View results

Respondent

9 Haribansha Timalsina



1. Date of this semester progress report submission *

02/10/2025

2. Name of project exactly as it was listed in your award letter *

Enhancing Water Quality Through Appropriate Woodchip Mulch and Phosphorus Filter Pairing

3. Date of original award letter *

10/18/2023

4. Date of expiration listed on award letter (or on scope change approval if more recent) *

10/05/2025

5. How much was your award (i.e., original award plus any approved budget increases)? *

9925

6. How much of your award has been spent to date (in dollars)? *

1261.72

7. Date of forecasted project completion *

07/31/2025

8. Have you submitted one or more semester progress reports previously? *

YES

NO

9. Describe, in detail, what has been completed on the project since the last semester progress report (or since the project commenced if you have not yet submitted a semester progress report)? *

Before our last semester (prior to last semester's report), we had set up the experiments with the woodchip mulch bioreactors and started dosing with the chemicals (nutrients). In the last semester, we conducted an extensive experiment by pairing up the woodchip bioreactor and phosphorus filter (filled with modified bottom ash pellets).

Since the last semester, significant progress has been made in evaluating the paired woodchip bioreactor and phosphorus filter system. The phosphorus filter, filled with modified bottom ash pellets, was manufactured locally in the lab using a food pelletizer. The bottom ash material was sourced from a coal power plant, where it is typically disposed of as waste in landfills.

Extensive bench-scale experiments were conducted at the Water Quality Lab in the Department of Agricultural and Biological Engineering to assess the performance of the bottom ash pellets in removing phosphorus. These experiments helped refine the selection of filter materials for optimal nutrient removal. After establishing the bottom ash phosphorus filter, the modified pellets were integrated with the woodchip bioreactor columns set up in the previous semester. The system was dosed with nutrient-laden water, and performance was monitored for over six months. The study was divided into two phases (three months each), allowing for a comprehensive analysis of system efficiency under varying environmental conditions.

Key factors evaluated during this period included:

- Hydraulic retention time (HRT) to optimize nitrate and phosphorus removal.
- Influent nutrient concentrations to assess removal efficiencies across different loading conditions.
- Relative positioning of the bioreactor and phosphorus filter to determine the most effective configuration.
- Nitrate and phosphate leaching and removal in each system.

Data collection included regular water quality testing to track nutrient removal rates and system stability over time.

10. Describe, in detail, the project's challenges/obstacles since your last semester progress report (or since the project commenced if you have not yet submitted a semester progress report)? *

1. Limited Equipment Availability: One critical challenge was the lack of equipment for the experiment. To optimize the experiment for the maximum results, we did our best to borrow the equipment such as columns for the experiments and peristaltic pumps. We borrowed expensive equipment such as peristaltic pumps and accessories from other laboratories from a different department. Moreover, since the critical constraints were budget and equipment more than time, we split our experiments into two phases to sufficiently allocate the available resources.

2. Continuous Monitoring Demands: The experiment required daily monitoring over six months, including weekends, which posed challenges in resource management and coordination with undergraduate students.

3. Water Supply Logistics: A significant challenge was the large water requirement for the experiment, necessitating the transportation of creek water from a nearby river. This process demanded considerable time, labor, and external assistance.

4. Procurement of Reagents and Chemicals: The acquisition of specialized reagents and chemicals, not readily available on campus, was time-consuming and introduced delays in the experiment timeline.

11. Describe, in detail, the project's successes since your last semester progress report (or since the project commenced if you have not yet submitted a semester progress report)? *

A significant progress was made after the last semester's report. We have successfully demonstrated that coal bottom ash (a waste generated from coal powerplants) can be reutilized as a resource to reduce the nutrient pollution in water integrated with the woodchip bioreactor system. We have completed the major objectives of the research. We are planning to extend the sustainability impact of our project through analysis of the critical components such as heavy metals etc. which could be an issue with reusing byproducts such as coal ash.

12. Did your project have any changes to its team that SSC should know about (e.g., project lead, faculty/staff advisor, departmental financial contact)? *

NOTE: If yes, please complete the SSC Project Contact Information Change Form located at this link: <u>https://forms.office.com/r/uBjx9nmNpG</u>

○ YES

NO

13. Complete and upload the semester financial documentation for your project. You should reflect all expenditures since your last semester project report. We strongly suggest that you also upload supporting financial documentation from Banner for your award CFOP. NOTE: When your project is completed and/or expired (whichever comes first), any remaining project funds will be transferred back to the SSC.

https://studentengagement.illinois.edu/sites/default/files/2024-09/SSC-Budget-Timeline-SEMESTER-PROGRESS-REPORT-template.xlsx

- SSC-Supplemental-Budget-Timeline Haribansha Haribansha Timalsina.xlsx
- 14. (OPTIONAL FOR SEMESTER REPORT) Upload project marketing and/or media not previously submitted in semester progress reports.

NOTE: Project marketing and/or media must include SSC's logo and/or a statement of which fee(s) funded the project.