PLUTUS IAS

CURRENT AFFAIRS

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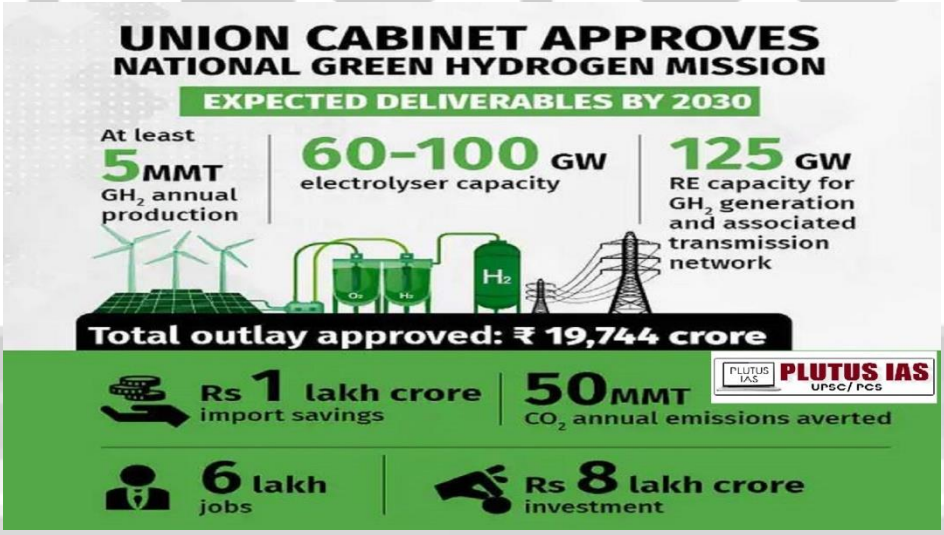
NATIONAL GREEN HYDROGEN MISSION

(This article is related to the section ' Biodiversity, Environment and Ecology, Environmental Protection, National Green Hydrogen Mission and its related challenges' under UPSC Civil Services Mains General Studies Paper – 3 and ' Fossil Fuels, Climate Change, Environmental Pollution, Renewable Energy' section under UPSC Preliminary Exam. It also includes suggestions from the PLUTUS IAS Team. This article is related to ' National Green Hydrogen Mission ' under ' Daily Current Affairs '.)

WHY IN THE NEWS ?



- Recently, the Ministry of New and Renewable Energy (MNRE) has increased the annual allocation of green ammonia from 550,000 tonnes to 750,000 tonnes to meet the growing demand of the fertilizer sector in India.
- This initiative of the Ministry of New and Renewable Energy has increased the support for green hydrogen in India.

INTRODUCTION TO NATIONAL GREEN HYDROGEN MISSION (NGHM) :

- National Green Hydrogen Mission (NGHM) is an important initiative to encourage commercial production of green hydrogen in India and make India a net exporter of the fuel and lays down a roadmap for green hydrogen in India.

- The main objective of this mission is to increase the demand for green hydrogen in India as well as promote its production, use and export.

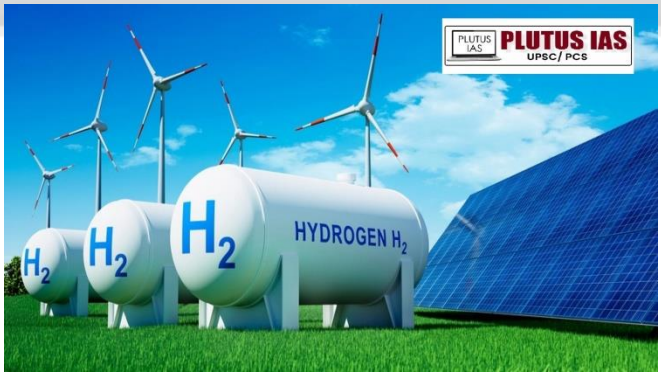
Following are some important initiatives under National Green Hydrogen Mission in India –

- **Green Hydrogen Transition Program (SIGHT):** It aims to provide strategic interventions for the production of green hydrogen.
- **Manufacturing of Electrolyzer:** Under this, the development of electrolysers will be encouraged, which use electricity to split water into hydrogen and oxygen.
- **To encourage production of green ammonia:** Under National Green Hydrogen Mission Green will also encourage the production of ammonia, which is used in the production of steel and cement.
- **Launching a dedicated portal:** Under National Green Hydrogen Mission A dedicated portal has been launched that provides information about the mission and steps towards green hydrogen ecosystem in India.
- **Schemes in other areas:** India has also launched other related initiatives to promote the use of green hydrogen in the steel, transportation and shipping sectors.

OTHER INITIATIVES RELATED TO RENEWABLE ENERGY LAUNCHED IN INDIA :

- **National Wind-Solar Hybrid Policy.**
- **Jawaharlal Nehru National Solar Mission (JNNSM).**
- **PM-Kusum.**
- **International Solar Alliance.**
- **Rooftop solar scheme.**

INTRODUCTION AND IMPORTANCE OF GREEN AMMONIA :



- Ammonia is a colorless gas with a pungent odor.
- It is lighter than air and its vapor density is 8.5.

- Because it is highly soluble in water, it is called ammonia.
- Ammonia is primarily used in the manufacture of nitrogen-containing fertilizers such as urea and ammonium nitrate.
- In addition, ammonia can also be used for engine operation and other uses.
- Green ammonia production uses 100% renewable energy, making it carbon-free.
- The method of its production uses electrolysis of water, in which hydrogen and air are separated.
- Next, in the Haber process these two elements are reacted together at high temperature and pressure to produce ammonia (NH_3).

USE OF GREEN AMMONIA IN INDIA :

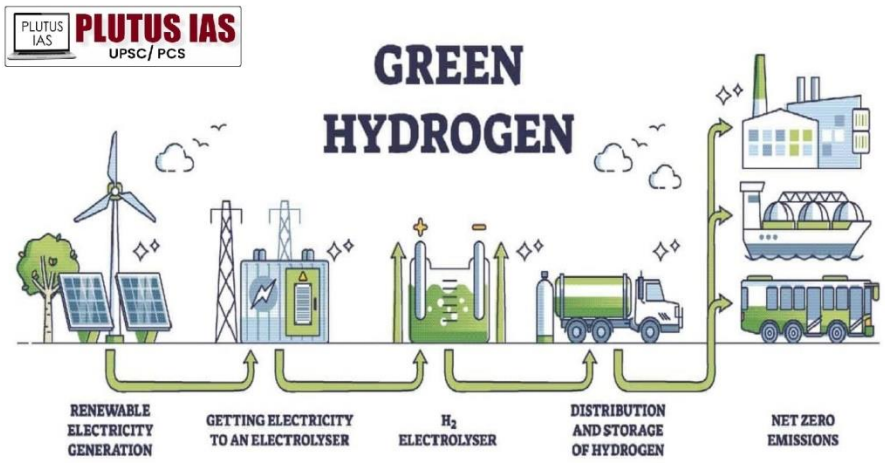
Following are some examples of use of green ammonia in India –

- **In storing energy storage :** Ammonia can be easily stored in liquid form in large quantities at moderate pressure (10–15 bar) or by refrigerating it at -33 °C. This makes it an ideal chemical repository for renewable energy.
- **As a zero carbon fuel :** Ammonia can be burned in engines or used as a fuel to generate electricity. When it is used, the only by-products of ammonia are water and nitrogen.
- **To replace the use of fuel oil in the marine industry :** There is a possibility of replacing the use of fuel oil in marine engines through the marine industry. Along with this, the importance of green ammonia is also increasing.

IMPORTANCE OF GREEN AMMONIA :

- In the future, green ammonia has the potential to become a fuel for climate-neutral transportation and will be used in the production of carbon-neutral fertilizers.
- This fertilizer will help in making the food supply chain carbon-free.
- The use of green ammonia will be essential to meet the urgent needs of CO2-free electricity and sufficient food production for the world's growing population.

MAIN CHALLENGES RELATED TO NATIONAL GREEN HYDROGEN MISSION:



- Producing hydrogen from renewable sources is relatively expensive compared to producing hydrogen from fossil fuels. Due to the high cost of production from renewable sources, it accounts for less than 1% of global hydrogen production.
- There are doubts about achieving the goal of being a high technology manufacturing hub, as India has not managed to become a net exporter of solar cells, semiconductors or wind energy components despite various supportive policies.
- The basic manufacturing base in India continues to be weak. It also lacks the capacity to appropriately absorb and utilize global capital.

SOLUTION / WAY FORWARD :

The path to solution under the National Green Hydrogen Mission in India is as follows –

HIGH COST OF PRODUCTION AND USE :

- Currently, the production cost of green hydrogen is higher than conventional hydrogen, which is produced from fossil fuels or other low-carbon sources (such as nuclear or blue hydrogen). To solve this problem, it is necessary to develop efficient technologies, which can reduce the production cost of green hydrogen.

- One possible solution could be to use more efficient electrolysis systems, which require less energy to produce the same amount of hydrogen. This may be possible with the use of advanced materials or more efficient catalysts.
- Another solution could be to integrate green hydrogen production with other renewable energy technologies, such as wind or solar farms. This can reduce the cost of electricity used in the electrolysis process, making green hydrogen more competitive than conventional hydrogen.

IMPLEMENTING INCENTIVES AT THE REGULATORY LEVEL :

- Governments can encourage the production and use of green hydrogen by implementing regulatory incentives such as tax credits and subsidies.
- This will accelerate the adoption of this green hydrogen technology in India and will play an important role in its development.

LACK OF ADEQUATE INFRASTRUCTURE AND SUPPLY CHAIN :

- The production, storage, transportation and distribution of green hydrogen requires dedicated infrastructure and supply chains.
- The existing infrastructure and supply chain for conventional hydrogen is not sufficient or compatible to meet the needs of green hydrogen.
- Therefore, efficient and cost-effective supply chains for green hydrogen should be developed in India.

TO ESTABLISH COORDINATION BETWEEN VARIOUS STAKEHOLDERS AND CONCERNED SECTORS:

- The development of green hydrogen in India involves multiple stakeholders and sectors such as renewable energy producers, electrolyzer manufacturers, hydrogen producers, transporters, distributors and end users.
- There is a need for coordination among all these to ensure alignment of policies, standards, regulations, incentives and markets for this technology.

AWARENESS DISSEMINATION AND CAPACITY BUILDING AMONG POTENTIAL USERS AND PRODUCERS, NEED TO DEVELOP NECESSARY SKILLS AND COMPETENCIES :

- Green hydrogen is still a developing technology, which requires awareness generation and capacity building among potential users and producers.
- The development of green hydrogen in India needs to demonstrate the benefits, safety and feasibility of green hydrogen in various applications and in different sectors.
- Furthermore, there is also a need to develop the skills and competencies required for the production and utilization of green hydrogen.

Source- The Hindu and PIB.

PRACTICE QUESTIONS FOR PRELIMINARY EXAM :

Q.1. Consider the following statements regarding the National Green Hydrogen Mission.

1. This fertilizer helps in making the food supply chain carbon-free.
2. It can be used to produce carbon-neutral fertilizers.
3. Ammonia is primarily used in the manufacture of nitrogen-containing fertilizers such as urea and ammonium nitrate.
4. The production of green hydrogen uses 100% renewable energy, making it carbon-free.

Which of the above statement/statements is correct?

A. Only 1, 2 and 3.

B. Only 2, 3 and 4.

C. None of these.

D. All of the above.

Answer – D

PRACTICE QUESTIONS FOR MAIN EXAM :

Q.1. Underlining the main objectives and importance of the National Green Hydrogen Mission, discuss what are the main challenges related to green hydrogen in India and how effective is it as a clean fuel? Discuss rationally. (UPSC CSE – 2021 Word Limit – 250 Marks – 15)

Dr. Akhilesh Kumar Shrivastava

"PESA HAS BOOSTED FOREST CONSERVATION IN INDIA."

THIS ARTICLE COVERS "DAILY CURRENT AFFAIRS" AND THE TOPIC DETAILS OF "PESA HAS BOOSTED FOREST CONSERVATION IN INDIA."THIS TOPIC IS RELEVANT TO THE "ENVIRONMENT AND ECOLOGY." SECTION OF THE UPSC—CSE EXAM.

WHY IN THE NEWS?

The Panchayat (Extension to Scheduled Areas) Act 1996 granted political empowerment to Scheduled Tribes, prompting them to assert their rights. Their dependence on forests for livelihoods strongly opposed commercial timber harvesting and mining activities. The conservation strategy in India has faced persistent challenges involving conflicts between conservation efforts and local communities' resource extraction practices, as well as conflicts between conservation goals and

economic development initiatives. Government responses have often been fragmented, oscillating between prioritising one aspect over another based on the dynamic interplay among different factions within the national, state, and local political spheres.

MORE ABOUT THE NEWS:

- The concentration of political power determines the influence of national or state elites, typically favouring the interests of large corporations over those of local communities.
- This tendency often results in deforestation driven by activities such as mining, power projects, commercial logging, and large dams, which can overshadow conservation efforts and the livelihoods of forest-dependent communities.
- In India, conservation initiatives frequently adopt a **top-down approach**, leading to local communities losing access to vital traditional forest lands crucial for their sustenance.
- **Is there a policy approach capable of reconciling these contradictions?** According to **Saad Gulzar, Apoorva Lal, and Benjamin Pasquale**, the answer lies in providing marginalised communities with mandated political representation. This approach not only enhances forest conservation but also safeguards their economic interests.
- **What form should this political representation take?**
- A blend of decentralisation and democratisation, where marginalised local communities living in or near forests are granted substantive, rather than symbolic, political representation. This empowerment allows them to participate actively in decision-making processes and effectively manage natural resources.

THE METHODOLOGY ADOPTED TO COME TO THIS CONCLUSION :

- Based on empirical data to facilitate the specific type of political representation they advocate: **the Panchayat (Extension to Scheduled Areas) Act (PESA) 1996,** PESA extends local governance structures to Scheduled Areas defined under the Fifth Schedule of the Constitution. These areas predominantly consist of tribal populations, where customary rights of Scheduled Tribes (ST) are recognised.
- In contrast, the **73rd Amendment of 1992** formalised local self-government through Panchayati Raj Institutions (PRI) in non-scheduled Areas but did not mandate ST representation. PESA further introduces **electoral quotas** mandating that all chairperson positions and at least half of the seats on each local government council be reserved for ST individuals.
- However, in states like Gujarat, where PESA implementation has been inadequate, a common issue is the absence of mandated ST representation in gram sabha committees.
- This diverse governance landscape provides valuable comparative datasets on local self-governance and forest cover across different geographic regions and over time.

- The authors leverage this variation to analyse villages: those with local self-government in Scheduled Areas (with mandated ST representation), those without such mandated representation, villages that adopted PESA earlier, and those that did so later. Their study employs a **"difference-in-differences"** framework **using remote-sensing microdata from satellites like LANDSAT, Sentinel, and DMSP, specifically the MEaSURES Vegetation Continuous Fields (VCF) and Global Forest Cover (GFC) datasets spanning 2001-2017.**
- Unlike previous studies relying on fieldwork in limited communities to monitor local changes in forest outcomes, this research utilises remote sensing to assess deforestation and afforestation rates over time, focusing on the causal effect of ST-mandated representation on forest conservation outcomes.

INCREASE IN STS REPRESENTATION BOOSTING TREE CANOPY:

- Analysing changes in tree and vegetation cover across various forested areas surrounding different village types, the researchers observed that "increasing formal representation for Scheduled Tribes (ST) led to an annual average increase in tree canopy by 3% and a reduction in the rate of deforestation."
- These effects were more pronounced in areas with higher initial forest cover. Importantly, the study found that these improvements began specifically "after the implementation of PESA elections that mandate quotas for ST."
- The presence of Panchayati Raj Institutions (PRIs) or local self-government alone, introduced in 1993 but without mandated ST representation, did not yield similar conservation benefits.
- This demonstrates a **causal relationship** rather than a mere correlation. Empowered as political actors, STs had economic incentives to preserve trees crucial for their livelihoods, which heavily rely on non-timber forest products and sustenance needs. Thus, they opposed commercial timber and mining activities—key drivers of deforestation.
- **"Forest stewardship"** facilitated under PESA, where STs effectively pursue their economic interests, thereby enhancing forest conservation.
- Furthermore, qualitative and quantitative evidence supports another critical mechanism for improving forest health: opposition to mining activities. Increased ST representation empowered communities to resist large-scale mining operations, significantly reducing deforestation rates in PESA villages located near mines. However, the introduction of PESA elections also correlated with an uptick in conflicts related to mining interests.

BY FOLLOWING STEPS TO IMPLEMENT PESA TO BOOST FOREST COVER EFFECTIVELY:

- **Recognising community forest rights**: Expediting the process of recognising individual and community forest rights under the Forest Rights Act can empower tribal communities to manage and conserve forests.

- **Capacity building of Gram Sabhas:** Providing training and resources to Gram Sabhas on forest management inventory and using tools like GPS can enable them to monitor and protect forest resources effectively.
- **Reducing conflicts over mining and development projects**: Strengthening the provision that empowers Gram Sabhas to oppose mining and other commercial projects that lead to deforestation can help communities protect forests.
- **Promoting sustainable livelihoods**: Schemes like MGNREGA that provide employment to tribal communities and develop local infrastructure can reduce their dependence on forests and promote conservation.
- **Overcoming administrative hurdles and resistance to change**: Addressing bureaucratic apathy and lack of political will in the forest bureaucracy is essential for effectively implementing PESA and FRA.
- **Amending state laws**: States must amend laws related to land acquisition, excise, forest produce, mines and minerals, agricultural produce market and money lending to align with PESA provisions.

MAINS BASED QUESTION:

Q. How does the PESA and Forest Rights Act of 2006 strengthen democracy at the grassroots level and ensure inclusive development of tribal areas in the country?

Vishal Yadav