SustainableConservation

Newsletter Winter 2001

Existing Technologies, New Applications

Innovation does not necessarily mean inventing something from scratch. Sometimes existing solutions are not applied broadly enough and are candidates for being transplanted from one arena to another. Sustainable Conservation's approach is ideal for these circumstances. Using our process of identifying barriers and focusing on incentives, we identify factors that prevent existing solutions from taking wider hold; we then find ways to motivate industries to adopt them and apply them more widely in order to improve environmental performance. This newsletter highlights two Sustainable Conservation projects with this kind of innovation.

First, in our ongoing work with California's dairy industry, we have reinterpreted several well-established methods of waste management, making them applicable to dairy farms. We became involved with California's dairies because the problems associated with improperly handled manure are immense. When the tons of manure produced by the state's 1.5 million dairy cows aren't dealt with correctly, rainwater washes pollutants from the manure, primarily nitrates and salts, but also E. coli, salmonella, phosphorous, potassium, ammonia, hormones, and antibiotics. Pollutant-laden runoff flows to creeks and streams and into groundwater supplies. By not falling into traditional assumptions, we have been able to establish workable solutions for this complex problem.

Second, our recently completed feasibility work on constructed treatment wetlands came about because we noticed that an increasingly popular process of wastewater treatment for municipalities wasn't being utilized by industry. Cities have already caught on to the potential of constructed treatment wetlands, which duplicate the capabilities of natural wetlands to clean up wastewater. In what has become Sustainable Conservation's trademark fashion, we sought to understand what prevents more businesses from exploring this method. Our motivation was primarily to find a way to augment efforts to restore natural wetlands, so that more habitat would be available to the millions of shorebirds and waterfowl that use California as a stopping point on their annual migrations.

Sustainable Conservation can adapt solutions from one issue to apply to another because of our propensity for unconventional thinking. This quality, combined with perseverance, produces surprising but successful results in the face of difficult environmental problems.

Ashley Boren

Our Mission

Sustainable Conservation advances the stewardship of land and water resources using innovative strategies that actively engage businesses and private landowners in conservation.

Organizational Milestones

Partners in Restoration's expansion plans received a big boost from four recent government grants. One of three U.S. E.P.A. 319 (h) grants from the State Water Resources Control Board will help establish a training program for watershed stewards and regulatory agency staff to use Sustainable Conservation's tools and techniques of permit coordination. The other two 319 (h) grants will bring the PIR permit coordination program to Humboldt and San Diego Counties. A California Coastal Conservancy grant will support the program in the Navarro River watershed.

Investor's Circle members were treated to a first hand view of Sustainable Conservation's work through a farm tour in Sonoma County, visiting a dairy farm and restoration site. Special thanks to dairy farmer George McClellan, and to our partners, Charlette Sanders of the Natural Resources Conservation Service and Paul Martin of Western United Dairymen.

As part of our Auto Recycling program, regulators, environmentalists, auto dismantlers, and technical consultants from throughout California convened for the first time this October. The group's main objective is to identify best management practices for auto dismantlers, and it will also help develop content for the technical assistance materials that Sustainable Conservation will be putting together next year using funds from the U.S. E.P.A.

Sustainable Conservation welcomes new Board member Felicia Marcus. In October 1993, Felicia was appointed by President Clinton as Regional Administrator of the U.S. E.P. A. Region IX and served until January 2001. She is now Chief Operating Officer of Trust for Public Land.

Turning Industry's Waste

In the first sixty years of the twentieth century, many wetlands across America were filled to accommodate urban development, agriculture, logging, and flood control efforts. Migrating and nesting birds have been hit particularly hard by this loss. With only 9 percent of California's natural wetlands remaining, life along the Pacific Flyway isn't easy. That's why Sustainable Conservation started looking into constructed treatment wetlands as one way to shore up the state's scarce wetlands acreage.

This method of wastewater treatment is most widely used by municipalities. Since the 1970s, cities around the United States have been mimicking nature to clean up their water. "From a water quality standpoint, the beauty of a natural wetland is that it can filter tremendous amounts of pollution," says Sustainable Conservation Senior Project Manager Liz O'Brien. "That power to remove contaminants is what attracted cities to the idea of constructing wetlands." In nearly 800 communities across the nation, municipal water treatment agencies have duplicated the qualities of natural wetlands to create wastewater treatment systems.

Constructed wetlands are defined as wetlands that use natural processes involving wetland vegetation, soils, and their associated microbial assemblages to assist, at least partially, in treating an effluent or other source water.

Natural wetlands also create food and shelter for wildlife, especially waterfowl. When constructed wetlands are designed to let water flow freely on the surface of the land, they include abundant vegetation similar to their natural counterparts. While these engineered systems are not equivalent to natural wetlands, treatment wetlands still have value. On top of their primary purpose—water treatment—constructed wetlands can provide habitat for wildlife.

In examining the use of constructed wetlands, Liz was struck by the fact that under 10 percent of the country's treatment wetlands are created from industrial sources of wastewater. Moreover, a lack of information existed about why more businesses, especially in California, weren't using this option.

"The question was clear: What stops businesses from using wetlands to treat water generated from their industrial processes?" says Liz. To get an answer, Sustainable Conservation launched a feasibility study that examined eight industries: fruit and vegetable processing, wine production, dairy farming, other agricul-

FROM WASTEWATER

Photo by Liz O'Brien

Many food processing facilities discharge large volumes of wastewater during some part of the year. After letting the solids settle out, the remaining effluent is typically used for irrigating low to medium value crops.

Photo by Rich Morrison

Food processing facilities are excellent candidates for converting wastewater to wetlands. This American Crystal Sugar's beet processing plant in North Dakota filters almost 70 million gallons of wastewater per year through a 158-acre constructed treatment wetland.

ture, petroleum refining, pulp and paper manufacturing, cooling water from utilities, and chemical manufacturing. The study was designed to determine barriers to broader adoption as well as to identify industries in California that are good candidates for treatment wetlands, while recognizing that constructed treatment wetlands are not appropriate for every situation.

We found that lack of familiarity with the technology was the main reason that all eight industries did not employ constructed wetlands. People within the businesses studied simply didn't know they could treat the water in this manner. Or, if they were aware of constructed wetlands, they had insufficient information on how to design, build, and maintain them.

Liz felt that the best place to start was to pick an industry to demonstrate the potential for converting wastewater to constructed wetlands. California's food processing industry presents the ripest opportunity because:

- The technology already exists for the industry and is an effective means for treating the effluent generated by food processing.
- There is a low risk of harm to wildlife from the constituents in food processing wastewater, which are similar to those in human wastewater.

California's Central Valley would serve as a great location to initiate this project since constructed wetlands would be compatible with the surrounding land uses for most of the food processors in the Valley. In addition, there is good potential for replication beyond a single demonstration site, as the food processing industry has over 130 fruit and vegetable processing facilities in the Central Valley alone. Plus, recent consolidations within the industry have resulted in several larger companies within the Central Valley. Because of their size, these companies will have more resources for and potentially more interest in pursuing an alternative treatment technology.

Sustainable Conservation's task now is to develop strategies to promote the adoption of constructed treatment wetlands. "By borrowing first from nature, and then from municipal sewage treatment, California's food processing industry can treat its wastewater in ways that benefit these businesses and the environment," says Liz.

TO WETLANDS

Photo by Kelly Kiemele

When correctly designed and maintained, treatment wetlands attract diverse shore birds and waterfowl. These giant Canada geese are one of the 200 species that use Tesoro Petroleum's constructed treatment wetland in North Dakota.

Photo from USEPA

Municipal treatment wetland systems, like this one in Arcata, California, have many years of data on wildlife use and impacts. Since wastewater from food processing plants has similar constituents to human wastewater, treatment wetlands should not pose a risk to the wildlife that might use the habitat.

Obstacles Become Opportunities for Dairies

"Manure is a great asset," says Petaluma dairy farmer, George McClellan. "Often, you can sell it or use it on your fields to produce more nutritious feed for higher milk production." And with 1.5 million dairy cows in California generating 90,000 tons of fresh dairy waste daily, one can argue that we have an abundant asset in our midst.

Presently dairy farmers don't have adequate ways to manage all that waste. Too frequently it ends up in our waterways, turning this prolific by-product of milk production into more of a liability than anything else. Enter Sustainable Conservation in July 2000 to partner with dairy organizations, government agencies and universities to find farmer friendly ways of addressing the environmental threats of dairy waste.

"By applying existing technologies in innovative ways, we're able to show how well-tested ideas have the potential to solve California's dairy waste problems."
—Allen Dusault, Senior Project Manager

"Managing biological waste is not a new issue," comments Allen Dusault, Senior Project Manager for the Dairies Project. "It has been a major challenge throughout history and a significant defining factor in establishing good public health." Given that, Allen looked at different ways biological waste was being processed in other arenas to see if any of those technologies were a good fit for dairies.

He found some great matches and from that created a portfolio of solutions designed to keep dairy waste out of our surface and groundwater resources.

Methane from Manure: Methane digesters have been used by cities to treat sewage for years. Digesters convert biomass into methane gas, treat the liquids from the waste, and reduce the volume of solids. The process yields liquid fertilizer, soil amendments, and electricity generated from the methane. Despite their use by municipal wastewater treatment agencies, methane digesters have not been widely used by agriculture. One of the biggest drawbacks: the initial capital investment to build a digester.

Sustainable Conservation has done two things to ease that barrier. One, we worked in conjunction with the dairy industry to get state legislation passed to provide $10 million in funding for the installation of on-farm methane digesters. Allen now sits on the committee that oversees the distribution of these funds. We have also developed return on investment models that show the average farmer will break even in 5 years.

How? Farmers can use the electricity generated to power their own farm and sell any excess. For even a small dairy, this can add up to $75,000 a year. (See chart *Cow Power*.) Furthermore, dairy farmers can sell the residual solids as a soil amendment or fertilizer, getting a higher price per ton than raw manure. With California's recent energy crunch, methane digesters have become even more attractive. Sustainable Conservation is in the process of setting up a demonstration site to document the environmental and economic benefits of on-farm digester use and to serve as a model to motivate dairymen to adopt them on their farms.

Satellite composting: There's nothing new about composting manure. However, this long-standing technique is not commonly used on dairy farms. Composting takes manure and, through microbial action, breaks it down into a rich soil amendment that provides nutrients, decreases soil erosion, promotes disease resistance in plants, and increases water retention in soil. Because of these benefits, the product can be sold for profit. Most importantly, composting handles the solid and liquid waste products of manure in a manner that keeps their contaminants out of groundwater and surface water supplies.

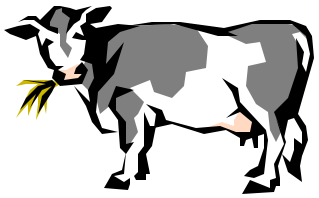
Because transportation of the source materials is a large expense, Sustainable Conservation is working to bring commercial composting closer to the source with satellite composting—operations of professionally managed compost sites near clusters of dairy farms. We are currently in the process of setting up three to four demonstration sites to spur broad adoption.

Wastewater treatment technologies for on-farm use: Presently, most dairy farmers transfer dairy waste into lagoons, where settling ponds separate out the liquids from the solids. The liquids are applied to fields as soil nutrition but the manure tends to build up in the lagoons until it takes up too much space and has to be removed at great expense. To avoid this and related problems, there is an alternative to settling ponds for manure-laden wastewater that achieves better results. A promising new solid separator technology pulls the manure solids out before the liquid waste goes into the pond. We are assessing costs and benefits of this system before proceeding with implementation.

These are three of the five initiatives currently being undertaken by the Dairies Project. Together, these components emerge as a new approach to agriculture and the environment. "By applying existing technologies in innovative ways, we're able to show how well-tested ideas have the potential to solve California's dairy waste problems," says Allen.

Cow Power

Each of California's 1.5 million dairy cows excretes as much waste as 40 people per day.



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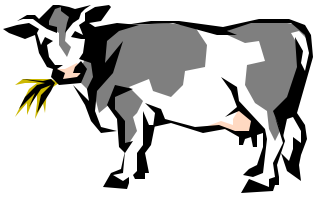
If this waste is processed through a bio-gas plant, it will produce methane, a natural gas, that can be converted to electricity. Through this process, a single cow can generate about 3kW/h per day, roughly the power required to operate two 60-watt light bulbs.



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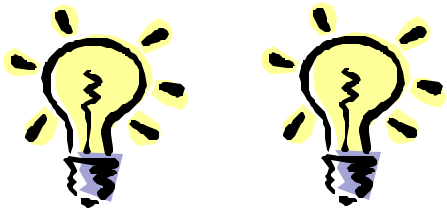
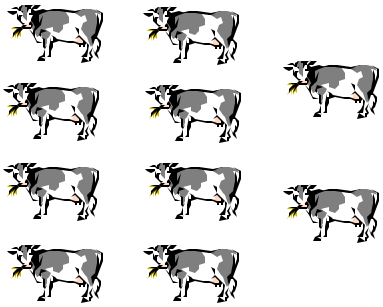


Ten cows can produce enough energy to meet the needs of an average household.



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A typical California dairy (1,000 cows) can generate enough energy to power 100 households.

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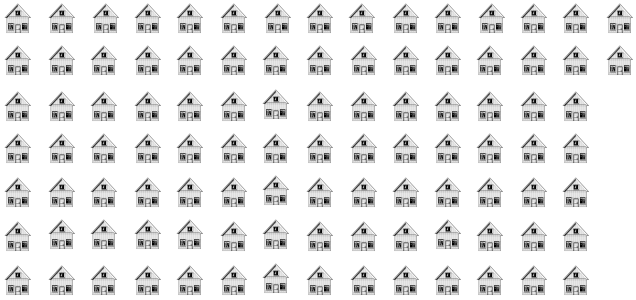

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