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REVIEW OF INTEGRATED WATER MANAGEMENT 2007 INTERNATIONAL WATER CONFERENCES

My first exposure to a water conference was at the 2006 ARCSA in Tucson, AZ.

I learned there about the upcoming 2007 Rainwater & Urban Design conferences ARCSA (American Rainwater Catchment Systems Assoc) in Hawaii (which was going to offer the first ever certification training for rainwater design professionals) followed by the IRCSA (International Rainwater Catchment Systems Assoc) in Australia.

I intuited that this was going to be extremely important informational sharing on a global level, uniting policy makers, design professionals, industry leaders, academics, & environmentalists. I knew that it was going to transform my career as an architect.

The Hawaii hosted conference was held on the big island, at the Volcano military center. It was frugal & campy, with many internationals attending, every one wearing leis with Hawaiian floral print & very at ease.

The Sydney Australia hosted conference, held at the urban downtown Sydney Sheraton Hotel was attended by international delegates from over 40 countries, everyone dressed in dark well-tailored suits.

The conferences were advertised to have presentations on: various purification methods, strategies for bringing clean water in the form of harvested rainwater to poor rural residents, a decentralized approach to meeting water needs in urban areas, microbes and treatment, pro-biotics that populate cisterns, holistic engineering applied to Rainwater Harvesting and Sustainable "Green" Building Practices, residential or non-residential applications, scientific white papers, & how drought stricken populations around the globe have come up with solutions.

Local Off the Grid applications- Off the grid power miser- if you are afraid that the pump will drain your battery power or not work when batteries are drained, have an extra tank above the house so you get any gravity pressure. Use your pump in sunny good PV days, so that the water is perched above with free gravity on the low PV generating gray blizzard & monsoon days.

Anti-freeze tips- hang the gutters low on the fascia so that sliding snow doesn't rip the gutters off of the roof.

The last place to freeze is the center of the tank, so locate pipes, valves, & switches there if possible.

Just get started & set up your system. Tanks are the most expensive component. Add more tanks as you can afford them.

Policies- Portland & Australia have ordinances allowing dual supply systems (rainwater & municipal with back flow & air gap devices to protect the municipal source from cross contamination. Santa Fe mandates systems on new buildings 2500 SF or larger. Tucson, AZ requires R.W.H. systems for irrigation & flood control.

In Texas, rain water harvesting equipment & systems are exempt from sales tax & property tax.

Chlorine IS the most common method used by jurisdictions & centralized water districts to disinfect water.

Fire protection is being approved with rain water by some Australian jurisdictions by having the domestic tap above the fire protection reserve.

Global conferences coming up are writing legal instrument for managing aquifers shared by 2 or more countries.

Some Australian states require mains water for the kitchen sink & allow rainwater & reclaimed gray water for everything else. Other states do allow water disinfection filter systems for potable drinking water from rain & no mains requirement.

Mains vs. Catchment- There is archaeological evidence of rainwater being harvested in China 6000 years ago.

"Mains " water is from water districts, wells, & community infrastructure. It can be subsurface from aquifers, or surface water from rivers, dams, & acequias. It is municipally managed to direct it from somewhere else & delivered to the occupants site address. Rain water comes from the sky & lands on the occupant's property. Reclaimed water is water that the occupant uses once, then uses again either with treatment or not.

Rainwater collection basics: determine quantity of water needed determine annual rain fall, size roof surface to collect required quantity, divert through gutters to storage cistern (cistern size large enough to accommodate occupant usage volume during the longest expected interval without rain) . Tanks are the most expensive component of a R.W.H. system so start with what you can afford & add more tanks in the future. Pipe to user taps with either gravity or pumps for 40 to 60 psi pressure, determine % of potable & drinking water. Install disinfection system to potable & drinking water.

Treatment techniques- screening, settling, activated charcoal, roof washer, cartridges, slow sand, distilling, chlorine, UV lights, nano-filtration (just a big word that means super tiny) , ozone, reverse osmosis. No treatment necessary for irrigation. Catchment systems typically disinfect 10% of water for potable using 5, 1, & .5 micron cylinders, UV lights, distillers, charcoal if they use chlorine (discouraged) & occasionally Ozone. Chlorine degrades into trichloroethane which is carcinogenic when combined with decaying carbon (like leaves). Choosing alternates to chlorine is an advantage of private R.W.H. Systems.

Maintenance- clean UV light meter & lens , change filter cylinders, clean out first flush & roof washers, brine membrane changing, repair leaks, clean gutters, change filters, maintain & clean disinfection equip, quarterly water quality testing at labs for potable water, check roof integrity, check openings, inlets, & screens, de-sludge every 2 to 3 years

Tanks are now available in all materials, shapes & sizes from 50 gal to 40,000 gal & larger. Polyethylene, fiberglass, wood, metal, concrete, masonry, above ground, below ground, bladders, & food grade liners. Underground tanks should be 50 ft min from septic systems to minimize contamination

R.W.H. systems need to be maintained. They are perhaps not suitable for rental vacation homes, rather better suited at homes where the occupants take responsibility for the mint.

Carbon filters remove pesticides. Carbon is the food that bacteria like, hence carbon filters help reduce the bacteria in the cistern or potable water.

ABS pipe is toxic. Make sure your tank is made from new virgin food grade material. Reclaimed plastic might have chemicals in it.

Bacteria needs mixing, still stored water improves its quality, microbiologists say that tanks have good bacteria, like yogurt. Do not try to clean the walls of your tank.

Wind- rainwater falls when it finds some particulates in the air to bond to, then it falls. If there are low PH particulates in the air, then that rain that falls will have a low PH (acid). Pay attention to air or wind borne

soot, crop dusting, industrial vapor, animal farm feces, other neighbors up wind from your catchment surface, or jurisdiction spraying for oak moths (current California nightmare).

PH - Rainwater preserves ground water, it is mineral free, is close to the user, & can reduce flooding. Rain falls at neutral 7.0 ph. When it comes in contact with naturally occurring carbon dioxide it gets slightly acid to 5.7 ph. Acid PH rain is corrosive. Concrete tanks or copper roofing make it even more acid. Rain that lands on copper roofs & gutters becomes acid PH, & corrosive for the rest of the rainwater catchment system parts (pipes, pumps, filters, tanks, etc.) Water can be buffered by baking soda to alkalize it. Water gardens take out the calcium oxalate that water may have absorbed from concrete cisterns or tanks in rain h₂o is PH 7. Ponds are PH 8. Below PH 7 copper pipe starts to etch & corrode.

Gray Water - Individuals generate 90 liters per person per day. Grey water is alkaline ph.

Australian's document Water Use: Garden & lawn = 35-50%, Bathroom = 20-30%, Toilets = 10-20%, Laundry = 25-5-%, Kitchen = 5 %, Drinking water = 1% Americans tend to average it at 60% irrigations, 30% toilets, 9% domestic potable, 1% drinking water

Australian Average family household water consumption is approx. 300,000 liters/yr. Americans average it at 3 person household of 33 gal per day = approx. 100 gal/day/household for indoor use.

Rule of thumb- to grow food- the water catchment area must be 2.5 times larger than the cultivated area. Different plants have different coefficients of evaporation.

Rain gardens are roadway drainage gardens to pre-treat & infiltrate road run off.

Typical rainfall destination: 40% infiltrates, 15% goes to the water way, 45% evapo-transpires (the engine of earth's water cycles) the challenge of the urban environment is to maintain the evapo-transpiration.

Permeable pavement is for re-using water stored under pavement

RWH is appropriate for residential, commercial, industrial, agricultural, urban & rural.

Technically, rain water & waste water reclamation can provide all water needs, provided there is enough collection surface & rain fall.

Training & Certification

ARCOSA offered first time ever certification of rainwater harvesting design professionals at the Hawaii Aug. 2007 conference. Now the graduates from that training program are offering classes in their respective home regions.

The first workshop/training session was by Tim Pope ARCOSA 2007 president gave the first class in Hawaii. Graduates from that session with experience installing over 10 rainwater systems will begin to offer training sessions in their respective regions.

Billy Kniffen hosted the second ARCOSA professional training workshops in Texas.

The workshop topics include : situation analysis - growth, concerns , TCEQ regulatory guidelines for potable water use in municipal and private rainwater harvesting systems, System construction from planning to drinking and other end uses, Sanitation concerns and options, Non-potable use inside and outside the home, System maintenance

Australia- has an organization called green www.plumbers.com training their plumbers how to install integrated water management systems. CA is currently adopting a similar green plumber program.

ARCSA Chapters-

ARCSA has SW region, Central region, NE region, SE region, Mid pacific region

Marilyn Crenshaw & Jack Schultz were appointed as representatives for Southwest region of ARCSA 2007.

Guidelines

The Texas MANUAL ON RAINWATER HARVESTING is "THE BIBLE" with guideline.

The Australian guidelines for rainwater & waste water have 600 pages of text. 66% of south Australians drink rainwater, based on a risk management approach.

The UN & World Health Organization are drafting an aquifer treaty

ARCSA is currently working on refining their guideline to get ready to submit them to the ICBO (International Conference of Building Officials), as suggested guidelines for code adoption in plumbing & building, & fire codes.

New water industry sector innovations

Australia's water shortages have stimulated industry businesses that make products
5 years ago, tanks were not allowed, today homes with a 530 gal tank connected to toilets & laundry save 40 % of prior water use.

Dual system gages that use rain water first if it is in the tank & municipal water only as a backup, back flow preventer.

Waste water- The OzziKleen is the only domestic sewerage system utilizing the Aerobic Activated Sludge technology, therefore the only one which offers the convenience associated with town sewerage.

ARCSA president, Tim Pope, is pursuing development of better filter to resist pollen.

Global conference message

The overriding concept that was communicated at these 2 conferences was the consensus that Integrated Water Management for urban & rural, consisting of rain water harvesting, potable disinfection, gray water reuse, black water reclamation, constructed wetlands for bio-remediation, & storm water retention & re-use,

flood control, food growing irrigation, maintaining watershed health is the future for all civilization to meet demands of human basic needs. We all need water & we all need to manage it.

Over 40 countries were represented at these conferences.

Currently 2 billion (1/3 of earth's 6 billion population) people do not have access to clean sanitary water

Tremendous power creating greenhouse gas emissions is created pumping water from industrial scale water supplies to industrial scale waste water processing plants. Local collection processing radically reduces those GHG (Green House Gases).

Aquifers are being over used by civilization, going dry, getting polluted with arsenic & fluoride, salt ocean water siphons in laterally at aquifers adjacent to the coast.

Australian studies have shown that new dams or new de-desalinization facilities will cost more than updating every home to integrated water management, with the added benefit of home owners managing their water system, & jurisdiction relieved of annual budget to maintain infrastructure of a dam or desalination.

Developers should first acquire water entitlements. Economists under value benefits of water ways & lifting water literacy. Suburbs of the future will collect roof water, collect storm water & utilize open space watering, reduce evaporation, smart metering, Mains prices to vary peak & off peak, water scarcity pricing will cost 2 to 3 times extra in droughts, apartment occupants o get individual water bills,

We need to be thinking about carbon taxes WSUD (Water Sensitive Urban Design) needs to be made mainstream. We need fully integrated water policy

Conventional hydrology is 18th century public health engineering level. Some regions have grown 65% in 20 years. Water infrastructure hasn't kept up with population increase. Recycled sewage water being used for power station cooling water (western corridor water recycling scheme). Desalination is too energy intensive. Grey water has gone from illegal to encouraged. New homes are now required to have R.W.T. (Rain Water Technologies) plumbed into them. The home of the future will integrate R.W.T., gray water re-use & storm water reuse.

USA- by 2015, 20 USA cities will have populations over 10 million.

In the past 5 years water cost has increased 27%. 36 states expect to have h2o shortages in the next 10 years under normal conditions. We need to either force conservation or develop alternative sources. R.W.H. Provides a new source ,reduces power & greenhouse gas emissions. 12 states in USA currently use R.W.H. We need to decentralize h2o supplies to minimize security fears.

Water promises to be to the 21st century as oil was to the 20th century. It will determine the wealth of nations.

Korea has 5000 years of successful water management governing the nation with 3 masters: rain, cloud, & wind. Korea's vision of the ultimate urban system integrates 3 tanks under each high-rise for : flood control, water saving, & emergency reserve. Water monitoring of all tanks in urban area to water office to Internet weather & emergency offices would empty all cisterns in advance of a major storm so that the cisterns are empty at time of flood , so that the cisterns can be filled by the flood to offset that amount of water in the storm drain overflow to watershed.

Waste water & storm water bio retention systems either retain to re-use or infiltrate. See- Facility For Advanced Bio-filtration FAWB.

Goal- don't create storm water runoff. Initiate & improve waste water re use @ the allotment scale.

The UN says that 2/3 of the world population will have water scarcity by 2025

Australian national agenda: cut greenhouse pollution, restore rivers, secure h2o supplies, build smarter cities, and strengthen the environment.

Water supply is directly related to the health of the atmosphere & the water shed. Australia currently recycles 4 % of water. Goals are to recycle 40% by 2020.

It will cost \$3/4 billion to do R.W.H. on all homes in all major cities in Australia vs. \$ 3.1 billion to build desalination facilities. Bill is currently being reviewed proposing \$1 billion/yr. rebates per yr. for 20 years to upgrade all homes to R.W.H. & greening of homes. Goal to upgrade all homes within 1 generation.

In 2005/2006 3 councils spent \$4.8 million maintaining 20 water bodies, assumed to be under maintained. Cost per HA of surface & \$6500 to \$17,000. there is a need for local guidance on design, maintenance, remediation, consistent methods for collecting data, sustainable water management regime for all new water bodies, storm water harvesting strategies, eco system protection, regional water supply strategy, rainwater conveyance, attenuation, recharge pits, network with other water shed water, treat the water before it goes into the piped water system, the top 20 cm has the best filtration w/ bio beneficial critters in it, decentralized natural systems, occupant must use storm water or else infiltrate it. Development must come up with a maintenance free system. ESC ecological storm drainage. Water related zoning: recreational/natural/working. The restoration economy of environmentalism need to go from boutique to mainstream. The future of ecology engineering is closed loop design.

Canada has 25% of the world's fresh water. Patrick Lucy & Carrie Barroclay are designing development on Victoria Island where it's population will double in 30 years. Currently there is no sewage system & all is dumped into the ocean. The premiere & cabinet are looking for bio models to challenge & implement green thinking on a large enough scale to enable whole city change to implementing integrated design to accommodate capacity. Canadians are developing projects with a bio refinery. Integrated resource management boards are implementing the urban version of the intention of permaculture (even though they

don't use that word) in that everything becomes a revenue stream. Nothing is waste. They envision a water ministry/bio refinery/district heating/biodiesel factory/fertilizer plant/organic waste processing/bio gas plant. Currently all parts exist fragmented on earth. We need to pull together peer review teams from around the world. Canada will host Olympics in 2010.

The environment can survive the water demand of cities & increasing populations if we have water policies that legislate basic rights, have catchments management, demand management, mimic nature's ecosystems renewable energy & no waste, monitor & maintain our rivers in excellent health, implement bio retention pre-filtering, monitor macro invertebrate health, aquatic plants health & biodiversity, atmospheric management, light & noise pollution, to result in lovely elegant modernization strategies. All water on earth is recycled. Evapo-transpiration is the engine that does it.

I think that conference attendees learned that we are all one sharing the waters that are continually recycled on this planet.

This new business sector. It is exciting. Get ready to see the way human civilization does utilities & appliances completely change. The companies & individuals who get their products & services on the market can harvest abundant opportunities.

All communities must become sustainable or perish, so they will all be becoming sustainable communities to survive.

Diverse conference presentations –

Australia has a TV star with a show about growing food at your home- save h2o, save energy, sustainable gardens, create habitat, recycle wastes, and grow food.

Uganda- women walk 10km daily to carry 15 to 20 liters of water. This absorbs most of their day. Women money saving collectives are building concrete cisterns. African rainfall is sufficient to support 9 billion people.

Papua New Guinea – Aids workers have designed a water system for aids victims who have been out cast from sharing society's community water using 5 gal buckets for collection, bathing, cooking, & toilet functions.

International water conferences around the globe

There is still a little bit of fear of the unknown in regards to jurisdictions allowing potable drinking water disinfection techniques, use of gray water, & reclamation of black water. The conferences all over the globe are a re-assurance that it is only a matter of time before all of the information for environmental stewardship of water is shared all over the globe.

WATER ORGANIZATIONS & CONFERENCES

www.ircsa.org International Rain Catchment systems Assoc., 2008 conference

www.iwahq.org International Water Assoc., 2008 Vienna conference, 2008 Korea conference

www.arcsa-usa.org American Rain Catchment Systems Assoc., 2008 Conference

www.watersmartinnovations.com, 2008 Las Vegas conference

http://www.who.int/water_sanitation_health/en/ World Health Water

<http://www.unwater.org/> United Nations water programs

<http://www.iwtc.info/> International Water Technologies Conference, 2008 Egypt Conference

SUMMARY & POST CONFERENCE ACTIVITIES

2007 ARCSA President , Tim Pope, is developing a model code with NSF International, for design, installation, & maintenance for RWH., (supported by Amer. Soc. of Plumbing Engineers & the first step in creating a national code, as ASHRAE Amer. Soc. Heating, Refrigerating and Air Conditioning Engineers)

My wow at the beauty of Australia's marine & botanical life renewed my commitment of Gaia tithing by doing my part to network, cross pollinate policies, & participate in the open source type of international academic sharing of water management techniques & collective intelligence.

My intention is to populate my database of water links with water products, policies, & organizations.

Author, Marilyn Crenshaw, www.theGreenArchitect.com, life member ARCSA, & ARCSA Certified Professional, designs ultimate green building hybrid projects using site built, natural building, or prefab structural systems, with fully integrated water management strategies.