Greenhouse to be used to 'grow' water

B.C. technology will be used in the self-irrigating project that will be built on Grand Turk Island, where many are malnourished

By DONNA JACOBS

Water-rich Canada has launched a novel experiment to 'grow' water as a greenhouse crop in some of the world's most parched regions.

A North Vancouver scientist, a greenhouse builder and a government agency are behind the plan. If the project goes ahead, the greenhouse, which would cover one-third of a hectare, would churn out 200,000 litres of water a day, plus food crops, on Grand Turk Island by late next year.

Grand Turk is part of the Turks and Caicos Islands, a centuries-old trading partner with Canada. That tie, and Canada's record of giving aid to the islands, which are only 60 kilometres east of the Bahamas, may have led to their unsuccessful request in the 1970s to become part of Canada. Today it is a British Crown colony.

The greenhouse's design is low-tech, adapting tried-and-true dehumidifying technology to atmospheric water vapour processing. It would pull water from moist greenhouse air to support hydroponic crops and yield valuable drinking water in abundance.

In a greenhouse that size, it takes only 10,000 litres a day to irrigate the proposed crop of cucumbers, tomatoes, lettuce, bell peppers, strawberries, beans, eggplants and herbs. The other 190,000 litres can be purified and piped or trucked for household use or for field-crop irrigation.

Water shortages on the island have been sapping productivity for decades. The CIA, in its World Factbook 2002, calls lack of fresh water the No. 1 environmental problem for the islands, citing "limited natural fresh water resources."

The 18,000 residents import almost all their food and water. It's so expensive that many are malnourished.

Of the 41 islands, eight are inhabited. And only two per cent of the land on those eight is arable. A report presented last month to the Canadian International Development Agency (CIDA) shows that in 1999, one-third of Grand Turk's 4,200 residents lived below the poverty line. One-quarter of all Turks and Caicos islanders are poor.

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The scientist behind the Grand Turk Greenhouse is Roland Wahlgren of North Vancouver.

Wahlgren, who has worked for nearly two decades on finding an answer to critical water shortages, says the greenhouse is "actually a big atmospheric water vapour processing machine."

If the prototype is built (investment capital is its final hurdle), it may be the first of many in parched regions.

Key players in the project include Aar Koeman, managing director of Batavia Greenhouses, of Aldergrove, CIDA, and agronomist Bob Crocker of Site Specific Structures in Langley. Their Grand Turk partner is wholesale food processor and distributor Columbus Foods Limited.

Wahlgren says nine feasibility studies confirm the idea's practicality. Funding for those studies came largely from CIDA, with a contribution from Batavia Greenhouse Builders as well.

In the B.C. design — the province is a world leader in greenhouse hydroponics — wind power would supply 40 per cent of the energy needed and diesel gasoline the remainder.

Wahlgren says there are two potential plans for the greenhouse, to be built at the Crisson Plantation near the island's east coast. A $6.3-million greenhouse, with a three- to four-year payback, would run on wind and diesel. A $4.5-million version would use electricity, with the option of conversion to solar or wind power later.

The Grand Turk Solar Desalination Greenhouse for Water + Food is relatively simple. Air would enter the front of the greenhouse, where it would pass through large cellulose pads soaked with seawater to cool the air.

The air would then be pulled to the back by 27 exhaust fans and another set of seawater-soaked pads designed to increase humidity further.

Then the cooling process would be taken one step farther: lowering the temperature of the moist air enough to condense the vapour in it to water.

Instead of costly dehumidifier or air-conditioner refrigerants, though, the condenser coils would rely on cheap, piped-in saline groundwater from 460-metre deep wells.

Unlike other desalination techniques, which produce environmentally harmful high-salt residues, the seawater would return to the ocean virtually unchanged.

But the dehumidifying principles are the same: When the warm, moist air reaches the chilled coils, water forms on the cool surface, like the outside of an icy drink in summer.

Whereas in dehumidifiers, copper coils collect waste water, the greenhouse coils would be covered in food-grade plastic to avoid heavy-metal contamination. And, as with conventional water supplies, the greenhouse water would require purification, using filters, UV, chlorination or ozone.

"Part of the thrill," says Wahlgren, "is its simplicity. "It's B.C. technology with standard, off-the-shelf evaporative and condensing techniques, pulled together and ending up with a self-irrigating greenhouse."

The other low-tech advantage of the plan is the relatively modest use of energy, adaptable to a variety of energy sources.

The first self-watering greenhouse was the Seawater Greenhouse, an award-winning $4.8-million British-led project in Tenerife on the Canary Islands. It produced 3,000 litres of water daily.

Despite its success, it was closed for lack of funding in 1995 after only a few years of operation.

The Grand Turk Greenhouse would substitute low-tech seawater for the high-tech heat pump operating in the Tenerife model.

A second Seawater Greenhouse is still producing 800 litres of fresh water daily in Abu Dhabi, United Arab Emirates, as well as cucumbers, tomatoes, salad plants and flowers.

The Grand Turk Greenhouse would produce 250 times as much water, at an anticipated selling price of $0.03 per litre.

"Over there, I can be an asset and help improve the situation," says B.C. greenhouse builder Aar Koeman, who just returned from a week's visit to Grand Turk.

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