Sludge Management

For Prelims: National Mission for Clean Ganga, Sludge, **Arth Ganga project**

For Mains: Sludge management in Indian sewage treatment plants, Potential uses of sludge as fertilizer and biofuel.

Why in News?

The **sludge found in Indian** sewage treatment plants (STPs) plays a significant role in the efforts to treat polluted water from the **Ganga River.** A recent study of this sludge revealed its potential for **use as fertilizer and a potential** biofuel.

- The **National Mission for Clean Ganga**, aimed at preventing pollution and rejuvenating the Ganga River, has introduced an emerging initiative called 'Arth Ganga' **(economic value from Ganga).**
  - This initiative aims to derive livelihood opportunities from the river rejuvenation program and includes measures to monetize and **reuse treated wastewater and sludge.**

What is Sludge?

- **About**:
  - Sludge is the **thick residue generated during the treatment of wastewater or sewage in sewage treatment plants.**
  - It is the **semi-solid material** remaining after the liquid portion of the sewage has been separated and treated.
  - The composition of sludge can vary depending on the source and treatment processes used.
    - It typically **contains organic compounds, nutrients (such as nitrogen and phosphorus), and microorganisms.**
    - However, sludge can also contain **contaminants like heavy metals, industrial pollutants, and pathogens.**
  - Treatment and processing of sludge **can yield** organic fertilizers**,** biogas **for energy production, or construction materials.**
  - Contaminants in sludge require careful handling to avoid negative impacts on water bodies and agricultural land.
- **Classification of Treated Sludge:**
  - Sludge can be classified as **class A or class B** according to the **standards of the United States Environment Protection Agency.**
    - Class A sludge is **safe for open disposal** and **serves as organic fertilizer.**
    - Class B sludge can be used in **restricted agricultural applications,** with **precautions to avoid exposure of edible parts of crops** to sludge-mixed soil and to limit contact with animals and people.
  - India does not have established standards for classifying sludge as class A or B.
- **State of Sludge in Indian STPs:**

- Contractors under the **Namami Ganga Mission** are assigned land for **sludge disposal.**
    - Inadequate treatment of sludge by these contractors leads to its **release into rivers and local water sources during rainfall.**
- Data on the chemical characteristics of sludge is essential to **incentivize private players to treat and dispose of sludge properly.**
- This study marks the first of its kind initiative in India, aimed at effectively addressing the issue of sludge disposal.

What are the Findings from the Study?

- **Findings:**
    - Most of the **dried sludge analyzed falls into the class B category.**
    - **Nitrogen and phosphorus levels** exceed **India's fertilizer standards,** while **potassium levels are lower than recommended.**
    - Total organic **carbon content is higher than recommended**, but **heavy metal contamination and pathogen levels surpass fertilizer standards.**
    - Calorific value of sludge ranges from 1,000-3,500 kcal/kg, lower than that of Indian coal.
- **Recommendations for Improving Sludge Quality:**
    - **Storage of sludge** for at least three months is recommended to **kill pathogens**.
    - **Blending sludge with cattle manure,** husk, or local soil can reduce heavy metal content.
        - These measures, however, would still categorize sludge as class B.
    - Converting sludge into class A would require more extensive treatment.

What is the Arth Ganga Project?

- **About:**
    - **'Arth Ganga' implies a sustainable development model with a focus on economic activities related to Ganga.**
    - Prime Minister of India first introduced the concept during the first National Ganga Council meeting in Kanpur in 2019, where he urged for a shift from **Namami Gange** to the model of **Arth Ganga.**
    - Under **Arth Ganga**, the government is working **on six verticals:**
        - The first is Zero Budget Natural Farming, which involves **chemical-free farming** on 10 km on either side of the river, and the **promotion of cow dung as fertilizer through the** Gobardhan scheme.
        - The **Monetization and Reuse of Sludge & Wastewater** is the second, which seeks to reuse treated water for irrigation, industries and revenue generation for Urban Local Bodies (ULBs).
        - Arth Ganga will also involve **Livelihood Generation Opportunities**, by creating haats where people can sell local products, medicinal plants and ayurveda.
        - The fourth is to **increase public participation** by increasing synergies between the stakeholders involved with the river.
        - The model also wants to **promote the cultural heritage and tourism of Ganga** and its surroundings, through boat tourism, adventure sports, and by conducting yoga activities.
        - Lastly, the model seeks to promote institutional building by **empowering local administration for improved water governance.**

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. Which of the following are the key features of 'National Ganga River Basin Authority (NGRBA)'? (2016)

1. River basin is the unit of planning and management.
2. It spearheads the river conservation efforts at the national level.
3. One of the Chief Ministers of the States through which the Ganga flows becomes the Chairman of NGRBA on rotation basis.

Select the correct answer using the code given below:

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (a)

Mains

Q. Discuss the Namami Gange and National Mission for Clean Ganga (NMCG) programmes and causes of mixed results from the previous schemes. What quantum leaps can help preserve the river Ganga better than incremental inputs? **(2015)**

Source: TH