

Managing systems

The main advantages of phytodepuration are: frequently excessive purification (removal of bacteria, virus, organic substances, suspended solids, ammonia etc.) as well as being extremely simple and economic; absence of mechanical organs (pumps, turbines etc.); absence of electric energy; relatively low plant costs part and almost no running costs; low maintenance; high tolerance to variations in organic waste (seasonal fluctuations in population) and water levels (following strong rains), absence of noise and bad odours. Strengthening the logics of recycling refuse (metallurgical waste) via bioconversion into usable resources or at least harmless to the environment, is also one of the reason - not of secondary importance – why phytodepuration development has been sustained over the last few decades.

Aesthetically, a phytodepuration plant is a natural reed, therefore it blends in very well with the environment, is compatible with tourism and even pleasant to see.

The areas best suited to place a phytodepuration plant are agricultural, marginal and semi-natural. The role of phytodepuration is, in fact, to integrate the natural environment's own self-depurative functions, limiting consumption of conventional energy and mitigating visual impact.

Phytodepuration can be considered restoring vegetal filter areas along waterways and wetlands degraded by excess eutrophicated wastes and recovering abandoned wetlands.

There are, nevertheless, some elements of risk in phytodepuration technology that must be taken into serious consideration in order to efficiently manage the system:

- ◆ *The system has to be correctly sized:* the project and sizing are crucial phases with the aim of assuring that the plant complies to the specifics of the expected and requested waste both at the initial stage and throughout the life of the system. Initially, where selected plants are in the growth process, a correct plan will give optimal conditions. Equally important is the choice of sand/gravel granulometry for the bed, so as to guarantee good water control.
- ◆ *Treatment plants need water:* in tropical climates, phytodepuration systems will need a water supply to treat relatively constantly, so as to assure the evapotranspiration level doesn't exceed the volume of wastewater. These systems, in fact, are provided with plants typical of marshy environments that need a saturated wet environment; therefore specific calculation of water supply is needed. If the calculation shows negative supply, additional water must be catered for or an alternative solution should be scheduled.
- ◆ *Bugs: slow moving or still water tubs produce risk areas for the proliferation of mosquito larva.* This problem is eliminated however thanks to two factors typical of "constructed wetlands": a) the waterline appears only for small stretches and brief moments b) the dynamics of

wastewater provokes constant exchange, checked by the hydraulic system of regulating the water table.

- ◆ *Damage caused by wild animals:* it is advisable to provide an enclosure to protect the systems from this problem. This is important especially in the initial phase when plants are small and vulnerable to physical impact.

- ◆ *Odours:* hydraulic control assures that the upper part of the bed is frequently aired; this way the potential accumulation of debris will be treated in an aerobic stage that will minimize odour.
- ◆ *Bacteria:* in general the waters to be treated contain a high number of bacteria, (“constructed wetlands” are one of the technologies that most provokes bacteria reduction), measured specifically by the differences between in-coming and out-going.
- ◆ *Collecting or setting light to biomass:* the treatment system will withstand collecting or setting light to biomass as the plants will quickly reappear. In tropical cities, biomass can be collected once or twice a year without re-growth problems. In moderate climates, however, with very low winter temperatures, it is recommended to leave the biomass so it isolates the bed and therefore prevents heat loss that could cause serious chilling to the bed.
- ◆ *Lack of maintenance:* the treatment system capability will be reduced if maintenance is neglected or unsuitable.
- ◆ *Improper mechanical pre-treatments:* an inappropriate mechanical pre-treatment device will cause vast sand/bed particles to enter, provoking greater concentrations of bacteria and emission of unpleasant odours.