THE HYDRO-LODGE-ICAL CYCLE

ON-SITE WATER MANAGEMENT STRATEGIES

FROM A RURAL PERSPECTIVE

PRESENTED BY
AQUARIAN SYSTEMS INC.
MAIN FEATURES

- RAINWATER HARVESTING & STORAGE
- USE OF RAINWATER INDOORS AND OUT
- WASTEWATER TREATMENT BY WAY OF LANDSCAPING:
  - GREYWATER TREATMENT PLANTERS
  - ENGINEERED WETLANDS
  - EVAPOTRANSPIRATION GARDENS
  - DRIP IRRIGATION
- WATER CONSERVATION WITH:
  - LOW FLOW FIXTURES
  - COMPOSTING TOILETS
- ON-SITE INFILTRATION OF STORMWATER
RAINWATER CATCHMENT AND USE
10,000 Gal. concrete cistern under house. Cistern bypass infiltrates garden soil.
• Strainer baskets catch roof debris allowing for easy access and cleaning
• Rainwater then drains to cistern or bypass to garden
WATER CLOSET

- PVC pipes from cistern (bottom left hand corner)
- Pump (on floor)
- Pressure tank (blue tank)
- Particulate filter (small filter on wall above hot water tank)
- Ultra-Violet filter (on wall)
- Hot water tank
- Supply line to house plumbing system
• Particulate filter removes suspended solids
• Ultra-violet filter disinfects, removing pathogens
HEDGE IRRIGATION USING RAINWATER RUNOFF
Gravity at work
Overflow to drip lines
Gravity feed to soaker hoses
In-line filter
Soil infiltration during irrigation bypass mode in winter.
- Trees absorb carbon dioxide at an ever increasing rate as they mature.

- Mature trees will provide a wind buffer helping to deflect winter’s cooling winds.

- Vegetation reduces stormwater runoff by absorbing and slowing the movement of water.

- Trees shade the ground thereby cooling the surface of the planet.
GREYWATER TREATMENT USING PLANTERBEDS
GHOSTS
(GreenHouse Organic Sewage Treatment Society)
Greywater Pilot Project
Distribution Laterals
Flood chambers on laterals
Water Independence

- All water used in this house is harvested from the roof.
- 3000 imp. gal. plastic cistern
- 1 Pint flush composting toilet
- Planter bed for greywater treatment.
- In-door summer temperatures reduced by shading from vegetated planter.
- Drainage from planter used for landscape irrigation.
- Compost from toilet used as soil amendment.
Roof collection system
Sun-Mar composting toilet
1 liter flush toilet
Close up of membrane lined, cedar clad, greywater planter. Flowers in foreground irrigated with planter drainage.
Greywater treatment planter as an integral component of landscape architecture.
Cooling summer shade
All household water collected from roof.
3000 imp. gal. capacity, tucked away at back of house.

Overflow infiltrated to local soils
Compost/Dry Toilet

- Composting bin
- Access hatch for monitoring, maintenance and removal of composted material
- In-house toilet directly above composting bin
Dry toilet (non-flush)
Compost used as soil amendment for rose bush
Compost could be used as soil amendment for planter and covered with bark mulch.
Planters for treating onsite sewage
Pre-cast well rings for planters
Sewage treatment blends with landscaping
GRAND OPENING!
Hornby Depot
Composting Toilet Facility

*recycle
*reuse

*protect the environment

12 Noon
Saturday, Feb. 18
Come Celebrate!

*ribbon cutting
*drumming
*hot bowls of chili
*educational tours

Education for the 21st Century

FEATURES OF THE FACILITY:
*rainwater catchment and dispersal
*greywater treatment
*vermiculture composting of solid waste
*solar-powered ventilation system
*alternative construction materials...and more
Wall materials

Crushed and baled tin cans and old hot water tanks create the shape.
Public sorting area
Tin can processing area
Tin can baler
Mortared like bricks
Gourd plants in evapo-transpiration garden receive water from hand basins and urinal.
Evapotranspiration bed

EPDM rubber membrane
Drain port with overflow standpipe
Crushed glass aggregate
Sand layer to provide for capillary action and evaporation from surface.
Vine trellis made with recycled bicycle rims
Maturing gourd
Terraced evapo-transpiration garden (recycled rubber tires) receives compost leachate & roof water during dry season and overflow (if any) from evapo-transpiration wetland at front of building.
Terraced garden 1 ½ years later
Roof water collection for hand basins
Passive solar vent on roof
Entryway garden feature irrigated with rain water from roof
Soil infiltration trench for roof runoff
Composting chamber access
Composting worm bins
Toilet chute
URINAL AND TOILET
Mature compost
CONSTRUCTED WETLANDS
Constructed wetland for residential sewage treatment.
Freshly planted
Mature vegetation in constructed wetland
Septic tanks preceding wetland
EPDM liner and inlet distribution pipe
Bulrush prior to planting
Mature vegetation
AQUAPONICS

Integration of fish rearing and gardening
Hornby Community School Science Fair
Harvesting of the sunflower sprouts
Goldfish tank
Filter/growing medium and bell siphon
Seedling Nursery
CLIMATE CHANGE AND BEST WATER MANAGEMENT PRACTICES

- Increase in local vegetation humidifies and cools the air by way of evapo-transpiration from the surrounding soil and vegetation.

- Shade provided by vegetation reduces in house temperatures.

- Cooler temperatures reduces the use of air cooling devices thus reducing energy demand, consequently reducing greenhouse gas emissions.

- Greenhouse gases are absorbed from the atmosphere because of increased vegetative growth.
ASK NOT ONLY: HOW WILL OUR WATER SUPPLY BE EFFECTED BY CLIMATE CHANGE?

BUT, ALSO, HOW WILL OUR WATER MANAGEMENT PRACTICES EFFECT CLIMATE CHANGE?
CHEMICAL HAZARDS TO LOCAL WATERS

- **Medications** and other chemicals such as **cosmetics** and **cleansers** persist in the environment, traveling beyond the septic field or sewer discharge pipe.

- Research shows that the root zone and surrounding rhizosphere has the capability of breaking down complex compounds into their constituent elements.
Phytoremediation involves the use of vascular plants, algae, fungi, and soil micro-organisms to remove and control waste or spur waste breakdown.
RECOMMENDED READING

“Phytoremediation: Transformation and Control of Contaminants”

Edited by Steven C. McCutcheon and Jerald L. Schnoor

Published 2003
AFFORDABLE COMMUNITY HOUSING

A CONCEPTUAL MODEL

INCORPORATING HYDRO-LODGE-ICAL DESIGN PRACTICES
3 STORY, 4000 SQ. FT.

- HOUSING 18 – 20 PEOPLE IN STUDIO, AND ONE AND TWO BEDROOM APTS.

- 4 STUDIO/WORKSHOP/RETAIL SPACES

- CAFÉ, KITCHEN, GALLERY SPACE

- WASTE TO WEALTH WATER MANAGEMENT STRATEGIES
INTENTS

• PROVIDE AFFORDABLE HOUSING
• FOSTER ECONOMIC OPPORTUNITY
• CREATE COMMUNITY
• WATER MANAGEMENT INTEGRATING STRUCTURAL, SOCIAL, AND ECOLOGICAL PRINCIPLES
• NOURISHMENT OF BODY AND SPIRIT
GROUND FLOOR
STUDIO/WORKSHOP/RETAIL
2\textsuperscript{nd} & 3\textsuperscript{rd} FLOORS
RESIDENTIAL

MIXED USE RESIDENTIAL/COMMERCIAL RENTAL LODGE
CONCEPTUAL PLAN
PLAN: FLOORS 2 & 3, RESIDENTIAL APARTMENTS - 4,000 SQ FT INCLUDING ATRIUM

STUDIO APT:
\~ 500 \text{ sq ft}

SINGLE BEDROOM:
\~ 600 \text{ sq ft}

SINGLE BEDROOM:
\~ 720 \text{ sq ft}

HALLWAY/BALCONY

OPEN AIR ATRIUM
(VEGETATED WALL)

STUDIO APT:
\~ 500 \text{ sq ft}

TWO BEDROOM:
\~ 1,050 \text{ sq ft}

\frac{1}{80} = 1\text{"}
ENERGY SAVING FEATURES:

• Optional drying racks in laundry area

• Exercise room with electricity generation capability

• Rooftop solar hot water heaters

• Photovoltaic roofing materials

• Passive air conditioning

• Maximize natural lighting

• Growing raw materials for craft work onsite

• Living and working onsite reduces vehicle use
Consultation, Design, and Construction of:

• Rainwater Harvesting Systems
• Onsite wastewater management
• Planter Bed Greywater Treatment
• Composting Toilets
• Engineered Wetlands
• Stormwater management
• Residential or commercial buildings integrating, sky to soil water management, and landscape architecture

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