1. Potential of Quad-led biomanufacturing hub

Topic: International Relations

In News: The Quad (Australia, India, Japan, and the United States) has set up a Critical and Emerging Technology Working Group to facilitate cooperation, monitor trends, and scout for opportunities related to developments in critical and emerging technologies, that included biotechnology.

More on the Topic:

About Biomanufacturing and it's Potential:

- Biomanufacturing **uses living systems, particularly microorganisms and cell cultures,** to produce molecules and materials on a commercial scale.
- It has **the potential to transform the global industrial system,** with up to 60% of physical inputs to the global economy expected to be producible using this technology.
- Many countries, including the United States and China, recognise the need to optimise this ecosystem and have designed specific policies to shape their bio-economies.

How can QUAD Contribute in Turning India in to bio manufacturing Hub?

- India's National Biotechnology Development Strategy envisions the country as a **"Global Biomanufacturing Hub" by 2025.**
- While the strategy sets a target of $100 billion for the hub, without external support it will be difficult achieve this target.
- Quad nations have complementary strengths that can be leveraged to create this hub.
- **The U.S. has significant funding capability, while all three (Japan, Australia and the U.S.) also possess advanced biotechnology innovation ecosystems and intellectual property.**
- **India has skilled manpower** and the potential to provide **affordable scale.**

Why India is the ideal choice to host the biomanufacturing hub?

- **I**ts existing infrastructure, pharmaceutical manufacturing expertise, and the available workforce is makes India an ideal candidature to develop bio manufacturing hub.

- According to the Australian Strategic Policy Institute, India is among the top performers in the field of biomanufacturing in both the quality of **research output and in the share among research publications**.
- India also has significant potential in **low-cost biomanufacturing,** particularly in the production of enzymes, reagents, research materials, and equipment.
- According to at least one analysis, **the cost of manufacturing in India is around 33% lower when compared to that in the U.S**.

Challenges Which has to be Overcome By India::

- **Uplift workforce quality:** While there are many life science professionals in the country, they lack access to cutting-edge technology and training.
- Permanent training facilities can be established in universities around the Quad hub, with experts from other Quad countries providing the training.
- **Language, regulations, and data-sharing constraints** exists in India which will hamper the growth of bio manufacturing industry.
- To facilitate cross-Quad collaboration, the biomanufacturing hub should establish **a research collaboration office.**
- The hub can also harmonise language, regulations, and data-sharing regarding biomanufacturing **to secure supply chains for Quad nations** and facilitate international collaboration.

Source: Hindu

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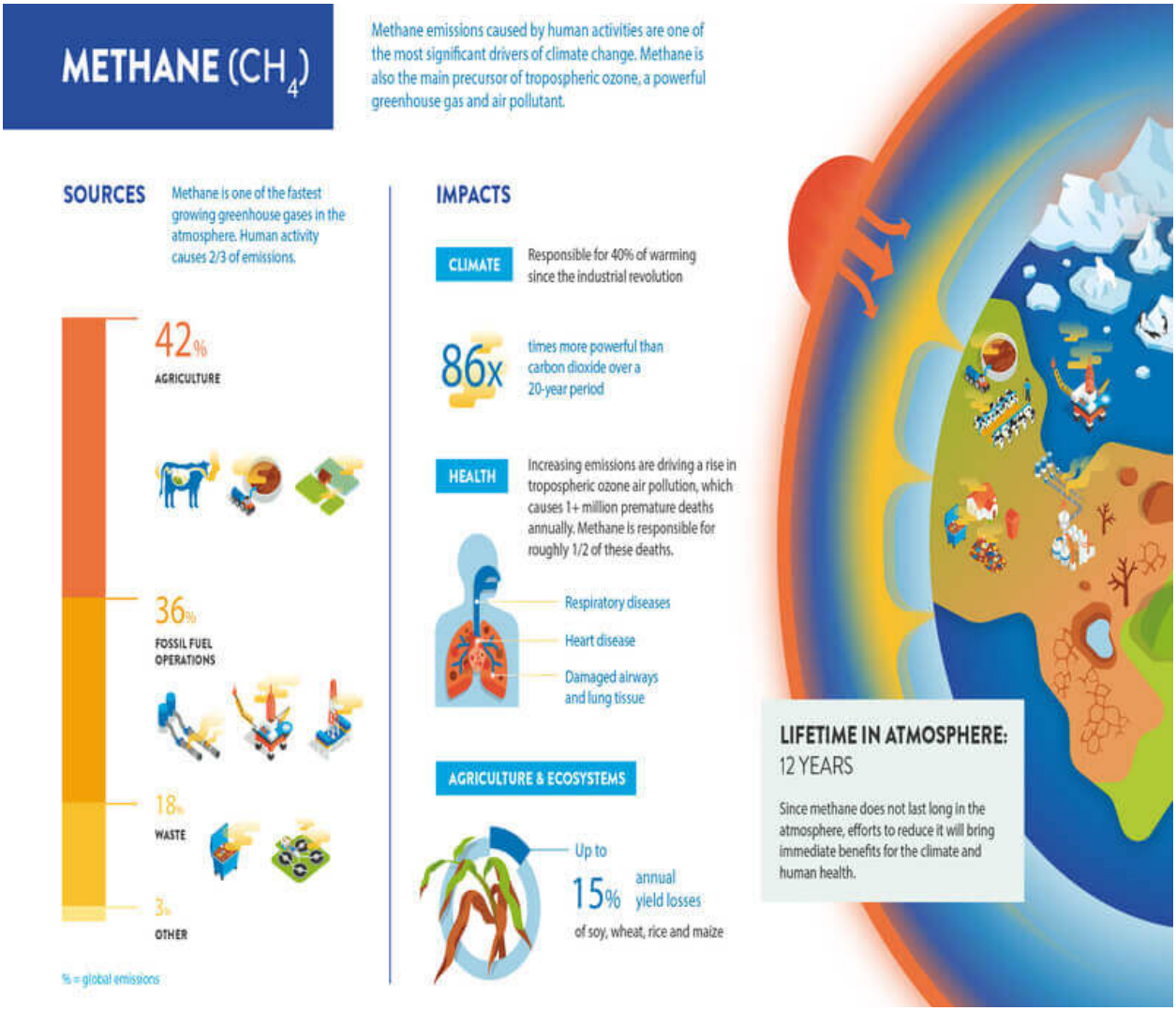
2. Methane Pollution

Topic: Environment and Ecology



In News: According to a new study only 13 per cent of methane emissions are covered by global methane mitigation policies.

More on the Topic:

- **Methane is 80 times more potent than carbon dioxide** over 20 years.
- According to the International Energy Agency, it is responsible for around 30 per cent of the rise in global temperatures since the Industrial Revolution,
- **Agriculture, fossil fuels as well as solid waste and wastewater** are the three major sources of methane.
- Methane emissions are increasing faster than at any time since the 1980s.

Methane Mitigation Policies:

- Methane policies are actions by governments that explicitly aims to monitor, prevent, or reduce methane emissions from anthropogenic sources.
- Currently, 281 policies are in place across sectors that release methane, including energy, waste, and agriculture. Of them, 255 are currently in force.
- 90 per cent of identified national policies were from three regions: North America (39 per cent), Europe (30 per cent), and Asia Pacific (21 per cent).
- Central and South America, Africa, the Middle East, Russia, and Central Asia represented the remaining 10 per cent.
- Their analysis showed that **policies targeting fossil methane (coal, oil, and gas) are lower than biogenic methane (released by living organisms)**.
- Almost half of them (49 per cent) target methane emissions from fossil fuels, and 42 per cent of policies target biogenic methane originating from waste and agriculture and waste sectors.
- Fossil methane emissions policies are less stringent than the biogenic sources.
- The waste policies were identified as being the most stringent, followed by oil and gas, agriculture and coal.

Factors contributing to less stringency of policies on fossil methane:

- The relative importance of those industries to **national and subnational economies,** energy and food security or rural poverty considerations (reduction of methane emissions from agriculture touches upon cultural issues, as food, is part of our culture.
- Most policies t**arget emissions from animal waste than enteric fermentation despite the former being a smaller source of emissions.**
- Enteric fermentation occurs in the digestive systems of ruminant animals such as cattle, buffalo, sheep, goats and camels, which are the largest sources of methane emissions from agriculture.

India's policies:

- In India, t**here are no effective policies targeting methane emissions from rice cultivation and biomass burning.**
- While the Indian federal and state rules -- advisories, bans and incentive systems -- have been adopted since 2014, they have been only partially enforced.
- **The 1997 Coalbed methane policy was ineffective** in incentivising coalbed methane production.
- **Coalbed methane is the methane produced during the coal formation process**, which gets trapped on the surface of the coal in tiny pores and fractures.
- While reducing livestock or rice-production-related emissions is challenging, **India can contribute by reducing emissions associated with coal production**

Source: DTE

3.“Eretmoptera murphyi”

Topic: Environment and Ecology

In News: Eretmoptera murphy - a flightless midge is changing the soil composition of Antarctica’s Signy Island.

More on the Topic:

- It has caused nitrate levels in the island’s soil to spike in the magnitude previously only seen in colonies of much larger species like penguins or seals.
- Eretmoptera murphy is **an invasive species on Antarctic Signy Island.**
- **It can survive in water.**
- It is a native of South Georgia, a sub-antarctic Island, and was accidentally introduced to Signy in the 1960s during a botany experiment. Its proliferation became apparent in the 1980s.
- **Eretmoptera murphyi feasts on dead organic matter** and has led to faster plant decomposition, thus increasing the soil nitrate levels by three-five times compared to places on the island where only native invertebrate species live.
- Experts have proposed some theories for the cause of the spread of murphyi, the most prominent one being through humans.
- It is possible they clung to the soles of researchers and tourists who walked over their colonies and travelled longer distances than they could have by any other means.

Source: Hindu

4.Calcium-41 for Radiometric Dating

Topic: Science and Technology

In News: Carbon-14 has a half-life of 5,700 years, so the technique can't determine the age of objects older than around 50,000 years. In 1979, scientists suggested using calcium-41, with a half-life of 99,400 years, instead.

More on the Topic:

- Calcium-41 is produced when cosmic rays from space smash into calcium atoms in the soil.
- It is found in the earth's crust, opening the door to dating fossilised bones and rock.

What is radiometric dating?

- When an organic entity is alive, its body keeps absorbing and losing carbon-14 atoms.
- When it dies, this process stops and the extant carbon-14 starts to decay away.
- Using the difference between the relative abundance of these atoms in the body and the number that should've been there, researchers can estimate when the entity died.
- A significant early issue with carbon dating was to detect carbon-14 atoms, which occur once in around 10 12 carbon atoms. Calcium-41 is rarer, occurring once in around 10 15 calcium atoms.

New Techniques:

- Atom-trap trace analysis (ATTA) is projected as a solution.
- ATTA is sensitive enough to spot Calcium-41 atoms; specific enough to not confuse them for other similar atoms; and fits on a tabletop.
- In an atom, **an electron in one orbital can transition to the next if it's given a specific amount of energy;** then it jumps back by releasing that energy.
- In ATTA, a laser's frequency is tuned such that it imparts the same energy as required for an electron transition in calcium-41.
- The electrons absorb and release this energy, revealing the presence of their atoms.

- The researchers reported being able to spot one calcium-41 atom in every 10 16 calcium atoms with 12% precision in seawater.

Source: Indian Express

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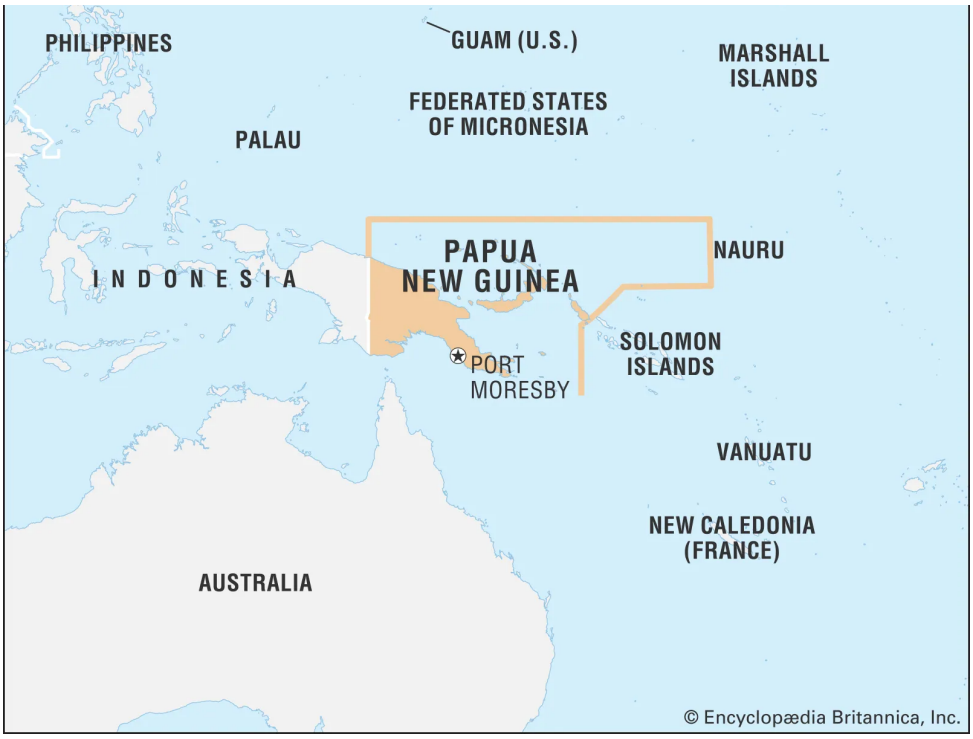
5. Papua New Guinea

Topic: International Relations



In News: Prime Minister has visited Papua New Guinea recently.

More on the Topic:

- This is the first visit by an Indian Prime Minister to Papua New Guinea.
- Prime Minister Narendra Modi and his counterpart Prime Minister will jointly host the third summit of the **Forum for India-Pacific Islands Cooperation (FIPIC).**
- Forum for India-Pacific Islands cooperation (FIPIC) is a **multinational grouping developed in 2014** for cooperation between India and 14 Pacific Islands nations which include Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Samoa, Solomon Islands, Palau, Papua New Guinea, Tonga, Tuvalu and Vanuatu.
- In view of the rising importance of the Indo-Pacific regionally and internationally the PICs have attracted a lot of attention from countries like **China, Japan, the US, Russiaand others.**

- With its **growing maritime domain awareness, strategic ambitions and its growing economic interests in the Indo-Pacific region**, India's approach to the PICs has been changing gradually as it is looking beyond its immediate region.

About Papua New Guinea:

- Papua New Guinea is an island country that lies in the **south-western Pacific.**
- It includes the eastern half of New Guinea and many small offshore islands.
- Its neighbours include Indonesia to the west, Australia to the south and Solomon Islands to the south-east.

Source: Business Standard

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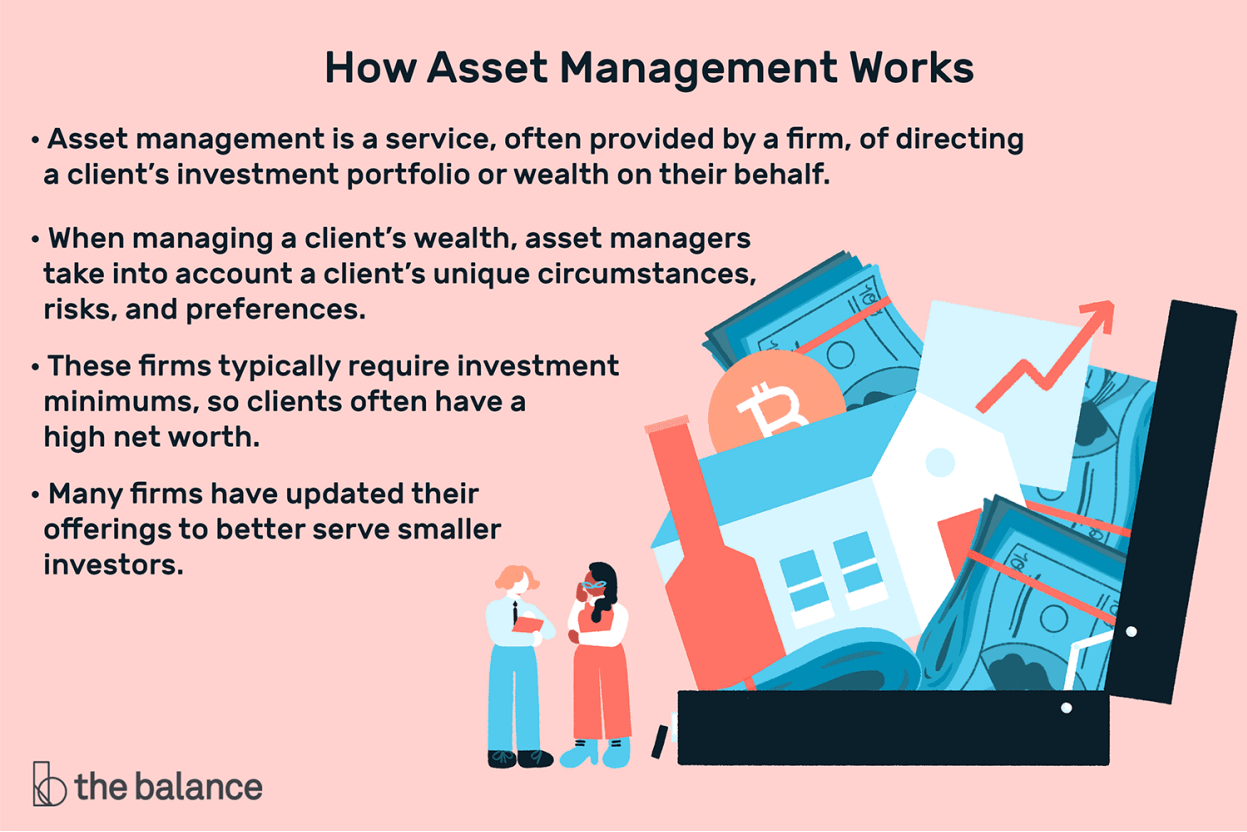
6. Asset Management Companies

Topic: Economy



In News: SEBI has proposed setting up of adequate surveillance and internal control systems by AMCs for deterrence of possible market abuse.

More on the Topic:

- An asset management company (AMC) is a firm that invests pooled funds from clients, putting the capital to work through different investments including stocks, bonds, real estate, master limited partnerships, and more.
- Along with high-net-worth individual (HNWI) portfolios, AMCs manage hedge funds and pension plans, and—to better serve smaller investors—create pooled structures such as mutual funds, index funds, or exchange-traded funds (ETFs), which they can manage in a single centralized portfolio.

Regulatory Bodies of AMC:

- AMC performs under the supervision of the board of trustees. All the Asset Management Companies are **governed by SEBI and AMFI.**
- The **Association of Mutual Funds in India (AMFI)** is a statutory body formed by mutual fund companies.
- Banks being sponsors are governed by RBI as well along with SEBI and AMFI.
- Lastly, all the regulatory bodies SEBI, AMFI, and RBI are governed by RBI.

Source: Business Standard

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7. International Pathogen Surveillance Network (IPSN)

Topic: International Relations

In News: WHO and partners are launching a global network to help protect people from infectious disease threats through the power of pathogen genomics called the International Pathogen Surveillance Network (IPSN).

More on the Topic:

- The International Pathogen Surveillance Network (IPSN) **will provide a platform to connect countries and regions, improving systems for collecting and analysing samples, using these data to drive public health decision-making, and sharing that information more broadly.**

- The IPSN, with a Secretariat hosted by the WHO Hub for Pandemic and Epidemic Intelligence, brings together experts worldwide at the cutting-edge of genomics and data analytics, from governments, philanthropic foundations, multilateral organisations, civil society, academia and the private sector.
- Pathogen genomics analyses the genetic code of viruses, bacteria and other disease-causing organisms to understand how infectious they are, how deadly they are, and how they spread.
- With this information, scientists and public health officials can identify and track diseases to prevent and respond to outbreaks as part of a broader disease surveillance system, and to develop treatments and vaccines.

Source: Business Standard