Better World Solutions
Good News Platform on Water, Energy and Sustainability

Best practices from all over the world

Sao Paulo dehydrates; the city/state suffers because of a water crisis. What are the best practices from the world?

Objective Members of the LinkedIn discussion group '**Sao Paulo is running out of water**', come from all over the world. They all have large networks and wan specialized people in their network to get involved in order to get more knowledge, power and world wide support and tackle this world issue of increasing dehydration.

Julie ann Futcher River Thames London - Thames21 / http://www.thames21.org.uk/

Here are a few links to urban rivers and green infrastructure (London specifically) - there are many many more... the opportunity this discussion offers should not be
missed.... http://www.thames21.org.uk/http://www.thamestidewaytunnel.co.uk/https://www.london.gov.uk/priorities/environment/greening-london/improving-londons-parks-green-spaces/all-london-green-gridhttp://daylighting.org.uk/Daylighting/

Today example (i don't understand Danish but) - page 10 http://www.e-pages.dk/bgmonline_fb/393/

Sergio Correa de Jesus MFA **Sebastião Salgado – Instituto Terra - Video**

World-renowned Brazilian photographer Sebastião Salgado tells his story about the changes deforestation gives nature, climate and people. **Link to his impressive story on TEDX video**

Julie ann Futcher **Morocco**
see this one - The 'Oued Fes' - the river buried under ancient Medina of Fes, **Morocco** - is being daylighted. TED Talk here: https://www.youtube.com/watch?v=b4UFlldZuKk&app=desktop

Seoul - Korea

And then there is this http://www.connectedurbandevelopment.org/cities/seoul, here opening up the river here was found to have significant positive implications on the urban climate - lowering both air pollution and building cooling loads ..... the implication of water as an urban climate modifying device cannot be expressed enough....

Aleks Blumentals

http://www.institutoterra.org/eng/midiaGalery.php#.VCwCWWeSyDk Plant forests, grow water... it does not take very long. It does however ask t free land , lower intensity of agriculture... this is not a trivial question.

Helena Chaja Heyning

The Netherlands

Recently there was an interesting PhD promotion of Ruud van der Ent at the TU Delft (Netherlands) on the hydrological cyclus. His cum laude thesis is called: "A new view on the hydrological cycle over continents" and can be picked up at repository.tudelft.nl or click on http://repository.tudelft.nl/search/ir/?q=Ruud+van+de+Ent&faculty=&department=&type=&year= Abstract Where does precipitation come from? It is not easy to answer this question because of the complex and energy-intensive processes that bring moisture to a certain location and cause moisture to precipitate highly heterogeneously in space and variable over time. Part of the precipitation comes from so-called “moisture recycling”, which is moisture from land evaporation that returns to the land surface as precipitation. It is widely accepted that land-atmosphere interactions play a crucial role in the global climate, but the importance of moisture recycling specifically had, before the research presented in this thesis, not yet been fully quantified. It is, however, important to do so as the magnitude of moisture recycling can be used as an indicator for the susceptibility of our water resources to local and remote land-use change. The main research question of this thesis is: “How important is land evaporation in the hydrological cycle over continents?” Cite or link this publication

Helena Chaja Heyning

Water stress in the future

How about this interesting ('scary") article: 'Water on an urban planet: Urbanization and the reach of urban water infrastructure' by McDonalds et a http://www.sciencedirect.com/science/article/pii/S0959378014000880

ABSTRACT

Urban growth is increasing the demand for freshwater resources, yet surprisingly the water sources of the world’s large cities have never been

globally assessed, hampering efforts to assess the distribution and causes of urban water stress. We conducted the first global survey of the large cities' water sources, and show that previous global hydrologic models that ignored urban water infrastructure significantly overestimated urban water stress.

Large cities obtain 78 3% of their water from surface sources, some of which are far away: cumulatively, large cities moved 504 billion liters a day (184 km3 yr1) a distance of 27,000 3800 km, and the upstream contributing area of urban water sources is 41% of the global land surface. Despite this infrastructure, one in four cities, containing $4.8 0.7 trillion in economic activity, remain water stressed due to geographical and financial limitations. The strategic management of these cities' water sources is therefore important for the future of the global economy. 2014 The Authors Published by Elsevier Ltd. This is an open access article under the CC BY-NC-SA license (http://creativecommons.org/licenses/by-nc-sa/3.0/).

BetterWorldSolutions Suggestions of new technologies to supply clean, fresh water to (poor) communities all over the world

In a former LinkedIn discussion we asked for clean water products and technologies that will help overcome the scarcity of clean, fresh water. And because methods for purification of water are just as different as recipes for **favorite** dishes as Niels Erik Jorgensen mentioned, we got many reactions. **This is a short list.**

- **Inoke Mo'unga** from the small Island Tonga, sanitizes rainwater tanks WITHOUT using chemicals. They need your help. Find out why
- Water Saving Solutions - **Massimiliano Montesi** generates water from the air
- **Michael Thomas** recommended the Warka Water Tower which provides remote villages about 25 gallons of clean drinking water per day from the air

- **Eros Kaw** mentioned Biocleaners. "If its sanitation plus drinking water....well, it has to be cheap. cheap to own and cheap to operate. It is used to clean polluted rivers till the water is clean enough for drinking"

- Cryodesalination is meant because waters high in sulphates, can be treated using Barium salts to precipitate out barium sulphate. Recovering the Barium, sulphur and lime may generate sufficient revenue to pay for the whole process. **Ian Pearson**

- We also liked the product of **Bhaskar Mallimadugula.** He suggests a product to grow Diatom Algae in lakes and reservoirs. A 'waste to wealth' solution that keeps the lakes and reservoirs clean, reduces bacteria, mosquitoes and increases fish catch (diatoms are the best foo

for fish).

- Know this? Wastewater turns into usable fresh water through Bio-Solar Purification: based on the combination of sun on photosynthetic micro flora in tubular photo-reactor. By **Laurent Sohier**
- **Greg Chick** came with a simple but maybe effective idea of local pedal driven pump stations supplied with a filter to pressure dispense drinking water. Can he cooperate with you?

Maria Alice van Genne-Bogado Fernandes

Clean the river

About covered and polluted rivers, please listen to this Ted talk form : "Aziza Chaouni: How I brought a river, and my city, back to life". You will see that if politicians understood how they could make valuable changes for everyone and not only to themselves, the quality of life in huge cities coulc change. Certainly the micro climate!

Helena Chaja Heyning

International competition

Another way of getting good & innovative ideas is to organize an international competition like New York did after Sandy -the most incredible solutions came up incorporating al kinds of approaches and disciplines: urban planners, architects, geologist, water and infrastructure managers, public managers, civil engineering, etc. etc.

BetterWorldSolutions

Global best practices collected

Because there is a lot of experience world wide, it must be possible to make a list of best practices from all over the world. From smaller cities to th large ones like Sao Paulo. Maybe we have a contact who can help us making this list including the best practices from London.

Jullie Ann Futcher

3 cities are using smart tactics to manage water for the future: Las Vegas, Philadelphia and Austin

- **Low-flow and water-efficient indoor fixtures have been a big part of the change**
  The savings are tremendous, but indoor water use in the U.S. averages 55 gallons per person per day. That's because lots of people still have ol

toilets and faucets in their homes that use way more water than necessary. Off-the-shelf efficient fixtures, if universally deployed, could bring the usage rate down to between 30 and 35 gallons

One of the things Dallas has done that has shown a lot of leadership is go to a two-day watering schedule, adding that the city went to that model long ago and has stuck with the limit even in wetter years. Savings are at least 10 percent from that one measure alone.

- **Incentives**

  In the parched deserts of Nevada, the SNWA is making much-needed progress, in part by instituting rebates and other incentives for replacing lawns with water-efficient landscaping. Las Vegas has changed a lot since SNWA has gotten serious about water conservation. Southern Nevad has the largest budget for water reduction in the United States. They have, on a very large scale, gone after outdoor water use. They've realize it's insane to have grass in a desert. They have good analytics on what works and doesn't work — and they follow up.

- **Leaks**

  A lot of water is also lost from underground leaks, although the cost and difficulty of infrastructure repair can be a tough sell.

  The Massachusetts Water Resources Authority [MWRA] is not as active in water conservation right now in part because they don't need to be. But in the 1980s they were way over sustainable levels. They really went after unaccounted for leakage, reduced it by 50 percent. In part because of that effort, the MWRA has reduced usage by 40 percent since the late '80s, despite significant population growth over the same period. It really demonstrates what you can achieve with infrastructure.

Green stormwater infra initiatives

the way green stormwater infrastructure initiatives, such as those in **Philadelphia** and **Austin**, are transforming traditional approaches to water management. These are partnering with other environmental concerns. Over time, green infra strucuture is going to start changing our whole idea of the landscape and our relationship to the landscape.

Maria Alice van Genne-Bogado Fernandes

Prevention, for instance, is always better than repair

Take a look at the Guarani Aquifier here

The population of São Paulo is starting to taken some small initiatives to save water. But they are by far not enough considering the gravity of the problem.

Wytze Boomsma- Dutch Water Manager

water infrastructure in order to collect (rain)water in cities – the Netherlands

- Water care eg. AquaFlow
- and the Water Plaza in Rotterdam

It might be much better in the future to ensure small closed water systems which capture, recycling and re-use remains within the districts

Look also at

- Zuid Africa - water in the streets
- Vancouver - Canada
- Melbourne is business as usual; record of $182.2 million invested by City West Water in vital infrastructure

Maria Alice van Genne-Bogado Fernandes

Groundwater resource Aquifer

The Guarani Aquifer

The aquifer is delimited to 2 geological structures that have exerted a control on aquifer thickness and depth, and today influence regional groundwater flow:

1. The Ponta Grossa Arch (in the north of Parana State Brazil), which forces groundwater to flow from east to west in Sao Paulo
2. The Asuncion-Rio Grande Arch, which divides the portion south of the Ponta Grossa Arch into 2 semi-independent sedimentary basins – the Central Parana and the south western Chaco-Lower Parana

•

A few goals from the project plan (period 2003 – 2007)

- Design and implementation of an aquifer monitoring network that provides results early in the execution phase. (5% of all wells)
- Information system which provides the technical basis for decision making for the sustainable use of the auifer
- A strategic Action Prgram which facilitates and supports solutions to emerging problems of pollution and over-exploitation and other stresse

that may threaten sustainable development of the aquifer

- Increase expertise within the region on groundwater management
- Promotion of public participation, social communication and environmental education

The Guarani Aquifer Program has completed a full inventory of production boreholes in the SAG which indicates current resource exploitation to total 1.04 km3/a, with 94% in Brazil (of which about 80% is in São Paulo State), 3% in Uruguay, 2% in Paraguay and 1% in Argentina. Some 80% of the total is used for public water-supply, 15% for industrial processes and 5% by geothermal spas.
(source) The Guarani Aquifer Initiative – Towards Realistic Groundwater Management in a Transboundary Context (report)

This is what we found in the report sustainable Groundwater Management MERCOSUR:
From Sustainable Groundwater Management: Concepts and Tools - Sustainable Groundwater Management - Lessons from Practice

- Both Paraguay and Uruguay are unitary states with responsibility for groundwater resources resting wholly with the respective national governments, and :
  - in Uruguay there is a clearly stated 'water resource code' and a specific decree dealing with hydrogeo-thermal energy and establishing an advisory committee – the competent authority is the Dirección Nacional de Aguas y Saneamiento (DINASA) although they have no jurisdiction over pollution
  - in Paraguay the national water law has some relevant issues still pending regulation – the Secretaria del Ambiente (SEAM) having responsibility for water resources and the Empresa Reguladora de Servicios de Saneamiento (ERSSAN) for the regulation of water services.

  In contrast, both Brasil and Argentina are federal countries in which the administration of groundwater resources has been largely delegated to state or provincial government – but various states/provinces (including some large ones) have not yet evolved adequate institutional capacity and/or are not very active on implementation.

At international level an important legal outcome of the FEF-Program is the agreement for continuing regional cooperation on SAG management and protection through:

1. Assuming direct responsibility for continuation of the main activities, with each country responsible for providing (in coordination with the others) the necessary tools and resources – SISAG database management (Argentina), groundwater monitoring and modeling (Brazil), capacit building and dissemination (Paraguay) and coordination of activities and office-base (Uruguay)
2. Continuation of the activities initiated in the pilot projects – with Concordia/Salto being coordinated by Argentina, Rivera/Santana by Urugua

Riberao Preto by Brazil and Itapua by Paraguay

COUNTRY	PROVISION	SCOPE
Argentina	Federal Groundwater Plan (2009)	• all provinces involved in SAG agreed on plannng and coordinating groundwater management
	Thermal Water Act of Entre Rios (2006)	• regulatory framework for hydrogeothermal resources
	Guarani Aquifer Act of Chaco, Corrientes & Misiones (2004, 2004 & 2006)	• provisions on use and protection of SAG through declaration as provincial public domain
Brasil	CONAMA Regulations (2005 & 2008)	• provisions for waterbody classification • waterwell protection areas and potential pollution control
	CERH Deliberation Sao Paulo (2005)	• restriction areas and control of abstraction and use of groundwater
Paraguay	National Water Act (2007) SEAM Resolutions (2005, 2006 & 2007)	• management and protection of water resources • guidelines for borehole drilling for groundwater abstraction • regulation of water councils • national register of water rights
Uruguay	Constitutional Amendment (2004) Water Policy Act (2009)	• public domain and management principles for groundwater • possibility of creating local 'groundwater management committees'
	National Decrees (2004 & 2006)	• technical guidelines for deep borehole drilling • National Commission of Water & Sanitation set-up

The GEF-Program was essentially 'preventative' in character and cooperative in nature – there being no major 'crisis issues' to resolve and many benefits potentially accruing from cooperation between the countries.

PILOT PROJECT	ADVANCES	RECOMMENDATIONS
Concordia-Salto (Argentina-Uruguay)	• local transboundary committee (with branch in each country) set-up to support Pilot Project activities (CLAP) – although inactive since GEF-Program ended • municipalities agreed registration of deep borehole drilling and quality control for water re-use and effluent discharge	• agreement between municipalities needs to be implemented by specific actions (eg. sampling, analysis, monitoring, etc) • technical guidelines on deep borehole drilling should be reinforced by incorporation in provincial regulations of Entre Ríos • consider tariff collection to support strengthening management at local level
Itapúa (Paraguay)	• local committee set-up to support Pilot Project activities (CLAP) • relevant interaction developed amongst local government, stakeholders, academics, municipalities, etc • CLAP interaction with Comisión Aguas del Arroyo Capiibary	• control of activities should be delegated by municipalities to CLAP technical support • agreement between university (FUCAI) and national government (SEAM) could be implemented for monitoring, etc • divulgation of new Water Law regulations amongst stakeholders with CLAP support
Ribeirão Preto (Brasil)	• federal and state regulations have been implemented at local level, in parallel with development of specific protection and control measures with support from Comité de Bacía do Rio Pardo (CBRP)	• involve authorities at all levels in CBRP to articulate groundwater management needs in respect of municipal land-use controls • strengthen regulatory control through dissemination fora with support of CBRP • institution strengthening and capacity building in land, environment and water resources management
Rivera-Santana do Livramento (Uruguay-Brasil)	• local transboundary commission was set-up to support Pilot Project activities (COTRAGUA) – although inactive since GEF-Project ended • international agreement to cover shared water resources and environmental management issues	• international cooperation agreement could be implemented for specific actions, such as information exchange on waterwell abstraction • COTRAGUA could articulate modifications to land and water use plans based on information generated by GEF-Program

Institutional advances of the GEF-Program for improved Local-Level Groundwater Management

Priorities: international cooperation should focus upon:

- Finding practical mechanisms and financial means to continue the Pilot Projects in as much as these not only deal with hotspot issues but provide very practical insights about managing SAG Groundwater resources in general
- Continuing the further development and operation of the SAG database (SISAG) and the regular exchange of scientific data and management experiences
- Promoting a research forum and initiating further collaborative research projects on key topics on which there remains significant scientific uncertainty including the following (in order of decreasing importance):
  - The impact of major land-use changes in the SAG recharge areas on groundwater recharge quality rates
  - The vertical variation of groundwater quality in SAG recharge areas under both urbanization and intensive agriculture pressures
  - The geographical variation in the rates of – and controls on – SAG recharge in weakly-confined basalt-covered areas
  - The monitoring and modeling of SAG response to major groundwater abstraction from the highly-confined zone of the aquifer, and any localized natural discharge from this zone

About the Aquifer

The Guarani Aquifer located beneath the surface of Argentina, Brazil, Paraguay, and Uruguay, is one of the world's largest aquifer systems and is an important source of fresh water.[1] Named after the Guarani people, it covers 1,200,000 square kilometers (460,000 sq mi), with a volume of about 40,000 cubic kilometers (9,600 cu mi), a thickness of between 50 meters (160 ft) and 800 meters (2,600 ft) and a maximum depth of about 1,800 meters (5,900 ft). It is estimated to contain about 37,000 cubic kilometers (8,900 cu mi) of water (arguably the largest single body of groundwater in the world, although the overall volume of the constituent parts of the Great Artesian Basin is much larger), with a total recharge rate of about 166 km^3/year from precipitation. It is said that this vast underground reservoir could supply fresh drinking water to the world for 20 years. Due to an expected shortage of fresh water on a global scale, which environmentalists suggest will become critical in under 20 years, this important natural resource is rapidly becoming politicized, and the control of the resource becomes ever more controversial. (source Wikipedia)

Link to the report: **http://www.oas.org/dsd/Events/english/Documents/OSDE_7Guarani.pdf**

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