



Constructed Wetlands

**Eco-engineering systems for
wastewater treatment and sludge dewatering**

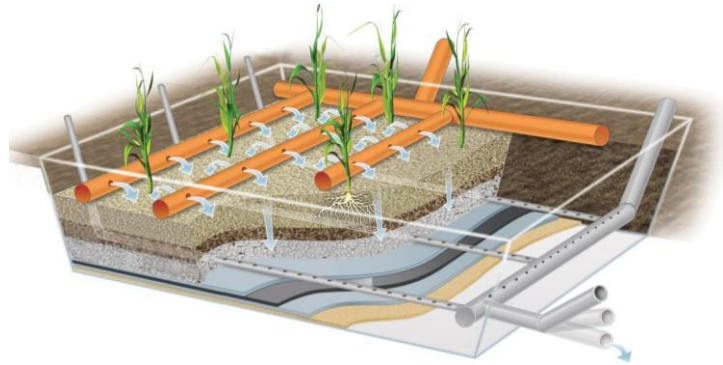


CONSTRUCTED WETLANDS



Constructed Wetlands (CWs) are natural systems for wastewater treatment and sludge dewatering and drying. A CW bed is an excavated basin filled with different layers of porous media (typically, locally available sand and gravel). Their main characteristic is the use of plants

(common reeds) which contribute to and promote the removal of various pollutants (e.g., organic material, nitrogen, phosphorus, pathogenic microorganisms, heavy metals)



through various removal/transformation processes (e.g., microbial consumption and metabolism, plant uptake, adsorption, filtration, precipitation etc.). A CW facility usually comprises two or more treatment stages of two or more parallel beds each, depending on the application characteristics (wastewater nature and origin, target pollutants etc).

ADVANTAGES

Compared to conventional treatment methods, CWs offer a series of advantages:

- ✓ Effective treatment, similar or even better than those of common mechanical methods.
- ✓ Reduced investment cost (up to 20-50%) within 3-5 years, depending on the application and including the depreciation of the initial capital cost, especially when land area is available.
- ✓ Reduced operation and maintenance costs up to 80%.
- ✓ Limited energy consumption up to 90% - use of renewable sources by plants (e.g., sun, air).
- ✓ No use of complex and energy consuming mechanical equipment– very few mechanical parts.
- ✓ Autonomous and silent operation – practically no odor production.
- ✓ No use of chemical substances.
- ✓ No need for specialized personnel to run the facility.
- ✓ No by-products (like sludge in activated sludge systems). The only by-product is the plant biomass which is harvested once annually and can be exploited as biofuel or for composting.
- ✓ Reduced greenhouse gas emissions up to 60%.
- ✓ Aesthetical - social acceptance, green appearance



APPLICATIONS



DOMESTIC AND MUNICIPAL WASTEWATER

- ◆ Single households, maisonettes or residential complexes (on-site treatment). Especially in regions where no sewer network exists and septic tanks are used and regular emptying of the tank is needed.
- ◆ Facilities like hotels, resorts, enterprises, commercial centers etc.
- ◆ Small / medium settlements, villages, communities, municipalities.
- ◆ Settlements in remote, mountainous, agricultural, insular areas
- ◆ Upgrade/expansion of existing conventional treatment plants as tertiary stage.
- ◆ Collection and treatment of urban runoff, combined sewer overflow, highway runoff etc.



WASTEWATER FROM FOOD INDUSTRY & AGRO-INDUSTRIAL WASTEWATER



- ◆ Olive mills
- ◆ Dairies / cheese dairies
- ◆ Wineries
- ◆ Vegetable washing waters
- ◆ Livestock farms, piggeries

INDUSTRIAL WASTEWATER

- ◆ Tanneries, Petrochemical industry, Airport field runoff, Metallurgic industry, Mine drainage
- ◆ Chemical industry
- ◆ Polluted groundwater in industrial areas, e.g., refinery sites
- ◆ Drainage from gas storage facilities
- ◆ Landfill leachate, textile industry



SLUDGE DEWATERING AND DRYING



- ◆ Management of sludge produced in conventional activated sludge plants or in drinking water plants is a major problem. Sludge Treatment Wetlands (STWs) represent an ideal and cost-effective green solution for the on-site management, providing a solution to the disposal issue of the daily sludge production. The final product of STWs after the first operation cycle (8-12 years) is a valuable material which can be exploited as a fertilizer, soil amendment etc.

SERVICES WE PROVIDE



Ecosafe can and provides integrated solutions based on the specific needs of each customer, with multiple services:

- ▶ Wastewater characterization for each application
- ▶ Feasibility and optimization tests using small pilot plants prior the full-scale implementation, especially in case of specific/industrial wastewater
- ▶ Study and design of CW facilities
- ▶ Construction of CW facilities - Project management
- ▶ Supervision and maintenance of the CW facility
- ▶ Customer training
- ▶ Monitoring and evaluation of treatment performance (chemical analyses)
- ▶ Technical and scientific support, after-sales services
- ▶ R&D (Research & Development)

Our company develops cooperation with research institutes, industrial bodies and organizations for the configuration of the optimum and innovative technological solution and the exchange of knowledge and expertise.

We participate in national, European and international research projects and conferences which bring close industrial, research and market partners.

In Ecosafe we study and design each application separately, based on the customer needs and the wastewater type and origin, aiming at providing the optimum CW solution in terms of technical efficiency and cost-effectiveness.

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