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### **Waste water reuse for stream flow augmentation**

**General Topic:** Stream flow augmentation project are a common and growing public investment. It improves not only aquatic and wildlife habitat, water quality, public perception of recycled water, but also increases potable supply.

**Questions:** However, little has been done so far to quantify it benefits or its cost effectiveness. It is maybe unclear whether this investment is worthwhile. So, the goal of our research project was to give people the tools that would help them decide either or not it is worthwhile. We quantified both the benefits to the public and potential benefits to water quality of a specific stream flow augmentation project. We focused our research on the city of Pacifica (CA), where a stream flow augmentation project had been experienced. A stream called Calera Creek was restored by creating a wetland and riparian Ecosystem and a waste water recycling site was constructed next to it.

**Method:** In the first part of our project we tried to quantify the value of ecosystem to people. Highly treated wastewater is being reused for flow augmentation at Calera Creek, and provides a recreational area for people. The addition of recycled water to creek, and the restoration of the creek, provides value to the population of Pacifica by providing recreational opportunities and aesthetics. To quantify this value, our first plan is to count how many people are visiting per year, and compare it to the additional cost of building and operating the plant per year to determine how much it costs to provide those benefits per person.

#### **Results:**

**Additional Cost/year =  
\$1,220,000**

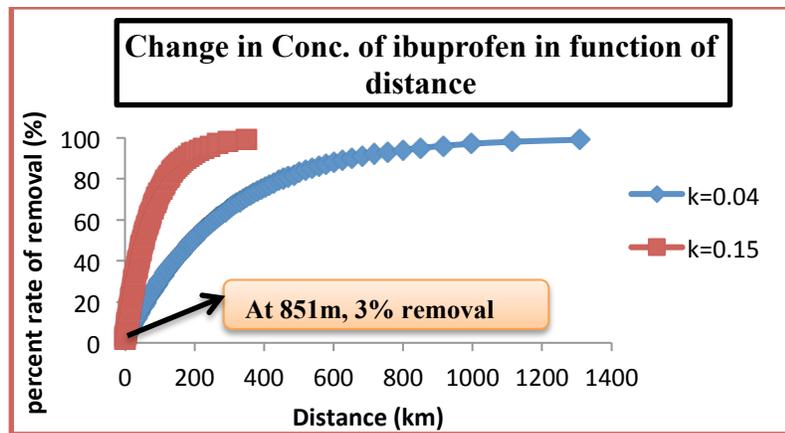
**Number of visitors/ year =  
174,000**

**Cost/Visitors= \$7.00**

**Method:** The second part was to quantify the water quality. We calculated the residence time, constructed a model to estimate change in concentration with distance, what tell us by how much we need to increase the residence time to improve the water quality in the creek.

An increase in the residence time will decrease the final concentration of a contaminant and consequently improve the quality of water.

### Results:



**Residence Time = 2 hours**

However, the results that we got are not very precise. In the future, we need a better estimate of removal rate for contaminants for the model. A tracer test for the residence time would have given us a better result. Also refine calculation of the number of visitors at Calera creek, because the number of visitors during the winter time would be less than the number of visitors in the summer. A whole year count would have given us a precise number of the visitors.

### References:

- Fono and al., 2006