



REED BED FILTERS

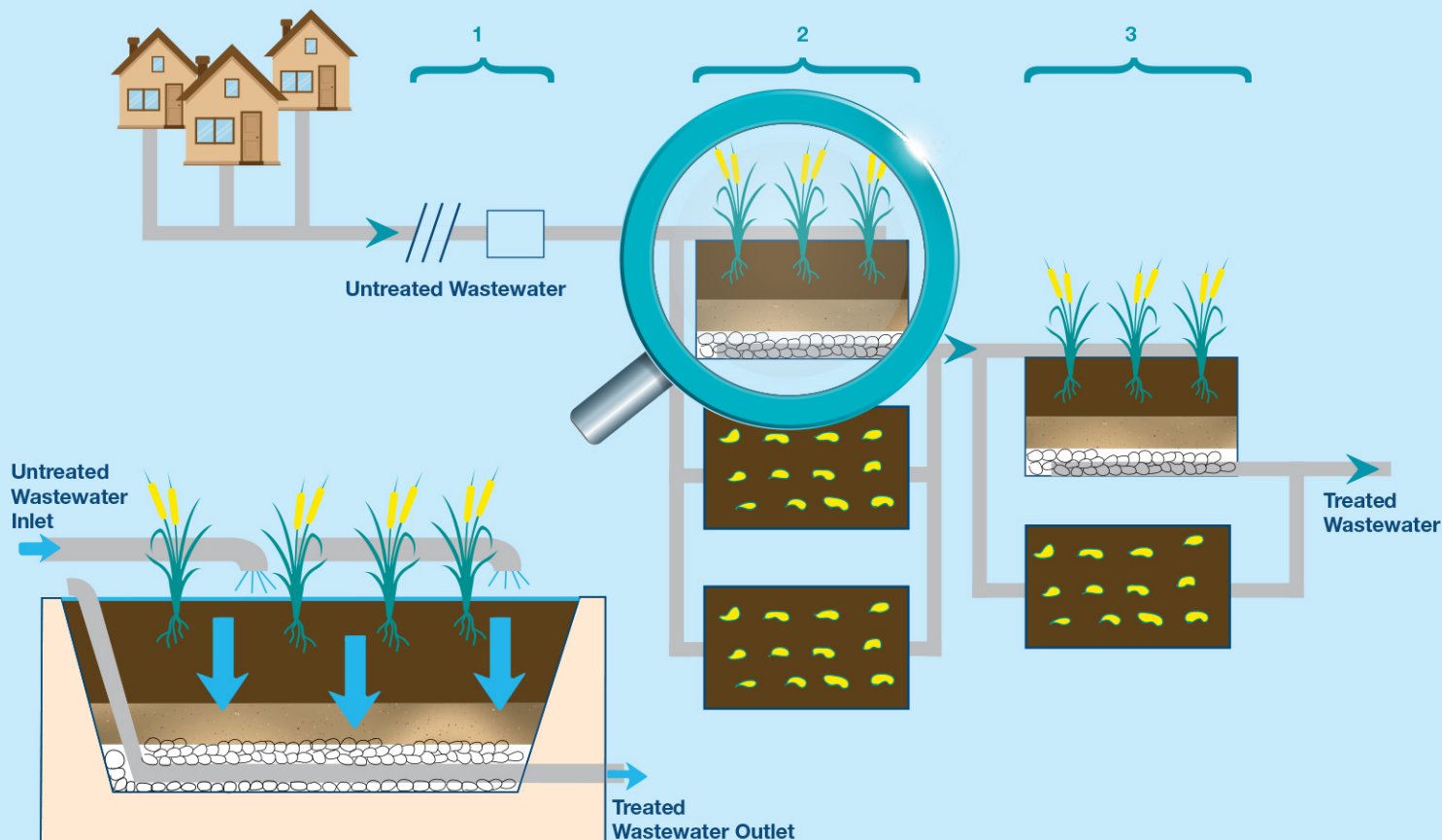
The treatment of wastewater is meant to reduce pollutants in the treated water in order to limit pollution of the natural environment. Wastewater treatment plants are said to be natural once they rely on natural technologies of wastewater treatment. They are responsible for the treatment stage in the overall wastewater collection and treatment process. These imply normally low cost and easy techniques of water treatment that do not require energy input.

WHAT IT IS ?

This water purification process based on reed bed filters treats wastewaters the same way swamp waters are naturally filtered. Wastewaters run through two consecutive filter layers filled with gravel material and planted with reed plants. Several treatment systems can be designed, yet, this sheet describes the technique implemented in North Lebanon, namely in Bcharre.

The purification process works as follows:

- The structure filled with gravel or sand holds suspended particles and solids
- Gravel and reed roots develop associated bacteria responsible for the degradation of most organic material
- Reed roots avoid clogging the filters and help in the degradation of nutriment



The treating plant is composed as follows:

1. A screen that holds big particles
2. A first layer of three filter beds held in parallel to be used in alternation
3. A second layer of two filter beds held in parallel

The system is efficient in reducing materials in suspension and breaking down dissolved organic material. It is less efficient with pathogenic germs, nitrogen and phosphorus.

IMPLEMENTATION CRITERIA

The number of users served	less than 2.500
Filters land area requirements	from 2m ² / inhabitant to 2,5m ² /inhabitant
Type of water treated	domestic
Maintenance	simple but regular
Special conditions	located down a slope of 3 to 4 m of the primary treatment unit to allow for gravity flow through the treatment train, and save energy required for pumps
Point of release	vertical infiltration under the second filter or release in the nature
Main costs of investment	purchase of the land, construction of filters: excavation, waterproofness, purchase of material and plants, etc.
Main costs of treatment	weekly follow up by a non-qualified technician, reed cutting and reed bed management, maintenance of equipment, and extraction of sludge every ten years approximately



RED BED FILTERS-FRANCE



RED BED FILTERS-LEBANON

THE MAINTENANCE

Grey water treatment systems do not require particular technical expertise. It mainly consists of following up the operation of the plant and ensuring the gardening services. Thus, the task is simple but requires regular follow-up. Three steps are essential for the proper functioning of filters:

- Weeding of filters the first year
- Adjust the level of reed beds every year, once they become dense
- Extraction of sludge from the first layer of filters every 10 years on average

A variety of routine maintenance checks are required regularly, these can go from weekly checks to yearly ones depending on the operations. This includes, for example, cleaning drainage pipes, sewage treatment, cleaning the screen, quality control of treated water, etc.

THE IMPORTANCE OF SLUDGE

The sludge resulting from reed bed filters can be used as a fertilizer for agricultural soil and plants. Direct sewage sludge spreading is possible depending on the quality of wastewater being treated as well as the characteristics of the receiving soil. It is also possible to compost the sludge by mixing it with other organic wastes. The waste resulting from the yearly trimming of reeds is green waste and can be equally composted. The compost produced can be used as a soil fertilizer.

+ ADVANTAGES

Adapts well to seasonal variations in population

Simple and low cost treatment

Operation in gravity, energy saver

No unpleasant sounds and smells, integrates well in the landscaping

Simple management of sewage sludge

Direct treatment of raw water

- DISADVANTAGES

Difficult in larger cities of more than 2000 inhabitants

Regular maintenance required and gardening work

An important slope is a must to avoid the use of pumps

Risk of insects and rodents

Significant land pressure

This technical data sheet is a brief presentation of a natural water treatment system that works well for small municipalities in Lebanon. The choice of the treatment technique should result from a local wastewater management strategy.

Steps to define a local wastewater management strategy

- 1- Define the needs based on: the national judicial and institutional framework; the characteristics of the land; the requirements of the users; the existing operating system**
- 2- Define the strategic orientations of intervention: the land status, zoning, define the infrastructure to be built and the equipment to be installed**
- 3- Define an economic framework: the cost to launch and maintain the plant, determine the proportions of local and national funding, the ability of users to cover the expenses of the treatment strategy**
- 4- Set an action plan in order to implement the strategy**

