Integrated Water Systems

Water Source
- Rain Water
- Groundwater
- Greywater
- Piped - CRD

Water Storage
- Tanks
- Ponds
- Soil
- Landscape

Water Use
- Crop Choice
- Food Forestry
- Conservation
Rainwater Incentives – Local Government

- Cistern Collection
- Rain Gardens
- Infiltration Chambers
- Green Roofs

Now Legal in BC

PROS:
- Legal
- Recognizes the need for reuse & conservation
- Lead by the Province

CONS:
- Lack of informed regulatory personnel
- Excessively conservative & over stringent
- Not necessarily less expensive

Grey water: Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>shower</td>
<td>Water from showers and baths</td>
</tr>
<tr>
<td>laundry</td>
<td>Water from washing machines and laundry</td>
</tr>
<tr>
<td>light</td>
<td>Water from sinks and toilets</td>
</tr>
<tr>
<td>commercial</td>
<td>Water from commercial activities</td>
</tr>
</tbody>
</table>

Water Sources: Grey Water

- 4 greywater systems
  - Pumped (aerated)
  - Filtered (worms)
  - Gravity fed (B.Drain)
  - Source captured (sink)

- Kitchen
- Laundry
- Shower

3 RULES:
- Don’t apply above ground
- Don’t apply to vegetables
- Don’t store > 24hrs
Grey Water: Mulch Basin

Grey Water – less simple...

Grey Water - Simple...

Water Sources: Well
Water Sources: Well

- Wells can not meet the flow volume needed during irrigation cycles
- Top up cisterns tanks every evening
- Irrigation pumps from the tanks
- Run our irrigation top-up through our floors which cools the house at the same time

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Water Storage: Tanks

- Inground
  - Expensive Very limited application
  - $5/gal - installed
- Above Ground
  - Most common
  - HDPE Tank at $1/gal
- Water Pillows
  - Up to 100,000 gallons
  - For inaccessible areas
Water Storage: Ponds

Clay lined
- 2 feet - minimum of clean washed clay
- Overflows
- Bentonite additions – Geosynthetic bentonite mats
LLDPE HDPE EPDM
- Burp valves for gasses and ground water
- Protect from UV, animal hooves/claws
Size & Location
- Think about:
  - Soil movement
  - Water Licensing
  - Impacting local hydrology

Basic Pond Details

Burp Valve Anchor Trench Retention Detention

BC Damn Safety Regulations
250 000 gallon [US, liquid] = 946.35 m³
Categorizes damn's for risk:
- Potential of failure
- Potential loss of life
- Environmental & Cultural
- Infrastructure & Economic Impact

Water Storage: Landscape Swales & Contours
SLOW IT DOWN
SPREAD IT OUT
SINK IT IN
Water Storage: Swales & Contours
SLOW IT DOWN
SPREAD IT OUT
SINK IT IN

Water Storage: Landscape
Example:
Re-graded driveway into a stepped water course
Planted and becomes a silt trap - Gordism "Siltation"

Soak-Away Pits
Rain Gardens
Hugelkultur beds

Water Storage: Soils
- Mulches
- Roots in Innoculants
- Microbes
- Ground covers
- No compaction
- Don't overwater
- Feed the microbes not the plants.

Mark Shoppard – New Forest Farm

SUSTAINING NATIONAL WATER SUPPLIES BY UNDERSTANDING THE DYNAMIC CAPACITY THAT HUMUS HAS TO INCREASE SOIL WATER STORAGE CAPACITY; Glenn David Morris, 2004
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**Water Use: Conservation**
- Composting Toilets
- Saves 35% indoor water use
- Soil innoculant
- Short, intense, deep watering
- Train roots to go deep - allow periods of stress
- Mulch basins – tree wells
- Grey water - conserving by re-using
- Deep Mulch
- Low Flow fittings

**Water Use: Food Forest**
- Perennial
- Tolerant of seasonal variations
- Mimics natural ecology
- Creates biodiversity
- Offers resiliency - not reliant on one crop.
- Stabilizes soil
Water Use: Crop Choice

Examples:
- Chestnuts
- Hazelnuts
- Figs
- Yellowhorn
- Olives

Water Use: Mulches

- Wood chips
- Leaf and twig – whole
- Leaf and twig – ground
- Straw and animal bedding
- Living Mulch

Initiatives

- CRD Water Conservation bylaw to create a tool to initiate restriction based on "qualitative" emerging factors... and CLIMATE CHANGE = DONE
- Groundwater governance for the Municipality, in conjunction with UVic Environmental Law Centre and the BC MOE - in progress
- Grey water and Composting toilet regs for the BC Ministry of Health = DONE
- Riparian Bylaw for the DoH to allow impacts that increase bio-diversity, carbon sequestration, slow storm flows, increase recharge, protect infrastructure - In Progress
- BC Water Sustainability Act https://engage.gov.bc.ca/watersustainabilityact/

GREY WATER & COMPOSTING TOILET REGULATIONS

- BC Ministry of Health initiated the creation of this document
- Final draft has been submitted after the public consultation process
- Changes will ensue:
  - BC Building Code
  - Septic and Sewage Regs
- Final approval competed
Rain Water

- ARCSA Accredited Professional
- http://www.arcsa.org

- Regional rain harvesting policy for the CRD - Passed and being developed
- RDN Rainwater Harvesting Manual
  http://rdn.bc.ca/events/attachments/evID6235evattID1344.pdf

RDN’s Yellow Point Aquifer Protection DPA

- No subdivision or development activities may occur within the DPA without first obtaining a Development Permit from the RDN

- Subdivisions
  - Assess aquifer characteristics at the most stressed time of the year including cross sectional analysis
  - Perform a 72 hr pump-down test
  - Assess ability of the aquifer to provide a sustainable water supply without impacting adjacent rural properties or agricultural activities
  - Identify recharge locations

- Residential - All new dwelling units must include an external rainwater harvesting system which includes the following:
  - Equipment for collecting and distributing rainwater from the dwelling unit roof;
  - A storage tank(s) with a minimum storage capacity of 18,000 litres which is designed for rainwater collection and is rated for potable use;
  - A pumping system;
  - An overflow handling system; and,
  - The ability for future connection to the dwelling unit.

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www.rainwaterBC.com

ARCSA AP, CANARM Director
Water Commissioner - CRD & JDF
Councilor District of Highlands,
Living Building Challenge petal recognized

Presentations
- Solar
- Water
- Green Building
- Mechanical

Tours
Policy
Workshops