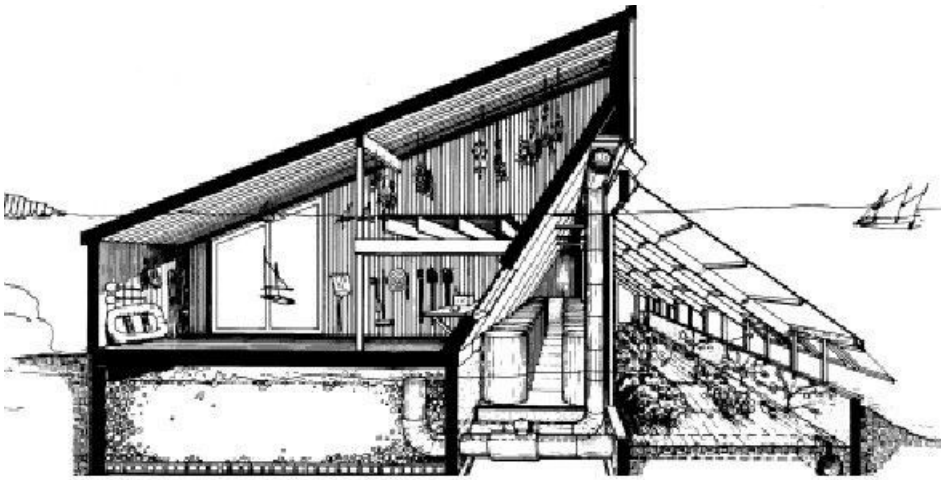
# The Green Door

Citizens Supporting Ontario's Prosperous and Sustainable Future

The Yorklands Green Hub Newsletter | April 2018 | No. 10

The PEI Ark. A completely solar-heated Canadian greenhouse and bioshelter.

## Introducing...The Solar Greenhouse

### Capturing the Sun's Energy to Reduce our Foodprint

For YGH, promoting urban agriculture involves finding the most sustainable ways to grow food. One significant challenge is the current footprint of growing produce indoors in year-round northern greenhouses. We would like to look at comparative greenhouse efficiencies and contribute to lessened fossil fuel use.

The greenhouses industry is big business in Canada. And it's biggest in Ontario. Here, the vegetable-growing greenhouse area is larger than the entire United States' greenhouse vegetable industry. In 2016, it accounted for 70% of the total vegetable crop area in Canada, a $1.3 billion business that employs thousands.

We tend to think of local produce as environmentally friendly. But a closer look at commercial greenhouse vegetables shows that their production has two environmental drawbacks. One is the disposal of large quantities of spent hyrdoponic nutrient solution into waterways, which contributes to eutrophication (excessive algae growth) problems in Lake Erie. The second is the amount of heat it takes to keep plants happy in out-of-season "hothouses." Heating with natural gas (a fossil fuel) is expensive. It can cost up to $61,000 per hectare, 15-20% of a greenhouse operation's overhead. And every heated greenhouse hectare produces 482 tonnes of $CO_2$. Ontario's cap and trade policy, which puts a tradeable premium on companies' fossil fuel costs, may be an incentive to reduce fossil fuel use over time. But for now it has added a second financial challenge to an industry already concerned about fluctuations in the price of natural gas.

### Canada's Earliest Solar Greenhouse? – an Ark for a Sustainable Future

So how could greenhouses be …. greener? Paul Neelands, a YGH member who worked at the Prince Edward Island Ark, a leading-edge experimental bioshelter and research facility for sustainable energy in 1970s, has a suggestion. **(Cont. p. 3)**

## YGH EVIRO-SERIES 2018 TALKS #1 FOOD

We need to take care of our soil! Years of chemical monoculture agriculture have decimated soil life as well as beneficial insects. Local, small-scale agriculture is an excellent setting for learning how to put moisture-retaining life back into depleted soils and care for soil being used to grow local crops.

*Bob Reeves answers questions.*

Bob Reeves of Root Rescue was our featured speaker for our first of four public Enviro-Series talks on YGH's key themes of food, heritage, energy and water. Going beyond natural soil amendments such as peat moss, compost and manure, Bob presented us with a fascinating innovative approach to plant root health. After years of collaborative research with partners at the University of Guelph, he has developed a mix of specialized mychorrizhal fungi that attach to plant roots and and help them absorb more water from soil. **(Con't. p. 2)**

A Pine seedling with and without mycorrhiza.

**Enviro-Series #1 – FOOD (con't)**
Bob's slide show was a science lesson on how soil fungi work symbiotically with plants by trading water and nutrients for energy from their hosts. He has developed a product called Root Rescue which is now commercially available. If you missed his talk, you can read up on mycorrizhal science at Bob's website at www.rootrescue.com

**Cameron Bell** from **Everdale and the Guelph Youth Farm** also joined us, to give a presentation on a new youth-led social enterprise at at St. Joseph's Health Centre. The project will grow and sell organic produce while offering youth training programs and services. https://guelph.ca/location/guelph-youth-farm/

Do you wish you had fruit trees or berry bushes in your yard? Here's help! **TreeMobile Guelph's Mike Barber** concluded our evening by telling us how this innovative program works. They'll bring your choice of fruit bearing plants right to your door. They'll even help you plant them, and tell you how to take care of them. **Deadline for ordering is April 22.** https://www.transitiontreemobile.org/

Many thanks to all our speakers for their work in helping Guelph build more participatory, knowledgeable, organic and resilient communities! ◙

# YGH EVIRO-SERIES 2018 TALKS #2 HERITAGE

For our second Enviro-Series event we were honoured to have local historian and past president of the Architectural Conservancy of Ontario, Susan Ratcliffe, as our speaker. Susan has a gift for bringing history to life with her wonderful personal and archival research.


*Susan Ratcliffe, historian*

Her talk focused on the early days of the Ontario Reformatory. It began with this prison farm's original social mission of molding inmates into responsible citizens through teaching skills in a wide range of trades. The first was building, as the prison buildings were built by inmates with stone quarried on the site (from which Stone Road takes its name). More than 1,000 acres of farmland were transformed into work and ornamental spaces.

In the early days, the prison housed minor offenders serving less than two-year sentences. The complex grew to add barns, an orchard, greenhouses, a woolen mill, machine shop, tailor shop, creamery, lime kiln and broom shop. The grounds were landscaped with dry stone walls, ponds and watercourses, stone stairways, bridges and terraced gardens which remain today. During its most productive years, the prison supplied food and other products for both itself and other Ontario prisons. It also raised prize livestock.

In 1917 the prisoners were relocated to Burwash to make room for returning wounded soldiers from WWII. Renovations made things more pleasant for the war veterans. The OR was renamed the Guelph Military Convalescent Hospital, but called Speedwell by its residents. By 1919 it housed 900 vets, half of them disabled, half bedridden.

The veterans were welcomed and celebrated in Guelph with parades, aide committees and gifts of crafts. The soldiers, like the prisoners, were offered rehabilitation and vocational training to help prepare them for employment and reintegration into society after their war years. The Ontario Agricultural College and the Macdonald Institute shared teaching such trades as crop science, mechanics, woodworking, agriculture and tractor-building to these young men.

In 1921 the hospital closed and the OR re-opened. In 1972 it became the Guelph Correctional Centre which continued operations until 2001.

Eleven buildings from the site are currently identified for conservation in Guelph's Heritage Plan. ◙

*YGH Acting Chair Norah Chaloner points out Yorklands site features.*

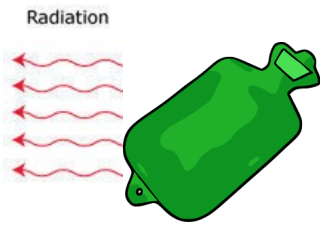
**Solar Greenhouse (con't. from p 1)**
We could build greenhouses like the Ark's. The Ark was an indoor integrated ecosystem that combined a south-facing greenhouse with research space and living quarters. A first in Canada, it pioneered both aquaponics (growing fish and plants interdependently) and solar-heated architecture. Sadly, it's ideas were ahead of its time, and its funding was canceled with the end of the oil crisis. But its legacy lives on and is sparking new interest today. https://peiark.com/

In terms of modern research into solar architecture, the Ark's design is a "solar" greenhouse. Neeland's two years spent instrumenting and monitoring the Ark's integrated systems, including its passive and active solar heat systems, left him with an enduring interest in – and admiration for – architecture that makes best use of the heat that nature provides. He believes it's time for Canada to embrace this new (or old!) way to heat greenhouses. Use sunshine to save money and reduce fossil fuel emissions that contribute to climate change. And he thinks that the Yorklands Green Hub would be an ideal organization and site to develop a research and demonstration solar greenhouse that would combine the YGH focus areas of urban agriculture, renewable energy and water conservation.

**What *is* a "solar" greenhouse?**
All greenhouses use sunshine for plant photosynthesis. But most year-round indoor growers vent out excess heat in summer and use expensive artificial heat to extend the growing season. A solar greenhouse, on the other hand, is built to absorb and store as much as possible of the sun's heat during the day, and release it back into the growing space at night. It does this with southside-only glazing to capture the sun's daytime heat, and insulated walls at the back and sides to hold it in. Some solar greenhouses have additional "heat stores" (water tanks, underground rock beds) built in to increase the amount of heat retained.

*A Chinese style solar greenhouse in Manitoba. It features a south-facing orientation, thick heat-retaining walls and an insulating night blanket..*

What's the magic that allows this to happen? It's called *thermal mass*, the ability of dense materials to absorb and store ambient heat, and release that heat gradually into their surrounding environment when it cools.




Think of a hot water bottle under a duvet. The warmth from the heated water radiates gradually into the insulated air space between the covers to make the sleeper cozier. Solar greenhouses do that for plants. Builders can use the properties of materials such as water, stone, cement and soil which have good thermal mass and incorporate them into greenhouse design as passive or active heating elements.
**(Con't p. 4)**

# Second Sunday Yorklands Walks a Hit

In January 2018 YGH introduced a new activity to engage community members in our vision: Second Sunday Walks. These leisurely two-hour afternoon rambles guide visitors around the meadows, waterways, ponds, trails and heritage stonework of the proposed Yorklands. They provide a relaxing way to share some history, some ecology and some of YGH's ideas for establishing a sustainable environments centre on 70 acres of this former prison farm property.

Walks are scheduled for every second Sunday afternoon of the month at 2:00 pm, from January to July, weather permitting. The April walk introduced a special feature: photographer Michael Chisholm came along to offer tips to walkers with cameras. We now have some lovely new pictures of the site!

We meet at the entrance gate at 2:00 pm. Come join us for upcoming spring walks on May 13, June 10 and July 8. ◙

**Solar Greenhouse (con't. from p.3)**

**After the Ark – China Goes Solar**

Cheap fossil fuels allowed North America to pass up on a budding trend to invest in more environmentally sustainable greenhouse cultivation on a meaningful scale. But China moved ahead on this front with a huge investment. Neelands reports that China has a whopping 3 million hectares of land under cultivation in greenhouses. And 800,000 hectares of those are solar greenhouses built in the north-east to grow greens year-round for China's capital, Beijing – with minimal artificial heat. They built the first generation of solar greenhouses in the 1980s, of locally available materials – thick earthen brick back and side walls, earth berms, and bamboo frames. The south sides were covered with plastic film. They added straw insulating blankets to roll down over the sunlit side at night to prevent heat loss. Over time they have been studying the successes and challenges of this technology, and are now in their fourth generation of solar greenhouse construction, improving as they go. There's now a pre-fab version that uses cell phones to control the temperatures.

In 2006, Chinese solar greenhouses were introduced into Manitoba, Canada. Biosystems engineers at the University of Manitoba have been working with commercial greenhouse operators to adapt original design and construction materials for colder, more humid Canadian winters.

Meanwhile, Paul Neelands has been doing mathematical modeling on a version of a solar greenhouse that would combine some of the the best heat-retentive attributes of both Chinese and Ark designs: an insulated concrete back wall with stacked water barrels up its interior side, quadruple glazing, and an underground rock-store heated with hot air vented from the greenhouse peak, reverse-blown back into the greenhouse at night. His computer simulations show that such a combination should be able to keep interior temperatures above 14C throughout Ontario winters without additional heat.

**Passive Solar Greenhouse as a Community Asset**

An example of a community hub solar greenhouse is the Groundswell solar greenhouse in Invermere, B.C. It's used to teach how to reduce the carbon footprint of food. The project had 35 funders, and more than 300 volunteers helped to build it. The food it grows is used by the high school next door in both the cafeteria and the culinary arts program. A YGH solar greenhouse in Guelph could be a similarly engaging community research, demonstration and collaboration site for making local winter vegetables truly environmentally friendly.
http://www.greenenergyfutures.ca/episode/73-passive-solar-greenhouses

Many thanks to Paul Neelands for all his work researching how we might be next! ◙

**MEMBERS MAKE EVERYTHING POSSIBLE!**

**Become a member of the Yorklands Green Hub!!**
**yorklandsgreenhub.ca/become-member**


**May 13, June 10, July 8**

## Second Sunday Walks

Come for a Sunday afternoon exploratory ramble around the fields, waterways and stonework of the Yorklands, where we'll share history, ecology and future vision for this uniquely special site. Meet at 2:00 pm at the entrance, 785 York Road. Bring your camera!

**Sunday, June 24**

## YGH at 2Rivers Festival

**"Biological Life at the Yorklands" - A Closer Look at the Biodiversity of the YGH Site**

As part of Guelph's 2RiversFestival we will welcome biologists and nature buffs who'd like a closer look at the land and water ecology of our proposed Yorklands site. Come learn how water quality and biodiversity are closely related. Our friendly volunteers will lead walks to identify flowers and plants, leaves and trees, birds and insects on land and in water, in a mini-update of the 2014 Bioblitz that covered the entire area. We will concentrate on Parcel 2 (our proposed site) only.

**See yorklandsgreenhub.ca for more details.**

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**"The Green Door" is a publication of the Yorklands Green Hub Promotions Committee. We welcome news, articles and letters. Each must include the author's name and full contact information.**

**We reserve the right to refuse or edit all submissions. Questions should be directed to the editor at ehoughton@yorklandsgreenhub.ca or a member of the Board of Directors at info@yorklandsgreenhub.ca**