

Cracks-Sealing Bacteria and Multi-Usage Bamboo

The Sultan Qaboos Academic Chair for Quantitative Water Management assists with a holistic solution for drought problems in the Chinese province Yunnan

Last year Prof. Dr. Ruud Schotting, holder of the Sultan Qaboos Academic Chair for Quantitative Water Management at Utrecht University/Roosevelt Academy in The Netherlands, joined an experts study mission organized by the PA International Foundation (www.pa-international.org) to the province of Yunnan in China. The mission, which equally included a representative of the Government of Oman, aimed to develop a holistic approach to the multilayered problems in the Chinese province of Yunnan, caused by six months of drought, lack of infrastructure, lack of energy, lack of food. A severe drought event in spring 2010 caused more than 20 million people short of drinking water in this region. This aroused not only a public awareness of the drought vulnerability in this region but also the need to develop new means for water management strategies for building drought resilient societies.

Against this background a first ever large-scale test is soon envisaged in China, focused at the creation of man-made underground water masses (aquifers) through the new 'BioSealing' technology. This technology seals off cracks in the rock bottom under layers

of earth, thus creating the possibility for underground water basins. On top of such basins bamboo and other relevant plants providing biodiesel can be planted, thus contributing to water sources, food through bamboo sprouts, construction materials through bamboo trees and biodiesel through several other plants.

Prof. Schotting wrote about his visit to Yunnan in the 'International Ecology and Safety' magazine of the Chinese Eco-Safety Cooperative Organization IESCO. The article is provided below.

Reflection on the drought in Yunnan

My first trip to China was a trip of huge contrasts. The journey started in Shanghai, where I had to deliver a speech at the opening ceremony of the Holland Water Week, organized by the Province of South Holland. I was truly impressed. My hotel was located next to the Shanghai TV tower. What a beautiful place to be! After two days in Shanghai we headed for Beijing. In Beijing we visited the world-famous Institute for Water Resources and Hydropower Research and, moreover, Tsinghua University (the Hydrology Department). These

visits were not just for fun: they were part of the preparations of our team for the Yunnan mission. Many important institutions, organisations and experts took part. Among them, the Sultanate of Oman, known for its historic interest to manage water as key requirement for survival. So why a mission to Yunnan?

Yunnan is one of the poorest provinces of China. In Yunnan, the average income of 95% of the people is approximately 300 Euro a year. Recently, Yunnan has suffered from extreme droughts. For almost half a year: no rain! Fortunately, this has caught the attention of the Prime Minister on China. One of the important questions is how regions like Yunnan can prepare to face serious droughts in the future. Drought preparedness is as important as flood preparedness. Yunnan receives a lot of recharge (= rain) during the wet seasons. However, all this water goes down the drain. Which drain you might ask? The answer is quite simple: through the fractures and cracks in the Yunnan rocks.

From Beijing we headed for Kunming in Yunnan. In Kunming three four-wheel cars, with fortunately extreme-

ly experienced drivers, were waiting for us to guide us through the mountains of Yunnan. Although I normally suffer from serious vertigo, I was never ever afraid. We had to drive on unpaved roads, climb mountains by car and look down: the most astonishing and beautiful sights I have ever seen in my life! Grand Canyon is nice, but Yunnan is absolutely far better!

We did not go to Yunnan for holidays. Yunnan suffered from drought and should be prepared for the next drought to come. Our mission, organized by PA International, as part of their company social responsibility program (CSR), aimed at an integral approach. Not only a change in local water management, but also a change in growing the right crops leading to less soil erosion, and an increase of income.

How to get there? Maybe changing from corn to bamboo might be an excellent idea. Bamboo decreases the erosion of the Yunnan soil, provides food, and moreover, could sustain local industrial activity. Bamboo chairs, tables and even bamboo houses!

So what about the water problem in Yunnan? Let's think out of the box! Why don't we use natural processes to solve a problem? Why don't we build with nature? Let's use naturally present bacteria to seal the 'drains' (i.e. fractures in the Yunnan rocks) to create subsurface water reservoirs? This is extremely challenging! This might lead to storage of huge amounts of fresh water in the subsurface. Normally this fresh water goes down the 'drain', but due to naturally occurring bacteria the fractures can be clogged. Almost four field experiments have shown that this technique works. During my trip in beautiful Yunnan, I got convinced that these small bacteria could help us to solve a serious problem: store water in the subsurface. The Yunnan subsurface. Why not?



On-site fact finding and information gathering. Prof. Schotting is second from the left.



Bamboo

