018530 - SWITCH

Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

Poster

Minimization and pollution prevention as a control strategic of contamination due to domestic wastewater in the expansion area Cali, Colombia

5th SWITCH Scientific Meeting, Lodz, Poland, October 2010

Due date of deliverable: October 2010
Actual submission date: January, 2011

Start date of project: 1 February 2006 Duration: 60 months

Lead partner: UNIVALLE

Revision: final

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Minimization and pollution prevention as a control strategy of contamination due to domestic wastewater in the expansion area of Cali, Colombia

Diana A. Zambrano[a] , Alberto Galvis[a],
[a]Cinara Institute - Faculty of Engineering , Universidad del Valle - University Campus of Melendez Street 13 No 100-00, Building 341, Cali, Colombia (dialeza2@yahoo.es; algalvis@univalle.edu.co)

Objective

To evaluate the potential to implement minimization and pollution prevention strategies due to domestic wastewater in the expansion area of Cali.

Area description

Cali is a 2.1 million inhabitant's city located in the south-west of Colombia in the Cauca Valley; at 958m – 1200 m above sea level; it has a tropical climate with temperatures between 20 and 30 °C and precipitation around 1000 mm/year.
The future urban expansion area is located in the south of the city called the Cali-Jamundí Corridor, this area of 1652.85 ha is promoted for the construction of urban developments at medium-high socio-economic levels. (Strata 3 to 6). Currently, this area is mostly used for agricultural purposes. Population of the expansion area is estimated in a value of 298,760 .

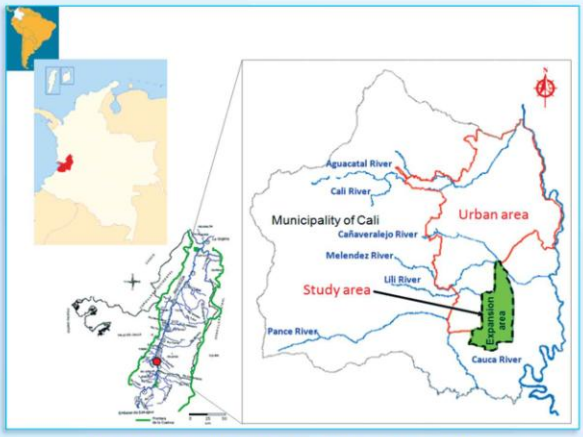

Figure 1. Localization of the future expansion area of Cali

Proposal minimization and prevention

The concept of minimization and pollution prevention refers to the reduction of waste, emissions and spills by means of measures to diminish (economically and technically feasible levels) the amount and risk of contaminant loads in water bodies that require a treatment or final elimination (Cardona, 2007; Siebel & Gijzen, 2002).

In this proposal of minimization and pollution prevention the water plan starts with the house as a unit of wastewater production. It was taken into account the possibility to incorporate low consumption devices and to use other different sources from drinking water as storm water and grey water. The concept of three steps was used (Nhapi & Gijzen, 2005).

It was generated multiple alternatives of possible water uses that can be given to other water sources along with water quality and water consumption in the City. Those alternatives were applied to the socioeconomic levels promoted in the area.

Results

From multiple combinations of low consumption devices and water sources Figure 2 shows the result obtained of one alternative in which it is considered the use of different sources of water with their applications.

Figure 2. Proposal of uses and alternative water sources

Table 1 shows storm water and grey water demand according to the wet or dry seasons, relating them to the different uses and the drinking water requirement.

Table 1. Water requirement according to quality and uses for the expansion area

Water Use	Kitchen	Basin	Shower	Washing machine & cleaning house	WC	Irrigation gardens & other
%	15%	9%	22%	15%	34%	5%
l/person-day	21	13	31	21	47	7
Drinking water requirement with proposal **minimization and prevention**						
	Potable			Storm Water	Grey	
Demand -Winter (m^3/day)	11,744		12,211	5,893	16,221	
Demand - Winter (L/s)	277			68	188	
Demand -Summer (m^3/day)	11,744		14,176	3,929	19,964	
Demand -Summer (L/s)	300			45	231	
Drinking water requirement under the **conventional approach**						
Demand by use (L/s)	566					

This proposal only generates the kitchen effluents and the WC flushing, decreasing by 57.5% compared to conventional management. Table 2 shows the different contaminant loads

Table 2. BOD and SST Contamination loads by management alternatives

Option	Waste Water (L/s)	BOD (mg/l)	BOD Load (Kg/day)	SST (mg/l)	SST Load (Kg/day)
Minimization and prevention	193	252.84	4,206	416.45	6,928
Conventional	453	252.84	9,898	416.45	16,302

Conclusions

Application of strategies with minimization and pollution prevention in the expansion area of Cali can be satisfactory applied. It represents environmental, economic and social benefits. It reduces the amount of water used and the production of wastewater alleviating in this way the water resources. The economic benefits are associated with less requirement in aqueduct, sewer and treatment infrastructure as well as operation and maintenance. There are social benefits due to less public service payments.

References

Cardona, M. M. (2007). "Minimización de Residuos: una política de gestión ambiental empresarial." In: P+L.
Nhapi, I., and Gijzen, H. J. (2005). "A 3-step strategic approach to sustainable wastewater management." Water SA, 31(1), 133-140.
Siebel, M. A., and Gijzen, H. J. (2002). "Application of Cleaner Production concepts in Urban Water Management." In: Environmental Technology and Management Seminar, Institute Technology Bandung/Environmental Engineering Department, Bandung, Indonesia.