# UP- Biosolids
# Challenges, Combat and Reuse

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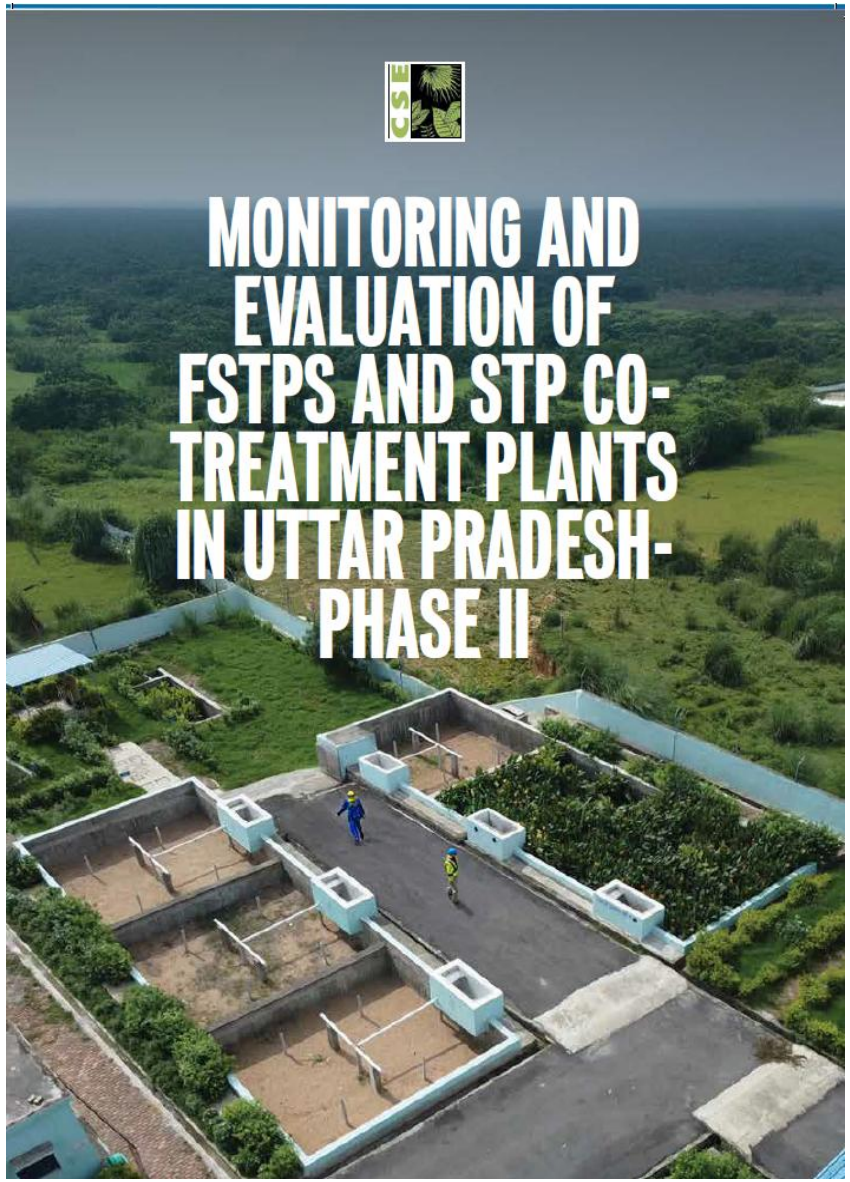
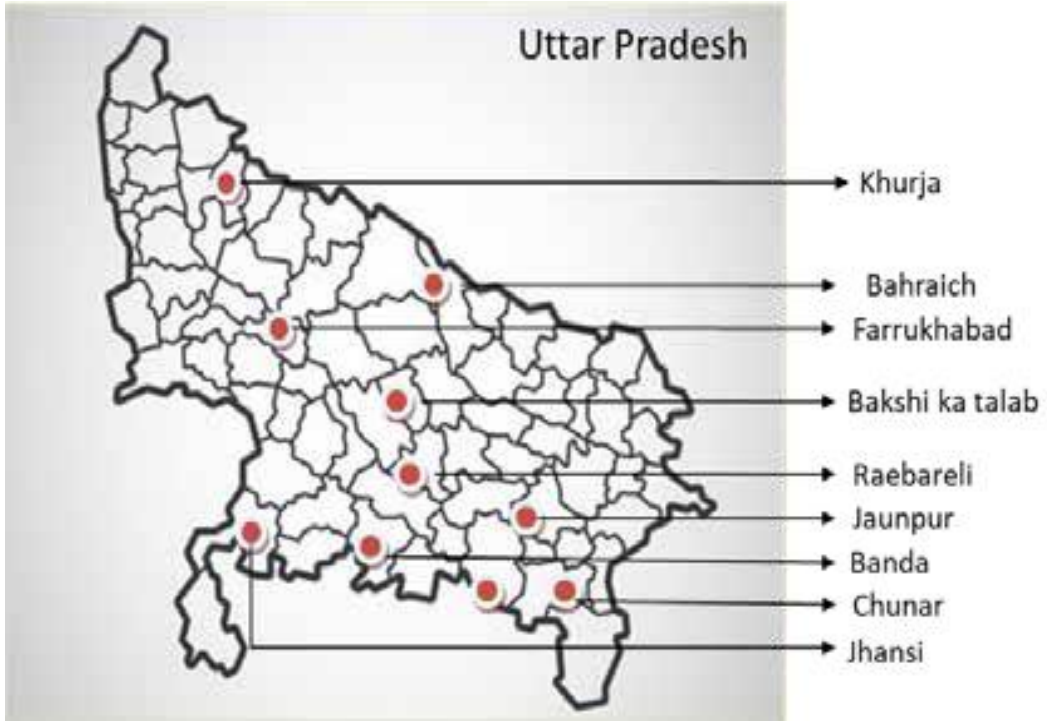
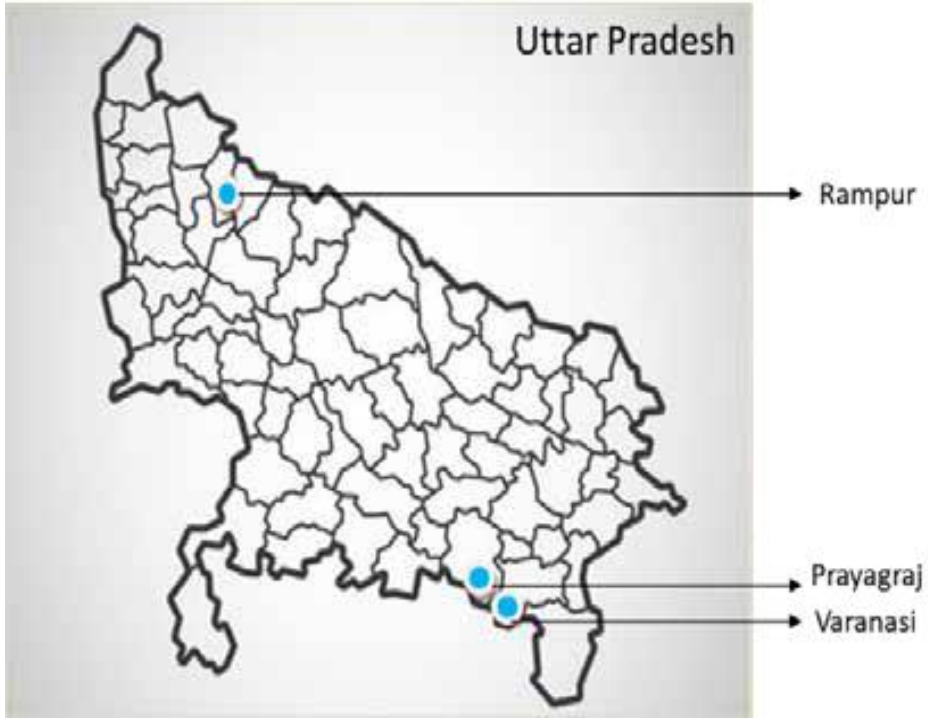


# FSTP/ Co Treatment Plants Evaluated




FSTPS: 9




Co Treatment: 3

# Challenges…

| FSTP/Location | Primary Biosolids Challenges |
|---|---|
| Bakshi Ka Talab | Very high levels of pathogens (including Helminths and *E. coli*), severely compromising safety despite achieving very low moisture content. Low pH (5.6), slightly below the FCO minimum (6.0–8.5). High C:N ratio (22.9), above the optimal range. |
| Bahraich | Extremely high levels of pathogens. High C:N ratio (26.9), indicating potential nitrogen immobilization. Elevated Zinc levels. |
| Chunar | High levels of pathogens. |
| Farrukhabad | High levels of pathogens  Elevated levels of heavy metals: Chromium and Zinc exceeded FCO limits.. |
| Jaunpur | High levels of pathogens. Moisture content (29.0%) exceeds the FCO standard (<25%). |
| Khurja | High levels of pathogens. Moisture (27.55%) slightly above FCO limit. Elevated heavy metals: Zinc (2560 mg/kg) and Copper exceeded FCO limits. High C:N ratio (22.8). |
| Banda | High levels of pathogens. Elevated heavy metals: Mercury, Zinc, and Copper. |
| Raebareli | High levels of pathogens. Elevated heavy metals: Mercury, Zinc, and Copper. High C:N ratio (22.8). |
| Jhansi (6+12 KLD) | Exceptionally high levels of pathogens (including Helminth eggs, 250 eggs/4g). High moisture content (32.29%). |
| Jhansi (32 KLD) | High levels of pathogens. High heavy metals: Mercury (4.17 mg/kg) and Copper. Moisture content (30.64%) exceeds FCO standard. |
| Prayagraj (Co-TP) | High levels of pathogens; excessive levels of pathogens (Helminths 2355 eggs/4g). High moisture content (62.78%), Zinc levels approaching FCO limits. |
| Rampur (Co-TP) | High levels of pathogens. Critical heavy metal contamination: Chromium (191.42 mg/kg) exceeded FCO limit significantly. High moisture (57.66%) |
| Varanasi (Co-TP) | High levels of pathogens (Helminths 3574 eggs/4g). High moisture (39.35%) content. High Critical heavy metal contamination: Zinc (1696.67 mg/kg) and Chromium exceeded FCO limits |

# How to Correct the Challenges?

1. **Enhancing Drying and Moisture Control (Addressing moisture and related pathogen regrowth)**

• **Improve Drying Infrastructure: covered drying beds** or mechanical drying units

• **Optimize Sun Drying Practices:** Ensure **adequate drying periods** and implement **frequent turning** of the sludge beds to promote uniform evaporation.

• **Pulverization:** Shred or pulverize the dried biosolids cake into smaller particle sizes to increase surface area

2. **Implementing Rigorous Pathogen Inactivation (Addressing Helminths, *E. coli*, *Salmonella*)**

• **Adopt Advanced Stabilization Techniques:** Implement techniques beyond passive sun drying, such as **thermophilic composting**, **pasteurization** (heat treatment), or **lime stabilization** (raising pH >12)

• **Ensure Proper Storage:** Utilize **closed storage rooms** to preserve dried biosolids

3. **Controlling Heavy Metal Contamination** (Addressing Cr, Hg, Zn, Cu)

• **Source Control: Identify and control upstream contributors** of industrial or commercial waste

• **Specialized Treatment:** Explore techniques as stabilization, chemical precipitation, or specialized thermal/chemical treatment.

4. **Optimizing C:N Ratio** (For enhanced agricultural value)

• For sites exhibiting a high C:N ratio (e.g., Bahraich, Khurja, Raebareli), incorporate **carbon-rich materials** (like sawdust, dry leaves, or other organic waste) during stabilization or co-composting to bring the ratio into the optimal range of 15:1 to 20:1.

# Where to put the Biosolids?

| Potential Use Category | Specific Restricted Applications | Quality Consideration |
|---|---|---|
| Agricultural/Soil Conditioning | **Cash Crops: For crops consumed after processing or non-edible crops (e.g., cotton, jute, tobacco).** | Use must adhere to strict monitoring protocols due to pathogenic load. |
| Land Reclamation | **Reforestation and Afforestation Sites. Soil Reclamation projects.** | Usage areas must be controlled to prevent public exposure. |
| Energy Recovery | **Green Fuel: Production of briquette, biochar, etc., if the calorific value complies.** | Thermal conversion (e.g., pyrolysis to biochar) inherently destroys pathogens due to high temperatures. |
| Material Use | **Building and Construction Materials (e.g., fillers in brick or cement manufacturing).** | High temperatures in manufacturing (cement/bricks) ensure complete pathogen destruction. |
| Disposal | **Fillers in Restricted Landfills (such as industrial sites).** | Used for safe disposal options when reuse pathways are impractical. |

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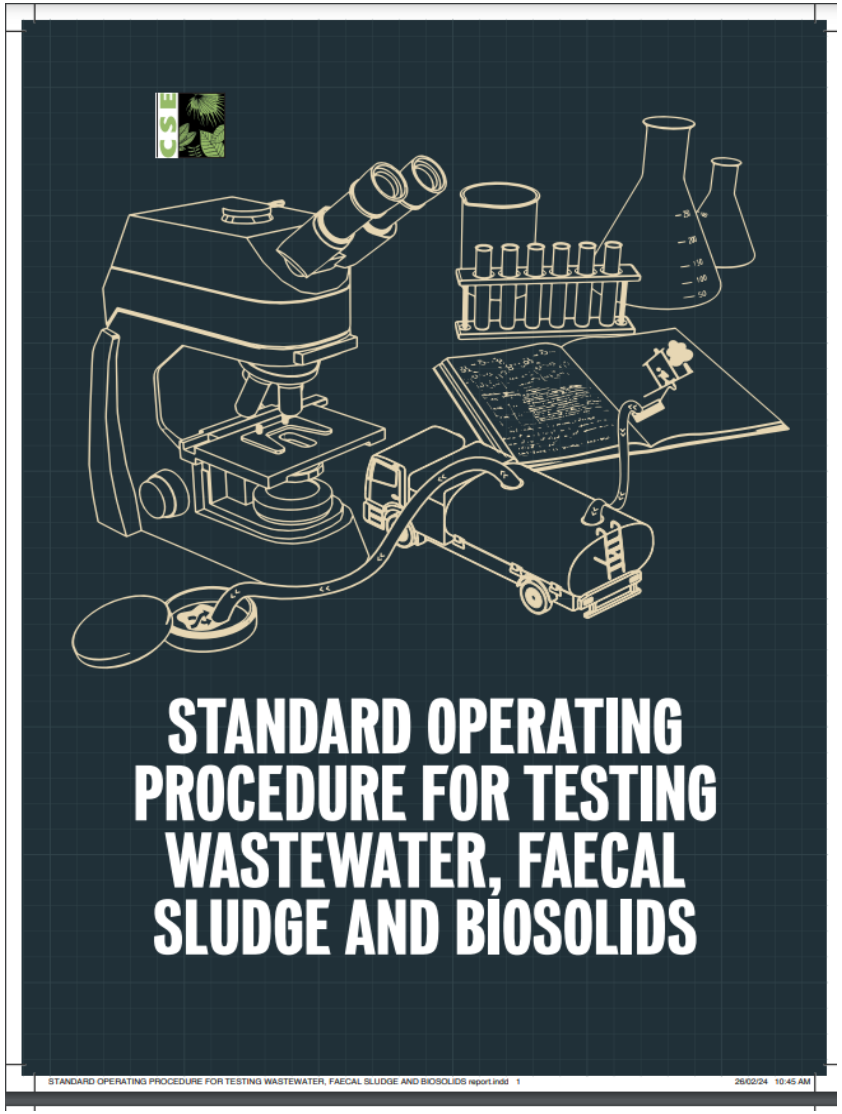


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# Thank You

To measure is to Know...
If you cannot measure it, you cannot improve

- Lord Kelvin-

## Your Questions/ Queries ????

Gates Foundation

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