

# Land Application Systems and its Assessment on Financial and Economic Criteria: The Experience of CENTA in Southern Spain

Alberto del Villar, Irene de Bustamante,  
Carlos Mario Gómez, Ángel de Miguel

# THE LAS OF CARRIÓN DE LOS CÉSPEDES

## Main characters

Land application system with forest mass (LAS) is a plot of land, determined by the influent to treat, where arboreal vegetation is planted and irrigated with wastewater.

Main characters:

- ❑ Surface of 2.000 m<sup>2</sup>, divided in two plots.
- ❑ Species: *Populus euroamericana* (945 m<sup>2</sup>) and *Eucalyptus camaldulensis* (1,055 m<sup>2</sup>).
- ❑ Flood irrigation in cycles of 4-10 days.



# *THE LAS OF CARRIÓN DE LOS CÉSPEDES*

## *Treatment results*

Groundwater and treatment plant effluent parameters (mg/l)

	Treatment Plant Effluent	Groundwater
COD mg/l		
TOC ppm	28	4 - 9
N <sub>Total</sub> mg/l	31,5	30
HPO <sub>4</sub> <sup>-2</sup> mg/l	11	0

**reduction, around 80-95 %**

# ***THE LAS OF CARRIÓN DE LOS CÉSPEDES***

## ***Hydraulic Balance***

### **Hydraulic Balance**

Water received from a secondary wastewater treatment plant		3,420 m <sup>3</sup> /yr
Net flow obtained ( <i>Recharge</i> )		502 m <sup>3</sup> /yr
Water used in LAS		2,918 m <sup>3</sup> /yr
Biomass production ( <i>Populus</i> )	<i>estimated</i>	1.32 m <sup>3</sup> /yr
Biomass production ( <i>Eucalyptus</i> )	<i>estimated</i>	2.04 m <sup>3</sup> /yr

# FINANCIAL ANALYSIS

COST/INCOME	Annual aver	30 yr exp
<b>EXPENSIVE?</b>	EAC	VA
Investment	946	16,362
Maintenance costs (yr)	865	14,957
Total Cost	1,811	
Income (Logging)		
AVERAGE TREATMENT COST:		€/m <sup>3</sup> 3.27
AVERAGE TREATMENT COST:		€/m <sup>3</sup> 0,53

**WHY?**

**TWO REASONS**

**2- LACK OF ECONOMIES OF SCALE**

**1- WATER TO PRODUCE BIOMASS**

# ***ECONOMIC ANALYSIS (I)***

1. CO<sub>2</sub> captured: 6.3 Tons/yr.



# ***ECONOMIC ANALYSIS (II)***

2. If tertiary treatment is mandatory

**Low cost technology. Value: €/yr 1,020**

Considering €/m<sup>3</sup> 0.30 differential

3. Increased water stored underground

**Assurance cost. Value: €/m<sup>3</sup> 0.50**

Considering desalination

# CONCLUSIONS

COST/INCOME	Annual average	30 yr exploit
Financial	1,811	31,319

This is a technology with the prospect to become a real suitable and economically sound alternative for small places

Per m <sup>3</sup> recharged (€/m <sup>3</sup> )	0.639
--	-------

***THANK YOU***