

ECOSAN: CLOSING THE POOP LOOP

ECOLOGICAL SANITATION IS THE RECYCLING OF HUMAN FECES TO LAND FOR FOOD PRODUCTION.

IT HAS THE POTENTIAL TO OFFER MULTIPLE BENEFITS:

PUBLIC HEALTH 1

- 4bn people risk disease from unsafe sanitation services.¹
- EcoSan provides a safe end use option for feces?²
- EcoSan gives feces a value, which may incentivise better collection and treatment.



- Linking EcoSan uptake back to improved public health outcomes is difficult to quantify. More pilot studies required.

FOOD SECURITY 2

- The global food supply system is in crisis^{3,4}, with a 40% dependance on chemical fertilisers.⁵
- EcoSan contains essential plant nutrients^{6,7} and can produce comparable yields to chemical fertilisers.^{8,9}



- Challenges remain for scaling up EcoSan, e.g. product optimisation, finance, policy restrictions, compatibility with farm machinery.

SOIL HEALTH 3

- 33% of soil is moderately to severely degraded¹⁰, threatening soil functions, like water purification, plant growth and carbon storage.^{11,12}
- Feces contain organic matter which improves soil structure and nutrient cycling.¹³



- Better accounting methods for ecosystem services, in order to evaluate the true value of EcoSan as a soil improver.

LIVELIHOODS 4

- The price of fertiliser quadrupled from 2020 to 2022 following the Ukraine invasion, pressuring farm profits.^{4,14,15}
- EcoSan can provide affordable, local crop nutrients to reduce fertiliser dependance, and buffer price shocks.¹⁶



- Policies and subsidies must support the adoption of sustainable crop nutrients, and promote small scale, local food production.

PLANET 5

- Chemical fertiliser production accounts for 2.1% of global GHG emissions.¹⁷
- EcoSan can offer a low-emission fecal sludge treatment^{18,19} reduce illegal dumping of feces, and increase soil carbon storage.²⁰



- More evidence required for emissions reduction associated with EcoSan for both the sanitation and agricultural sectors.

HOW CAN ECOSAN HELP?

NEXT STEPS NEEDED

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 6. Trimmer et al., 2017. Amplifying progress toward multiple development goals through resource recovery from sanitation.
 7. Mihelcic et al., 2011. Global potential of phosphorus recovery from human urine and feces.
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 13. Bonanomi et al., 2020. Repeated applications of organic amendments promote beneficial microbiota, improve soil fertility and increase crop yield.

14. World Bank Blogs, 2023. Fertilizer prices ease but affordability and availability issues linger.
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 17. Menegat et al., 2022. Greenhouse gas emissions from global production and use of nitrogen synthetic fertilisers in agriculture.
 18. McNicol et al., 2020. Climate change mitigation potential in sanitation via off-site composting of human waste.
 19. Ryals et al., 2019. Greenhouse gas fluxes from human waste management pathways in Haiti.
 20. Ryals et al., 2021. Toward zero hunger through coupled ecological sanitation-agriculture systems.

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