



CHALLENGE OF RAIN- WATER HARVESTING

CREATING AWARENESS AND EDUCATION

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Environmental protection can be defined as the basic provision for the continuing existence of mankind. Unfortunately the awareness of such an understanding is not automatically available even though everybody must contribute towards it.

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◀ Fig. 1:

SALEM COLLEGE: GROUNDWATER RECHARGE BY RAINWATER FROM PLANTED GREEN ROOF

noted with interest the remark by the Hamburg Environmental Authorities that rainwater utilization plays a main part in this respect. In their opinion the utilization and processing of rain water will help bring about a growing awareness of environmental problems to other trade branches such as heating, road traffic, etc.

fbr ASSOCIATION FOR ADULTS

The fbr was founded in 1995. Its purpose is to promote water recycling and rainwater utilization, save drinking water and reduce sewage. Its responsibility lies in the creation of a provision against future contingencies, while at the same time taking into account all aspects of environmental protection, science and research.

It is a German nation-wide professional association of people, companies, local authorities, offices, specialized trading companies and institutions interested or already actively involved in water recycling and rainwater utilization. The association is a registered non-profit-making (NPO) organisation with its headquarters in Darmstadt, Germany. The fbr is a non governmental organisation (NGO). www.fbr.de

Within the association, members are active in work groups dealing with all the topics in the field of water recycling and rainwater utilization. Members are people, companies, local authorities, offices, specialist trade associations and institutions interested or already actively involved in the use of water recycling and rainwater utilization.

Since 2007 the fbr helps to organize the European branch of International Rainwater Catchments Systems Association (IRCSA). www.ircsa-europe.com

HOW TO INSPIRE CHILDREN

All of us must endeavour to educate the next generation to deal responsibly with energy and water. When I installed the rainwater harvesting system on my premises 16 years ago, I included a water level gauge which shows the height of the water level in the underground storage facility. This is of course completely unnecessary for the proper functioning of the system, as mains water make-up is automatically effected when so required.

When it rains and the children cannot go into the garden or play ball in the streets then they can go down to have a look at the level gauge and then after a few min-

◀ Fig. 2:

STEINER SCHOOL ÜBERLINGEN: TILE COVERED ROOF AS A COLLECTION AREA FOR RAINWATER



utes come proudly up to pronounce: "Well Dad, the rain has again provided more water for storage". Simple devices like this can help children become aware of the environmental aspects of rain which they would otherwise regard as negative.

WATER THEATRE

In 1993 the pedagogical concept of the Water Theatre was born. The Ministry of the Environment of the German state of Hessen, in cooperation with the Natural Protection Centre at Wetzlar/Hessen, developed this idea for pre-school aged children. With puppets they showed the adventures of a raindrop. During the first seven years funds have been made available for 200 performances of this theatrical group under the direction of Mr. Lemb.

RAINWATER HARVESTING IN SCHOOLS

Salem College is the latest addition to the school at the Salem Palace, in the town of Überlingen on Lake Constance. Prince Max von Baden and Kurt Hahn, the great educator and reformist, founded this school, which is rich in tradition, in the 1920s. Since October 2000, nearly 100 students have been housed in this college, the largest private school in Germany. This insti-

Fig. 5:

STUDENT BUILDING IRRIGATION SYSTEM WITH RAINWATER AT STEINER SCHOOL



◀◀ Fig. 3:
**SALEM COLLEGE:
GROUNDWATER
RECHARGE BY
RAINWATER FROM
PARKING AREA
SURFACE**

◀ Fig. 4:
**WATER FESTIVAL
ÜBERLINGEN:
STUDENT PRE-
SENTING HIS
PROJECT**

tute is sponsored by the Deutsche Bundesstiftung Umwelt (German Federal Environmental Foundation) as an official project of the World EXPO 2000, Hanover. In a headline in the school's promotional brochure, the administration proudly declares that: "Rainwater utilization is a prime example of how ecologically compatible processes can be employed without impacting water quality." Water not being collected for utilization, (such as from parking area surfaces and from the dormitories' planted roofs) is infiltrated into the ground as groundwater recharge.

STUDENTS MONITORING

The stated objective of the educators is to demonstrate the ecological aspects to their students in a clear and understandable manner. Instruments that monitor and control water and energy consumption demonstrate daily use; this provides an increased awareness of the technology applied and provides facts and Figs. that back up theories.

STUDENTS PRESENTING AT A CONFERENCE

As part of the Überlingen Water Festival in October 2004, I was asked to organize a conference for students from schools of the Lake Constance region. The presentations were made by groups that worked on water projects in the school. One of those groups was the Burg Hohenfels School. Ten year olds taught fellow students

JAPANESE RAINWATER MUSEUM

As secretary general of PPRU (People Promoting Rainwater Utilization) and a chief of rainwater utilization promoting section of Sumida City Hall, Dr. MURASE organized the rainwater museum project. The first Rainwater Museum was created in a used elementary school in Sumida City by PPRU and opened on May 14, 2001. Sumida City commissioned PPRU to make the Rainwater Museum. Another theme of the museum is the expected water crisis in the 21st Century and ways in which rainwater utilization can mitigate this water crisis not only in Japan but all around the world.

SAFETY EQUIPMENT FOR DISASTERS IN TOKYO

Rojison literally means 'roadside respect' and indeed it is a symbol of neighbourhood safety and protection. Rainwater is collected in an underground tank from the roofs of nearby houses. This water can be pumped up with a hand pump and used in emergencies, to extinguish fires or in case of an earthquake. Local children use it in the summer to play and rojison water is also used to grow organic vegetables. Rojison are a familiar sight in the Mukojima area of Sumida, Tokyo.

Fig. 6:
**STEINER SCHOOL:
STUDENT BUILDING
IRRIGATION SYSTEM
WITH RAINWATER**



how to save potable water without reducing hygiene standards. Daniel Schmech, as the representative speaker for this group, was happy to announce that after half a year the school reduced water consumption by 30%. The money that had been saved by reducing water consumption was given to a water project of development in Guinea/Africa.

STUDENT BUILDING A RAINWATER HARVESTING SYSTEM FOR HIS SCHOOL

Another initiative in 2004 was the irrigation project at Steiner school in Überlingen. 18-year-old Manuel Oeder presented the ideas and results of his one year of studies. The task was to use the rainwater from the roof of the school for the irrigation of vegetables.

At German Steiner schools, the younger students learn how to grow vegetables as a lesson. The vegetables which are harvested are used in the kitchen of the school's restaurant. So irrigation by rainwater from the roof of the school helps to reduce storm water runoff problems in the city and at the same time it helps to feed the students. Manuel had to find professional help to plan and realize his project. It was his challenge to organize the project without help from his school. He asked me for advice and some companies for funding. The BOMMER plumbing workshop nearby supported him with tools and material. A manufacturer of rainwater harvesting systems, GEP, donated the pump and fittings. In the end he exhibited his project in Überlingen as part of the Water Festival. His teachers encouraged him to give a presentation to the public. Now the school saves potable water and has some contribution to the natural water cycle.

Fig. 7: ▶▶
**MIYAKE ISLAND
ELEMENTARY
SCHOOL: SUPPLY
OF TAP WATER
(LEFT) AND RAIN-
WATER (RIGHT)**



Fig. 8: ▶▶▶
**MIYAKE ISLAND
ELEMENTARY
SCHOOL: RAIN-
WATER BASIN
WITH GOLDFISH**

CELESTIAL WATER ON PACIFIC ISLAND

Miyake is a Japanese Island of volcanic origin in the Pacific, located 200 km south of Tokyo. The technological age has also arrived here. The nearly 4000 inhabitants do not lack PCs or mobile phones: water, however, is a scarce commodity. Here, rainwater is not allowed to run off, since it ranks highly as so-called „celestial water“. Sedimentation appears to be the prevalent purification process used. Traditionally goldfish, that swim in places that can be easily viewed in the cistern, are used to determine the toxicity of the water.





TEACHER OPENING RAINWATER DOWNPIPE

In the Bruckfelden School near Überlingen therapy workshops were extended for children and teenagers with handicaps. At the new building close to the classroom the down pipe was changed from a traditional closed round tube to an open U-shaped form. When the rain falls, students now can see and even touch the water running down towards the cistern. So they get a demonstration of the physical effect and thus believe that a fluid does not fall down like sand or other hard materials, but comes slipping along the down pipe profile, whatever shape it has. Knowing this effect, 20 years ago one of the most successful filter products for cleaning rainwater was developed by Norbert Winkler.

CHILDREN'S HOME WASHES WITH RAINWATER

The Breisgau metropolis Freiburg is known worldwide for its ecological commitment. For the „green“ mayor Dieter Salomon, the secret of the environmental head-start lies in the special „Freiburg mixes“: the communal-political decisions of the city, the commitment of the people in the region, the active support of the regional electric utilities and many organisations, institutions and companies. One of these institutions is the „Haus Tobias“, it lies at the edge of a forest above Herdern. It houses residential groups, a kindergarten, a school and a therapy workshop for children and teenagers with handicaps. The supporting organisation of the facility is the remedial Sozialwerk Freiburg e.V. Since 1968, the „Haus Tobias“ has been a fixed component of the social and pedagogic structure of the city of Freiburg in Breisgau. The extension of the home and school in 2003 helped meet the constantly increasing demand for space. The number of spots in the home could



then be stepped up from 15 to 45. A total of about 130 children are cared for here.

Fig. 9+10:
**BRUCKFELDEN
SCHOOL: U-SHAPED
OPEN DOWN PIPE**

WATER, A “GIFT FROM THE SKY”

In „Haus Tobias“, the relief rainfall is „harvested“, which the clouds of meteorological depressions leave on the hillsides of the Black Forest. In this way, more than 1000 millimetres of precipitation are collected per year. That's 1000 litres per square metre of free raw material, or a gift from the sky, depending on the way you look at it.

The philosophy of the social facility: The lasting interaction with nature is a prerequisite for the basis of existence of the following generation. Keeping additional costs in mind, the new building was equipped with a planted green roof and rainwater utilisation. Rainwater here isn't only considered to be a raw material, but also an element of the natural cycle. Before it reaches the earth, this water undergoes a fascinating metamorphosis in the atmosphere and is too valuable to conduct it directly into the sewage system. Now there is only overflow from cisterns when these are full and it continues to rain. The overflow could be fed to the groundwater through the ground; but seepage is not possible here due to the hillside situation. A stream is planned in the centre of the facility with the recirculation of the rainwater, which runs off the reinforced area of the square and paths. It is not yet clear how this will be financed since it depends on donations.

ENVIRONMENT RELIEVED, OPERATING COSTS LOWERED

A system was realised for utilising rainwater in order to collect it from the surrounding roof surfaces at a justifiable cost. The responsible planning engineer, Bernhard Bruse, recalls: „By using rainwater, drinking water can be saved and also the rain drainage in the sewage system can be reduced. The operator benefits from this financially, it relieves the municipal sewage system

Fig. 12: ►:
HAUS TOBIAS:
RAINWATER
COLLECTED FROM
THE ROOFS



Fig. 13: ►►
HAUS TOBIAS:
LAUNDRY WASHED
WITH RAINWATER



and contributes to protecting the environment". A washing machine's requirements are 200 l per week. The collection areas are 900 m² of extensively planted roof and 520 m² of roof surface with bitumen shingles. The storage tank size is 38 m³.

The caretaker Hans-Jörn Bosse is happy about the good performance of the system and explains: "The rainwater is cleaned in the central filter shaft, even before the cistern. Vertical sieves with a passage of less than 1 mm keep out the particles rinsed off the roof. Even floating substances, such as pollen, are kept out". The filter shaft and cistern lie underneath the central square.

Since commissioning the rainwater system in May 2003, more than 4 years have gone by. The managing director, Nikolaus Ebner, sums up positively: "We are satisfied in many respects. It was exciting to watch how far our rainwater supply can go. We were able to go through the dry summer of 2004 without having to use the drinking water feed. Even in the dry fall of 2005, the contents of the storage tank were enough to cover our high demand for the washing machines, plus the flushing water for the toilets and the irrigation of the outdoor installations. We are also happy that we haven't been able to tell a difference in the laundry washed with conventional drinking water from that washed alternately in rainwater."

CONCLUSION

Through applied projects such as this, students are proud to show the adult world what can be done for environmental protection as the basic provision for the continuing existence of mankind.

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Fig. 11:
FBR: EUROPE'S
BIGGEST NGO / NPO
FOR RAINWATER
HARVESTING



fbr

Fachvereinigung Betriebs-
und Regenwassernutzung e.V.