



## **TÍTULO DEL TRABAJO**

“Ecophytoflow – a system for waste water treatment in regions with aggravated ecological and economic situation.”

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## **ECOPHYTOFLOW – A SYSTEM FOR WASTE WATER TREATMENT IN REGIONS WITH AGGRAVATED ECOLOGICAL AND ECONOMIC SITUATION.**

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**ABSTRACT:** For waste waters treatment in regions with stressed ecological and economic situation it is proposed to apply a complex use of natural objects provided with some elements of Constructed Wetlands. Such technology is named *ECOPHYTOFLOW*. It is based on ability of higher aquatic plants' biocenoses (bulrushes, cat's tail, etc.) to remove pollutants. The technology provides not only for qualitative improvement of waste waters, but also for their decontamination.

**KEYWORDS:** Constructed wetland, subsurface flow

## **“ECOFITOFLOW” – SISTEMA DE DEPURACIÓN DE LAS AGUAS RESIDUALES EN REGIONES CON UNA DIFÍCIL SITUACIÓN ECOLÓGICA Y ECONÓMICA.**

### **RESUMEN**

Para la depuración de las aguas residuales en las regiones con la situación ecológica y económica complicada se propone la utilización compleja de las obras de naturaleza con los elementos adjuntos de los edificios del tipo Humedales Artificiales. Esta tecnología tiene la denominación “?C? FITOFLOW” y se basa en la utilización de las propiedades depurativas de las biocenosis de las plantas acuáticas superiores (junco, tifa y otras.). Utilizando dicha tecnología es posible no solo mejorar la composición cualitativa de las aguas residuales, sino también depurarlas.

**PALABRAS CLAVE:** Humedales artificiales, terrenos pantanosos, flujo subsuperficial.

### **THE METHOD**

In some regions with stressed ecological and economic situation it is not always possible to provide for proper level of waste waters treatment. And this would lead to harmful effects on natural environment and to creation of sanitary and epidemiological threats. And sometimes due to small volumes of uncontrolled sources of polluted waters it is impossible to construct treatment units. Often such waters arbitrary flow into the relief lowerings. Under such circumstances in Ukraine is applicable *ECOPHYTOFLOW* system in which complex use of natural objects is connected with added elements of Constructed Wetlands. The system is applicable for treatment of domestic waste waters with minimal costs.

*ECOPHYTOFLOW* is used in areas where there are no waste water treatment units and waters are drained by gravity flow to the relief lowerings and water bodies situated there (ravines, lakes, bogs, man-made ponds, canals), and where it is difficult to construct ever such simple treatment units as Constructed Wetlands. In such areas it is necessary to form natural thick stands of higher aquatic plants where natural self-purification processes are lowering technogenic load on the environment.

It is possible to provide *ECOPHYTOFLOW* system with some elements of constructed wetlands either on internal or external contours of lakes, bogs, ponds, or along ravines receiving waste waters.

Addition of some treatment unit elements to the existing ecotope allows to eliminate impact of uncontrollable sources of waste waters (such as small transport and industrial enterprises, agriculture, townships, etc.) in the most cost-effective way.

*ECOPHYTOFLOW* consists of simple and reliable engineering units for interception of pollutants and for their transfer to preformed blocks with thick stands of higher aquatic plants. At that the thick stands have to be reconstructed in the following way: it is necessary to provide a drainageway and dams for shifting the direction of the waste waters flow.

The *ECOFITOFLOW* technology should be installed by the following stages:

- identification of uncontrollable sources of pollution;
- selection of a site for installation of the Constructed Wetlands elements;
- determination of design parameters of the *ECOPHYTOFLOW* engineering units.
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The Constructed Wetland elements allow to control the self-purification process.

The *ECOPHYTOFLOW* technology provides not only for qualitative improvement of waste waters, but also for their decontamination.

Sanitary investigations have demonstrated that the technology ensures reliable protection of the water body against such pathogenic microflora as tuberculoses bacteria, *Escherichia Coli*, etc. And general sanitary indices are considerably improved, i.e. Coli-index, total microbial number.

## **FEATURES**

The *ECOPHYTOFLOW* technology is recommended first of all for treatment of domestic waste waters.

In-built blocks or technical elements can be situated in existing natural objects, such as lakes, ponds, canals, bays, on sites unsuitable for economic use.

The *ECOPHYTOFLOW* system does not need electric energy, its operation is independent of weather conditions. It is tolerable to fluctuations in waste water inflows and to shifts in their qualitative composition.

The *ECOPHYTOFLOW* technology allows to mitigate negative impact of uncontrolled sources of waste waters of minimal economic costs. And this feature makes it attractive for regions with stressed economic situation.

## **RESULTS**

Application of the *ECOPHYTOFLOW* technology in Ukraine (Lviv and Kharkiv oblasts) allowed to reduce capital costs by 30-40% as against cost of the Constructed Wetlands.

Application of the *ECOPHYTOFLOW* technology will allow to protect aquifers against pollution, to water bodies, to regulate drainage at flooded sites, and it will promote protection of natural landscapes and biodiversity.