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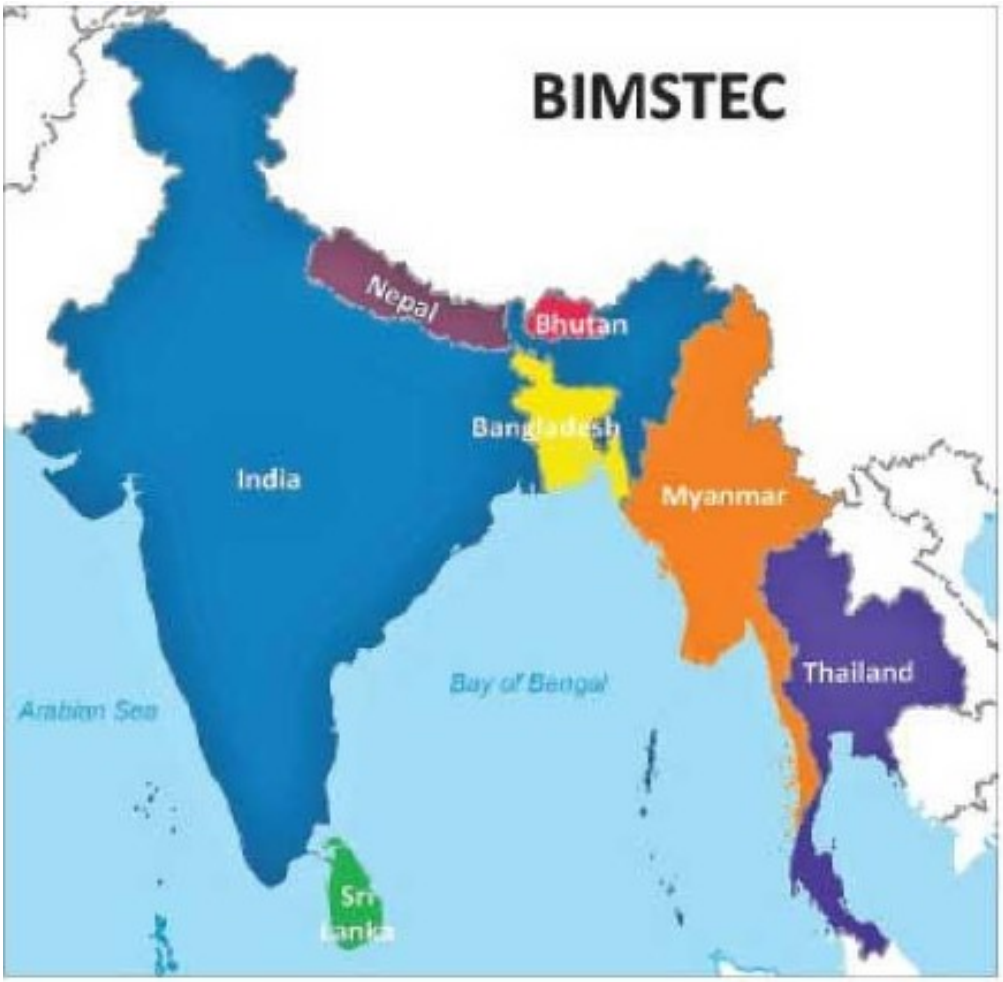
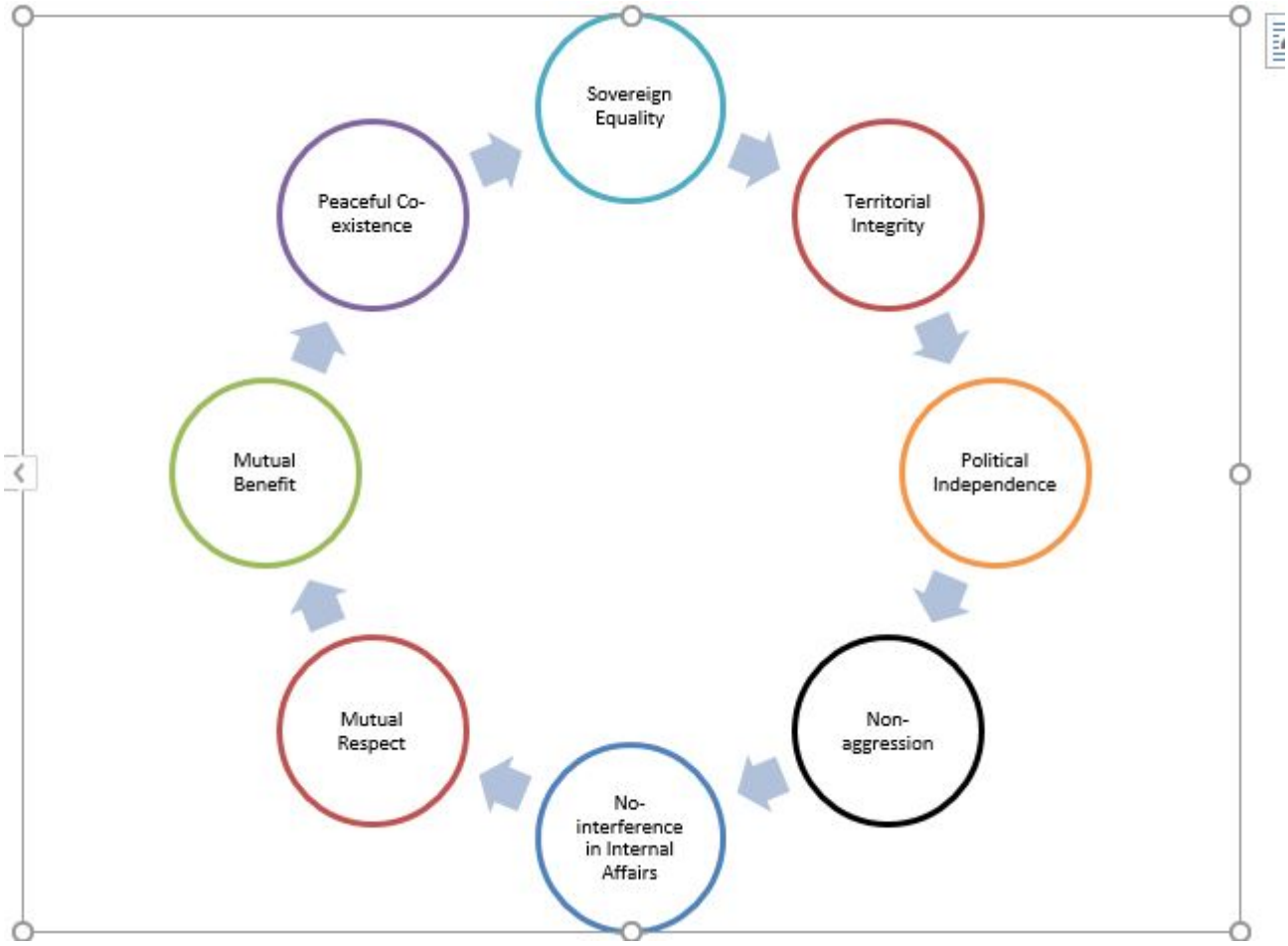
BIMSTEC

Recently, India hosted the 2nd Bay of Bengal Initiative for Multi-sectoral Technical and Economic Cooperation (BIMSTEC) foreign ministers' meeting in Delhi.

- **BIMSTEC** - It is a ***regional organization***, established in ***1997*** with the signing of the ***Bangkok Declaration***.
- It is initially known as BIST-EC (Bangladesh-India-Sri Lanka-Thailand Economic Cooperation), now known as BIMSTEC.
- **Headquarters** - Dhaka, Bangladesh.
- **Members** -It comprises ***7 Member States*** from South and Southeast Asia lying in the littoral and adjacent areas of the ***Bay of Bengal.***
- **7 members**
  - **South Asia -** India, Sri Lanka, Bangladesh, Nepal and Bhutan.
  - **Southeast Asia –** Myanmar and Thailand.



- **Principles**



- **Objectives**
  - Promote mutual assistance in economic, social, technical, and scientific fields.
  - Provide training and research facilities in education and technical spheres.
  - Collaborate to combat terrorism, organized crimes, and address disasters and diseases.
  - Maintain cooperation with similar international and regional organizations.
  - Strive to eradicate poverty in the region.
  - Promote trade and investment to foster regional development.
- **BIMSTEC Centres**
  - BIMSTEC Energy Centre
  - BIMSTEC Centre on Weather and Climate

BIMSTEC houses 1.73 billion people and having a combined gross domestic product of US$5.2 trillion (2023).

References

1. The Hindu | BIMSTEC Foreign Ministers

2. BIMSTEC | About BIMSTEC

Vaccine for Shigella

The Indian Council of Medical Research (ICMR) has recently found an Indian partner to manufacture the breakthrough vaccine for the Shigella infection.

- **Shigella** - It is an ***intestinal infection*** caused by ***bacterium*** that belongs to the ***enterobacter family***.
- **Four species of Shigella**
  - Shigella sonnei
  - Shigella flexneri
  - Shigella boydii
  - Shigella dysenteriae
- The main sign of shigella infection is ***diarrhea***, which often is bloody.
- **Symptoms** - Diarrhea (often containing blood or mucus), Stomach pain or cramps, Fever, Nausea or vomiting.
- Some people have ***no symptoms*** after they've been infected with shigella but their feces may still be contagious up to a few weeks.
- **Transmission** - Shigella is ***very contagious***.
- People get infected with shigella when they come in contact with and swallow small amounts of bacteria from the stool of a person who is infected with shigella.
- Eating or drinking ***contaminated food or water***.
- It can also be spread during ***sexual activity*** with a sick person.
- **Vulnerable Age** - ***Children under age 5*** are most likely to get shigella infection, but it can occur at any age.

  Shigellosis affects about 188 million cases per year that result in about 1 million deaths per year around the world.

- **Prevention** - Washing your hands frequently with soap and water is key to preventing the spread of this infection.
- **Vaccine** - There is ***no vaccine*** or cure yet.

References

1. The Print | Shigella

2. Mayo Clinic | Shigella infection

Mineral nano particles

Recently, IIT-Madras team makes mineral nanoparticles with water.

- **Background** - Water droplets are ***ubiquitous*** in our environment which exist in various sizes from large raindrops to minute aerosol particles.
- Among these, ***microdroplets***, which are a thousandth the size of typical raindrops, display unique properties and behaviors.

- **Surface Molecules vs. Bulk Molecules** - In bulk water, surface molecules participate in chemical reactions more readily than those inside.
- Microdroplets, due to their ***confined space and close-packed molecules***, engage in chemical reactions more eagerly and up to a ***million times faster than bulk water***.
- **Electrically Charged Microdroplets** - Microdroplets at the beach can ***carry ions from seawater***, settling on skin.
- As larger droplets evaporate and shrink, remaining water molecules bond closer, potentially leading to the formation of ***negatively charged hydroxyl ions (OH-) and free protons (H+)***.
- **Research Findings on Microdroplets** - The team conducted an experiment using ***quartz, ruby, and fused alumina crystals***.
- Applying a ***high voltage*** to mineral microparticles in water, they observed the particles breaking into nanoparticles within milliseconds.
- Free protons might infiltrate crystal layers and break them apart.
- Surface tension and electric fields could contribute to ***creating shockwaves*** that fragment the microdroplets.
- **Implications of the Study**
- **Origins of Life** - The study's findings could aid research on proto-cells, potential precursors to modern cells, providing insights into the origins of life.
- **Agricultural Applications** - Silica nanoparticles, essential for plant growth, can be supplied to soil, improving agricultural productivity.
- This method could ***transform unproductive soils*** and desertified areas into fertile lands.

Nanoparticles
• **Nanoparticles** - They are tiny particles that measure between ***1 and 100 nanometers in size***. • A nanometer is ***one-billionth of a meter***, making nanoparticles incredibly small, often comparable in size to atoms and molecules. • **Property** - Due to their small size, nanoparticles have a ***large surface area relative to their volume***. • This enhances their ***chemical reactivity and physical properties***. • **Applications** - Medicine, Electronics, Energy, Environmental, Materials Science.

Reference

1. The Hindu | Mineral nano particles

Uropeltis caudomaculata

A team of researchers have recently discovered a new species of shieldtail snake in the Meghamalai-Munnar hill region of the Western Ghats.

- **Shieldtail snakes** - These are a ***non-venomous***, small, and fascinating group of ***burrowing snakes*** with over 50 species identified from the Western Ghats.
- Shield-tail snakes belong to the Uropeltidae family, endemic to peninsular India and

Sri Lanka.
- They have a ***large keratinous shield*** at the tip of the tail and hence called shield tailed snakes.
- **Habitat –** Inhabit Hilly forests, occupy tunnels in the leaves, humus, rocks & logs.

Uropeltis caudomaculata

- It is a shieldtail snake recently found in Western Ghats have similarities with its closest known relative**,** Uropeltis pulneyensis.
- The name, Uropeltis caudomaculata, refers to the lateral yellow spot on each side of the base of the tail.

- **Endemic** - Uropeltis caudomaculata is known to be found in only 3 localities
  - Meghamalai Tiger Reserve in Tamil Nadu
  - Periyar Tiger Reserve
  - Yellapetty, Munnar in Kerala.
- **Breeding** - These snakes spend most of their life ***underground*** and emerge during the ***monsoons*** for breeding.
- **Diet** - They feed on earthworms and other small snakes.

Quick facts
• **Sky island habitats** - These are separated from each other ***physically and environmentally*** but have similar communities of species distinct from those elsewhere in the Western Ghats. • In the Western Ghats, the ***shola grassland forests of the Agasthyamalai region, Meghamalai, Anamalais, Nilgiris, and Wayanad*** are some of the important sky islands with rich and unique biodiversity. • The fragile sky islands are highly threatened by the rapid encroachment of highly invasive species such as ***acacia, lantana, wattle, and pine trees***. • **Reptiles** - The Western Ghats is one of the most diverse regions for reptiles in India, with ***more than 50% endemic species***. • 15 new species of snakes have been described from the Western Ghats in the past 5 years.

Reference

[The Hindu | shield-tail snake]

Makhana Cultivation

Makhana have become a popular 'super snack', with prices rising sharply in both domestic and international markets since 2019.

- **About -** Foxnuts or Makhana is an aquatic crop traditionally grown in India.
- **Botanical Name-** Euryale ferox.
- **Common Names-** Fox nut, Gorgon nut, Phool Makhana.
- **Production-** Makhana, is mainly cultivated in the states of ***Bihar, West Bengal and Assam.***

  *Bihar is the leading producer of makhana accounting for more than **90%** of the total production of India. India contributes to **80%** of the world's demand.*

- **Climate-** Makhana is an aquatic crop and requires a warm, humid climate. It is typically cultivated in areas with temperatures ranging from ***20°C to 35°C.***
- **Soil-** It thrives in loamy and clayey soils with good water ***retention capacity.*** The pH of the soil should be between 5.5 to 7.5.
- **Nursery Preparation-** Seeds are collected from mature Makhana fruits.
  - Seeds are soaked in water for 24-48 hours before sowing.
  - Seeds are sown in nursery beds or trays filled with a mixture of soil and cow dung.
- **Main Field Preparation-** Select low-lying areas or water bodies like ***ponds, lakes, or wetlands.***
  - **Transplanting-** Seedlings are transplanted into the main field after 30-40 days when they are about 15-20 cm tall.
- **Fertilization-** Organic fertilizers like cow dung can be applied. Chemical fertilizers are generally avoided.
- **Harvesting-** Makhana plants take about ***4-5 months*** to mature.
  - The seeds are harvested when the fruits start to crack and the seeds float on the water surface.
- **Nutritional value-** The crop is a good source of vegetarian ***protein***, at 10%, and contains five of the ***nine amino acids.***
- There are also ***quercetin and kaempferol flavonoids***, both of which protect against diabetes and obesity.
- It is considered a 'super snack' because they are low in calories, rich in protein, and contain essential nutrients.
- **Makhana Development Scheme-** The Bihar government runs the Makhana Development Scheme that gives a ***75% subsidy*** on the Suvarna Vaidehi variety of seeds, calculated at ₹97,000 per hectare.
- Makhana is approved under the Union government's ***One District One Product scheme***, which provides subsidies to food processors for branding, marketing, and infrastructure development.

Reference

1. The Hindu | Makhana
2. Niftem | Foxnut