

2013

P is for Phosphorus

Marcel Gietzmann-Sanders
Worcester Polytechnic Institute

Christopher Jackson
Worcester Polytechnic Institute

Steven Murphy
Worcester Polytechnic Institute

Liam Ogren
Worcester Polytechnic Institute

Follow this and additional works at: <https://digitalcommons.wpi.edu/gps-posters>

Recommended Citation

Gietzmann-Sanders, Marcel; Jackson, Christopher; Murphy, Steven; and Ogren, Liam, "P is for Phosphorus" (2013). *Great Problems Seminar Posters (All Posters, All Years)*. 202.
<https://digitalcommons.wpi.edu/gps-posters/202>

This poster represents the work of WPI first-year students submitted to the faculty as evidence of completion of a course requirement for the Great Problems Seminar (GPS). WPI routinely publishes these posters on its website without editorial or peer review. For more information about the GPS program at WPI, please see <https://www.wpi.edu/academics/undergraduate/great-problems-seminar>.



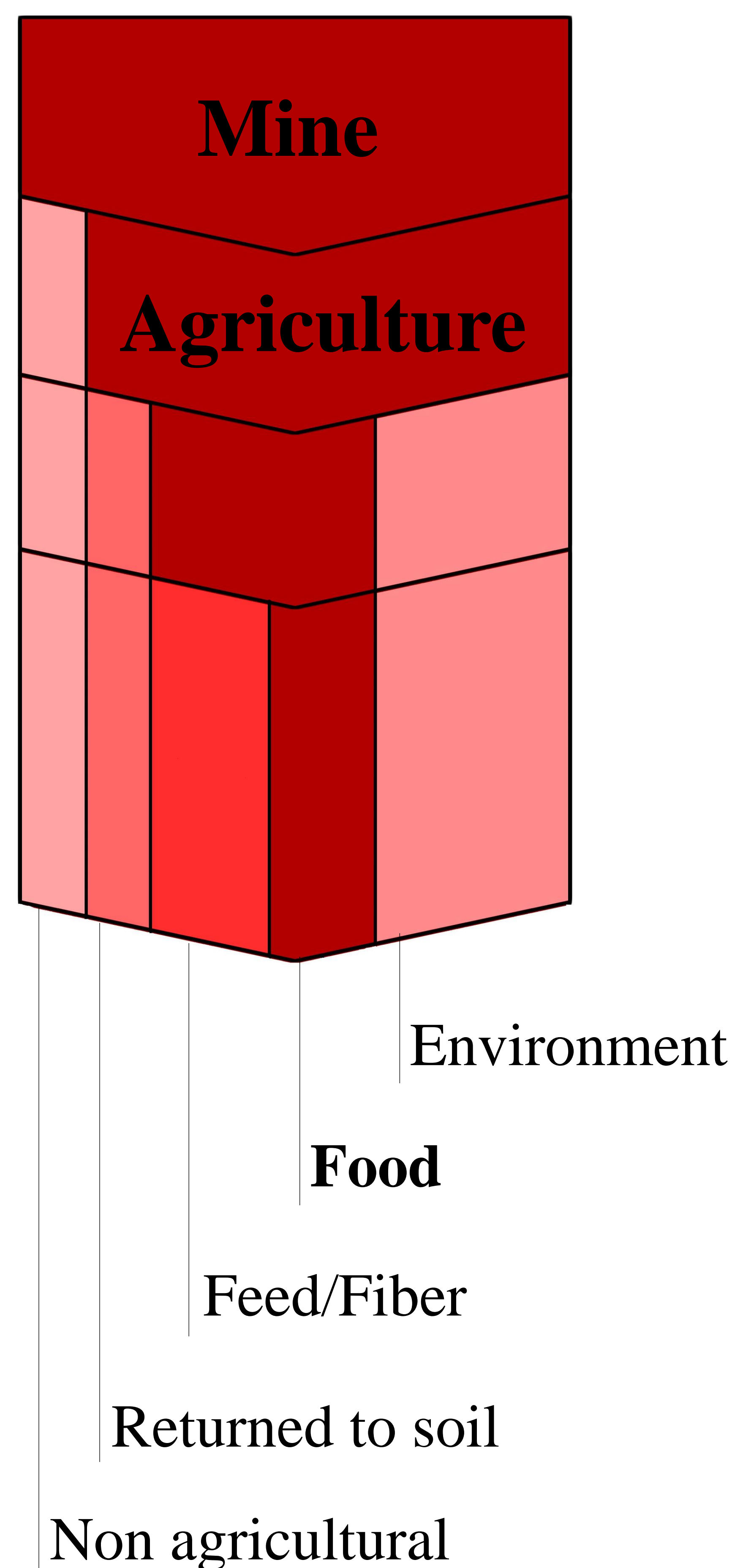
P is for Phosphorus

Marcel Gietzmann-Sanders (PH), Christopher Jackson (ECE), Steven Murphy (ME), Liam Ogren (MA & PH)
Advisor: Dr. Robert Traver & Dr. Kristin Wobbe

Rock to Porcelain

- 15 MT from mines to agriculture
- 7 MT from agriculture to market
- 3.3 MT from market to food
- **3.3 MT from food to urine**

Phosphorus Flows



Human Waste

Nearly 100% of what we consume in phosphorous is expelled in urine. The technology to reclaim it exists, so why are we letting such a valuable resource go to waste?

Food

People

Peak Phosphorus is set for 2033 raising the issue of Phosphorus Sustainability

The Greatest Roadblock for Phosphorus Sustainability is an Information Void

Farm

Urine

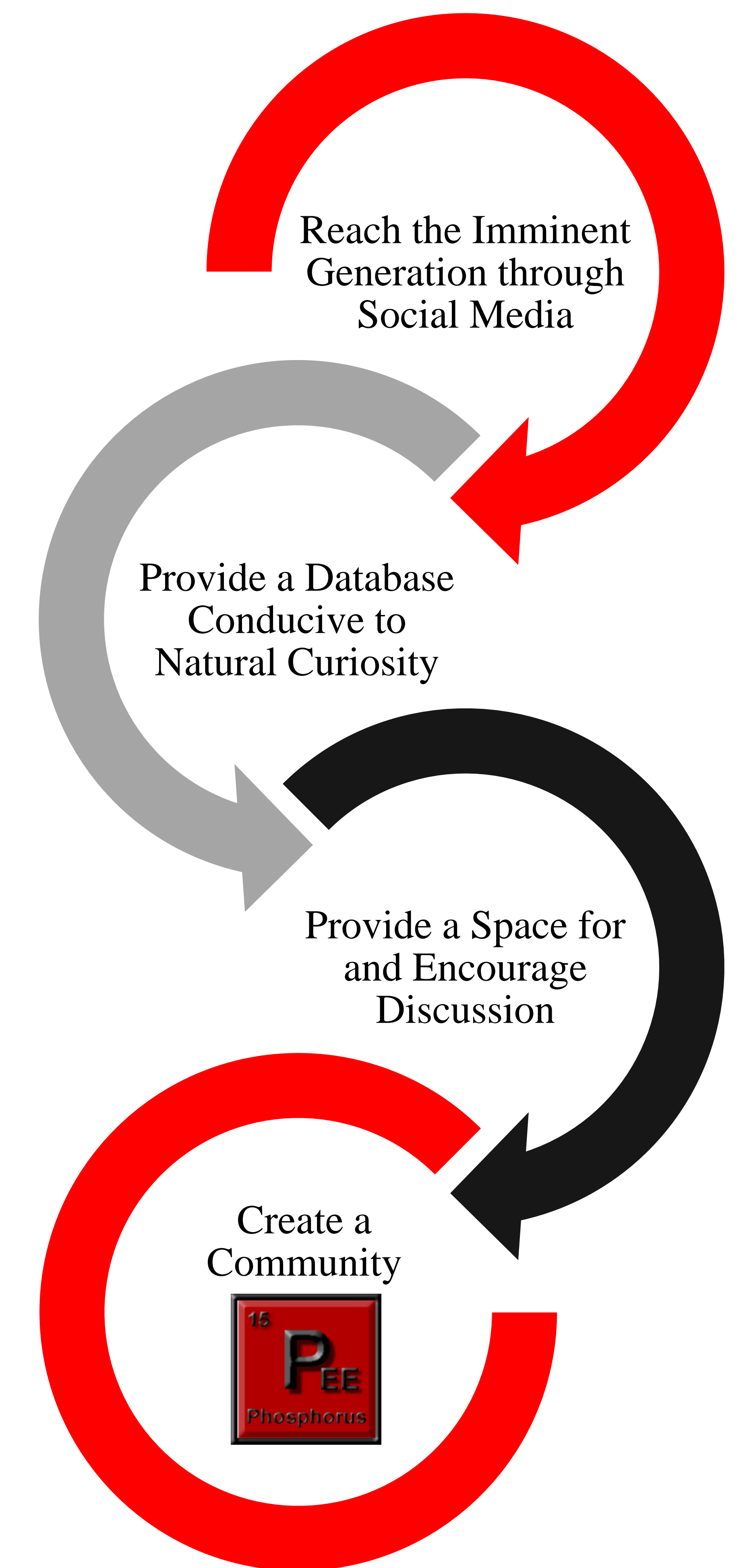
We Plan to Change That

Storage

Assessment Plan

- Monitor page metrics on the website and Facebook page.
- Track discussion-board traffic and discussions.

Methods



References

Cordell, D., Drangert, D., White, S. (2009) The story of phosphorus: Global food security and food for thought. *Global Environment Change*, 19, 292-305.
 Cordell, D., Jackson, M., White, S. (2013a) Phosphorus flows through the Australian food system: Identifying intervention points as a roadmap to phosphorus security. *Environmental Science & Policy*, 29, 87-102.
 Cordell, D., Nasset T. S., Prior, T. (2013b) The phosphorus mass balance: Identifying 'hotspots' in the food system as a roadmap to phosphorus security. *Current Opinion in Biotechnology*, 23, 839-845.
 Dawson, C. J., Hilton, J. (2011) Fertilizer availability in a resource-limited world: Production and recycling nitrogen and phosphorus. *Food Policy*, 36, S14-S22.
 Drangert, J. (2012) Phosphorus - a limited resource that could be made limitless. *Procedia Engineering*, 46, 228-233
 Liu, Y., Villalba, G., Ayres, R. U., Schroder, H. (2008) Global phosphorus flows and environment impacts from a consumption perspective. *Journal of Industrial Ecology*, 12 (2), 228-247.
 Plant Research International. (2009) *Phosphorus in agriculture: Global resources, trends and developments*. Wageningen, Holland: Smit.
 Schröder, J. J., Smit, A. L., Cordell, D., Rosemarin, A. (2011) Improved phosphorus use efficiency in agriculture: A key requirement for its sustainable use. *Chemosphere*, 84, 822-831.