

- 3) **Lack of robust data-** There are no periodic gender analysis and gender statistics on green jobs.
- 4) **Lack of proper training-** A Skill Council for Green Jobs study indicated that 85% of the training for green skills was imparted to men. Due to lack of green skill, their participation is restricted.
- 5) **Lack of women friendly policies-** There are no dedicated Gender-focused financial policies and products which could cater to the requirements of women entrepreneurs.

What is the significance of enhanced women participation in green jobs?

- 1) **Foster gender equality-** It can address the gender biases in the Indian labour market and improve women's labour force participation rates.
- 2) **Sustainable economy-** It would help in unlocking the benefits of a low-carbon and environmentally sustainable economy.

Read more- [The role of women in developing a knowledge economy](#)

What should be the way forward?

- 1) **Plugging data gap-** There is a need to conduct gender analysis, collecting gender statistics on green jobs through periodic labour force surveys to emphasize women's role in the green transition.
- 2) **Address structural barriers-** There is a need to address issues like low participation of women in manufacturing and engineering field and lack of adequate skill development training for women.
- 3) **Women friendly policies-** The government should devise ways to ensure collateral-free lending, financial literacy training to unlock the true potential of women. COP 28's '**Gender-Responsive Just Transitions and Climate Action Partnership**' with a focus on improved data, targeted finance, and skill development is a step in right direction.
- 4) **Leadership -** There is a need to bring more women into leadership positions to incorporate gender-specific needs in low-carbon economy.
- 5) **Multi-stake holder participation-** There should be partnerships across government, private sector and other stakeholders to ensure the availability of technology and finance for women entrepreneurs and workers.

Businesses must recognize the centrality of gender justice and ensure equity throughout the process of green transition by mitigating existing barriers.

Subject: International Relations

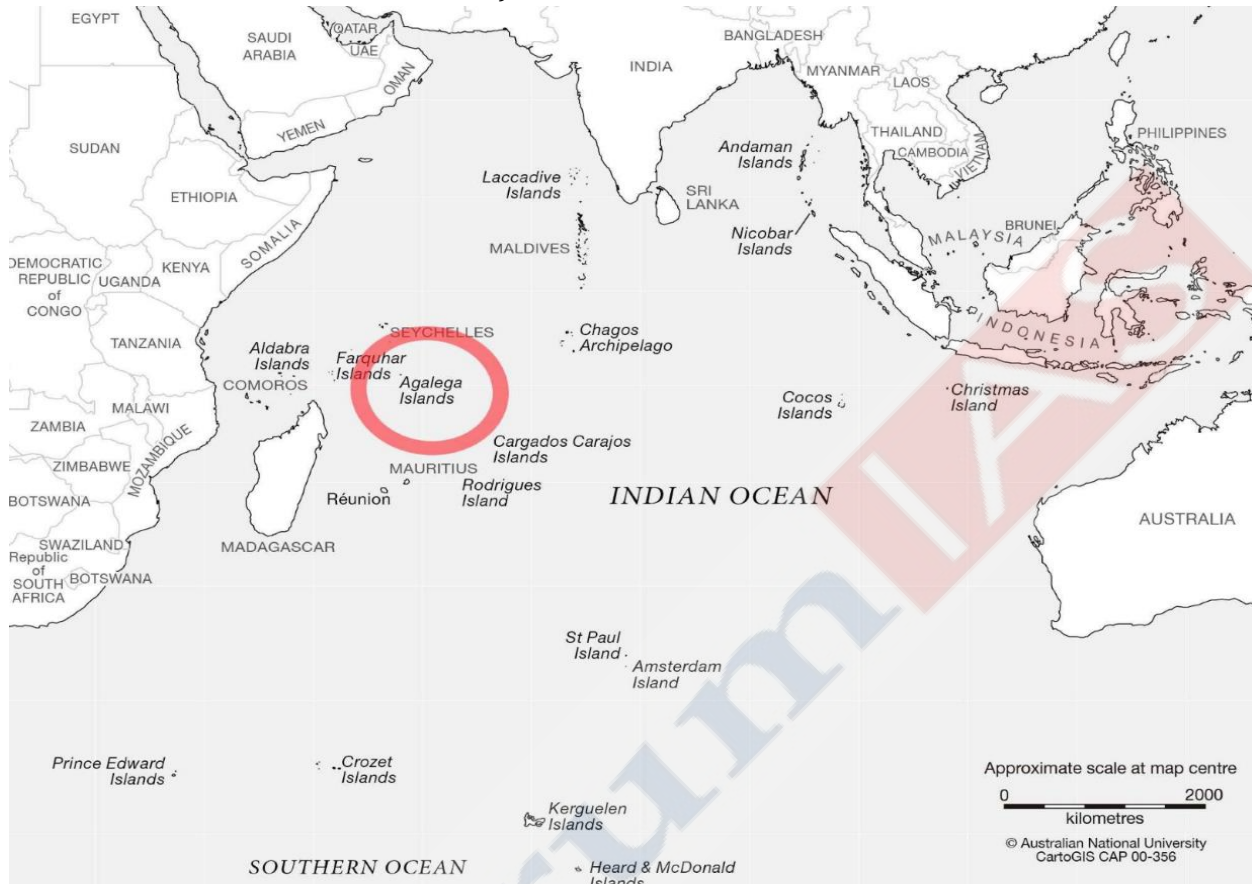
Topic: International Relation-Effect of policies and politics of developed and developing countries on India's interests,

Development of Agaléga - India's rising power in the Indian Ocean

News- Prime Ministers of India and Mauritius have jointly inaugurated an airstrip and the St James Jetty on North Agaléga Island in the Indian Ocean.

Where is the Agalega island situated?

Agaléga are two outer islands of Mauritius located in the Indian Ocean, about 1,000 kilometers (about 621.37 mi) north of Mauritius island



Source-Lowy institute

What is the significance of creating basic infrastructure in Agaléga island for Mauritius?

1) **Economic Significance:** -

- A) It will reduce two-day journey time from agaléga island to Mauritius to less than an hour's flight.
- B) It will create employment for the local population and improve their overall well-being.
- C) It would help in tapping the tourism potential of the islands.

2) **Strategic significance-**

The new jetty and airstrip will allow the stationing or forward deployment of ships of the Mauritius Coast Guard. This will significantly enhance the capabilities and capacities in marine surveillance and security.

Read more- [Comprehensive Economic Cooperation and Partnership Agreement\(CECPA\)" between India and Mauritius](#)

What is the significance of development of Agaléga island for India?

1) **Deepening of India-Mauritius relations:** -

A) **Enhanced goodwill-** It will enhance the goodwill and trust between the two countries. This would help India to project itself to other maritime neighbors a benign and friendly country that respects the sovereignty of independent nations.

B) **Multi-dimensional cooperation-** India and Mauritius are cooperating in all areas like monitoring of Exclusive Economic Zone, joint patrolling, hydrography, and Humanitarian Assistance and Disaster Relief.

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This will help India to sustainably use its exclusive economic zone in Indian Ocean region.

2) **Geostrategic significance-**

A) **Strengthen SAGAR initiative-**The joint development of Agaléga highlights India's commitment to the vision of Security and Growth for All in the Region (SAGAR) by assisting smaller maritime nations in building capacity and developing capability.

B) **Counter String of pearls-**China has built many assets in the Western Indian Ocean, such as the bases in Djibouti and Gwadar.

The development of ports in Agalega will provide strategic access to India dubbed by some analysts as the "necklace of diamonds" as against the "string of pearls" ports that provide access to the Chinese.

C) **Enhanced surveillance of Indian ocean-** With the maritime empowerment of Mauritius through the Agalega project, India can also monitor important ocean lines in the Western Indian Ocean.

D) **Reinforce Indias role as net peace provider in the Indian Ocean Region-**It will help India to transform into influential blue-water power and become the voice of the Global South.

It will also highlight Indias critical role as a net peace provider in the Indian Ocean region and maintaining overall peace, stability and security in the region.

Developing rail networks to improve economic ties and transportation efficiency

News: The article discusses the development of railway connections among Bangladesh, Bhutan, India, and Nepal (BBIN). This network aims to reduce transportation costs and time, improve trade, and support economic growth in these countries.

What is the BBIN initiative?

Regional Collaboration: The BBIN Initiative involves Bangladesh, Bhutan, India, and Nepal working together to enhance regional connectivity.

Focus on Railway Development: The initiative prioritizes developing rail networks to improve economic ties and transportation efficiency.

Economic Growth and Development: By connecting these countries more effectively, the initiative aims to boost economic growth and reduce transportation costs.

For more information on BBIN initiative [read here](#)

How are railways helpful in the regional growth of these countries?

Cost and Time Efficiency: Railways reduce transportation costs and times significantly. For instance, rerouting a freight train from Kolkata to Agartala through Bangladesh cuts transit time and costs by two-thirds.

Access to Ports: Landlocked Nepal and Bhutan gain access to major ports like Chattogram and Mongla, enhancing their trade capabilities.

Economic Integration: Improved rail connectivity fosters economic interdependence and growth among BBIN countries.

Revenue Generation: Enhanced railway links can increase revenue for countries like Bangladesh through transit fees and other charges.

Environmental Benefits: Railways offer a greener mode of transport, reducing greenhouse gas emissions compared to road transport.

What are the key projects in the BBIN initiative?

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Agartala-Akhaura Rail Link: This crucial link connects Northeastern India with Bangladesh, reducing the Kolkata to Agartala route from 1,600 km to just 500 km.

Khulna to Mongla Port Railway: This line in Bangladesh enhances connectivity between western, northern Bangladesh, India, and Bhutan.

Tongi-Akhaura Line Dual Gauging: Upgrading this line is part of the India-Bangladesh joint initiatives, improving connectivity and efficiency.

Hilli-Birampur Connection: This new link is aimed at enhancing cross-border rail connections between India and Bangladesh.

Jayanagar-Bijalpura-Bardibas Line in Nepal: The only cross-border rail link between India and Nepal, with plans to extend it further.

Gelephu-Kokrajhar Link Between Bhutan and India: A proposed rail line connecting Bhutan directly to the Indian railway network, facilitating easier access to Bangladesh through the Haldibari-Chilahati interchange.

How are regional rail connectivity projects being funded and executed?

Joint Funding and Execution: Unlike traditional individual country financing, these rail projects are being funded and executed through collaboration among the BBIN countries (Bangladesh, Bhutan, India, Nepal).

Support from the Indian Government: India is playing a significant role by extending lines of credit, offering assistance from the MDoNER (Ministry of Development of North Eastern Region) budget, and supplying rolling stock.

Involvement of International Organizations: The World Bank and the Asian Development Bank (ADB) are providing long-term loans and viability gap funding, contributing to the financial support of these projects.

Development Plans by Each Country: Governments of Bangladesh, Bhutan, and Nepal have also put forth their own development plans, showing commitment to the project and shared regional growth.

Way forward

To progress, the BBIN initiative should focus on timely completion of key railway projects like the Agartala-Akhaura link and the Khulna-Mongla line. Additionally, establishing effective cross-border protocols and regulatory frameworks is crucial for seamless operation and maximizing the economic and environmental benefits of these rail networks.

WTO 13th Ministerial Conference (MC13): Key Outcomes, Challenges

News- The World Trade Organization's 13th Ministerial Conference (MC13) recently concluded in Abu Dhabi. This article discusses the various outcomes of the conference and the challenges that remain unanswered.

What are some of the positive outcomes of the conference?

E-commerce tariff moratorium extended- WTO members agreed to extend the moratorium on e-commerce tariffs for two more years. India, Indonesia and South Africa had signaled their opposition to renewing the e-commerce moratorium, but supported it in the end. They are among countries worried about losing control of data flows.

Strengthen Multilateral Trading System- Members pledged to uphold and enhance the capacity of the multilateral trading system, with the WTO as its foundation, to address present trade challenges

What are the challenges?

1. US Obstructionism in WTO- The appointment of new members to the Appellate Body (AB) has been unilaterally blocked by the US. The body was supposed to be reformed by 2024, but that deadline has been missed.

2. Fisheries subsidies- Developing countries like Brazil emphasized their commitment to discussions on fisheries subsidies, as the West attempted to ban such subsidies. They highlighted the importance of resolving the issue to advance sustainable fishing practices globally.

3. India's Food security Challenge- India urged for a permanent solution to the public stockholding (PSH) issue for food security at the ministerial meeting. India stated that resolving the pending issue of PSH is crucial for achieving food security and improving the livelihoods of millions.

Way forward

India, as a leader of the Global South, should form alliances with like-minded nations such as South Africa and small island states. Through this approach, India can offer alternative viewpoints and initiatives that better reflect the concerns and objectives of developing countries.

India Joining the IEA as a full member- India and the IEA: Friends with benefits?

News: This article discusses India's potential full membership in the International Energy Agency (IEA). It highlights the importance of including India, given its growing energy consumption and role in climate change.

About India joining the IEA

India requested to join the International Energy Agency (IEA) as a full member. This discussion started during IEA's 50th anniversary.

India would be the first non-OECD (Organisation for Economic Co-operation and Development) country to join, reflecting the changing global energy landscape.

For information on IEA [read here](#)

What is the Significance of India Joining the IEA?

Benefits for India:

Enhanced Global Influence: As the world's third-largest energy consumer, India's full membership in the IEA can increase its global influence in energy decisions.

Energy Transition Support: India's ambitious renewable energy goals, like tripling non-fossil electricity capacity by 2030, can gain support and expertise from the IEA.

Learning from IEA Expertise: India can benefit from the IEA's experience in energy security and climate-proofing economies.

Benefits for IEA:

Reflecting Current Global Energy Trends: Including India reflects the shift in energy consumption from OECD countries to emerging economies.

Addressing Climate Change: India's role in global energy consumption makes its participation crucial in global climate efforts.

Balancing Energy Needs with Climate Goals: The IEA can work with India to balance its rising energy needs, especially in fossil fuels, with global emission reduction targets.

What Challenges Exist in India Joining the IEA?

Differing Energy Priorities: India's increasing fossil fuel consumption, including a potential 20% rise in oil use by the end of the decade, contrasts with the IEA's focus on reducing fossil fuels.

New Coal Capacity Concerns: Plans to build 40-80 GW of new coal electricity generation in India conflict with the IEA's stance against new coal capacity without expensive carbon removal technologies.

Oil Reserve Requirements: India currently has less than a week's strategic oil reserve, far below the IEA requirement of a 90-day emergency reserve, posing a compliance challenge.

Balancing Economic Growth with Emission Reductions: Aligning India's rapid economic growth with global emission reduction efforts presents a complex negotiation issue.

How does India's energy consumption impact the world?

Major Contributor to Global Energy Demand: India's growing population and economy significantly increase global energy demand.

Influence on Global Emissions: As a major greenhouse gas emitter, India's energy choices directly affect global emissions. Its success in renewable energy and emission intensity reduction is crucial for global climate goals.

Setting a Precedent for Developing Nations: India's path in balancing economic growth with sustainable energy practices can serve as a model for other developing countries.

Driving Global Energy Transition: India's commitment to increasing renewables, like targeting a tripling of non-fossil electricity capacity by 2030, influences global energy market trends and investments.

Way forward

To move forward, the IEA and India should focus on mutual goals while respecting their differences. India's energy growth and transition to renewables, like its ambitious 2030 targets, are key. Balancing India's oil and coal usage with global climate goals is essential, requiring cooperation and understanding from both sides.

GS Paper 3

Subject: Indian Economy

Topic- Issues relating to Planning, Mobilization of Resources, Growth, Development and Employment

Informal waste picker: Indispensable but invisible part of workforce

News-The article highlights the exclusion and marginalization of informal waste pickers.

What is the definition of Informal Waste Management Sector?

As per **The International Labour Organization**, they are individuals or small and micro-enterprises that intervene in waste management without being registered. They are not formally charged for providing waste management services.

What is the percentage of informal waste pickers in India's workforce?

There are no reliable estimates of informal waste pickers in India. However, as per the **Periodic Labour Force Survey 2017-18**, India has nearly 1.5 million waste pickers in its urban workforce. The workforce usually

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consists of women, children and the elderly, who are often disabled, are the poorest of the urban poor, and face violence and sexual harassment.

A detailed article on “Waste Management in India: Status, Challenges and Solutions” can be [read here](#).

What are the challenges faced by informal waste pickers in India?

- 1) **Lack of data**-There is no reliable data on exact participation of informal waste pickers in India's workforce. This prevents their integration into the formal economy.
- 2) **Lack of recognition**-They are not recognized and acknowledged by society for their work. Although, they play an important role in sustainable urban waste management.
- 3) **Neglect of health**-They live near dumpsites and work under unhygienic and unhealthy conditions. This leads to dermatological and respiratory health issues apart from regular injuries.
- 4) **Social Discrimination**-They are treated as dirty and unwanted elements of society, and they have to deal with exploitative social behaviour.
- 5) **Loss of employment due to Private sector participation**- As per **Alliance of Indian Waste Pickers (AIW) 2023 report**, private actors use expensive machinery and offers competitive rates to waste generators such as households and businesses. This deprives the informal pickers of their employment and forces them into hazardous waste picking.
- 6) **Extended Producer Responsibility**- According to report of **Women in Informal Employment: Globalizing and Organizing (WIEGO)**, it redirects waste away from the informal sector. This leads to large-scale unemployment of informal waste pickers.

What should be the way forward?

- 1) **Plastic treaty**- This is a UN endorsed resolution to end plastic pollution. However, it must ensure that employment of informal waste pickers is not endangered.
- 2) **Reforms in EPR (Extended Producer Responsibility)**-EPR guidelines should prioritize the welfare of informal waste pickers. This will be a win-win situation as waste pickers possess traditional knowledge around handling waste and this knowledge can be utilized to strengthen EPR.

Bloomberg including Indian bonds in its index- Confidence booster

News: The article discusses Bloomberg adding Indian government bonds to its index, which is expected to attract foreign investment and help India's economy.

About inclusion of India's government bonds to emerging market index.

Bloomberg will include Indian government bonds in its emerging market index starting January 31, 2025, over 10 months.

This follows JP Morgan's inclusion of Indian bonds starting in June 2024.

The initial inflow from Bloomberg's inclusion is expected to be \$2-3 billion.

What is the significance of Bloomberg including Indian bonds in its index?

Boost to Indian Debt Market: Bloomberg's inclusion of Indian bonds in its index significantly boosts the Indian debt market. (Expected to attract \$2-3 billion initially)

Confidence from Global Investors: Following JP Morgan's earlier inclusion, Bloomberg's decision signals strong confidence from international investors in the Indian economy.

Impact on Fiscal Deficits: Helps the Indian government finance fiscal and current account deficits by bringing in foreign savings.

Stable Investment Flow: Investments from funds tracking the index are typically passive and considered

more stable.

Economic Strength Indicator: Reflects confidence in India's macroeconomic stability, highlighting its growth and substantial foreign exchange reserves.

Risk Management: Calls for agile macroeconomic management due to the increased risks associated with higher foreign exposure.

What are the risks involved in including Indian bonds in the emerging market index?

Increased Market Volatility: Higher foreign investment can lead to greater market volatility, especially during global financial stress.

Currency Fluctuations: Large foreign fund movements can cause instability in the value of the Indian rupee.

Economic Impact of Reversed Flows: As per the RBI Governor's statement, an increase in index weighting brings inflows, but a decrease could lead to outflows, posing economic challenges.

Way forward

To manage the risks from Bloomberg's inclusion of Indian bonds, India needs to maintain low fiscal and current account deficits, ensure stable inflation, and actively manage foreign exchange flows. The Reserve Bank of India will play a crucial role in stabilizing the currency and mitigating volatility.

RBI and the net-zero transition

News-The article discusses the new draft brought out by RBI to help banks understand and manage climate-related financial risks.

Context- As fossil-fuel consumption is phased down over the coming decades, the financial system will have to prepare for this change.

What is the net zero target?

It is a state in which a country's emissions are compensated by the absorption and removal of greenhouse gases from the atmosphere.

Indian government has committed to cut its emissions to net zero by **2070** at the conference of parties-26(COP) summit.

Read more- [Achieving Net Zero by 2070 and the Associated Challenges](#)

What are the steps taken by the RBI to align its policies to the net zero target set by the government?

- 1) The introduction of lending to renewable energy under priority sector lending.
- 2) A framework for green deposits.
- 3) Releasing reports that assess climate risks.

What is the need to bring new draft by RBI?

- 1) As per RBI estimates, banks' current exposure to utilities, metal and transport is relatively higher. The transition to net zero may have implications for the financing of these sectors.
- 2) There would be more demand for green investment after the decline in consumption of fossil fuel-based assets. It will become difficult for the financial system to strike a balance between two demands because most fossil fuel assets are funded by banks and other financial institutions.

What are the themes of reporting as per the new draft by RBI?

The draft by RBI sets three thematic pillars for reporting:

- 1) **Governance**- The framework expects financial institutions to provide information on their internal processes to ensure capacity or understanding of climate change-related issues and oversight.
- 2) **Strategy**- The regulated entities will have to specify the kinds of issues and impacts that may arise over different time horizons, that is, short, medium and long term. It is specifically important for long-term lending to sectors in transition and sectors that are prone to extreme weather events.
- 3) **Risk Management**-Transition risks can impact differently under the various scenarios. Therefore, the framework seeks information from entities on the assessment of stress through climate-scenario analysis.

RBI has taken a step forward by introducing the draft that aligns well with international standards. There is a need to keep a watch on the asset quality not just in fossil fuel-based sectors but also in “green” sectors to ensure a smoother journey to net zero.

Topic- Changes in Industrial Policy and their Effects on Industrial Growth.

Growth of semiconductor industry in India

News-The article mentions the steps taken by the government to promote semiconductor manufacturing in India.

Background-The central government has recently approved India’s first semiconductor fabrication plant to be set up in Dholera, Gujarat, by the Tata Group.

What are Semiconductor Chips?

Semiconductors are materials which have a conductivity between conductors and insulators. They can be pure elements, silicon or germanium or compounds, gallium, arsenide or cadmium selenide.

What is the state of Chip manufacturing in world?

Currently, South Korea, Taiwan and China account for around 70 per cent of the global manufacturing capacity.

Read more- [Elusive quest for semiconductor self-sufficiency](#)

What are the steps taken by the government to promote Chip manufacturing in India?

1) Incentive scheme:-

- a) The government has rolled out Rs 76,000 crore chip incentive scheme. There will be incentives for every part of the supply chain including electronic components, sub-assemblies, and finished goods.
- b) The scheme will cover all three parts of the semiconductor ecosystem — packaging units (ATMP facilities), assembly and testing projects (OSAT plants), and full-scale foundries.

2) **Fiscal support**-The central government offers fiscal support and state governments can offer additional incentives to attract investments.

For ex- in the case of Micron, of the project cost of Rs 2.75 billion, the company will contribute \$825 million, with 50 per cent coming from the central government and 20 per cent from the Gujarat government.

3) **Promoting research and development**- The government is planning to set up an R&D lab at the Semiconductor Laboratory.

What is the significance of Chip manufacturing industry for India?

- 1) **Strategic significance** - Domestic manufacturing will reduce dependence on imported semiconductors. This will help in safeguarding critical infrastructure, defense system, sensitive data from cyber vulnerabilities.
- 2) **Digital Transformation**- It can lay the foundation for digital transformation. Chips are at the core of modern electronics and important for the fourth industrial revolution.
- 3) **Economic significance**-
 - A) **Robust supply chains**-The domestic manufacturing of chips will lead to diversification of supply chains. This would minimize uncertainty in the manufacturing of chips.
 - B) **Employment Generation**-It will create new employment in domains like design, fabrication, assembly, and testing.
 - C) **Enhance export potential** - It can help tap the global market and contribute to export earnings.
 - D) **Boost to domestic manufacturing**-It will support Make in India. For ex- The Tata-PSMC plant will serve industries such as high-performance computing, electric vehicles, defense and others.

The government has taken the right steps by providing support at a fiscal and regulatory level. However, it must also ensure a stable policy environment.

Women's Urban Employment Guarantee Act (WUEGA)

News- There is a growing discussion regarding including women's empowerment and narrowing gender disparities, especially in employment, under the Sustainable Development Goals. This article emphasizes the necessity of enhancing the involvement of urban women in the workforce.

What are the current challenges in Urban Women's Employment?

1. **Variations in Employment Rates** - More than half of the MGNREGA workers are women. However, in cities, women encounter challenges such as societal norms, safety issues, and inadequate transportation, which discourage them from entering the workforce. The Periodic Labour Force Survey (PLFS) shows that the employment rate for women in urban areas was 22.9% in the last quarter of 2023.
2. **Unfulfilled Employment Needs**- Urban women, despite being educated and willing to work, experience higher unemployment rates than rural areas. **For example**- In urban areas, the unemployment rate, reflecting those who desire jobs whether actively seeking or not, stands at 9%, while in rural areas, it is 4%.
3. **Need for Urban Job Programs**- Some states have started urban employment programs, but a national initiative like the Women's Urban Employment Guarantee Act (WUEGA) is needed to address urban women's employment challenges effectively.

What are the key features of proposed Women's Urban Employment Guarantee Act (WUEGA)?

Aim- The proposed act seeks to achieve gender equality in job opportunities by requiring the inclusion of at least 50% (ideally 100%) women in program management.

1. **Inclusivity**- The WUEGA would provide diverse job options within a 5-km radius and necessary amenities such as childcare services at work locations. Additionally, it offers free public transportation for women and provides incentives such as automatic enrollment in welfare boards to empower and assist women in the workforce.
2. **Skill Building Programs**- The proposal aims to tackle skill disparities and ease the shift from education to

employment by suggesting apprenticeships, information hubs, and empowerment programs specifically designed to meet the needs of women.

Is a separate Women focused employment program feasible?

1. Example of Women-Led Initiatives- Waste management initiatives led by women in Karnataka showcase the effectiveness and achievements of programs focused on women, indicating the possibility of similar efforts under WUEGA.

2. Costs and Benefits- Despite fiscal concerns, the implementation of WUEGA remains feasible, with projected costs amounting to approximately **2% of GDP**. The program promises significant advantages in terms of women's empowerment, economic growth, and social inclusion.

3. Future Prospects- By implementing WUEGA in phases and conducting regular assessments with necessary adjustments, we can lay the groundwork for wider urban employment initiatives. This will guarantee income security and empowerment for women.

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

The projections for oil and gas demand impact the clean energy transition- This is what's slowing down the clean energy transition

News: This article discusses how major oil companies' projections for oil and gas demand in 2050 could slow down the transition to clean energy and affect achieving net-zero carbon emissions. It highlights concerns about their investment strategies reinforcing reliance on fossil fuels.

What are the projections of major oil companies for 2050?

ExxonMobil's Projection: They predict **oil consumption in 2050 will be the same as today's level**, around **100 million barrels per day (mbd)**.

Chevron's Projection: Chevron estimates oil consumption by 2050 to range between 75-112 mbd, showing some variation but **not a significant decrease**.

European Companies' Scenarios:

Shell's "Archipelago" scenario suggests **slow electrification leading to a demand of about 90 mbd**. In Shell's "Sky 50" scenario, **faster electrification reduces demand to around 40 mbd**. BP and Total Energies project oil demand to be between 50-70 mbd, assuming a **moderate pace of transition** to clean energy.

How could these projections impact the clean energy transition?

1. If these companies plan based on high fossil fuel demand, they might invest more in oil and gas, making it harder to switch to clean energy.
2. ExxonMobil and Chevron have already invested heavily in oil and gas. ExxonMobil bought Pioneer Natural Resources for about \$60 billion. Chevron acquired Hess Corporation for \$53 billion.
3. Despite acknowledging the need for clean energy, European oil companies are also focusing on their existing petroleum businesses. The CEOs of Shell and BP plan to use their petroleum portfolios to improve returns, indicating a continued emphasis on fossil fuels.

What do these trends mean for global warming and energy transition?

Recognition of Global Warming: These companies recognize global warming but also consider economic and social realities, like the current dependence on fossil fuels.

Rising Energy Demand: They argue that energy demand, especially in the Global South, will rise and will likely be met by fossil fuels because clean energy infrastructure is lacking.

Challenge in Transitioning: They suggest that transitioning to clean energy will be costly and challenging, especially without a significant carbon tax.

Way forward

The way forward must include a significant reduction in oil demand, as the **International Energy Agency (IEA) states it must drop by at least 75% to meet the net-zero target**. This underscores the need for a rapid shift to clean energy and strong policy measures like carbon taxes to encourage this transition.

Critical Minerals - The biggest roadblock to India's net-zero goal

Context: This article discusses the global importance of critical minerals, which are essential for technologies like renewable energy and electric vehicles. It highlights the dominance of certain countries in mineral production and processing, particularly China's control over rare earths.

What are Critical Minerals?

Critical Minerals are not clearly defined globally, but countries identify them based on their own needs. India has listed 30 such minerals, the US 50, and Japan 31. Critical minerals are not synonymous with rare earths, but they are often confused.

For information on Critical Minerals [read here](#)

Uses of Critical Minerals:

Essential for Decarbonization: Critical minerals are crucial for renewable energy technologies. For instance, an electric car needs six times more minerals than a conventional car.

Growing Demand in Clean Energy: To meet Paris Agreement targets, a significant increase in minerals like copper, nickel, and lithium is needed. For example, the demand for lithium is expected to rise by 90% for clean energy technologies.

Diverse Industrial Uses: Beyond energy, these minerals are vital for industries like defense, electronics, and construction.

India: India is concentrating on securing a consistent supply of critical minerals to achieve its decarbonization and net-zero objectives by 2070. The country plans to establish 500 GW of non-fossil fuel power and greatly expand electric vehicle usage by 2030. Achieving these goals necessitates minerals such as lithium for battery manufacturing. India is investigating joint ventures with Australia to source lithium and cobalt. For information on steps taken by the government of India for critical minerals [read here](#)

What are the issues with Critical Minerals?

Geopolitical Monopoly: A few countries dominate critical mineral resources. For example, Australia controls 55% of lithium reserves, and China has 60% of rare earths.

Processing Dominance by China: China processes a large portion of the world's critical minerals, such as 35% of nickel and 50-70% of lithium and cobalt.

Environmental and Political Concerns: The energy-intensive and polluting processing of these minerals raises environmental issues. Additionally, China's dominance leads to political leverage over other countries.

Dependency on Imports: Many countries, including India, heavily rely on imports for these minerals, which poses a risk to their industrial and energy security.

Long Gestation Period for Alternatives: Developing alternative sources and processing capabilities, like India's plans with Australia, can take over 15 years, delaying self-reliance.

What is the global response to China's monopoly?

Formation of Minerals Security Partnership (MSP): Led by the US, the MSP includes countries like India, Australia, Canada, Sweden, and Norway to secure mineral supply chains.

Objective of MSP: Aimed at reducing reliance on China by "friend shoring" manufacturing to allied nations.

Diverse Membership: MSP unites countries with rich mineral deposits and those with advanced processing technology, like Japan and South Korea.

Exclusion of Some Key Nations: Notably, mineral-rich countries like Chile and Indonesia are not part of the MSP, raising questions about its effectiveness.

For information on MSP read [Article 1](#), [Article 2](#)

Green Hydrogen Vs White Hydrogen

News- As the world progresses towards a clean energy future, the debate surrounding green hydrogen and white hydrogen intensifies. This article explores the future potential of green hydrogen and its related projects while competing with white hydrogen

What is green hydrogen and its benefits?

1. Production- Green hydrogen is generated via electrolysis, a process that utilizes renewable energy sources such as wind or solar power to separate water into hydrogen and oxygen.

2. Benefits:

a. Environmentally Friendly- Green hydrogen production uses renewable energy sources like solar or wind, resulting in no greenhouse gas emissions.

b. Sustainability: As renewable energy sources are used to produce green hydrogen, it helps reduce reliance on fossil fuels, contributing to long-term sustainability and mitigating climate change.

c. Energy Storage- Hydrogen can store excess renewable energy for later use when demand is high, or generation is low.

3. Significance for India: In India, indigenous industries plan to produce green hydrogen. This is significant for India as the government aims for self-sufficiency and aims to become an exporter of fuel eventually. Out of the 5 million tonnes of green hydrogen production targeted by 2030, nearly 70% is planned for export.

Read more- [Green hydrogen and National Green hydrogen Mission](#)

What is white hydrogen and what advantages does it have over green hydrogen?

Recent discoveries of white hydrogen around the world are posing tough competition for the success of green hydrogen.

1. About- White hydrogen is geologically occurring hydrogen found in mines, often referred to as "gold" hydrogen by some enthusiasts.

2. Current reserves- Currently, reserves of white hydrogen have been discovered in various countries including the US, Russia, Mali, France, Australia, and numerous other locations. Some estimates suggest that the total availability of white hydrogen on Earth is approximately 5 trillion tonnes or more.

Advantage of white hydrogen over Green Hydrogen

1. Lower Production Cost: White hydrogen production is less water and energy-intensive, making it more cost-effective.

2. Accessibility: It can be readily mined from geological deposits without the need for electrolysis, which simplifies its production processes.

3. Competitive Pricing: Compared to green hydrogen, white hydrogen can be significantly cheaper, potentially revolutionizing the hydrogen market. For example, if green hydrogen costs \$5 per kilo, white hydrogen would cost \$0.5 per kilo.

Way forward

For India to be successful in its green hydrogen investments should bet on more technological advancements for extraction of cheap green hydrogen energy. It will make India competitive in the export of affordable green hydrogen energy.

Significance of Undersea cable for India

News-The article highlights the need of building robust submarine infrastructure for commercial and strategic interest of India.

Background- Recently, submarine cables in the Red Sea have been damaged. This poses challenge for India's Telecom Sector.

What is an undersea cable or submarine cable system?

It is a 'line link' in the form of wire, cable, optical fiber, tube, conduit, waveguide or another physical medium. It is for carrying communications by means of guided electromagnetic energy.

What is the damage and who caused it?

The Red Sea has 14 undersea cables. They carry 90% of net traffic between Europe and Asia. There is no solid evidence to inform who caused the damage. The Houthis claim that they have damaged it, whereas some believe it is damaged by anchors of old ships.

Read more- [Submarine Cables and India- Threats and Vulnerabilities](#)

What is the significance of building robust undersea cable for India?

1) **Economic significance-** Undersea cables carry 99% of internet traffic. India's TATA communication is a stakeholder in TGN Red Sea cable. Damage to cable may lead to substantial loss to Indian service sector

2) **Geostrategic Significance-**

A) Data is perceived to be new oil and cables carry data. So, cutting hostile or enemy nations' communication could prove to be a great strategic move during wartime. For ex-During world wars, this tactic was employed by warring nations.

B) India lies at the important maritime crossroads between western Pacific and Persian Gulf. Submarine cable mostly follow these maritime routes. Hence, India may be at a strategically advantageous position while navigating through regional diplomacy.

Subject: Science & Technology

Topic- Awareness in the fields of IT, Space, Computers, Robotics, Nano-technology

Roles AI play in protecting democracy- There's also a positive side of AI that can strengthen democracy

News: The article discusses how artificial intelligence (AI) can both harm and help democracy, especially during elections.

How has AI impacted elections?

Negative Impact of AI on Elections

Deepfakes have been used to spread misinformation, affecting public opinion and outcomes. Examples include a fake video in Bangladesh showing a leader opposing Palestinian support, and a fake audio in the US of President Biden discouraging voting.

Positive Impact of AI on Elections

It can improve election transparency and efficiency by detecting fraud and enhancing voting security. In Pakistan, AI-generated videos of Imran Khan led to high voter turnout and success for his party, despite his imprisonment.

What positive roles can AI play in protecting democracy?

Monitoring for Election Fraud: AI can scrutinize election-related data in real time, detecting any signs of fraudulent activities. It's capable of identifying unusual patterns in voter registrations and ballot submissions, which are crucial for maintaining the integrity of elections.

Cost-Effective Campaigning for Less-Wealthy Candidates: Generative AI (GenAI) has the capability to create campaign materials at a significantly lower cost and with greater efficiency. This aspect of AI can level the playing field in elections by empowering candidates with fewer financial resources, allowing them to reach a wider audience without the need for a large campaign budget.

Enhancing Voter Education: AI can tailor educational content about candidates and local issues to individual voters, using their local dialects. This personalization can increase political awareness and promote more informed voting decisions, benefiting particularly marginalized communities.

Assisting Voters with Disabilities: AI technologies, like voice recognition systems, can aid voters with disabilities, such as those who are visually impaired, making the voting process more accessible and inclusive.

Streamlining Election Logistics: AI can optimize the logistics of elections, making processes like voter registration and verification more efficient. This is especially beneficial in large countries, where managing large-scale elections can be logistically challenging.

Way forward

To safeguard democracy, it's vital to balance AI's potential for disruption with its ability to enhance elections. Implementing measures to counteract deepfakes and misinformation, while harnessing AI for voter education, fraud detection, and increased accessibility, can strengthen democratic processes as evidenced in Pakistan's recent elections.

Benefits and Challenges of the Genome India Project - Decoding the script

News: The article discusses the Genome India Project, which sequenced 10,000 Indian genomes to create a reference for Indian DNA.

What is the Genome India Project?

The Genome India Project, backed by the Department of Biotechnology, is a significant scientific initiative that has successfully sequenced the complete genomes of 10,000 Indian individuals. This project aims to construct a comprehensive reference for the Indian human genome.

For information on Genome India Project read [article 1](#), [article 2](#)

What are the benefits of the Genome India Project?

Creation of a Reference Genome: The project has sequenced 10,000 Indian genomes, creating a crucial reference for understanding the genetic diversity in India.

Disease Research: It aids in identifying genetic links to diseases. For instance, the discovery of the MYBPC3 genetic variant, prevalent in 4% of Indians, is associated with heart failure.

Personalized Medicine: The findings can lead to tailored healthcare solutions based on genetic information.

Understanding Genetic Complexity: It sheds light on the unique genetic makeup due to India's diverse population and endogamy practices, helping in future genetic research and healthcare planning.

What are the challenges faced by the Genome India Project?

Representative Diversity: Sequencing 10,000 genomes is not fully representative of India's over one billion diverse population, which includes around 4,500 population groups.

Complex Genetic Landscape: India's history of endogamy within castes has preserved rare, potentially harmful genetic variants, complicating genetic analysis.

Monogenic Disease Focus Limitations: Most diseases are not monogenic (caused by a single gene), challenging the simplification of genetic research to direct disease links.

Affordability of Treatments: Even when genetic causes of diseases are identified, treatments, if available, are often too expensive for many who need them.

Data Accessibility: Ensuring that the project's findings are widely accessible and not confined to academic circles is a significant challenge.

Way forward

To progress, Genome India should sequence more than 10,000 genomes, reflecting India's diverse population. The project must engage various experts, including scientists, students, and ethicists, ensuring findings are not confined to academia. This approach will deepen India's self-understanding and foster broader applications of the research.

Read more- [Social and Digital media regulations in India](#)

Prototype Fast Breeder Reactor (PFBR) - The status of India's nuclear program

News: On March 4, Prime Minister Narendra Modi attended the commencement of the core-loading process of the indigenous Prototype Fast Breeder Reactor (PFBR) at the Madras Atomic Power Station in Kalpakkam, Tamil Nadu. This event signifies the beginning of stage II in India's three-stage nuclear power strategy.

What is India's three-stage nuclear program?

Stage I: Uses Pressurized Heavy Water Reactors (PHWRs) with natural uranium-238 (U-238), which also contains U-235. This stage generates plutonium-239 (Pu-239) and energy.

Stage II: Implements the Prototype Fast Breeder Reactor (PFBR), which utilizes Pu-239 along with U-238 to produce energy, U-233, and more Pu-239. The PFBR, with a capacity of 500 MWe, represents a significant progression towards thorium utilization. The **Department of Atomic Energy (DAE)** set up a special-purpose vehicle in 2003 called **Bharatiya Nabhikiya Vidyut Nigam, Ltd. (BHAVINI)** to implement stage II.

Stage III: Focuses on combining Pu-239 with thorium-232 (Th-232) in reactors to produce energy and U-233.

For more information [read here](#)

What is PFBR?

About PFBR:

The Prototype Fast Breeder Reactor (PFBR) is a nuclear reactor in India that produces more nuclear fuel than it consumes. The Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, designed the PFBR. It's a key component of India's three-stage nuclear power program, aiming for energy self-sufficiency.

What is the importance of Stage II of India's nuclear program?

Transition to Thorium Use: Stage II, featuring the Prototype Fast Breeder Reactor (PFBR), is crucial for transitioning towards using thorium, leveraging India's large thorium reserves.

Foundation for Future Expansion: This stage lays the groundwork for building additional fast breeder reactors (FBRs). The Department of Atomic Energy proposed constructing four more FBRs, each with a 600 MWe capacity.

Self-Sufficiency in Nuclear Energy: Stage II is a strategic step towards making India completely self-sufficient in nuclear energy, a major goal of the country's nuclear program.

What are the challenges of Stage II?

Technical Complexity: FBRs like the PFBR are more complex to operate compared to other reactor designs.

Safety Concerns: Fukushima Daiichi disaster has intensified the concerns around.

Regulatory Hurdles: The AERB, India's nuclear regulatory body, faces criticism for not being independent, as it ultimately reports to the Department of Atomic Energy (DAE).

Handling of Radioactive By-products: The thorium fuel cycle produces radioactive isotopes like caesium-137 and radium-224. These are difficult to handle and store.

Can Small Modular Reactors (SMRs) be an alternative to present nuclear plants?

To read all the details about SMRs - [click here](#)

India's plan for semiconductor production- India's microchip leap: Now for the hard part

News: The article discusses India's plan to set up three semiconductor foundries with foreign partnerships, including a major project by Tata Electronics and Taiwan's Powerchip.

What is India's plan for semiconductor production?

India aims to establish three semiconductor foundries with private sector involvement. A significant partnership involves Tata Electronics and Taiwan's Powerchip Semiconductor Manufacturing Corporation. The total investment in these semiconductor projects exceeds 71.5 trillion.

The objective is to create a comprehensive semiconductor ecosystem in India, covering design, fabrication, assembly, testing, marketing, and packaging.

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These efforts are driven by the desire for strategic autonomy in semiconductor technology and to reduce reliance on foreign chip suppliers.

What are the potential benefits of India's plan for semiconductor production?

Establishing a semiconductor ecosystem: The foundries will develop a full value chain from design to packaging.

Strategic autonomy: Reducing dependence on foreign chip suppliers enhances India's self-sufficiency in key technologies.

Economic boost: The combined investment of over 71.5 trillion is expected to strengthen India's global economic ranking.

Job creation: The project will generate about 20,000 direct and 60,000 indirect jobs, impacting employment positively.

Technological advancement: By producing chips of 28 nanometres, these foundries will contribute to India's technological progress, although they are behind the global curve of 3nm chip production.

What are the challenges of India's plan for semiconductor production?

Limited technological edge: The plants will initially produce 28 nanometre chips, while the global standard is advanced at 3 nanometres.

Modest job creation: The projects are expected to generate 20,000 direct and 60,000 indirect jobs, which may not significantly impact the unemployment crisis.

Skilled labor shortage: Concerns about the availability of adequately trained workers for these specialized operations.

Infrastructure challenges: Questions about the assurance of uninterrupted power and clean water supply, crucial for semiconductor manufacturing.

Geopolitical risks: U.S. export controls and India's reliance on high-tech imports could affect operations. Additionally, domestic political factors, especially with investments focused in Gujarat, which lacks a strong tech base, present potential business risks.

Way forward

To progress, India should focus on developing more advanced semiconductor technology, addressing the skilled labor gap, ensuring stable infrastructure, and navigating geopolitical challenges. Strengthening partnerships, like the one with Tata Electronics and Taiwan's Powerchip, is also key to enhancing India's semiconductor industry.

Subject: Environment

Topic- Environmental Pollution and Degradation, Environmental Impact Assessment.

Problems of plastic waste in Himalayan states

News-The article discusses issues of unsustainable plastic waste management practice.

What is the status of Plastic waste in Himalayan states?

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As per The Himalayan Clean up (2018-21) drive and the National Productivity Council of India's waste and brand audit, there is an increase in plastic waste (especially non-recyclables) in Himalayan states.

For ex-A) The Himalayan Clean up (2022) waste audit results showed that 92.7% of trash was plastic, with 72% of waste being non-recyclable plastic.

B) In Assam, at the Ramsar site of Deepor Beel, Greater adjutant storks are eating the plastic waste in the landfill instead of fish from the wetland.

What are the legal and statutory provisions to deal with plastic pollution?

1) **Legal mandates**-The government has brought Solid Waste Management Rules (SWM) 2016, Plastic Waste Management (PWM) Rules 2016 and Extended Producer Responsibility (EPR) 2022 to regulate plastic pollution in India.

2) Initiatives by the state government-

A) Himachal Pradesh has a buy back policy for non-recyclable and single-use plastic waste since 2019.

B) Sikkim banned packaged mineral water use from January 2022.

C) Tripura has made policy changes, enacted municipal by-laws and had a State-level task force to eliminate Single Use Plastic

Read more- [Plastic Pollution in India: An Overview](#)

What are the reasons for increasing plastic waste in Himalayan States?

1) **Urbanization and Changing Consumption Patterns**-Rapid and unplanned urbanization, coupled with changing production and consumption patterns, contribute to the plastic waste crisis.

2) **Unsustainable Tourism**-Unsustainable tourism and a rapid rise in the number of tourists is contributing to an increase of plastic pollution problems in the region.

For ex- the National Green Tribunal has issued notices to Central Pollution Control Board (CPCB), the Himachal Pradesh State Pollution Control Board and Environment ministry on waste dumping in eco-sensitive areas by tourists and commercial establishments.

3) **Unscientific plastic disposal**- India has one of the highest mismanaged waste index (MWI), at 98.55%, in the world (after Kenya, Nigeria and Mozambique). This index measures the gap in waste management capacity and plastic consumption.

As per Centre for Science and Environment (CSE), India is recycling (through mechanical recycling) 12% of its plastic waste, burning 20% of its plastic waste and 68% is unaccounted for.

4) **Lack of adequate power for local bodies**- Under the SWM, PWM and EPR, local bodies are required to perform the task of collection and scientific disposal of plastic waste.

However, only a few States have enacted model by-laws to empower local bodies.

5) **Data gaps**- There is a need for scientific method of data collection on quantum and quality of plastic waste.

What should be the way forward?

1) **Resource Allocation and Support**-Adequate resource allocation, infrastructure development, and empowerment of local bodies are crucial for effective waste management, considering the region's ecological sensitivity.

2) **Public Participation and Education**-Public engagement through sustained education campaigns and waste segregation initiatives is essential to address the plastic waste crisis.

3) **Convergence of Schemes**-Convergence of existing schemes like Swachh Bharat Mission, Finance Commission grants, and corporate social responsibility funds can enhance resources for waste management infrastructure and operations.

Subject: Agriculture

Topic- Issues related to Direct and Indirect Farm Subsidies and Minimum Support Prices

Why are farmers protesting? - Rethink the way we grow food

News: The article discusses the high costs and challenges in modern farming, both in Europe and India.
Why are farmers protesting?

Protest in India:

Demand for Higher MSP: Farmers want increased minimum support prices for their crops due to high production costs.

Lack of Subsidies: Unlike European farmers, Indian farmers receive minimal government support, impacting their profitability.

Climate Challenges: Erratic weather and pest attacks increase risks for farmers.

Protest in Europe:

Climate Regulation Impact: European farmers face challenges with new climate rules, like reducing pesticides and fertilizers, which increase their costs.

Financial Burdens: Policies like reducing livestock numbers and cutting fossil fuel subsidies add to the financial stress of farmers in Europe.

Dependency on Subsidies: European agriculture heavily relies on government subsidies, such as the EU's Common Agricultural Policy. For example, each farmer received approximately €6,700 annually in 2021 as direct income support.

What are the issues in modern farming?

Farm consolidation: Farms have become larger, making it harder for small farmers to compete due to increased costs and bureaucracy.

Rising costs: Both small and large farms face high input costs and debt. Organic farming, covering 10% of EU land, increases cultivation costs.

Intensive agriculture: To improve productivity, there's more use of chemicals and bio-inputs, leading to higher costs and environmental damage.

Price control dilemma: Governments need to control food prices, but this affects farmers' income, especially when costs rise due to climate change and pests.

Lack of subsidies: In India, unlike Europe, farmers lack substantial government subsidies, making it hard to cope with increasing costs.

Environmental impact: Intensive farming practices compromise environmental protection efforts.

Conflict between productivity and affordability: Increasing productivity requires expensive inputs, but this isn't sustainable in regions needing affordable food.

What should be done?

Promote Sustainable Practices: Shift towards regenerative or natural farming to reduce cultivation costs and improve environmental health.

Local Market Support: Implement policies like Odisha's millet procurement for midday meals to provide farmers with assured markets.

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Balance Subsidies and Costs: Adjust subsidy systems to support farmers adequately, especially in regions like India where current support is minimal.

Manage Consumer Prices: Develop strategies to maintain affordable food prices while ensuring fair compensation for farmers.

Reduce Food Waste: Address the global issue of food wastage, ensuring efficient use of agricultural produce.

Enhance Environmental Policies: Integrate environmental standards with agricultural practices, focusing on long-term sustainability.

