

Agriculture, Resources, and the Environment

IV. 'Closing the Loop': Integrating Sustainable Waste Management in Agriculture

Summary

This initiative focuses on developing and assessing the feasibility and sustainability of new methods for redirecting urban, rural, and industrial waste flows into agricultural systems. The emphasis is on recycling used (or "grey") water in agriculture and preventing leakage of important crop nutrients from the larger food system after they leave agricultural fields in the form of harvested products. Accordingly projects will focus on environmental impacts of municipal wastes used in agriculture and sustainable methods for directing food wastes back into farming. Research will also examine the feasibility of re-using irrigation water for multiple purposes in the landscape and explore more sustainable ways to handle and re-direct dairy waste.

Problem statement/ Baseline

Across the country, large accumulations of animal waste at dairies and other concentrated animal feeding operations (CAFOs) have aroused concerns about negative environmental and health impacts and have instigated local community backlash against these operations. At the same time, nutrients contained in pre- and post-consumer food waste are lost to the agroecosystem when they are landfilled or disposed of by other means. Replacing nutrients lost via harvested crops is a major driver for application of synthetic fertilizer on crop fields. Water issues are also coming to head in California, with several years of drought heightening concerns for farmers as well as urban water users, while water of potable quality continues to be used for non-potable needs, such as crop irrigation.

Structural issues/ Broad drivers shaping change

- Separation of urban and rural populations as well as institutionalized, large-scale waste management schemes are all factors that foster a lack of awareness about the generation and ultimate fate of municipal waste and its potential value for agricultural uses.
- Current regulations governing land application of dairy wastes as well as food safety regulations constrain dairy managers and farmers from making more widespread and sustainable use of these resources.

Strategic opportunity

Several years of drought in California have heightened concerns about water availability for agriculture and have pitted rural, urban, and industrial users against each other. Improving our understanding of appropriate and sustainable use of grey water systems may not only increase water available to agriculture, but can also create opportunities to bring opposing sides together to work more collaboratively on a common issue. Furthermore, another ASI initiative is examining the environmental impacts of synthetic nitrogen use in agriculture. The work described here on recycling food and other municipal waste back into agriculture will contribute to the identification of best management practices for nitrogen use in that initiative.

Desired outcomes

- Policy makers and staff at environmental and health regulatory agencies understand the potential benefits and risks of redirecting municipal wastes into agriculture and have options for managing risks.
- Farmers and ranchers are eager to start using municipal waste and grey water and understand appropriate ways for doing so.
- Irrigation district managers and private industry become interested in collaborating on projects for new uses of used irrigation water.

Key Partners

- Producers (farmers, ranchers, dairies)
- State environmental health and safety regulators
- Municipal waste management operations
- UCCE

Activities

- Research on environmental impacts of municipal wastes (biosolids) on soil communities and processes.
- Research on use of used irrigation water for raising algae/brine shrimp for multiple functions (feed, biofuel, selenium removal)
- Research and demonstration projects on sustainable management of dairy waste.
- Training workshops on opportunities and risk management in agricultural uses of municipal wastes and grey water, targeted to government agencies, UCCE, waste management workers

Resources needed for 5 years

Total need: \$600,000

- Research grants (intra- or extramural funds) = \$500K
- Training grant to hire 1 training specialist for 1 year, partial support for administrative staff, and workshop expenses = \$100K
- *Additional SAREP/ASI staffing (using extramural funds) dedicated to ARE @ \$60K for 5 years = \$300K [part of all initiatives]*

Current extramural grants and scholarship support: approx \$325K

Additional need: \$275K