

Further down on this page are: WHAT HAVE WE LEARNED per Bob Slow, Funding Suggestions to Bluewater Council, Liquid Manure Management Project and St. Joseph Watershed Water Quality Pilot Project

BSRA Water Testing Work Plan 2005

Mission:

To conduct water quality and microbial source tracking testing in the ravines and on the shoreline in the Municipality of Bluewater for the year 2004.

Goals:

Goal One: To conduct an e-coli water testing program in the lake and ravines emptying into the Lake in the Municipality of Bluewater similar to the 2003-2004 water quality program sponsored by BSRA and Bluewater during 2005.

Objectives:

Goal One

3.1) To conduct E.Coli testing at the following eight beaches:

Wildwood	Ducharme
Glitterbay	Vista
Egerton	Cedar Bank
Sunset Cove	Highlands 1

3.2) To conduct beach and ravine testing at the following four beaches:

Houston Heights	St. Joseph's
Sunset Estates	Ridgeway

The **purpose** of this goal is to continue to obtain e-coli results to expand the information available for research purposes, to monitor trends over time and for people using the lake for recreational purposes to provide timely and accurate information on actual e-coli readings.

4. Activities:

4.1) To take individual water samples in the Lake at designated beaches on a weekly basis for 10 weeks.

4.2) When there is a significant amount of algae present at a testing site, samples of the algae will be taken for identification and the water at the site will be analyzed for phosphates and nitrates.

4.3) To publish the results on a weekly basis.

4.4) To analyze results to determine trends.

4.5) Publish a final report.

WHAT HAVE WE LEARNED??

Bob Slow's view of the 2004 St. Joseph Watershed Water Quality Pilot Project

1.From the water analysis of the beaches and the ravines we learned that the beaches failed to meet the standard of 100 E.coli/100 mL of water 43% of the time while the ravines proved to be "E. coli machines" failing to meet the standard 95% of the time and

often exceeding this guideline by factors of 10 and 100 (the highest single day record was 289x the limit or 28900 E.coli / 100 mL of water).It must be pointed out that E.coli is an indicator of fecal pollution and is one of many pathogens that reside in such waters.It must also be noted that the varieties of E. coli and other pathogens found today are much more hazardous than say 10 years ago in that many of the present E.coli and other pathogens have acquired resistance to many antibiotics making them much more difficult for medical personnel and health units to treat.BSRA was so concerned about the state of the ravines that they manufactured signs warning of playing and swimming in the ravines and made them available at cost to lakefront associations fronting on same.

2.That Council's vision and confidence in the DNA study were borne out as we now have a snapshot of E.coli populations in the sediments and water samples throughout the drainage basin. From these samples alone council can see "hotspots" of E.coli activity in the study area.In addition council has been led closer to the origin of E. coli through 9 DNA matches of E.coli in the drain and where they impact the mouth of the ravine.DNA microbial source tracking works and the results would have been more specific had we sampled on individual's properties.This we did not do (we cited confidence to those agreeing to such sampling) when it became apparent (due to accuracy of GPS readings of samples) that such assurance could not be guaranteed.

3.We have learned that all of the landowners involved in the study were positive and eager in their response to this initiative with 100% agreeing to allow us access to their property for sampling purposes!!They asked only that something be done finally to fix the problem.They seemed to be disappointed in what had been done in the past and seemed hopeful but skeptical that anything would happen based on any study including ours.This attitude begs for immediate and tangible evidence of at least a start of something being done to improve water quality.

4.We have learned that GAP EnviroMicrobial is amongst the leaders of such labs in Ontario .Mr. Palmateer and his staff have shown great commitment ,professionalism , thoroughness, accessibility, and knowledge throughout the study.They insisted on completing the DNA matches at the 95% confidence level when 80% would have been sufficient to prove their technology and publish their results.This philosophy is the driving force behind GAP in everything they do and assures them of a place as one of the premier labs in all of Ontario.

5.We have learned that Bluewater is fortunate to have a council as dedicated as it is for often we see the Mayor or Deputy Mayor and councillors at a variety of conferences workshops and information sessions throughout the region.Their dedication and commitment is much appreciated and too often unnoticed.

SUGGESTIONS—timeline next two years

1.That Council continue to treat the Zurich drainage basin as a pilot project to attract

funds from various government agencies for the purpose of initiating and carrying out programs that will improve the quality of water in the basin and ravine mouth and hence the beachwater at the lake. Hopefully a successful protocol could be established that would serve as a model to be implemented throughout Huron County with provincial and federal funding.

2. That Council with the Huron County Health Unit undertake immediate action to inspect all septic systems in the basin with recommendations to pump out and /or improve any and all such systems.

3. That Council impose a moratorium on manure spreading in the lands within the basin or at least reduce such spreading significantly under supervision for a period of the next two years. Manure is pathogen-laden harboring a host of bacterial and viral agents that can and often do too easily find their way into wells and watercourses.

4. That Council enjoin ABCA in approaching farmers in the basin for a visual inspection of each facility with suggestions for limiting runoff from manure piles that are adding fecal loadings to nearby drainage ditches and hence the ravine.

5. That Council continue to work with BSRA and GAP as this has been an excellent partnership forming a collegial and effective team and that GAP be retained for future testing to monitor improvements in water quality and to serve in a consulting capacity in locating and suggesting strategies to clean up existing and future "E. coli hotspots" along the drain.

6. That Council should view human and animal waste as a potential resource too valuable (and dangerous) to be wasted on fields and lagoons. Rather a facility could be built to accept all such wastes and in the process energy could be produced with valuable by-products such as pathogen free water and fertilizer along with a host of enzymes such as phytase, cellulase etc. If such a facility is too far in the future then an upgrade of the Zurich lagoons to an activated sludge facility with a nutrient removal system should be considered and built as soon as possible.

**Water Quality Initiatives
Funding Suggestions to Bluewater Council
2005**

Activity:	Amount
Lake and Ravine e-coli testing	\$ 5,000
DNA testing	

Follow up to 2004 testing	\$30,000
Houston Heights Ravine	\$30,000

Testing for phosphates, nitrates and algae \$ 1,000

Community Development Project \$10,000

Liquid Manure Management Project

EXECUTIVE SUMMARY

The proposed project being recommended is complete waste management system consisting of collection, storage, thickening, and anaerobic treatment of concentrated hog manure, dairy and poultry manure, with 80 percent organic to methane conversion including energy recovery to produce electricity. The "Demonstration Project" could be developed on less than 1.0 hectares of land on one of the candidate farms. Anaerobically digested sludge will be dewatered to produce 12 percent solids, using the Lystek Process. The dewatered digested sludge will be partially treated by the Lystek system, which is a novel technology that not only hydrolyzes sludges at relatively high pHs to render them more fluid, but also achieves further biosolids stabilization to Class A quality as per USEPA guidelines.. A combined volume of permeate from thickening and sludge dewatering will undergo physical/chemical treatment for phosphorus removal, followed by biological and physical chemical treatment that will be used to reduce ammonia, biochemical oxygen demand (BOD), and phosphorus to the level acceptable for direct discharge or recycling for use in farming operations or irrigation. On-site production of phytase using solid state fermentation will be demonstrated along with a significant cost-benefit to the farmer, in comparison to purchasing phytase amended feed.. The overall quantity of sludge will be greatly reduced with controlled phosphorus concentrations, which should allow for better utilization of the available land and/or expansion of production facilities without additional land requirements. Any water leaving the site will exceed all surface water guidelines for microbial and chemical quality. A pilot project, as described can be scaled or sized to meet the needs for manure management in Huron County.

The project incorporates solid state fermentation of anaerobically digested biosolids to produce phytase, an enzyme that enables swine to better digest phosphorous, thus minimizing both inorganic phosphorous supplementation in the feed and discharge in the hog manure. In addition to phytase, the aforementioned technology will be employed to develop cellulase, which is widely used worldwide to degrade cellulose as well as single-cell proteins for use in animal feed. This project would be the first of its kind to document the achievability of three important, potentially profitable, and environmentally friendly food supplements directly from hog manure. In addition, the Demonstration Project includes the use of a proprietary sludge treatment technology,

which can further enhance the processed sludge quality for land application. The processed sludge quality can meet or exceed all of the criteria for pathogen destruction at levels that meet or exceed the proposed future Class A biosolids standards developed in the United States.

The environmental benefits to be accrued from this project include:

- optimizing the farming operations with respect to wastewater and manure generation, followed by digestion of the organic materials, which would substantively reduce the potential for surface and groundwater issues associated with agricultural operations;
- treatment and reuse of the wastewater from the farming operations and the digestion process would reduce water-use demands;
- processing the manure and wastewater would result in earlier removal of the manure from the barns, which would improve the air quality within the barns and help to ensure the quality and health of the livestock population;
- processing the manure would significantly reduce odour and greenhouse gas emissions from modified hog farming operations;
- bio-security would be substantially improved by reducing the need to transfer manure and products between farming operations;
- processing the manure could essentially eliminate pathogens and antibiotic-resistant bacteria, essentially achieving the equivalent of the Class A biosolids standards that are being contemplated for municipal and private wastewater treatment plants in Ontario;
- volume reduction of the manure effectively lowers the risk of the occurrence of unwanted manure spills from transportation and spreading operations on the farm; and
- further processing the manure would reduce the spread of weeds and disease.

Potential socio-economic spin-off benefits include:

- manufacture of enzymes as animal feed supplements improves the efficiency of feed utilization and reduces the impact of some nutrients such as phosphorus on the environment;
- rural employment at treatment/processing facilities and secondary employment benefits such as trucking, or through farming operation expansions; and
- enhanced public relations/perception may aid tourism and other economic activities.

Other benefits of the project include the capacity to assess the potential benefits/issues associated with cooperative wastewater treatment systems in lieu of separate treatment systems at each farm. Furthermore, the regulatory framework pertinent to agricultural controls is continuing to evolve in Canada, North American and throughout the World. This project represents an opportunity to demonstrate a continuing commitment in this developing area, to continue to assess opportunities to advance agricultural management systems in a responsible and sustainable manner.

The accompanying figure describes this multi-faceted program to manage manure in a cost-effective manor. This design could be scaled from \$500,000 and higher depending on the scale. Many small communities throughout Huron County are in the need of various degrees of wastewater upgrades. In a number of cases the lagoons are being over-burdened by waste treatment demands. A target site such as the Zurich lagoons require an upgrade. Conestoga-Rovers and Associates have a number of possible novel

waste treatment options, that can be employed here and replicated at various locations. CRA engineers are well aware of the financial constraints these communities have and have demonstrated design systems throughout Ontario, which could be utilized anywhere.

To best provide a cost effective plan for Zurich should be discussed with the design engineers with greater than 30 years experience, at Conestoga-Rovers & Associates.

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St. Joseph Watershed Water Quality Pilot Project

2004-2005

Work Plan

Mission:

Develop and implement initiatives with the purpose of improving water quality in the St. Joseph pilot study watershed and in Lake Huron.

Goals:

1) To Create a Community Based Advisory Steering Committee to Develop and Implement Action Plans on the following:

- Upgrading of the Zurich Lagoons
- Ensuring all septic systems are properly functioning and maintained
- Reduce the negative water quality impact of applying manure to fields, manure storage, livestock access to watershed and other potentially adverse activities.
- Develop a Watershed Based Source Protection Plan for the Watershed
- Make recommendations for action to the following:
 - Bluewater Shoreline Residence's Association
 - Municipality of Bluewater
 - County of Huron

2) **Attract Funding From Senior Levels of Government to Finance Action Plans:**

In addition to the ongoing political initiatives, develop and implement plans to obtain funding for water quality initiatives through all potentially responsible ministries/departments of senior levels of government.

3) **Conduct Water Quality Testing in the Watershed:**

Develop and Implement a water quality testing program for 2004 and subsequent years.

Liaison and Activities with Other Organizations Interested in Improving Lake Huron Water Quality:

Continue to liaise and develop joint activities with organizations outside of the Municipality of Bluewater to promote, encourage and where possible undertake activities designed to improve water quality in watershed draining into and in Lake Huron

Objectives:

Goal One: Development of Action Plans

- Establish a community based advisory steering committee
- Ensure a plan is in place to upgrade the Zurich Lagoons that will eliminate the lagoons as a source of watershed contamination.
- Determine the feasibility of expanding the lagoons to process manure on a continuous basis to create an alternative to spreading manure on fields.
- That a process is in place that ensures all septic systems are functioning and maintained properly.
- Determine the feasibility of creating alternatives to spreading manure on fields.
- Assist the Ausable Bayfield Conservation Authority in developing a watershed based source protection plan.

Goal Two: Attract Funding

- Working with the County of Huron and the municipality, secure resources to conduct the investigations necessary to successfully apply for project funding from senior levels of government.
- Create a fund to reduce/eliminate financial impact on watershed property owners for any action/activity designed to improve watershed water quality.

Goal Three: Water Quality Testing

- Develop and implement a water quality-testing program for 2004 in the Municipality of Bluewater. See BSRA 2004 water quality work plan

Goal Four: Other Organization Liaison

- Identify and exchange information with other organizations interested in improved Lake Huron water quality.
- Make presentation to increase awareness and create opportunities for additional partnerships.

Activities:

Goal One: Development of Action Plans

Objective 1

1.1 Community participation

- Identifying all property owners in the designated watershed and developing a means of communication with them.
- Encouraging the participation of these property owners on the project Steering Committee
- Ensuring awareness among property owners of water quality issues and project details
- Reviewing the appropriateness of a Ryerson professor participating in the community development aspect of this project.

1.2 Zurich Lagoons

- Review Bluewater's plan to upgrade Zurich lagoons
- Determine if plan is appropriate in terms of eliminating the lagoons as a potential source of watershed contamination. Constant discharge, filtration, disinfection
- Investigate feasibility of expanding the lagoons to process manure to create a source of alternative energy and other potentially cost effective commercial possibilities.

1.3 Septic Systems

- To review county plans to establish a septic maintenance-funding program for Huron County; this involves ensuring that the proposed county program will meet the objective of eliminating septic systems as a source of contamination

1.3 Alternatives to spreading manure on fields

- Investigate technologies that help agricultural producers manage waste at the source.
- Examining the alternative methods of treatment/ disposal of manure.

1.4 Watershed Source Protection Plan

- Developing a watershed source water protection plan completed by the Ausable Bayfield Conservation Authority.

- Determining the percentage of agricultural operations with nutrient management and environmental farm plans
- Encouraging the creation and implementation of nutrient management and environmental farm plans for all agricultural operations in the designated watershed area

1.5 Recommendations to governments

- A report to the Bluewater Council and Huron County Water Protection Steering Committee in the fall of 2005 with respect to the project, and recommend such additional measures as may be deemed necessary to ensure the protection of water quality.
- To review water testing results and other related matters and identify projects designed to improve surface water quality in the watershed and apply for funding to senior levels of government to fund these programs.

Goal 2 Attract Funding

- To upgrade the Zurich lagoons
- For grants or loans for watershed property owners to undertake projects designed to improve water quality in the watershed.
- For a CURB like program such as the Dowson initiative where property owners could borrow funding for upgrading septic systems.
- To obtaining the funding to hire personnel to research what ministries have jurisdiction over the relevant issues, what program funding is available and to complete applications for funding.
- To research the Fergusson initiative which proposes conducting a feasibility study on the viability and sustainability of a manure processing facility.
- To determine the feasibility, sustainability and cost of processing agricultural manure waste by-products at the farm. This may include converting methane to electricity or to dehydrate the manure and package the solid dry manure as a retail good.
- To acquire funding to upgrade the Zurich lagoons
- To acquire funds for grants or loans for watershed property owners to undertake projects designed to improve water quality in the watershed.

Goal 3 Water Quality Testing:

- See BSRA 2004 water quality testing work plan

Goal 4 Other Organization Liaison:

- Participate and attend water quality workshops.
- Presentations to interested organizations.

Results/Outcomes:

