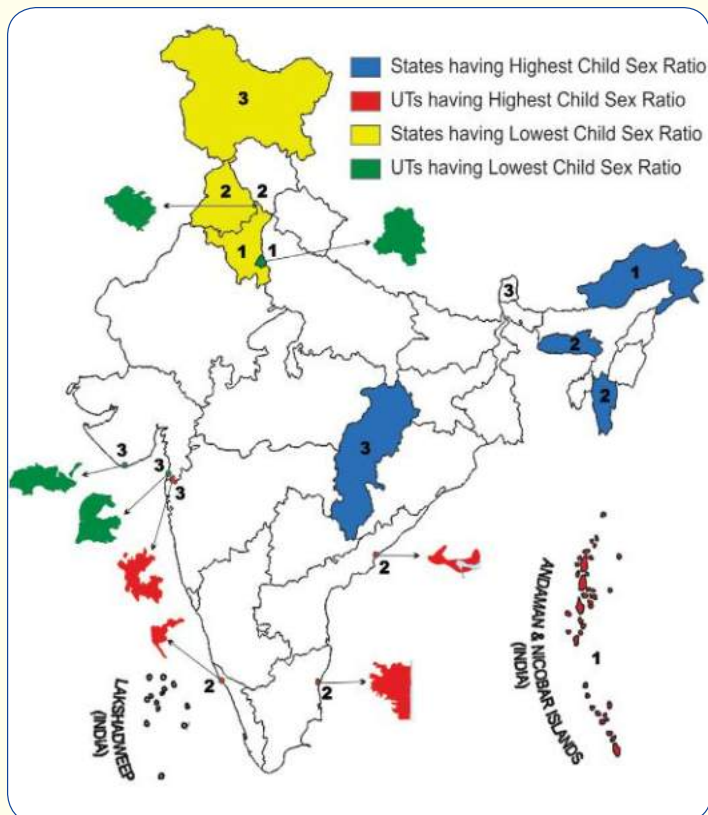
- According to the Census 2011, out of a total population of 1,21,08,54,977 persons, 62,32,70,258 are males and 58,75,84,179 females. As per this, the sex ratio of India is 943. The sex ratio at the National level has risen by ten points since the last Census in 2001. This is the highest since 1971.
- Sex ratio is defined in the Census of India as the number of females per 1000 males in the population.
- The situation in the immediate neighbourhood of India reveals a mixed picture. Myanmar (1,048), Sri Lanka (1,034) and Nepal (1,014) have more females in their populations whereas in all other countries the sex ratio shows male domination.
- After 1971 Census, trends were not consistent, showing increase in one decade and decline in the next. However, it was hovering around 930.
- Top five states with highest sex ratio are Kerala (1084), Tamil Nadu (996), Andhra Pradesh (993), Chattishgarh (991) and Meghalaya (989).
- Top five UTs with highest sex ratio are Puducherry (1037), Lakshadweep (947), Andaman and Nicobar Islands (876), Delhi (868) and Chandigarh (818).
- Least five states having lowest sex ratio are Haryana (879), Jammu and Kashmir (889), Sikkim (890), Punjab (895) and Uttar Pradesh (912).
- Least three UTs having lowest sex ratio are Daman and Diu (618), Dadra and Nagar Haveli (774) and Chandigarh (818).



3. Child Sex Ratio (0-6 Years)

Key Facts

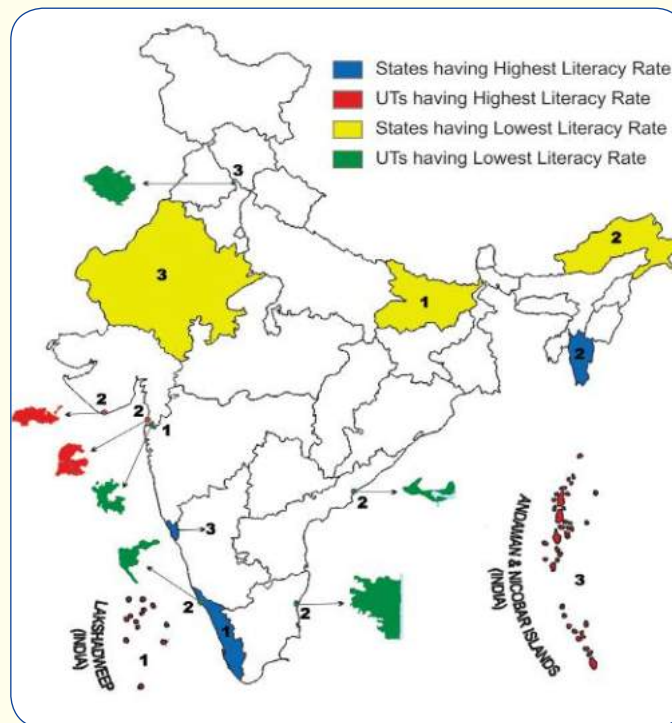
- While the overall sex ratio presents encouraging trends across the country, the same is not true in the case of the girl child in the age group 0-6 years.
- After 1991 there has been consistent rise in overall sex ratio. On the other hand, the fall in child sex ratio has been unabated since 1961. As per the Census 2011, it has declined to reach an all time low of 919. Despite a slew of laws to prevent female foeticide and schemes to encourage families to have girl child, the ratio has declined from 927 females against 1,000 males in 2001 to 919, which was described as a matter of grave concern.
- Top five states with highest child sex ratio (0-6 years) are Arunachal Pradesh (972), Mizoram and Meghalaya (970), Chattishgarh (969), Kerala (964) and Assam (962).
- Top three UTs with highest child sex ratio (0-6 years) are Andaman and Nicobar Islands (968), Puducherry (967) and Dadra and Nagar Haveli (926).
- Least five states having lowest child sex ratio (0-6 years) are Haryana (834), Punjab (846), Jammu and Kashmir (862), Rajasthan (888), and Uttarakhand and Gujarat (890).
- Least three UTs having lowest child sex ratio (0-6 years) are Delhi (871), Chandigarh (880) and Daman and Diu (904).



4. Literacy Rate

Key Facts

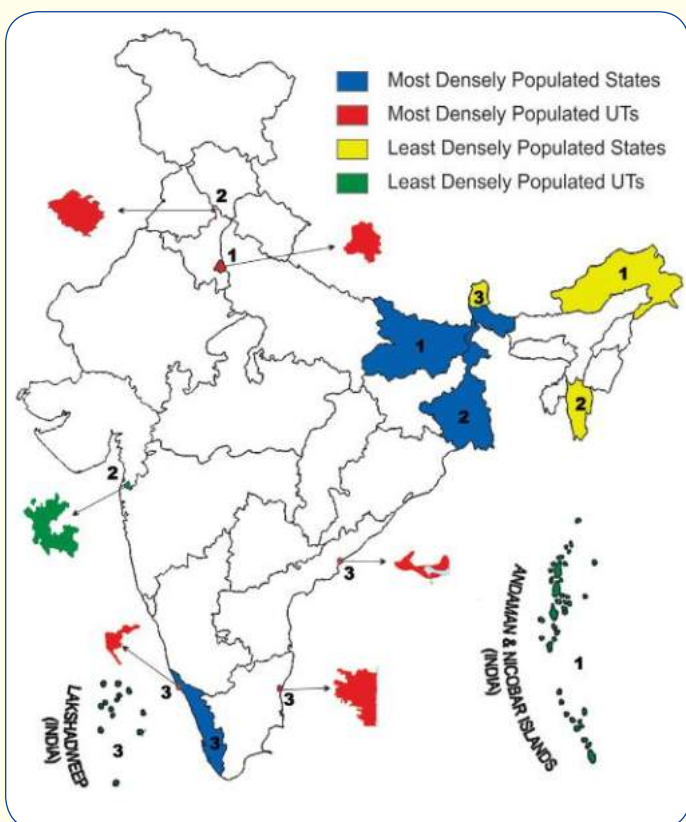
- The number of literates in India as per Census 2011 is 76,34,98,517. There has been a marked improvement in the proportion of literates in the last decade. Literates in 2011 constitute 73% of the total population aged seven and above as compared to 64.84% in 2001.
- The corresponding figures for males and females are 80.9 and 64.6 per cent respectively.
- A person who can both read and write with understanding in any language is treated as literate.
- In the Censuses prior to 1991, children below five years of age were necessarily treated as illiterates. The age limit was raised to 7 years based on the advice of experts that the ability to read and write with understanding is not ordinarily achieved until that age.
- It was, therefore decided at the 1991 Census that all children in the age group 0-6, would be treated as illiterate by definition and the population aged seven years and above only would be classified as literate or illiterate. The same criterion has been retained in the Censuses of 2001 and 2011.
- The literacy rate taking into account the total population in the denominator has now been termed as 'crude literacy rate' while the literacy rate calculated taking into account the 7 and above population in the denominator is called the 'effective literacy rate'.
- Top five literate states are Kerala, Mizoram, Goa, Tripura and Himachal Pradesh.
- Top five literate UTs are Lakshadweep, Daman and Diu, Andaman and Nicobar Islands, Delhi and Chandigarh.
- Least five literate states are Bihar, Arunachal Pradesh, Rajasthan, Jharkhand and Andhra Pradesh.
- Least three literate UTs are Dadra and Nagar Haveli, Puducherry and Chandigarh.



5. Population Density

Key Facts

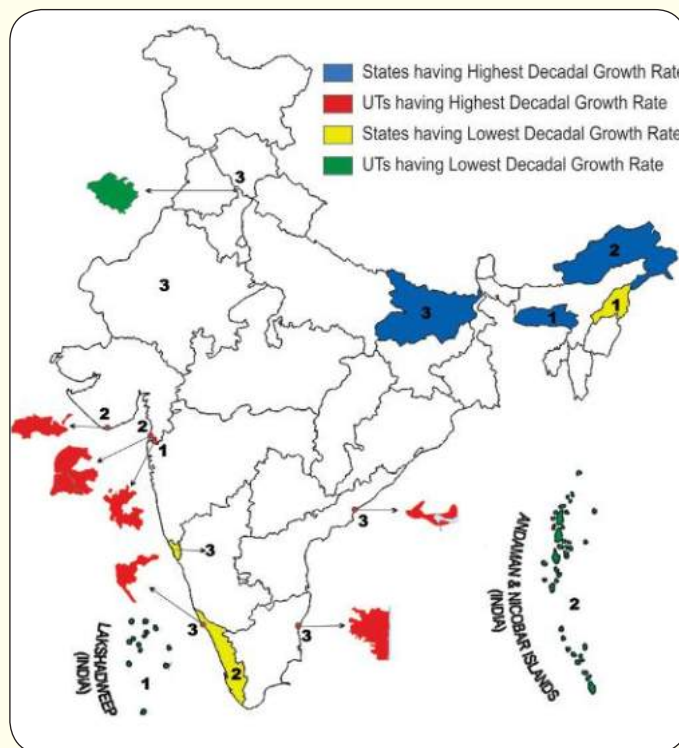
- 'Density of Population' is defined as the number of persons per square kilometre. It is an important index of population which shows concentration of population in a particular area.
- As per the Census 2011, the population density of India has gone up to 382 persons per square kilometre from 325 persons per square kilometre in 2001.
- On an average, 57 more people inhabit every square kilometre in the country as compared to a decade ago. This constitutes a 17.5 per cent increase over 2001.
- The states and Union Territories of our country vary widely in terms of their density due to differences in climatic conditions, geo-physical characteristics, availability of resources etc.
- Top five densely populated states are Bihar (1,106), West Bengal (1,028), Kerala (860), Uttar Pradesh (829) and Haryana (573).
- Top five densely populated UTs are Delhi (11,320), Chandigarh (9,258) and Puducherry (2,547), Daman and Diu (2,191) and Lakshadweep (2,149).
- Least five densely populated states are Arunachal Pradesh (17), Mizoram (52), Sikkim (86), Nagaland (119) and Himachal Pradesh (123).
- Least three densely populated UTs are Andaman and Nicobar Islands (46), Dadra and Nagar Haveli (700) and Lakshadweep (2,149).



6. Decadal Growth Rate

Key Facts

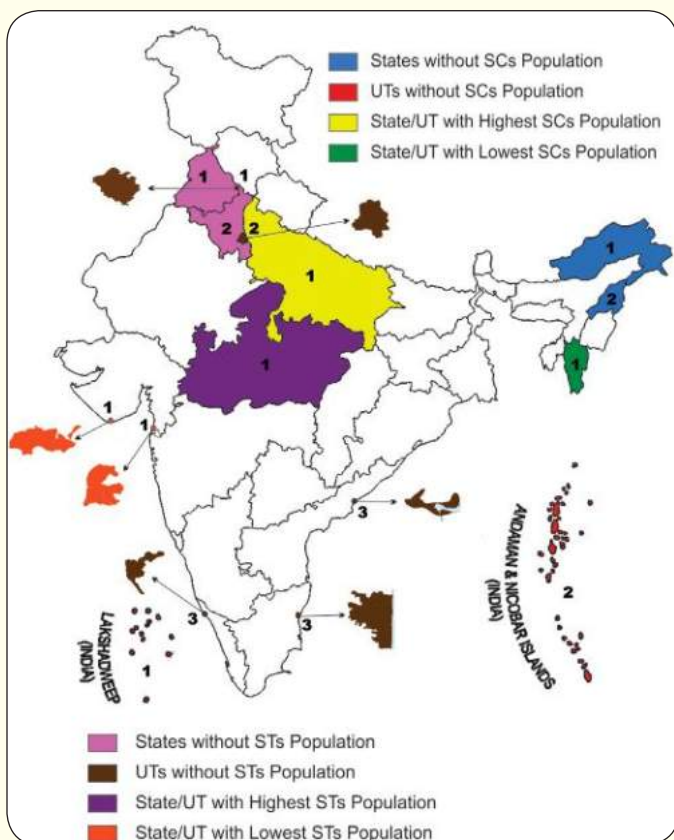
- It is significant that the percentage decadal growth during 2001-2011 has registered the sharpest decline since independence. It declined from 23.87 percent for 1981-1991 to 21.54 percent for the period 1991-2001, a decrease of 2.33 percentage point. For 2001-2011, this decadal growth has become 17.70 percent, a further decrease of 3.84 percentage points. Similarly, the average exponential growth rate for 2001-2011 has declined to 1.64 percent per annum from 1.97 percent per annum during 1991-2001.
- Top five states with highest decadal growth rate are Meghalaya (27.95%), Arunachal Pradesh (26.03%), Bihar (25.42%), Manipur (24.50%) and Jammu and Kashmir (23.64%).
- Top five UTs with highest decadal growth rate are Dadra and Nagar Haveli (55.88%), Daman and Diu (53.76%), Puducherry (28.08%), Delhi (21.21%) and Chandigarh (17.19%).
- Least five states with lowest decadal growth rate are Nagaland (-0.58%), Kerala (4.91%), Goa (8.23%), Andhra Pradesh (10.98%) and Sikkim (12.89%).
- Least three UTs with lowest decadal growth rate are Lakshadweep (6.30%), Andaman and Nicobar Islands (6.86%) and Chandigarh (17.19%).



7. Population of SCs and STs

Key Facts

- As per Census 2011, the population of Scheduled Castes (SCs) at 16.6 per cent and Scheduled Tribes (STs) at 8.6 per cent, together forming a quarter of the total population.
- In the period 2001-11, the SCs grew by 20.8 per cent and STs by 23.7 per cent.
- As per Census 2011, the sex ratio of SCs is 945, which is moved up by 9 points from 936 in Census 2001.
- As per Census 2011, the sex ratio of STs is 990, which is moved up by 12 points from 978 in Census 2001.
- Top five states/UTs with highest SCs population are Uttar Pradesh, West Bengal, Bihar, Tamil Nadu and Andhra Pradesh.
- Top five states/UTs with highest SCs population in terms of percentage are Punjab (31.9%), Himachal Pradesh (25.2%), West Bengal (23.5%), Uttar Pradesh (20.7%) and Haryana (20.2%).
- Least five states/UTs with lowest SCs population are Mizoram, Nagaland, Arunachal Pradesh, Lakshadweep and Andaman and Nicobar Islands.
- Least five states/UTs with lowest SCs population in terms of percentage are Mizoram (0.1%), Nagaland (NSC), Arunachal Pradesh (NSC), Lakshadweep (NSC) and Andaman and Nicobar Islands (NSC).



- Top five states/UTs with highest STs population are Madhya Pradesh, Maharashtra, Odisha, Rajasthan and Gujarat.
- Top five states/UTs with highest STs population in terms of percentage are Lakshadweep (94.8%), Mizoram (94.4%), Nagaland (86.5%), Meghalaya (86.1%) and Arunachal Pradesh (68.8%).
- States/UTs without STs are Punjab, Chandigarh, Haryana, Delhi and Puducherry.



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**4
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**11
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**18
AUG.**

Test-11- (9:30 am to 11:30 am)

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Test-12- (12:00 noon to 2:00 am)

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**25
AUG.**

Test-13- (9:30 am to 11:30 am)

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**01
SEP.**

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**08
SEP.**

Test-15 - (9:30 am to 11:30 am)

सामान्य अध्ययन-I/General Studies-I

**15
SEP.**

Test-16- (9:30 am to 11:30 am)

सामान्य अध्ययन-I/General Studies-I

**22
SEP.**

Test-17- (9:30 am to 11:30 am)

सामान्य अध्ययन-I/General Studies-I

Test-18- (12:00 noon to 2:00 am)

सामान्य अध्ययन-II/General Studies-II

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