

About DWC:

DecRen Water Consult is consulting its clients in all aspects of an integrated and renewable based water supply and waste water management. By using decentralized, appropriate and renewable powered technologies we can ensure cost effective and individual solutions from a single source. Therefore the following product is an attractive product alternative.

Requirements

In the area of treating waste water appropriately there seems to be a number of technologies available. Depending on the quantity and quality of waste water and its desired cleaning objective the requirements are completely different. May it be waste water from the farming sector or from gardening, from smaller communities or from tourist resorts and hotels. Energy autonomous, technology appropriate and very robust on site waste water treatment systems are extremely important. Therefore those systems should be scalable and powered by renewable energies or based on natural principles.

Working principle of constructed wetlands

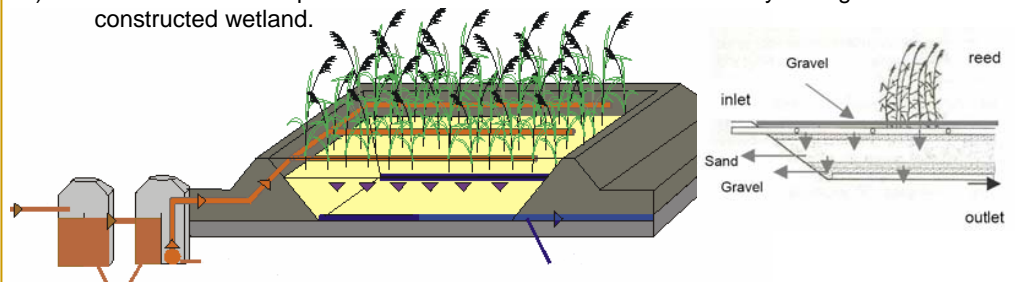


Pictures: Setting up and building constructed wetlands can be done using local workforce and material.

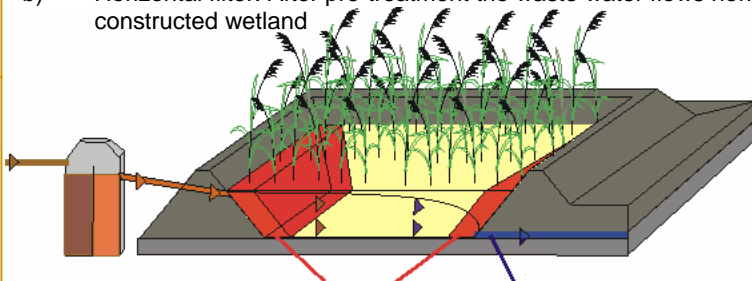
Constructed wetlands are principally using natural degradation processes and nutrient uptake but they are acting as "extensive systems". The high degree of biodiversity present in these systems allows multiple and various degradation mechanisms for several classes of compounds, and therefore higher performances in comparison with the technological treatment plants in which only few families of specialised bacteria are grown. The purifying processes take place without input of "human produced" energy by, for instance, oxygenating pumps. Furthermore there is no excess sludge to be removed since there is a balance of biomass growth and decomposition in the constructed wetland system. As a compensation to the low energy demand there is a relatively large area demand. Accordingly constructed wetlands are usually suitable and cost effective for small and medium size wastewater treatment.

Two types of constructed wetlands have emerged as standard waste water treatment solutions.

a) Vertical filter: After pre-treatment the waste water flows vertically through the constructed wetland.



b) Horizontal filter: After pre-treatment the waste water flows horizontally through the constructed wetland



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Sludge treatment

The treatment of domestic or municipal wastewater sludge is also possible using the principle of constructed wetlands. The sludge will be pumped into a similar designed wetland. Through evaporation and a drainage system for further treatment the sludge will dry without any further addition of energy. The plants will grow along with the raising sludge level. Its roots are constantly penetrating the drying sludge. The volume reduction through this system is over 90% so that after 8-10 years this process is finished and the sludge is transformed into reusable earth.



## Waste Water Treatment



### Decentralised waste water treatment in China, Shanghai, HuaXin

The city of HuaXin lies in the larger area of Shanghai. The wastewater situation required an ecological and economical solution. The demand of the local government was to reach this result, the local benchmarks must be met.

May 2003: HuaXin / Shanghai / China One year later:  
The vertical flow constructed wetland was settled into the channel. The first construction period was designed for a daily load of 80 m<sup>3</sup>. An extension for 600m<sup>3</sup>/d is planned.

The benchmarks for Shanghai to be matched have been: (DB31/199-1997):  
CSB 100 mg/l, TOC 15 mg/l, BSB5 30 mg/l,  
NH4-N 15 mg/l,  
Achieved results: CSB < 50 mg/l, TOC < 10 mg/l,  
BSB5 < 10 mg/l, NH4-N < 10 mg/l,

### Domestic or municipal wastewater

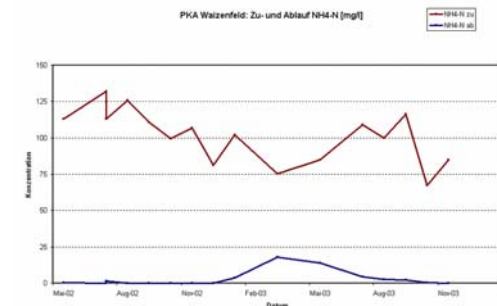
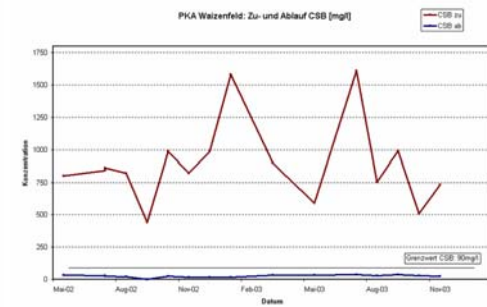
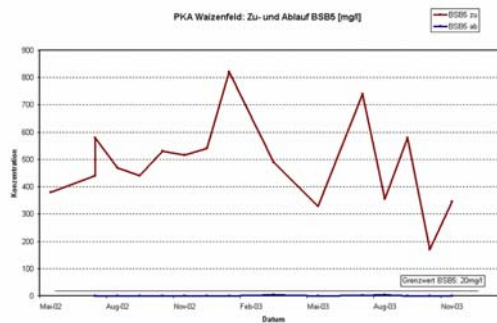
Treatment of domestic or municipal wastewater is currently a conventional application. There are several thousand of operating constructed wetlands worldwide, since more than 15-20 years, and the most used are the subsurface flow systems. The most available sets of monitoring data (like as the North American Database, the UK Wrc database, several European collections and so on) are related to this kind of application.

### Industrial wastewater

There are numerous possibilities also for industrial wastewater like chemical industry, laboratory effluents, landfills, acid mines... and agricultural or agro-food wastewaters like wineries, olive oil mills, dairy, and in general all the high organic content characterised waters.

### Ability of constructed wetlands to clean waste water

Despite fluctuating contamination (red line) properly planned, installed and maintained constructed wetlands can continuously match the different benchmarks like BOD, COD und NH4-N (blue line below).



Within the last 20-30 years various types of constructed wetlands have been developed in different countries. There is a wide acceptance and interest within the population because of the following advantages:

- Less expensive to build than other treatment options
- Simple construction, operation and maintenance
- Low operation and maintenance costs
- High ability to tolerate fluctuations in flow and inlet quality
- High process stability (buffering effect)
- Sludge produced only by the primary treatment stage
- High pathogen removal – good water reuse and recycling options
- Optimal aesthetic appearance

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*This product is in our view one attractive possibility to ensure a sustainable and renewable based water supply and waste water management. If this product is however applicable for your personal circumstances or in combination with other products or processes should be examined prior to its installation. Although we take extreme care of all data and information in this document we cannot be held responsible for any changes, omissions or errors.*