



# CURRENT AFFAIRS PROGRAM 2023

## PRE-CUM-MAINS

### NOV 2022 – PART 5

### KURUKSHETRA (NOV-22 – S&T)

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## 1. SOCIAL JUSTICE: ISSUE OF LOW PARTICIPATION OF WOMEN IN S&T RESEARCH

### - Introduction

- » Science and Technology is the most powerful enterprise that drives a nation's development, but ironically women in this area are underrepresented globally, and India has been no exception.
- » In India, the leaky pipeline doesn't start at the school or college levels but at the doctoral level.
  - Women constitute over one-third of the total science graduate and post-graduate degree holders but comprise only 15-20% of the tenured faculty across research institutes and universities in India.
  - Further relatively higher representation of women at junior level jobs is seen (e.g., junior, ad-hoc faculty)

### - Main Reasons

- » **Family Responsibilities**
  - Since competition to remain and advance in science careers begins at the earliest stage soon after PhD, it is important for women to establish themselves during early 30s, a period that coincides for most Indian women with marriage and family commitments.
- » **Family Pressure to move**
  - In the patriarchal society, it is women who has to move jobs according to husband's requirement which affects women's career.
- » **Maternity breaks affect** her long term participation
- » **Gender Bias:** Discrimination in a male dominated world leads to restricted career advancement opportunities.
- » **Non-flexible rigid timings** force women taking care of children, elderlies to quit.

### - Steps Taken by government

1. **KIRAN (Knowledge Involvement in Research through Nurturing):** It was launched by DST in 2014 to cover all the women-exclusive schemes to bring gender parity in S&T and provide a framework for gender mainstreaming. It addresses issues like unemployment, relocation etc. and is aimed at providing opportunities in research, technology, and self-employment.
2. **Women Scientists Scheme (WOS):**
  - i. WOS-A: It provides opportunities to women researchers who have taken a break in a career primarily due to family responsibilities, relocation, etc. for pursuing research in basic or applied sciences in frontier areas of science and engineering.
  - ii. WOS-B: It provides grant support to women scientists for development S&T solutions for solving grassroot level issues and promoting social benefit.
  - iii. WOS-C: It provides one year internship in the domain of IPRs. Participants who participate in this scheme go forward to pursue a career in IPR.
3. **Mobility Scheme Under KIRAN**
  - This landmark scheme addresses the relocation issue of women scientists working in regular position in Government Organization. It offers a **contractual research award to women scientists and enables them for independent research**.
4. **CURIE Program (2008-9)** (Consolidation of University Research for Innovation and Excellence in Women Universities): it is focused on improving S&T infrastructure in women only universities.
5. **SERB-POWER** (Promoting Opportunities for Women in Exploratory Research)
  - By DST

- A scheme to mitigate gender disparity in science and engineering research funding in various S&T programs in Indian academic institutions and R&D laboratories
  - **Two components**
    - **SERB-POWER Fellowship** - to women researchers - upto 25 women every year every year - fellowship of Rs 15,000 in addition to regular income - for three years.
    - **SERB-Power Research Grants**
      - Funds women researchers' project.
        1. Level I (Applicants from IITs, IISERs, IISc, NITs, Central Universities, and National Labs of Central Government Institutions): The scale of funding is up to 60 lakhs for three years.
        2. Level II (Applicants from State Universities / Colleges and Private Academic Institutions): The scale of funding is up to 30 lakhs for three years.
6. **The Gender Advancement for Transforming Institutions (GATI)** is an attempt to bring about gender balance in the institutions.
- GATI was launched for mentoring of institutions for transforming them towards more inclusive and sensitive approach towards women and to promote gender equity in Science, Technology, Engineering, Mathematics, and Medicine (STEMM) domains.
7. **DST collaborates with IBM to build STEM career opportunities for girl students**
- **Vigyan Jyoti** is a programme to promote STEM learning among girl students and to inspire them towards STEM careers by creating a level-playing field for meritorious girls from grades 9 to 12 to pursue STEM in their higher education, especially from the top colleges in the areas where girls are hugely underrepresented
  - **Engage with Science of Vigyan Prasar** is another initiative to build interest and create a community of practice with students, teachers, and scientists connecting the high school students to the higher education institutions.
8. **Other Initiatives:**
- **Biotechnology Career Advancement and Re-orientation Program (BioCARE):**
    - By DoBT in 2011
    - For career development of employed/unemployed women researchers upto 45 years of age by providing extramural research grant support. It is focused on bringing researchers to mainstream science after a career break.
  - **UDAAN initiative by CBSE**
    - Udaan is a project launched by **Central Board of Secondary Education (CBSE)** under the guidance of Ministry of Human Resource Development, Government of India, to address the low enrollment of girl students in prestigious engineering institutions and the teaching gap between the school education and engineering entrance examination.
    - The effort is to enrich the teaching and learning of Science and Mathematics at school level by addressing the three dimensions of education- curriculum design, transaction and assessments
    - Under this program, students are provided **free offline / online resources through virtual weekend contact classes** and study material while studying in Class XI and Class XII for preparation of admission test to various premier engineering colleges in the country.

- **Way Forward**

- **Organizational Reforms: Inclusive work environment**
  - » **Flexibility in timing** is very important for long term increase in participation of women
  - » **Childcare facilities**
  - » Accommodation on campus

- » **Safe Transportation** - to ensure women from even outside the city are able to continue their research in universities and other research institutions.
- **Compulsory Gender Audit**
  - » Mandatory requirements for all research institutes
  - » A time bound recruitment system, with an emphasis on increasing the recruitment for women
  - » Diversity should also be given a weight in ranking of the institution.
- **Transparent selection and evaluation process**
  - » So that women are not discriminated against
- **Modify the existing schemes for re-entry of women**
  - » Short duration of 3-years should be replaced by a longer period of 5 years duration that can be renewed periodically based on performance.
- **More inclusive conferences** - Support and reward organizers who ensure greater women participation

## 2. DIGITAL HEALTH SERVICES

- **Introduction:**
  - COVID-19 crisis has driven health service providers to embrace digital technology to stay in business. Fear of COVID-infection gave virtual counselling through telemedicine a much-needed boost and tele-consultation multiplied during the pandemic, as there was a renewed acceptance among doctors, patients, insurers, and others in the wellness ecosystem.
  - Healthcare is slowly moving away from healthcare facilities, focusing on patient (home) facilities, and technology in driving this transition.
- **Steps taken by Government to promote Digital health:**
  - In 2020, MoH&FW, NITI Aayog, and the Medical Council of India issued the **Telemedicine Practice Guidelines** enabling medicine practitioners to provide healthcare using telemedicine.
  - **Steps towards ensuring Interoperability:**
    - » **Need:**
      - The Electronic Health Records (EHR) of people need to be easily communicated within doctors, hospitals, pharmacies etc. But It faces constraints due to constraints like security permission, cost, lack of common standards in collection and storage of data.
    - » **Revised EHR Standards for India** was notified by MoH&FW in 2016.
    - » **Ayushman Bharat Digital Health Mission (ABDHM)** was launched in 2020. It is implementation of the National Digital health Blueprint (2019). Under this every Indian will get a **Unique Health ID**. The health ID will contain information about every test, disease, medicine, and associated reports of a patient which can be accessed by an authorized person from anywhere across the country.
    - » A comprehensive EHR would soon include data from digital devices that display information about the patient's health problems and could include information about their lifestyle and habits.
    - » Genomic data can also be added to EHR which could lead to personalized treatment.
- **Advantages/Need of Telemedicine:**
  - **Bridge the urban-rural healthcare gap**
    - While rural India has 65% of India's population, most of the health facilities are concentrated in urban areas.
  - **More use of technology** like AI, ML, Data Analytics, IoT, and robotics in different facets of healthcare
  - **Reduces the time wasted in travel** for accessing the services
  - **Health Education and Training** could become much cheaper and affordable through digital technology. This could reduce the scarcity of human resource in rural India.

- **Internet of Medical Things (IoMT)** is changing the nation's healthcare system for better. IoMT devices that are Bluetooth enabled can transmit all essential clinical data to the consulting physician in real-time. This set-up closely mimics face to face consultation and helps the treating physician make appropriate clinical decisions.
- **Challenges:**
  - Countries government hospitals and dispensaries have very little ICT infrastructure, with only some major public hospitals having computers and connectivity.
  - Rural population still isn't very comfortable with online consultation.
  - Physical health infrastructure in rural India lacks necessary equipment and diagnostic expertise needed for growing population.
  - Medicine prescription and delivery remains a challenge.
  - Poor internet connectivity, digital literacy and poor health & diagnostic facilities in rural areas.
- **Way Forward:**
  - Model of Medicine ATMs already in use in rural South Africa, ensure that patients obtain their medication in a medically safe way, without relying on inaccessible pharmacists, doctors, or other professionals. These ATMs in future can become more comprehensive and become an information kiosk and patient portal that can support diagnosis, testing and medication prescription, thereby removing pressure on hospitals and community health.
  - Support Innovative startups in healthcare sector: This can ensure latest and most efficient technologies available at affordable rates for rural requirement.
  - Focus on enhancing internet connectivity (BharatNet) and digital literacy (PMGDISHA).
  - Health and diagnostic facilities in PHCs and CHCs need to be enhanced. Without this, tele-medicine will not be able to serve its purpose.
- **Conclusion:** The scope of rural healthcare in the nation is massive as we have only just skimmed the surface. Once internet connectivity, digital literacy and health infrastructure improves, the rural-urban divide can be bridged more efficaciously.

### 3. NON-CONVENTIONAL ENERGY SOURCES

- **Example Question:**
  - » Discuss the significance of renewable energy in India's sustainable economic development. What are the factors hindering the growth of renewable energy sector in the country? Suggest some measures to deal with these problems. [15 marks, 250 words]
- **Introduction**
  - » Non-conventional energy sources refer to renewable energy sources which are replenishable at a rate faster than it is consumed i.e., they don't get depleted when used. These sources are also much less hazardous to environment compared to conventional sources of energy.
  - » **Popular Sources of Non-Conventional Energy Sources are:**
    - i. Solar Energy
    - ii. Wind Energy
    - iii. Tidal Energy
    - iv. Geothermal Energy
    - v. Hydropower
    - vi. Biomass Energy
    - vii. Fuel Cell

- » As per government sources, as on **Feb 2022**, a total of **152.90 GW** of renewable energy capacity projects have been installed in India. It comprises of **Solar** (50.78 GW), **Wind** (40.13 GW), **Bio-Power** (10.63 GW), **Small Hydro** (4.84 GW), and **large Hydro** (46.52 GW).
- » **India's Renewable Energy Targets**
  - In 2015, India had set a installed renewable energy capacity target of 175 GW by 2022. This included:
    - **100 GW** of Solar Energy Capacity
    - **60 GW** of Wind Energy
    - **10 GW** from biomass
    - **5 GW** from small hydro
  - But, at COP26, India has set up a target of 450 GW installed RE capacity by 2030.
- **Why do we need to invest more in the Renewable Energy Sector?**
  - » **Energy Security: Increasing demand** of energy in the country can be catered to by renewable sources in future.
  - » **Economic growth:**
    - Thrust on non-conventional sources of energy can fetch economic gains to India by bringing down the cost of energy supply.
    - **Reduced import dependency:**
      - Good for CAD control -> as import bills for fossil fuels is huge.
      - It will also delink India from volatile international oil prices.
    - The transition to non-conventional sources of energy results in more employment and entrepreneurship opportunities.
      - India can also lead in exports of non conventional energy sources such as wind electric generators, bio-mass gasifiers, solar energy systems, electric vehicles etc.
  - » **Inclusive Development: Electricity in inaccessible areas**
    - Solar, small hydro, wind energy etc. can easily provide electricity in the region where Grid connected electricity has not reached.
  - » **Environmental sustainability:**
    - **Climate Change:** For our Paris Summit targets to be met, we would need to shift more to renewable energy.
    - **Pollution and deteriorating quality of air we breath**
  - » **Strengthening India's Soft Power:** India could also handhold other developing nations to explore the path of sustainable development via making best utilization of non-conventional sources of energy.
- **Steps taken by Government:**
  - » **FDI upto 100% under automatic route** for renewable energy projects including offshore wind energy projects
  - » **Setting up of ultra-mega renewable energy parks** to provide land and transmission to renewable energy developers on a **plug and play basis**.
  - » **Waiving of Inter-State Transmission System (ISTS)** charges for inter-state sale of solar and wind power for projects to be commissioned by 30th June 2025.
  - » **Laying of new infrastructure:** new transmission lines and subs station capacity for evacuation of renewable power etc. under **Green Energy Corridor scheme** for evacuation of renewable energy
  - » **Pradhan Mantri Kisan Urja Surakha Evam Utthaan Mahabhiyan (PM-KUSUM):** It is aimed a de-dieselization of the farm sector along with providing energy security and increased income for farmers. It aims to create an additional capacity of 30.8 GW of solar capacity. It has **3 components**:
    - Creation of 10 GW of Decentralized Ground Mounted Grid connected solar power plants.
    - Solarization of 15 lakh grid connected agricultural pumps

- Installation of 20 lakh agricultural pumps powered by Solar Energy.
  - » **Rooftop Solar Phase-II Program:** Under the program 4 GW of RTS is targeted through central financial assistance in residential sector including for households in rural areas.
  - » **National Hydrogen Mission:** It aims to make India a green hydrogen hub, aiding to fulfill its target of production of five million tonnes of green hydrogen by 2030 along with allied development of renewable energy capacity.
    - In Aug 2022, India's first indigenously developed Hydrogen Fuel Cell Bus developed by KPIT-CSIR was launched.
  - » **Steps to promote wind Energy:**
    - National Offshore Wind Energy Policy notified in 2015
    - National Wind Solar Hybrid Policy was adopted in 2018
  - » **Steps to promote bioenergy:**
    - **Scheme to support promotion of Biomass based cogeneration in sugar mills and other industries**
    - **Program on Energy from Urban, Industrial and Agricultural Wastes/Residues**
    - **Biogas Power (Off-Grid) Generation and Thermal Application Program (BPGTP)**
- **Problems faced by Renewable Energy Sector**
- i. **Mobilization of Finance and investments:** India is a developing country with limited resources and renewable energy sector is a capital-intensive sector.
  - ii. **Land Acquisition:** Solar and wind Power projects require large land areas, which has in recent years emerged amongst the biggest challenges faced by the sector.
  - iii. **Poor Manufacturing Technology:** Western countries use more advanced technology and we are stuck with inefficient ones.
  - iv. **Skilled Manpower:** India still has not been able to attract youth towards this sector. Moreover, the opportunity to train in the sector is also negligible
  - v. **Wastage (between 15-20%)**
    - Various resource suggest that we waste up to 15-20% of our renewable energy generated because of variability and use of no or poor storage facilities.
  - vi. **International Trade Rules**
    - WTO trade rules have sometimes hindered our local manufacturing.
- **Intermittent nature of Renewable Energy poses another limitation**
- » Because of the intermittent nature of wind or solar energy, they have to depend on the non-renewable sources for the continuous supply of energy.
  - » **How to deal with the problem?**
    1. **Use of technology:** Digitalization of meters and batteries can enable companies or households to smooth out their demand - by doing some energy intensive work at night. This helps to cope with intermittent supply.
    2. **Small Modular Power Plants** which are easy to flex up or down, are becoming more popular. **High voltage grid** are also becoming more popular and can usually move excess energy around the network more efficiently.
    3. The bigger task is to **redesign power markets to reflect the new feed for flexible supply and demand**.
      - Adjust prices more frequently to reflect the fluctuations of the weather. At times of extreme scarcity, a high fixed price could be kicked in to prevent blackouts.
- **What further needs to be done**
- i. **For increasing Finance**
    1. More government investment

2. Creating mandates for provident funds to invest in infrastructure and environmentally sustainable projects
3. Increasing the priority sector lending limit for bank loans under solar energy from a meagre Rs 15 crore.
4. Mobilizing retail savings by way of tax exemption on the lines of Section 80CCF
5. Promote Green Bonds.
- ii. Standardizing the definition of green to be able to target government efforts in the direction
- iii. Promoting more R&D on Green sector
- iv. Promoting local manufacturing
- v. For dealing with wastage (due to variability and lack of storage facilities)
  - Focus more research towards storage technology
  - Announce tax incentives for storage technology manufacturing, such as is being done for IT sector, other steps like viability-gap funding can also boost the sector.
- vi. **Ensure Greater Synergy among all the concerned stakeholders** through a participatory approach and awareness generation, can further help to fasten the pace of shift towards renewable sources of energy.

#### 4. AGRICULTURE: SCIENCE AND TECHNOLOGY IN AGRICULTURE

- **UPSC Syllabus:** E-technology in the aid of farmers

- **Introduction:**

- » Just as India required technological breakthroughs (hybrid crops etc.) in the 1960s to achieve cereal security, we now stand at a similar crossroads. Frontier technologies such as Artificial Intelligence (AI), Blockchain, Internet of Things (IoT) amongst others are permeating industries like never before.

- **Agri-tech** is emerging as one of the most attractive investment destination for startups. India is already the third largest ag-tech market.

- » The **applications** range from enhancing productivity to ensuring traceability an access to credit.

- **E-Technology / Digital Technology:** Digital technologies are finding increasing use in the agriculture value system, and farmers are increasingly becoming more informed, as various measures are taken to provide them ready access to technology and information.

- » **India Digital Ecosystem of Agriculture (IDEA) Framework:** The government has finalized the core concept of IDEA framework which would lay down architecture for the federated farmer's database (a database of 10 crore+ farmers). The databases related to schemes governed by the department have been integrated. The IDEA would serve as a foundation to build innovative agri-solutions leveraging emerging technologies to contribute effectively in creating a better Ecosystem for Agriculture in India.
- » **Under the National e-Governance plan in Agriculture (NeGP-A)**, the funds are released to the stats and UTs for projects involving use of modern technologies such as AI, ML, Robotics, Drones etc.

- » **PM KISAN Digital Payment:**

- The PM-KISAN mobile app was launched to broaden the reach of scheme where farmers can view the status of their application, update or carry out corrections of name based on their Aadhaar card and also check the history of credits to their bank accounts.

- » **Estimating Agri-Production:**

- **The MNFC App**, developed by National Remote Sensing Centre, ISRO, uses satellites to collect field data for crops assessment under the FASAL project of the Ministry of Agriculture.
  - This information is important for enhancing our knowledge of India's agri-sector and in creating a national geo-spatial database of crops.



- » **E-Commerce:** To bring India's rural hinterland apace with global growth, the expansion of e-commerce platforms in these areas is undeniably important.
  - The resilience of e-commerce was put on display during COVID-19 pandemic when it continued to serve communities with essential items despite global lockdowns and shuttered factories.
- » **USAGE of Drones in Agriculture:**
  - To promote the use of drones in agriculture, the Department of Agriculture and Farmers Welfare has released SOPs for used of drones in pesticides and nutrient applications, which provide concise instructions for effective and safe operations of drones.
  - To make drone technology affordable and available for farmers and other stakeholders of this sector, financial assistance of 100% cost of drone (upto Rs 10 lakhs per drone) together with the contingent expenditure is provided under sub-mission on Agri Mechanization to the Institutions of ICAR, KVKs, and SAUs etc. for its demonstrations on farmer's field.
  - **FPOs** are provided grants of 75% for purchase of drones for its demonstration on the farmer's field.
  - Financial Assistance of 40% of the basic cost of drone and its attachments upto a maximum of Rs 4 lakh is also provided for drone purchase by CHCs under cooperative societies of farmers, FPOs and rural entrepreneurs.
- **Challenges:**
  - Lack of Digital Literacy (especially among small and marginal farmers)
  - Lack of Trust on online system.
  - Cost of technologies like Drones is still prohibitive for most of the farmers.
  - Soil Health Cards can ensure right information about fertilizer, but the subsidy regime has led to overuse of UREA.
- **Conclusion:**
  - The Government's thrust has been to help farmers accessing latest farm technologies as well as new varieties of seeds to ensure that farmers' income get a boost and is sustained in coming years besides ensuring that India remains self-reliant in production of most of the agricultural commodities

## 5. AGRICULTURE: E-NAM

- **Introduction: e-NAM**
  - e-NAM is a pan India electronic trading portal for farm produce which creates a **unified national market for agricultural commodities** by integrating existing APMC markets and other market yards. It was launched in **April 2016**.
  - This portal provides a **single window service** for all APMC related services and information, such as commodity arrivals and prices, provision of responding to trade offers, buy and sell trade offers, among other services.
  - Under e-NAM, the Government provides free software and one time assistance of Rs 75 lakh per mandi for computer hardware and IT infrastructure.
    - The hardware includes quality assaying equipment and creation of infrastructure for cleaning, grading, sorting, packaging and compost unit, etc.
- **Salient Features**
  - It provides for a **national e-market platform** for transparent sale transaction.
  - It **enables farmers to showcase their produce** through their nearby markets and **facilitate traders from anywhere to quote price**.
  - **Liberal licensing** of traders / buyers and commission agents by state authorities.
  - There are **no preconditions for physical presence or possession of shop/premises** in the market yard.
  - **One license** for the trader would be valid all across the country.

- **Single point levy of the market fee**, i.e. on the first wholesale purchase from the farmer
  - **Harmonizing the quality standards of agricultural produce** and infrastructure for quality testing is made available in every market to enable informed bidding by buyers. At present, Common tradeable parameters have been developed in 25 commodities.
  - **States desirous to join** has to accordingly **enact suitable provisions in their APMC Act.**
    - The amendments include a single point levy of mandi fee, unified trade license valid across all mandis of the state, and provision for e-auction facilities.
  - States can have their own electronic platform and can decide to link them to NAM.
- **Progress as of Oct 2022**
- 1260 mandis of 22 states and 3 UTs have been integrated on the e-NAM Platform.
    - Further, more than 1.73 crore farmers and more than 2.26 lakh traders have been registered on e-NAM platform.
  - Trading parameters of 193 agricultural and horticulture commodities such as cereals, pulses, oilseeds, fruits and vegetables, spices, flowers and fiber crops have been provided.
  - **FPO trading module** has been launched whereby FPOs can trade their produce from their collection center/premise without bringing the produce to APMC.
  - Warehouse based trading modules are provided in e-NAM to facilitate trade from warehouse based on e-NWR
  - E-NAM portal has been made interoperable with Rashtriya e-Market Services Private Limited (ReMS) platform of Karnataka Government.
  - **In July 2022**, MoA&FW have launched the **Platform of Platforms (PoP)** under e-NAM intended to promote trade and marketing of agricultural produce wherein farmers will be facilitated to sell the produce outside their state borders. PoP would increase farmers' digital access to multiple markets, buyers, and service providers and bring transparency in business transactions with the aim of improving price search mechanism and quality commensurate price rationalization. So, far 41 service providers from different platforms are covered under POP that facilitate various value chain services like trading, quality checks, warehousing, fintech, market information, transportation etc.
- **Advantages**
- **For Buyers/ Traders**
    - » Source commodity from any mandi.
      - Physical presence and dependence on intermediaries not required, thereby reducing the intermediation cost
    - » Local traders can get large national market for secondary trading.
    - » **Bulk buyers** have specifically benefitted as they are now able to participate and procure directly at the local Mandi level through e-NAM platform, thereby reducing their intermediation costs.
  - **Farmers**
    - » Open price discovery and better returns to farmers as there is no state or national price.
    - » Farmers get more options for selling their produce.
  - **Consumers**
    - » Increase number of traders and thus competition would increase. This would lead to lower and stable prices.
  - **Mandis**
    - » There will be reduction in book keeping and reporting system as it will be generated automatically.
    - » Monitoring and regulation of traders and commission agents becomes easy.
    - » Transparency in the process eliminates the scope of manipulation of tendering/auctioning process.

- » Market allocation fee will increase due to accounting of all transactions taking place in the market.
  - » It will reduce the manpower requirements as the tendering/auctioning process is carried out electronically.
    - For instance, the system declares the winner of lots within few seconds.
  - » It eliminates information asymmetry as all the of an APMC can be known directly from the website
- **But, the volume of trade of e-NAM and number of traders and farmers registering on e-NAM has been pretty low.** It is because e-NAM suffers from many limitations.
- **Lack of awareness among farmers** regarding e-NAM and its usefulness.
  - **Small and Marginal farmers find e-NAM unattractive**
    - » Most farmers sell their yield to a local produce aggregator than taking their crops to Mandis.
    - » Even if farmers take their produce to mandi their yield would be very small to attract a distant trader.
  - **Non-Uniform Quality Standards across different states**
  - **Obligations on states for successful implementation** has limited the rate of progress of e-NAM.
- **Way forward**
- **Train various stakeholders** and make them aware of the advantages of e-NAM.
  - **Harmonization of quality standard** across the states is the need of the hour. SFAC is already exploring the opportunity to bring uniformity in quality standard. Government should be setting up quality labs in all the APMCs to harmonize the quality standards.
  - **Small farmers can aggregate their produce** at their own bypassing local producer aggregator.
    - » Cooperatives and farmer produce organizations can play a very important role
  - Further, **fast track the integration of e-NAM with GrAMs**
  - Government should try to route purchase of paddy under MSP mechanism through the e-NAM platform. This should be done at least in the states that have on principle, allowed their mandis to link up to the portal.
  - **Strengthen Storage and Transport facilities** to ensure that online bought products reach the buyer at affordable rate and in good conditions.
  - **Expand the role of e-NAM:** The framework of e-NAM can be evolved from being a marketing portal to a one-stop information centre for accessing government policies, weather conditions, Early Warning Systems, and extension services, links to financial institutions for credit insurance etc.

## 6. ENVIRONMENT: CONSERVATION OF NATURAL RESOURCES

- **Introduction:**
- The term 'Environment' was introduced in the Constitution of India for the first time through the 42nd Constitutional Amendment Act which introduced Article 48-A and Article 51-A(g). **Article 48-A** says that the state shall endeavor to protect and improve the environment and to safeguard the forest and wildlife of the country. **Article 51-A(g)** makes it a fundamental duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.
- **Important Environment Conservation Efforts:**
- **National Environment Policy, 2006** formulated by MoEF&CC for the protection and conservation of environment identifies **7 Objectives:**
    - » **Conservation of Critical Environmental Resources**

- » **Intra Generational Equity - Livelihood Security for poor** - Poor communities, which are most dependent on environmental resources for their livelihoods, are assured secure access to these resources.
- » **Inter Generational Equity** - To ensure judicious use of environmental resources to meet the needs and aspirations of the present and future generations.
- » **Integration of environmental concerns in Economic and Social Development**
- » **Efficiency in Environment Resource Use**
- » **Environmental Governance**: To apply principles of good governance (transparency, rationality, accountability, reduction in time and costs, participation, and regulatory independence)
- » **Enhancement of Resources for Environmental Conservation**: Resources include finance, technology, management skills, traditional knowledge, and social capital, for environmental conservation through mutually beneficial multi-stakeholder partnerships.
- **Laws which deal with Conservation of Environment**
  - » Environment Protection Act, 1986;
  - » Water (Prevention and Control of Pollution) Act, 1974;
  - » Water Cess Act, 1977;
  - » Air (Prevention and Control of Pollution) Act, 1981;
- **Laws in respect of forest and biodiversity are:**
  - » Indian Forest Act, 1927;
  - » Forest (Conservation) Act, 1980;
  - » Wild Life (Protection) Act, 1972
  - » Biodiversity Act, 2002
- **LiFE (Lifestyle for Environment)**: It was unveiled by PM Modi at COP26. It aims to promote environment conscious lifestyle.
- **Panchamrita**: At COP26, India has given following targets to fight climate change:
  - i. India will get non-fossil energy capacity to 500 GW by 2030.
  - ii. India will meet 50% of its energy requirements from renewable energy by 2030.
  - iii. India will reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030
  - iv. India will reduce carbon intensity of its economy by less than 45% by 2030.
  - v. India will achieve the target of net zero by the year 2070.
- **Digital Initiatives by MoEF&CC:**
  - **PARIVESH** (Pro-Active and Responsive facilitation by Interactive, Virtuous and Environmental Single Window Hub): It is a portal launched in 2018 which has simplified the process of environmental clearance. It has paved a way for constituting the centralized processing centre in the Ministry and has resulted in a paradigm shift in the environmental clearance process with hallmarks such as transparency, accountability, efficiency and consistency.
  - **Decision Support System (DSS)**: It is a web-GIS application developed to provide qualitative and quantitative information with respect to forest area.
  - **Climate Change Knowledge Portal**: it is a single point resource which captures sector wise adaptation and mitigation actions that are taken by various ministries in one place. It helps in disseminating information among citizens.
  - **Wetlands of India Portal**: It is a single point source for information regarding wetland sites, projects, initiatives and trainings.
- **How Science and Technology can contribute in environmental conservation:**
  - **By Ensuring Effective Environmental Education:**
    - » Environmental education at all levels is crucial to enable the individuals to adopt green habits.

- » Environment education is also crucial for development of innovative solutions to counter environmental deterioration and to ensure sustainable development.
  - » MOOCs can play an important role for scaling up environmental education with the necessary adaptations in respect of the current environmental issues.
  - **Satellite and Remote Sensing Technologies** act as powerful tools in providing reliable information on various natural resources in the region. This contributes proper management of these resources.
    - » For e.g. Forest Fire risk areas can be predicted and an early warning of forest fires through risk modeling can be conducted.
  - **Off farm technologies like "bio-briquetting"** can also help in preventing forest fire hazards.
    - » These are biofuel substitute to coal and charcoal. They are produced by pressure compaction of paper, sawdust, agricultural or yard waste etc.
    - » Biomass energy from pine needle can be generated by using simple technology of biomass briquetting.
    - » This is a sustainable technology which is efficient, simple, cost effective and which can generate energy on a local scale.
  - **Biotechnology** can play a crucial role in growth of biofuels (3rd generation biofuels) and reduced dependency of fossil fuels.
  - **Nano Science and Technology** could contribute to precision agriculture by development of nano-fertilizers, pesticides etc. This reduces pollution, wastage and makes agriculture more sustainable.
  - **More R&D in STPs/ETPs** can be crucial in fighting water pollution.
- **Conclusion:**
- Through Science and Technology, environmental conservation can be achieved in holistic manner with the convenience of citizens in accessing information.

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