



CALIFORNIA STATE SCIENCE FAIR 2007 PROJECT SUMMARY

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Project Title A Filter Today Keeps Pollutants Away	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our objective was to determine whether sand, carbon, or foam best removes the dangerous pollutants and excess nutrients in the storm drain outfall runoff that flows into the Monterey Bay and then design a model of a workable filter. We hypothesized that sand would be the best of the three filter types and the one that Monterey should consider using on its storm drain outfalls.</p> <p>Methods/Materials We collected one water sample from two different Monterey storm drain outfalls during the first significant rainfall of the year. Using test kits, we performed two tests on each sample for pH, nitrates, and phosphates before and after pouring each through three filters: carbon, sand, and foam. We also obtained professional results from the Monterey Bay Sanctuary Monitoring Network First Flush event and professional analysis of our filtered samples from Monterey Bay Analytical Services. After analyzing the test results, we were able to determine which filter would be most effective and we built a model of our proposed filter.</p> <p>Results Based on our testing and research, we determined the most harmful nutrients to the ocean and its creatures are nitrate, orthophosphate, and zinc, and the most detrimental bacteria is enterococci. In the unfiltered samples from both locations, the levels of nitrate (0.52 to 0.57 mg/L) and orthophosphate (not detected) were below harmful levels, while the zinc level (101 to 172 mcg/L) and enterococci (41,058 to 155,312 MPN/100mL) were significantly above state standards. After filtering each sample, the amount of nitrate and phosphate barely changed, while the zinc and enterococci levels were significantly reduced by all three filters. Though all three filters reduced the amount of pollutants, the carbon filter had the most positive effect on the water flowing through it.</p> <p>Conclusions/Discussion After a thorough analysis of our results, we concluded that our hypothesis was incorrect. The carbon filter, not the sand filter, best reduced the amount of pollutants, though the sand filter was a close second. We learned that home tests are not nearly as reliable as we expected. We should have focused more on the enterococci and zinc results, instead of so much on nitrates and phosphates. After reading our project, we hope people will better understand what contributes to storm drain pollutants and consider our method as a way of reducing the negative impact of pollutants.</p>	
Summary Statement To design a simple filter that would remove the most pollutants from storm drain outfall runoff and build a model of the filter.	
Help Received Mom helped gather samples, drove us, bought materials, and helped find reliable Internet sources. Eric Kingsley, Monterey Bay Aquarium specialist, supplied the clean sand. Bridget Hoover provided First Flush data, supplies, and maps. Monterey Bay Analytical Services donated the professional lab tests.	