CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Marissa N. Ahmadkhani

Project Number
J0901

Project Title
Does the Runoff of a Golf Course Affect a Stream Below It?

Abstract

Objectives/Goals
My objectives, or goals, for this project was to see if the runoff from a golf course would affect the healthiness of a stream below it.

Methods/Materials
The materials you will need for this project are:
· Containers to hold samples of water in.
· 2 jugs of water from 2 different parts of a stream
· Collection pan
· Magnifying glass
· Paper that tells how to identify the macroinvertabrates
· pH testing kit
· Nitrate testing kit
· Turbidity testing kit
· Dissolved Oxygen testing kit
· Pair of boots

Results
The Data that I got from this experiment was that the two streams were similar in health except for the nitrate levels. The streams were similar in health because the pH, Turbidity, and Dissolved Oxygen were similar. The macroinvertabrates were also similar because all of the insects that I found were symbols of a healthy creek. So, basically my data was that Uvas had a higher level of Nitrate than Chitacatc, but they had basically the same health level.

Conclusions/Discussion
The conclusion that I formed from my experiment was that both Chitactac Adams and Christmas Hill Park had similar health. I drew this conclusion from the water tests and the macroinvertebrate search. The water tests told me that there were differences in Turbidity and Nitrate, but the biggest difference was the Nitrate. Uvas had an average of 6.6 while Chitactac had an average of 4.4. This shows that Uvas had a higher nitrate level. The macroinvertebrate test proved that the streams were clean because all the insects that I found were sensitive to pollution.
So, my hypothesis was supported because Uvas was more polluted than Chitactac. Uvas had a higher level of Nitrate, which meant that less sunlight could penetrate through the water#s surface. This is my conclusion for my science fair project.

Summary Statement
My project was to observe the affect of runoff from a golf course on the water quality of a creek.

Help Received
My parents helped me gather my water samples; I used lab equipment at Ascencion Solorsano under the supervision of Mrs. O'Connor

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
James P. Anderson

Project Number
J0902

Project Title
To Surf or Not to Surf? That Is the Question

Abstract

Objectives/Goals
My objective or goal in my project was to understand which surfing beaches in my area would be more likely to be unsafe due to the presence of E.coli bacteria.

Methods/Materials
I took water samples from five seperate popular surfing beaches on the same day on four seperate occassions. I tested on hightide on a clear day , lowtide on a clear day and i tested on hightide during a storm and on lowtide during a storm. I would also test the creeks that would runoff into the beaches. For my procedure I would acquire a 100 mL sample of ocean water from each surfing beach in a sterilized container. Then I would add my Colilert P/A testing kit and would let it sit overnight. Then i would compare my results to a positive and negative sample of E.coli.

Results
The highest measurable concentrations of E.coli bacteria were found after periods of storm activity and during hightides and always in areas of creek or drainage discharge.

Conclusions/Discussion
No matter what the variables, storm activity, no storm, hightide or lowtide, the beaches with the highest measurable E.coli concentrations for any given time period, were always those beaches that had creek or drainage discharge.

Summary Statement
Testing for the presence of E.coli bacteria in five popular surfing beaches in San Mateo County, Northern California.

Help Received
A teacher assisted in determining the type and acquisition of the test kits. Mother also helped type report.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Elizabeth Avalos

Project Number
J0903

Project Title
Does Repetitive Flooding Affect Soil Absorption?

Abstract

Objectives/Goals
My goal was to test the soil to see if repetitive flooding would affect it. Differences in soil absorption in my local neighborhood gave me the idea for this project. I studied soils from different places. I hypothesized that flooding was going to affect the soil.

Methods/Materials
Thirteen of my classmates brought in soil samples from their homes. I used thirteen cups to isolate each soil sample. I weighed each sample so it would weigh 200 g, then I used a graduated cylinder and poured 30 mL of water into each sample. The next day, I would pour off the water that remained. I measured this water and poured it back in the soil. I kept on doing this process for about 10 days. Also, prior to flooding, I screened each sample with seives to determine the soil components and percentages of gravels and sands.

Results
My results showed that repetitive flooding did affect soil absorption. Soil can contain only a certain amount of water because once it reaches its field capacity, it will not absorb more until water movement occurs outward from the soil. Soils disperse water better throughout substance material with lower gravel contents. Sands in the medium range are ideal at soaking up large amounts of water, dissipating it below to the soil horizons, and also for allowing rapid evaporation. The more sand a soil has, the more water it absorbs.

Conclusions/Discussion
During my project, I was particularly interested in the relationship of the texture of each soil sample and how much water it could hold during the flooding. Gravel does not allow as much water retention within a soil because it does not make as many open pockets as sand does. The closeness of the spaces of the sand particles and the small size of the pores allows more water to quickly pass from one layer to the next. Proper attention must be given to soil analysis where flooding is likely due to poor soil conditions. Attention must be given to the sand content, as sand should be the largest component of flood-prone soils.

Summary Statement
Repetitive flooding affects soil absorption.

Help Received
Teacher as facilitator.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Alexander A. Bennett

Project Number
J0904

Project Title
E. coli and the Carmel River

Abstract

Objectives/Goals
To find out if the amount of E. Coli bacteria in the Carmel River changes with the location, and whether the amount of E. Coli becomes greater farther up or closer to the mouth of the river, and if the rain lessens or dilutes the colonies. My hypothesis was that the amount of E. Coli would become greater farther down the river as I took samples and that the rain would lessen and dilute the colonies.

Methods/Materials
To find out if my hypothesis was correct I took water samples on November 13, 2005 from Sleepy Hollow, Rosie#s Bridge, Garland Park, the Mid-Valley Center, and two locations at the Carmel River Lagoon. I then took 1 ml of water from each location and added it to the Petri dish filled with Coli Scan Easy gel which corresponded with each location. I then left the dishes in a warm room to incubate for two days. After two days I recorded the amount of Coliform (purple) that I found in each location. I repeated the process on January 7, 2006 after a long period of rain.

Results
In Sleepy Hollow, I found 19 E. Coli colonies per 1 ml of water before the rain, and 3 colonies after the rain. At Rosie#s Bridge I found 29 colonies before the rain and 3 colonies after the rain. In Garland Park, I found 6 colonies before the rain and 2 after. At the Mid-Valley Center, I found 17 colonies before the rain, 15 after. In the marsh, (tulle) section of the Carmel Rive Lagoon, I found 3 colonies before the rain and 3 after. At the very mouth of the river, I found 3 colonies before the rain and zero after.

Conclusions/Discussion
I have concluded that the amount of E. Coli changes with the amount of civilization, and that the Carmel River Lagoon is the safest place to swim in terms of E. Coli concentrations. Rosie#s Bridge and The Mid-Valley Center are the least safe places to swim in, due to the fact that they have large amounts of civilization, including septic tanks, nearby. My hypothesis that the amount of E. Coli would increase as one gets closer to the mouth of the Carmel River appears to be incorrect. However, my hypothesis that the rain will lessen and dilute the colonies appears to be correct.

Summary Statement
My project is about finding out how the number of E.coli in the Carmel River is affected by the distance from the mouth of the river, and how the rain affects the colonies.

Help Received
My mother drove me to the various sites along the Carmel River and puchased the materials. Mr. Smith, my science teacher, provided general guidance.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Esther H. Chung

Project Number
J0905

Project Title
The World: Hot n' Exhausted by Exhaust

Abstract

Objectives/Goals
The objective is to determine if there is a difference in the amount of carbon dioxide in car exhaust emitted from the use of the 3 different gas grades to find which gas grade people should use to emit the least carbon dioxide possible as the problem of global warming becomes more severe.

Methods/Materials
Fifteen mL of water and 10 drops of bromothymol blue indicator solution were put in each of the test tubes. A nearly pure carbon dioxide sample in a balloon was made with vinegar & baking soda. Then, the car was filled with premium/mid-grade/regular gas (each of the gas grades separately tested). The engine was turned on and each balloon was inflated until it had a 6.5 inch diameter. After obtaining the samples from the tailpipe into the balloons, each of the balloons' necks was slipped over its respective test tube (BTB indicator + water solution). The color changes of the solution in the test tube were recorded and timed. Then each of the samples were titrated by diluted ammonia drops; the number of drops needed to turn the solution back to its original blue color were counted, as well. The car was taken for smog checks for accurate percentages of carbon dioxide in its exhaust.

Results
The order of the gas grades, producing the greatest to least amount of carbon dioxide in the exhaust, was premium, regular, and lastly mid-grade. The number of diluted ammonia drops required to turn the BTB indicator + water solution back to its blue color, the average time to change color (from blue to green or yellow when the gas samples are put into the test tubes), the changed color, and the smog check results were taken into account. Mid-grade needed the least ammonia drops, took the longest time to change color, turned a bluish dark green (closest color to control), and had the lowest percentages of CO2 in the smog check readings, signifying that the mid-grade samples had the least CO2. The closest results to the mid-grade samples were that of mid-grade and then premium.

Conclusions/Discussion
My conlusion is that mid-grade is the gas grade that when used would emit the least amount of carbon dioxide in the exhaust. To slow down global warming, the application of mid-grade instead of premium and regular, would be extremely helpful.

Summary Statement
This project is centered on determining the car gas grade that when used would give off the least amount of carbon dioxide in the car's exhaust or tailpipe emission.

Help Received
Parents helped obtain exhaust gas samples; Mr. Terry Newell (US EPA National Vehicle and Fuel Emissions Laboratory) gave useful info for research; Mother helped with pasting items on board and getting materials; Mrs. Williams helped develop SF topic.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Kaylah M. Clement

Project Number

J0906

Project Title

Correlating Total Coliform and Heterotrophic Plate Counts Using Labile Carbon

Abstract

Objectives/Goals

The purpose of my project is to determine if there is a correlation between Total Coliform (TC), Heterotrophic Plate Counts (HPC) and Biochemical Oxygen Demand (BOD) in the Kern River watershed. I feel that there will be a correlation between TC, HPC, and BOD because BOD provides food for the various groups of bacteria.

Methods/Materials

The experimental methods used to determine the correlation include Multiple Tube Fermentation using Lauryl Tryptose Lactose Broth and Brilliant Green Bile to confirm Total Coliform and Ecoli. The MPN results are determined using the charts in Standard Methods for the Examination of Water and Waste Water. Another test performed is the Heterotrophic Plate Count. This test involves transferring samples and agar into petri dishes and incubating the plates for 48 hours. Using a colony counter I counted the colonies in each dish and averaged the results. The final test was the Biochemical Oxygen Demand. This test involved taking 300ml of sample water and transferring phosphate buffer solution, alkali solution and sodium sulfite solution. This inoculation was mixed with sulfuric acid and results were determined using the formula in Standard Methods for Water and Waste Water. Other tests performed, though not necessary to determined a correlation were Ph tests, H(2)O temperature, outside temperature and turbidity for each sample site.

Results

My results confirmed that there is a correlation between BOD5, Total Coliform and Heterotrophic Plate Counts. Samples #1-5 showed a consistent pattern. My hypothesis was correct, showing a correlation between TC, BOD5 and HPC with results of R = 0.98. According to Pearson Correlation Coefficient, 1 is a perfect positive correlation, 0 is no correlation, and -1 is a perfect negative correlation.

Conclusions/Discussion

The testing that I have completed is beneficial to provide an indication of the type and extent of contaminants that threaten the Kern River as a source water. This study is a way to anticipate future source water problems. I plan to continue this study in 2006 - 07, comparing the correlation found this year to a possible correlation found the following year. The correlation should be translatable to sea water, and I intend to confirm this next year as well.

Summary Statement

Determining a correlation between TC, HPC and BOD5 in the Kern River water shed is beneficial to providing an indication of the type and extent of contaminants that threaten the source water and should be translatable to sea water.

Help Received

Used equipment at McRay Laboratory under the supervision of Gary Hill. My mom provided transportation, as well as videotaping and taking pictures.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
David M. Cohn, III

Project Number
J0907

Project Title
From Ashes to Life: Burned Region Plant Regeneration/ Soil Transformation

Abstract

Objectives/Goals
The San Diego County Cedar Fire of October 2003 was the largest fire in California#s history. After the fire, driving through my hometown of Poway, I saw black and white ash as far as the eye could see. I wondered how the plants would ever recover. How long would it take and would the same species return? I hypothesized that a wildland fire would cause invasive species to flourish during the first few years after the fire due to the lack of competition and an abundance of nutrients, though over time the burned areas would return to their original state, with native plants taking over and replacing non-natives. I also hypothesized that many nutrients would be abundant in the burned soil, gradually decreasing in concentration over time, and that soil chemistry changes due to a natural fire could be replicated by burning soil in a kiln.

Methods/Materials
I selected a burned area in a nearby preserve and staked out several 1m² observation plots. Every three weeks for 30 months from November 2003 to April 2006, I measured the soil moisture and temperature and documented the type, number, and description of each plant that germinated in the plots. I also recorded general plant growth observations for the entire hillside. I analyzed soil samples every three months using a Rapidtest soil test kit at my home and fired unburned soil in a Beilman gas kiln at 538°C, 816°C, and 1093°C to assess the fire impacts.

Results
Over the 30 months, a total of 1,348 native plants versus only 32 non-native plants germinated in the observation plots. To my surprise, the nitrate level remained normal for chaparral soil. Potassium remained above normal probably due to ash in the soil. Phosphorus stayed below normal throughout the entire 30 months. The pH was initially slightly acidic, then remained relatively neutral. Soil analysis of the kiln-burned soil revealed a decrease in potassium at 538°C, then increases at 816°C and 1093°C. Phosphorus increased at 538°C and 816°C, then declined at 1093°C. Nitrogen was depleted at all burn temperatures, and the pH rose as heat was applied.

Conclusions/Discussion
The native plants regenerated at significantly higher rates than the non-native plants. Native fire-followers, such as (Cryptantha micromeres), Minute popcorn flower and (Phacelia parryi), Parry phacelia, were predominant in the first 18 months. Native grasses thrived in all plots, far outnumbering any invasive grass species.

Summary Statement
This project examines the regeneration of native and non-native plants and the transformation of soil in a chaparral region affected by a wildfire.

Help Received
My science teacher assisted me with plant identification, editing and organizaiton.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Pavlina A. Crowley

Project Number
J0908

Project Title
Water Contamination Across the Nation

Abstract

Objectives/Goals
My objective was to determine the quality of tap water in various regions of the United States for unsafe quantities of certain contaminants.

Methods/Materials
Untreated tap water was obtained from nine rural and urban regions in the United States and tested for contamination. I tested for nitrates, nitrites, bacteria, lead, pH levels, pesticides and chlorine.

Results
New Jersey, San Diego and Washington D.C. had high nitrate and nitrite levels.
Bacteria was found in Arcata and Jersey City. Pesticides were found in Kneeland and Bainbridge Island. Chicago, San Diego, Washington D.C., New Jersey and Eureka had hard water. pH levels were above the desired level in every region except Kneeland. Lead tested negatively in every region. Only New Jersey had minimal amounts of chlorine.

Conclusions/Discussion
My results partially supported my hypothesis. Water in various regions in the United States did differ. Population size did seem to affect water quality. Big cities had high nitrate and nitrite levels. Human and animal waste products that seep into the water show up as nitrates and nitrites. New York city water was surprisingly clean. My research showed that water in New York city is tested around 350,000 times a year. There was bacteria found in the small town of Arcata. I attribute this to the large concentration of cattle farms and septic systems. Pesticides were found in the farming and logging regions. High Ph levels (alkaline water) could explain the bitter taste of most of the water I tested. Alkaline water requires more chlorine to destroy disease organisms. The chlorine did not show up when tested because it must have evaporated in transport. Chlorine dissipates over time. Most regional water samples showed some contamination although not always in the amounts I expected.

Summary Statement
My projects purpose was to test and compare tap water samples from geographically diverse urban and rural sources for various contaminants.

Help Received
Family and friends sent water samples from around the United States to make my project possible.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Allison Daley; Nina Loew

Project Number

J0909

Project Title

eWaste Toxins: Is This Water Safe to Drink?

Abstract

Objectives/Goals

The objective of this experiment is to measure the level of toxins that leak out of e-waste, and how quickly. Also this experiment will determine if our school district responsibly disposes of e-waste. By 2010 it is projected there will be 3 billion pieces of disposed e-waste in our communities, including computers, cellphones, ipods, and Blackberries.

Methods/Materials

Three covered glass containers were each filled with eight cups of tap water. An old cell phone was placed into Dish 1, an obsolete motherboard into Dish 2, and nothing was placed into Dish 3. Over a 29-day period, the water was tested each Saturday at 11:30 AM to measure levels of Cadmium, Nickel, Lead, and Copper. Results were recorded and compared with the National Secondary Drinking Waters Standards published by the EPA. The Burlingame School District was visited to investigate the policy for responsible e-waste disposal.

Results

The final water toxicity levels ranged form 50 - 200 ppb (parts per billion). EPA contaminate levels begin at 250 ppbs, therefore, according to the EPA this water is still safe to drink. The Burlingame School District follows a pledge to responsibly dispose of electronic waste.

Conclusions/Discussion

We conclude that within 30 days, drinking water exposed to e-waste toxins still meets EPA standards for safe drinking water. By conducting this experiment we hope to increases the knowledge of others on the importance of responsible e-waste recycling and disposal.

Summary Statement

Responsibly measuring and managing e-waste toxins, through disposal and recycling programs, is important to the future safety of our drinking water and environment.

Help Received

Mothers helped with purchasing (test kits, dishes) and gathering (cell phones, motherboard) of materials.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Anjuli H. Dasika

Project Number
J0910

Project Title
How Clean Is Drinking Water in India?

Abstract

Objectives/Goals
Comparing India's water quality to EPA, WHO, and India water quality standards. I conducted this experiment to prove that the water qualities in different parts of India do not meet the EPA or World Health Organization standards, but meet the requirements for India's water quality standards.

Methods/Materials
In order to conduct this experiment, I needed one glass filled halfway with tap water (ran for 30 sec.). Then I used the drinking water testing kit to test different strips of PH, Total Hardness, Free Chlorine, Total Chlorine, Nitrate, Nitrite, Copper, and Iron. By following the directions on the bottles, I found out each component in different parts of India. Then, I graphed my results and compared to EPA, WHO, and India standards.

Results
The pH in India turned out to be from 8-9 in all locations. Total hardness was from 120-425 (hard-very hard). Free chlorine/total chlorine were all 0. Nitrate was from 0-50. Nitrite was mostly 0, but one result was 10. Copper was 0-0.2. Iron was 0-0.15. pH passed standard, Total hardness max level between permissible, chlorine, Nitrate passed permissible, Nitrite met, Copper met max, Iron met India.

Conclusions/Discussion
For India standards, all except pH met the permissible or maximum standard. For EPA standards, all met but pH exceeded standards. For WHO standards, India standards and not all failed on EPA/WHO standards.

Summary Statement
My project is about testing India's tap water quality and seeing if it meet the requirements of EPA, WHO, and India water quality standards.

Help Received
Mother helped me get the test kit and manuals. Mother helped me formulate graphs on Excel. Parents took me to India. Mother cut the display board for me.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Katharine A. English

Project Number
J0911

Project Title
Reckless Respiration? Levels and Sources of Particulate Air Pollution in South Pasadena

Abstract

Objectives/Goals
There were two objectives--to collect data on levels of particulate air pollution, and to analyze them by distance from various traffic and industrial sources in order to draw conclusions about their causes.

Methods/Materials
The materials used included: 25 microscope slides and cover slips, petroleum jelly, cardboard collection boxes, tape and wire, and a digital microscope (200x magnification).

The method employed consisted of several steps: 1) assemble collection boxes to protect slides; 2)spread a thin layer of vaseline on the slides, place in the boxes and close; 3)hang the boxes in five different locations at a uniform height of 10 feet; 4) after 36 hours, replace the slides with fresh ones and bring the samples back for analysis; 5) after preserving with a cover slip, analyze each of the slides under the microscope--counting the large, medium, and small-sized particles per square millimeter; 6) repeat five times for reliable data; 7) when all data is collected, tabluate, average, and chart the data for different particle types by location and date.

Results
The most striking result was the large difference in pollution levels by location. Collection locations near busy traffic or business locations showed more than twice the level of particulate matter than residential areas. The averages of small, medium and large particles in a city park and quiet residential street were: 76.9, 11.4, and 4.9. Conversely, the averages near a freeway, busy avenue and nearby side street were: 168, 21.9 and 20.1. To summarize, there was variation by particle size and date as well. But location (distance from traffic or business) was by far the most powerful variable.

Conclusions/Discussion
This experiment produced several important findings. First, air pollution levels even in a small, non-industrial town were much higher than expected. Second, the most important determinant of air pollution levels was distance from traffic sources. Third, in all locations the levels of small particulate matter (.25 - 5 microns) was high. This is a great concern because medical research has shown that these small particles--soot, diesel emissions, etc.--easily reach the deepest recesses of the lungs and cause severe health problems.

Summary Statement
This project demonstrated the link between levels of particulate air pollution and distance from traffic or industrial sources.

Help Received
Parents bought microscope; father drove to and from collection points, helped with some graphics for display board.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Brittani N. Guajardo

Project Number
J0912

Project Title
Is the Creek Water Safe for Animals to Drink?

Abstract

Objectives/Goals
My Hypothesis is that the water in the creek is very. I also think that there will be some kind of really unhealthy bacteria that is growing in the creek. I think that because whenever Mr. Wright's horses drink out of the creek, they get dizzy and just lay on the ground. So with that information, I am hypothesizing that the horses are getting sick from the creek water.

Methods/Materials
Water testing kit (Environmental and Outdoor Water Full Panel plus Bacteria Growth Kit), and several samples of water. The kit tests for the following parameters: pH, Alkalinity, Water Hardness, Total Disolved Solids (TDS), Nitrate, Nitrite, Phosphate, Dissolved Metals (Combined Metals Cu+2, Co+2, Zn+2, Cd+2, Ni+2,etc.), Iron +2 and +3, plus Bacterial growth.

Results
1. Bacteria Growth - Average >10^4 of fastidious bacteria growth in a 48 hours time period.
2. Total Dissolved Solids(TDS)- Average TDS was 200ppm.
3. Nitrate plus Nitrite - Nitrate Average was 0.5mg/L & Nitrite was 0mg/L which are below the EPA limits of Nitrate (10mg/L) & Nitrite (1.0 mg/L)
4. Total Hardness - The average of 308 ppm showed that the creek water is very hard.
5. pH - The samples showed a average of 9 which makes the water more basic than acidic.
6. Iron (Fe^+2,+3) - The test results showed no signs of Iron in the water.
7. Dissolve Metals - The average result was 166.7 ppb
8. Alkalinity(CaC0(3)) - The results showed an average 240 mg/L or ppm, which again showed that the water again was more basic than acidic in nature.

Conclusions/Discussion
My Hypothesis that the creek water had harmful bacteria was correct. The water showed signs of substantial bacteria growth within 48 hours. Along with the bacteria testing, the water was also tested in seven other parameters that, in general were less harmful in nature than aerobic bacteria, and the results showed no other high signs of other harmful materials in the water.

Summary Statement
What is causing horses drinking out of a creek to become sick?

Help Received
Mother helped type report and father helped in gathering water samples & running tests.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Celine Izsak

Project Number
J0913

Project Title
Save Our Seas 4

Abstract

Objectives/Goals
I have been studying different ways of remediation for oil spills, for the past 4 years. This year my project was comparing two components of one form of a severity and a weathering process. Third component was the temperature. I compared warm temperatures (Gulf of Mexico) to freezing temperatures (Gulf of Alaska), trying to find which environment has the highest amount of oil loss with the use of oil-hungry bacteria that is a result of the degradation of the oil over a 6-day period. I hypothesized the Bacteria Warm environment would have the highest amount of weight loss over the 6-day period.

Methods/Materials
I used 100 sterile containers with caps, 25 for Bacteria Warm Environment, 25 for Control Warm Environment, 25 for Bacteria Freezing Environment, 25 for Control Freezing Environment. All my controls contained saltwater and crude oil. Half of the controls were placed in an environment of 70-75 degrees Fahrenheit, and the other half were placed in a freezer of 0-5 degrees Fahrenheit. My containers labeled bacteria are the same as the controls just with bacteria; half were placed in a warm environment and the other half in a freezing environment. Then over a 6-day period I weighed each container with a postal scale to see if there was a reduction of oil in any of the environments.

Results
On Day 6 Bacteria Warm Environment lost .05 ounces bringing its total weight loss to date .24 ounces and its weight at 2.99 ounces, Bacteria Freezing Environment lost .04 ounces bringing its total weight loss to date .19 ounces and its weight at 3.03 ounces, while both controls did not experience any weight loss.

Conclusions/Discussion
My hypothesis was correct that a warm environment with oil-hungry bacteria would exhibit the highest amount of weight lost as a result of oil degradation over a 6-day period. From this experiment I have learned that an important factor of oil spills is understanding the severities, characteristics, and tactics needed for each and every different oil spill.

Summary Statement
My project is about the effectiveness of oil-hungry bacteria when removing oil from oil spills in diffrent climatic regions.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Cassandra R. Kashanski

Project Number
J0914

Project Title
How Clean Is Your Air? Counting Air Pollution/ Particles in the Air Using an Original Particle Scale

Abstract

Objectives/Goals
My objective is to test my hypothesis.
Hypothesis: If air pollution is measured in 4 (four) different locations: a busy highway, a mountain home, a public school, and a park, then the greatest amount of pollution will be found at the busy highway, then the school, then the park, and then the least at the mountain home.

Methods/Materials
Air pollution in the form of visible particulate matter was measured at 4 different types of locations: a home, school, public park, and busy highway. A white, 10 cm x 15 cm (4 in. x 6 in.) index card covered with petroleum jelly was placed at the same height (122 cms, 4 ft.) on a tree or building at each location, at the same time of day (9 a.m. - 3 p.m.) and left for 6 hours. 12 trials were done. The cards were put in plastic baggies when I collected them to save the particles. I made up my own particle scale (like a pH scale) using particle patterns and amounts. It went from 0 (none) to 7 (the most). I used it to rate the cards.

Results
The most pollution particles were found on the cards by the busy highway location- 5.2 on my particle scale. Next most was the park at 2.2, then the school at 1.2 and last the home at .8.

Conclusions/Discussion
My hypothesis was right about the most pollution being at the busy highway and the least at the home. It was wrong about the school being 2nd and the park 3rd. The park was 2nd and the school 3rd. I found that the busiest places with the most cars, businesses and traffic have the most pollution. The pollution at the park could be natural, and I'd like to do another project to study the different types of particles on the cards, in a laboratory. My project shows that we need to use less fossil fuels, and find new cleaner energy sources for our health and the future of our planet.

Summary Statement
My project measured pollution particles in 4 (four) locations with different amounts of traffic and businesses to find out where the most and least air pollution particles are - home, school, park or highway.

Help Received
My teacher Mrs. Bloom gave me forms to help organize my project. My mom helped type my handwritten papers and data sheets, helped me glue papers to the board, and drove me to the four locations.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Richard H. Livingston

Project Number
J0915

Project Title
Clean Air Secrets

Abstract

Objectives/Goals
The objective is to determine which of two neighboring towns has better air quality, and why. The hypothesis is that the rural town of Woodside, CA has better air quality than a more urban neighboring city, Redwood City, CA, as measured by ozone levels.

Methods/Materials
The Woodside ozone data was collected in central Woodside using Vistanomics# Eco-badges, while Redwood City data was collected from the Internet using the Redwood City Bay Area Air Quality Measurement District (BAAQMD) monitoring site. 25 different days were tested, and analysis was done using different variables that might explain ozone levels, including wind direction, temperature, and solar insolation.

Results
The data showed that Redwood City and Woodside have equal ozone levels on average, but standard deviations show that the averages are not necessarily reliable. More analysis showed that on days when wind is blowing from the east, ozone levels in Woodside are actually higher than in Redwood City. When the wind is blowing from the West, ozone levels are higher in Redwood City. There is also a minor connection between relative ozone levels and temperature. Standard deviations show the wind direction data to be reliable for making predictions of relative ozone levels, but not temperature.

Conclusions/Discussion
Analysis of the data proved that when the wind is blowing from the densely populated and industrial East Bay through Redwood City to Woodside, Woodside will have worse air quality than Redwood City. Conversely, when the wind is blowing from the ocean, over the coastal mountains, through Woodside to Redwood City, Woodside has better levels of ozone. This project shows that cities really don#t always have worse ozone than rural areas. More specifically, it shows that Woodside residents who are very sensitive to ozone should consider going jogging down on the bay on hot days when the wind is blowing from the east, instead of hiking in Woodside. But on hot summer days, when the wind is blowing from the west, those who are sensitive to ozone should exercise in Woodside, instead of Redwood City. The project also shows that averages can be misleading, and that you have to really have to dig beneath the surface to discover what is really going on.

Summary Statement
This project investigates the ozone levels in neighboring rural and urban towns, and analyzes data on factors that might explain the relative ozone levels.

Help Received
Father helped me figure out how to make my graphs; Math teacher taught me about standard deviation; Mother helped find the BAAQMD website and showed me how it works.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Ingri Lopez; Karen Lopez

Project Number
J0916

Project Title
Do Pollution Levels Increase in Los Angeles River Water as the River Moves through Los Angeles County?

Abstract

Objectives/Goals
The purpose of our project was to see if pollution indicator levels increase in Los Angeles River water as the river moves through Los Angeles County to its mouth, from Encino to Long Beach.

Methods/Materials
We chose 10 sites along the Los Angeles River, from Encino to Long Beach, to sample and test water. We performed some of our water quality tests at the sampling sites, and brought additional water samples back to school to complete other tests. We measured turbidity, temperature, pH, dissolved oxygen, conductivity and Chromium VI content.

Results
Our results showed spikes in pH, conductivity, and turbidity at site 8 (The Dominguez Gap) on both of our sampling dates, as well as dissolved oxygen concentrations that cause stress in aquatic organisms. Site 8 is near Long Beach about 7 miles from the mouth of the Los Angeles River, and the river channel is completely encased in concrete. Since this site has no natural river bottom (it is all concrete), our data probably revealed an accumulation of pollution from further up the river.

Conclusions/Discussion
Our results partially confirmed our hypothesis because pH, conductivity, and turbidity are indicators of possible pollution, and these indicators had their highest levels close to the mouth of the river. However, we learned that the chemical and physical conditions of Los Angeles River water depend somewhat on whether or not the river bottom is natural or man-made with concrete, since the natural river bottom can help clean the water as it flows down the river.

Summary Statement
We measured pollution indicator levels in Los Angeles River water as the river flows through Los Angeles County, from Encino to Long Beach.

Help Received
Mr. Simonsen took pictures and edited our work, and my dad took us to the sites for the second round of sampling.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Bianca Maldonado; Maria Perez

Project Number
J0917

Project Title
Should Unmonitored Urban Lakes Be Used for the "Fishing in the City" Program?

Abstract

Objectives/Goals
Our objective was to investigate whether or not unmonitored urban lake water is consistently healthy enough for game fish, specifically trout, which are routinely stocked in urban lakes as part of the Fishing in the City program. This program is sponsored by the California Department of Fish and Game.

Methods/Materials
We examined the water quality of Lincoln, Belvedere, and Hollenbeck Park Lakes. These lakes are stormwater runoff reservoirs, and the City of Los Angeles does not routinely monitor their water quality. Therefore, we believed these lakes could pose a serious health risk to the fish that are stocked there. We analyzed water samples from six sites at each lake, on three different occasions, over a period of ten weeks. The parameters we measured were dissolved oxygen, pH, phosphate, turbidity, nitrite [NO(2)-], ammonia [NH(3)], nitrate [NO(3)-], and total chlorine. We used a Hanna Bench Photometer to obtain our data.

Results
Most of the samples that we tested contained toxic levels of substances that could hurt or kill fish, including nitrite, nitrate, ammonia, and total chlorine. Additionally, average dissolved oxygen levels were low enough to cause stress in trout, and turbidity levels were regularly high enough to cause gill obstruction. We also found dead fish floating in the lakes.

Conclusions/Discussion
Our results definitely support our hypothesis because the water quality of the three lakes was never consistently healthy enough for fish to live in. Our results need to be communicated to city and state officials so that the City of Los Angeles Stormwater Program or the Department of Fish and Game can monitor these lakes more frequently, so they can be healthy enough to sustain aquatic life.

Summary Statement
In this project we tried to determine wether or not unmonitored urban lakes are healthy enough to sustain the game fish that are routinely stocked in them.

Help Received
Dad drove us to the lakes to get water samples. Mr. Simonsen edited our work.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Mikael H. Matossian

Project Number

J0918

Project Title

The Effect of Carbon Dioxide and Ozone Enrichment on the Growth Behavior of Bush Bean Plants

Abstract

Objectives/Goals

Carbon dioxide and ozone are two pollutant compounds found in our atmosphere. Carbon dioxide is part of the photosynthesis process and can be beneficial to plant growth. However, ozone is a strong oxidizing compound that can be non beneficial to plant growth. The objective of my project is to use plant height and physical appearance to quantify the combined effects of enriched levels of carbon dioxide and ozone on the growth behavior of bush bean plants.

Methods/Materials

Bush bean plants were grown in six plastic containers exposed to the same temperature and sunlight. Plants grown in three of the six containers (the controls) were exposed to enriched levels of carbon dioxide alone (300 to 2000 ppm). Plants grown in the remaining three plastic containers were exposed to combined, enriched levels of ozone (20 to 120 ppb) and carbon dioxide (300 to 2000 ppm). Carbon dioxide was produced by the natural decomposition of organic matter in the plant soil and ozone was produced using a small, commercially available ozone generator. Carbon dioxide levels were measured using color gas detection tubes and ozone levels were measured using color monitor badges. Plant height and physical appearance were measured daily over a period of 22 days to quantify the effects of enriched carbon dioxide and ozone on growth behavior.

Results

Enriched carbon dioxide exposure alone (the controls), resulted in a 20% increase in plant height and a healthy physical appearance. In contrast to this, enriched ozone exposure, combined with enriched carbon dioxide exposure, reduced plant height by 60%, caused spotting of leaves, and eventual physical damage to the exposed plants.

Conclusions/Discussion

My results indicate that for the test conditions of my experiment, ozone enrichment levels of 20 to 120 ppb is enough to negate all the beneficial effects on plant growth due to carbon dioxide enrichment levels of 300 to 2000 ppm, alone. The data suggest that increased ozone pollution in the atmosphere should be monitored carefully by scientists.

Summary Statement

Ozone exposure of bush bean plants negates all the beneficial effects on plant growth due to carbon dioxide exposure alone.

Help Received

Father helped with experimental setup; Professor Antonio Machado (California State University at Northridge) advised the test matrix and methodology; Dr. Sherwood Idso (U.S. Water Conservation Lab, Phoenix, Arizona) suggested carbon dioxide production technique.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Nicholas W. McCracken

Project Number
J0919

Project Title
The Transfer of Toxins Through the Water Cycle

Abstract

Objectives/Goals
The purpose of my project is to see if toxins are able to travel through the water cycle. If It remains toxic? How Toxic? Can this effect our crops and does this provide dangers to animal life.
Daphnia will be used in this process.

Methods/Materials
I built a box that could catch evaporation. We used tranpaency film on the top of the box. This collected the condensation (like a gutter) transfered the condensation into a cup. The box itself was a plastic box. Water with different pesticide solutions were placed into the box. The evaporation process lasted 8 hours.

After condensation was collected, I put the condensation into a test tube. 4 for each solution and control.
I then used an eye dropper to collect daphnia and place into the test tubes.
Calculated death rates of daphnia.

Results
Light dose of pesticice. (5 sec) - took 24 hours to kill all daphnia
Medium dose (10 sec) - took 12 hrs
Heavy dose (15 sec spray) 2 hours
Conrol (no spray) 2 weeks or longer for daphnia to die

Conclusions/Discussion
I learned that pesticide can be transfered through the water cycle and that "acid rain" is real and a problem in our society today.
Acid Rain is pollution and my project is from daily or home use of pesticide. People need to be aware that when they are using household chemicals this can be a danger to us all.

Summary Statement
Determining if pesticide can travel through the water cycle and do damage to the environment.

Help Received
Parents helped supervise and build. Teacher helped with writing and supplies.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Crystal V. Moffitt-O'Neill

Project Number
J0920

Project Title
Air Quality

Abstract

Objectives/Goals
My project was to determine whether the road or the woods caused the most polluting particles in the air.

Methods/Materials
To collect particle samples,four, 4" x 2" inch paper particle collectors with a 2" x 1" inch area of plastic overhead sheeting in the middle were made. The overhead sheet area was coated with a thin layer of petroleum jelly. The collectors were then hung in areas near the woods and the road. The collectors were in ranges of 5' to 8.5' feet from each other. Four days later the collectors were observed under a microscope and the results were calculated then documented in tables and graphs. I thought the use of the microscope would be more useful than it was. I believe that there was not enough power to make that much of a difference, other than making the particles that were collected somewhat larger and more crisp.

Results
My results were that there were 99% more particles from the road than the woods. The greatest amount of particles found by the road and woods were dirt and seeds, dirt coming from the road and seeds coming from the woods. The particles I was able to see while under the microscope you could see with the naked eye.

Conclusions/Discussion
My conclusion is that the road does give off more air pollution than the woods. The weather during the collection time was cold and rainy. Results may have changed under warmer, dryer conditions.
When we breathe in, we inhale millions of tiny particles. Some particles are larger than others. The larger particles get caught in the hairs of our nose and the smaller particles penetrate to our lungs, which often times causes problems affecting our health.
The common health problems caused by the tiny particles are eye, throat, or lung irritation. Which means these areas may become itchy, watery, or sore. People diagnosed with different types of respiratory conditions, such as asthma or bronchitis, may worsen their condition by inhaling these infectious particles. These particles can decrease your capability to fight off cold infections

Summary Statement
My project is about finding what area gives off the most air particles and how those particles affect our health.

Help Received
I received help on this project from my science teacher Ms.Parker with providing the materials. I also received help from both of my parents with spelling, some grammar, and how to use the graph program on our computer.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Quinn B. Procter

Project Number

J0921

Project Title

Coliform Counts! In the Tule River Watershed

Abstract

Objectives/Goals

The objective was to determine if surface water at lower elevations within the Tule River watershed had higher coliform counts than surface water at higher elevations.

Methods/Materials

Water samples were collected from nine different locations along an elevation gradient of the watershed. The control was a water sample from purchased distilled water. The dependent variable measured for each sample location and the control was the density of coliforms and E. coli using Coliplates, which provided a quantitative measure of the number of colony forming units per 100ml water sample. Each Coliplate has 96 wells, each capable of testing positive or negative for coliforms in general, and E. coli in particular, providing 96 replications at each site.

Results

The highest sample site elevation, 2,138m at Quaking Aspen Campground, had the lowest number of wells testing positive for total coliforms (1) and E. coli (1). The lowest sample site elevation, 179m at Lake Success, had the highest number of wells testing positive for total coliforms (90) and E. coli (59). Generally, there was a trend of increasing coliform counts with decreasing elevation.

Conclusions/Discussion

According to some standards, water at all sample sites except one was unsuitable for drinking and water at the lowest elevation, Lake Success, was also unsuitable for recreational use. Coliform bacteria, which can cause gastroenteritis, hepatitis, typhoid fever, and other diseases, may be a threat to drinking water and bodies of water used for recreation. E. coli, a type of coliform bacteria, is a specific indicator of fecal contamination by warm-blooded animals. The results suggest that untreated water from the watershed should not be consumed, and that further monitoring is needed since Lake Success is used for recreation.

Summary Statement

The project showed that coliform bacterial counts, and E. coli counts in particular, generally increased with decreasing elevation within the Tule River watershed.

Help Received

Father drove me to sample locations.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Dylan Z. Redden

Project Number
J0922

Project Title
What Are Kids Breathing?

Abstract

Objectives/Goals
Does the distance from a freeway affect the air quality on a school campus in the form of air borne particle pollution?
Based on the research I have found, the air quality on the El Tejon School campus will have the most air borne particles in the form of pollution due to its location as it is approximately 500 feet from Interstate 5.

Methods/Materials
I created a cryanometer to measure the blueness in the sky and used Vaseline covered index cards to collect air particles on five school campuses. Combining the data collected from the air particles and the cyanometer will give a clear indication of which school has the most air pollution on campus in the form of air borne particles.

Results
The data shows that my hypothesis was correct. The closer the schools were to the freeway, the worse the air quality was in the form of air particles. The average daily air particles collected at El Tejon School was 198.4 air particles and the test sites average was 149 air particles. Also, over 144,000 vehicles pass by El Tejon each day. This is 7.5 times more cars than the other schools.

Conclusions/Discussion
Examining the collected samples under the magnifying glass made me realize what is floating in the air all around school campuses. Sunlight has different size wavelengths. This is due to particles and the thickness of the atmosphere. Blue light is made from wavelengths made by smaller particles that have very little dust, water vapor, and man-made pollutants in them. So the lighter the sky is the more air particles are in the air. Even though the skies in the mountains look darker blue than in Bakersfield, when you are close to a freeway there are still a lot of air particles present.

Summary Statement
An experiment to measure what is in the air that kids breathe while on a school campus and if distance from a freeway makes a difference in the air quality.

Help Received
My mom drove me around to the testing sites, assisted me with the typing of my report and board layout.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Daniel C. Reilly

Project Number
J0923

Project Title
Is Xeriscaping a Fire Risk?

Abstract

Objectives/Goals
Xeriscaping is the use of drought resistant plants for landscaping. The purpose of my project was to see if certain dry plants used in xeriscaping may burn easily and be a risk to your property during a wildfire.

Methods/Materials
I tested plants that grow on the Oak Park hillsides such as: California Walnut, Chamise, California Barberry, and Annual Grass. I compared these plants to the plants recommended for xeriscaping. Some of these include: Thyme, Sumac, Sage, Lavender, and California Bay. To test my plants I used a home-made calorimeter made of an aluminum water basin and a Chimney Charcoal Starter. I measured two things. First I recorded how long it took for the shrubs to catch on fire. I lit the plants on fire with matches. I poured water in the basin and measured the water temperature in the bowl before and after the burning. The independent variable of my project is the different types of plants. The dependant variable is the rate at which the plants burn.

Results
My results showed that some of the xeriscaping plants burn as hot as Chaparral plants. My hypothesis was partly supported because some xeriscaping plants are a significant fire risk.

Conclusions/Discussion
This experiment showed that xeriscaping is a good idea and that it is possible to have a drought-tolerant and fire resistant plant. But some xeriscaping plants are a fire risk, and you should think before choosing what goes in your garden.

In the future, I could test many more plants. I could also build a more complex and accurate calorimeter. One other thing I could do is to test exactly how much water the plants save.

Summary Statement
The purpose of my project was to see if certain dry plants used in xeriscaping may burn easily and be a risk to your property during a wildfire.

Help Received
My dad helped me gather my plants and shrubs used for burning. He also supervised the experiment.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Nicole S. Schauser

Project Number
J0924

Project Title
Ocean Acidification and Its Anticipated Effects on Calcifying Marine Species

Abstract

Objectives/Goals
The objective of the project was to determine how much the ocean pH can decrease before calcite shells of marine organisms show significant morphological changes due to dissolution.

Methods/Materials
Calcite rhombohedra were used as hypothetical calcifying species. The crystals were grown on small glass cover slips for 5 days and then placed in containers with solutions of different pHs (7.7 to 8.2). At time points of 3, 7, and 16 days the crystals were removed and examined with a scanning electron microscope. Different regions of each sample were evaluated and the percent of crystals exhibiting significant morphological alteration was documented.

Results
The analyzed data indicate that there are three different pH ranges that have unique effects on calcium carbonate dissolution. Crystals maintained in solutions above pH 8.0 did not show any obvious morphological changes. Crystals maintained in solutions between pH 7.8 and 8.0 exhibited an increasing percentage of surface etching as a function of time and decreasing pH. This process is slow, but nevertheless significant: 6% for pH 8.0, 10% for pH 7.9, and 20% for pH 7.8 after 16 days. Crystals maintained at pH 7.7 showed significant volume loss already after 3 days (30%) and 100% after 16 days.

Conclusions/Discussion
The oceans are saturated with calcium carbonate, but increasing carbon dioxide concentrations in the atmosphere that originate from the burning of fossil fuels are reducing ocean pH and carbonate ion concentrations, threatening the existence of species that synthesize skeletons of this material. Our results reveal that even relatively minor decreases in pH can have dramatic effects on calcite crystal structure, with significant dissolution occurring at pHs below 8.0. The results reported here using a relatively simple synthetic system raise concerns regarding the uncertain future of calcifying marine species in an industrialized world. Long-term research using live calcifying marine organisms in pH solutions below 8.0 will more clearly show the dangerous effects of ocean acidification.

Summary Statement
My project determined how much the pH of the ocean could decrease before the calcite shells of marine organisms significantly dissolve, by using a simple synthetic system of calcium carbonate crystals put in different pH solutions.

Help Received
Used SEM at UCSB under the supervision of James Weaver

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Ryan Schumacher

Project Number
J0925

Project Title
Rich Soil or Not Rich Soil? That Is the Question

Abstract

Objectives/Goals
The objective of my project was to determine in which environment of the Monterey Peninsula plants thrived most, and to determine if this correlated with the soil of that environment having the optimal amount of nutrients for plant growth. I hypothesized that the quality of the soil and the amount of nutrients in each environment would be varied, but the plants would thrive most in the Salinas Farmland soil, which would have the optimal nutrient combination.

Methods/Materials
I obtained a 3 gallon sample of soil from each of five different environments of the Monterey Peninsula. Using five species of non-native plants, I planted each of the five plants in sets of five pots, each set containing soil from a different environment. As the plants grew, each plant's growth was measured and recorded. At the end of 6 weeks, the amount of plant growth was compared. After testing the amount of nutrients in each soil with a soil test kit and evaluating each soil#s texture and composition, I was able to determine which environment has the richest soil.

Results
All soil samples were within the optimal pH level for most plants. Each soil sample contained an adequate amount of nitrate nitrogen, phosphorous, and potassium, but the Salinas Farmland sample had the best nutrient combination. Because the Salinas farmland sample contained the best combination of nutrients, I believed that this would translate into high plant growth, but I was wrong. Instead, the plants thrived most in the Laureles Grade summit sample.

Conclusions/Discussion
My results proved my hypothesis incorrect. While the Salinas farmland soil did have the best nutrient combination, this did not translate into significant plant growth. Surprisingly, the average plant growth for the Salinas farmland sample was the lowest of the five environments. Subsequent soil texture testing revealed this clay loam soil type to be too dense to allow the absorption of nutrients by roots. Plant growth was greatest in the Laureles Grade summit sample because it was the only soil sample to contain both macro invertebrates and organic matter, which reduced the density of the soil and allowed what nutrients it contained to most effectively nourish the plants. The results of my experiment show farmers and gardeners that their soil needs to have organic matter in it and cannot be too dense, so that all of the essential nutrients for plant growth can be absorbed by the roots.

Summary Statement
My project determined which environment of the Monterey Peninsula is best for growing plants and what soil attributes contributed to the plant growth.

Help Received
My mother helped me to obtain soil from the five locations in Monterey County and helped acquire research materials at several libraries. My science teacher, Mr. Schmottlach, answered any question that I had about my experiment and provided me with the greenhouse.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Ian M. Singleton

Project Number
J0926

Project Title
The Leaching of Soil Nutrients from Synthetic and Natural Fertilizers

Abstract

Objectives/Goals
The purpose of this experiment is to find out which type of soil fertilizer, organic or synthetic, will leach the fastest when water passes through the soil, mimicking different amounts of rain.

Methods/Materials
Using the Rapitest soil test kit, along with 100 capsules of potash, phosphorus and nitrogen testing powder each, test 2 different type of soil, clay and mildly fertile, with 2 different type of organic and synthetic fertilizer. Test each initial soil for nitrogen, phosphorus and potash. Test each soil (5 cups each)again after it is fertilized with each fertilizer(1 times the amount,2 times the amount and 3 times the amount of fertilizer). Place one cup of the fertilized soil, in each of the 4 filters/ funnels draining the water into bucket. Slowly pour two cups of water in each of the four funnels. Once the water has drained out, take the soil from each funnel and test Take one of the bucket the water drained into and test. Repeat the same process for 2 times the fertilizer but pouring 4 cups of water into each funnel, and 3 times the fertilizer but pouring 6 cups of water.
The whole process will be repeated again for each fertilizer, for each soil.

Results
The results between the synthetic and organic fertilizer were very close. In the soil testing the nitrogen never went up, no matter how much fertilizer you added. It always stayed in the deficient-depleted zone. Also there was no organic nitrogen in the water test, but there was a little bit of synthetic nitrogen in the water test. The other nutrients went up when you added more fertilizer in the soil.
Here are the average of the nutrients in the soil mixed with fertilizer, organic or synthetic after water has passed throught it. The soil was tested 24 times with organic fertilizer and 24 times with synthetic.

Based on the water test more synthetic nitrogen leached than the organic nitrogen. The results for the other nutrients were close

Conclusions/Discussion
My hypothesis was half correct: the synthetic fertilizer leached more, but only by a small amount. The synthetic nitrogen is the only nutrient that leached more than the organic nutrient. The other two nutrients, phosphorus and potash did not have a significant difference betwwen synthetic and organic nutrients.
To continue with this experiment I would want to use more precise laboratory equipment to test for nutrients.

Summary Statement
To find out which type of soil fertilizer, organic or synthetic, will leach the fastest when water passes through the soil, mimicking different amounts of rain.

Help Received
Father made the 2 holes in each of the board, mother helped with laying out the first chart

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Bryan E. Truitt

Project Number
J0927

Project Title
The Effects of Nitrogen and Phosphorus on Eutrophication and Aquatic Primary Productivity

Abstract

Objectives/Goals
The purpose of this experiment was to determine a numeric correlation of the effects of nitrogen and phosphorus on eutrophication and aquatic primary productivity. Although in the past experiments have shown that nitrogen and particularly phosphorus affect eutrophication and aquatic primary productivity, there is no definitive numeric correlation established.

Methods/Materials
4 ponds were sampled approximately 4-5 inches below the surface of the water in an area which accurately represented the entire body of water and the water temperature recorded. The values of dissolved oxygen, nitrogen, phosphorus, pH, and aquatic primary productivity subsequently were tested using the La Motte test kit.

Results
the level of nutrients such as phosphorus rise, the net and gross primary productivity also rise. As the temperature rises there is more dissolved oxygen as a result of the increased temperature allowing the oxygen to be saturated even more.

Conclusions/Discussion
The analysis of the data has determined that, in general, as the variables contributing to primary productivity (DO, Nitrogen, and Phosphorus) increased, the gross and net primary productivity decreased relatively uniformly. While looking at the variables contributing to primary productivity individually, similar results were obtained. The relationship between net and gross aquatic primary productivity corresponded by each decreasing and increasing as the other increased or decreased.
Between phosphorus, net and gross aquatic primary productivity, and nitrogen, net and gross aquatic primary productivity, there was no observable correlation. The experiment was unable to establish a specific numeric correlation as to how the specific variables could contribute to net and gross aquatic primary productivity. These experiments are useful because they describe some of the relationships of the variables contributing to net and gross aquatic primary productivity.

Summary Statement
The purpose of this experiment was to establish a definitive numeric correlation of the effects of nitrogen and phosphorus on eutrophication and aquatic primary productivity.

Help Received
Various university professors aided with providing information and ideas for the experimental design; Father aided in transportation to the ponds and with monetary support; Sister aided in suggesting possible project ideas.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Linda P. Vang

Project Number
J0928

Project Title
The Percolation and Depth Rate of Motor Oil in Soils

Abstract

Objectives/Goals
The objective of my project was to determine and compare how much and how fast motor oil can pollute and harm our soil. My goal was to find which soil could withhold motor oil the most. I believe that loam would have the fastest percolation rate and the deepest depth. I also believe that clay would have the slowest percolation rate and the least depth.

Methods/Materials
Four types of soil were collected: sand, clay, loam, and potting soil. Four tubes were then filled with 10 inches of each soil. 1/2 cup of motor oil was measured and poured into each tube one at a time. The tubes were then observed every thirty minutes for two hours. Then every hour for two hours, the tubes were measured and recorded into a data sheet. The previous steps were then repeated until there was a total of 10 trials. For my control group, I mixed all of the soils (sand, clay, loam, and potting soil) together and repeated the original steps until 10 trials were completed with 1/2 cup of water.

Results
The percolation rate of sand averaged a total of 2.28 inches the first hour and .15 more the second hour; it had a depth average of 2.73 inches. Loam percolated a total of 3.28 inches the first hour and .50 more the second hour; it had a depth average of 3.78 inches. Clay percolated a total of 2.23 inches the first hour and .43 more the second hour; it had a depth average of 2.66 inches. Potting soil had a percolation total of 4.51 inches the first hour and .32 more the second hour; it had a depth average of 4.83 inches. My control group had a percolation total of 8.03 inches the first hour and .55 more the second hour. The depth rate of my control group totaled approx 8.58 inches.

Conclusions/Discussion
I had learned a lot from my experiment. I discovered that my first hypothesis, for loam, was incorrect, but my second hypothesis, for clay, was correct. I also found out that, overall, motor oil percolates slower than water. In conclusion, my project will benefit people to help keep our environment clean. It will also inform people to clean oil spills quickly.

Summary Statement
By conducting an experiment with motor oil in soils, I determined and compared the percolation and depth rates to find how oil polluted soil.

Help Received
Mother edited finished board; father collected motor oil; Mrs. Cloud revised rough drafts.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Jade J. Wentz Fitzgerald

Project Number
J0929

Project Title
How Is It Possible that by Washing Our Cars and Spraying Our Flowers, We Are Polluting Our Creeks, Streams, and Ocean?

Abstract

Objectives/Goals
The objective of my project was to see if even the smallest percentages of pesticides and detergents would affect life in the creeks that lead into the ocean and which would be the most harmful.

Methods/Materials
I used 80 Daphnia magna in this experiment. My control was 5 testing chambers with 2 daphnia in each for each solution percentage from 100% to as low as .78% for each pollutant. Their mortality was recorded every 2 hours visually and with a magnifying glass, (LC50) and their heart rate was observed and recorded at the end of the control using a microscope and stopwatch (BPM).

Results
Pesticides killed the daphnia faster than the car soap. The LC50 results for both were 4.5%, meaning 50% mortality at 4.5%#s. The heart rate was not consistent between the pollutants. The car soap put them to a sleep type death while the pesticide killed them quickly at higher percentages and at lower percentages made them extremely active. In the end, the mortality rate when recording the BPM, was 100% at 6.25% for both the pesticide and car wash solutions, although 1 of the daphnia was still alive at 12.5% of pesticide solution, the detergents had a lower mortality rate at the lower levels of 3.125, 1.56, and .78 percents.

Conclusions/Discussion
Chemical pesticide is harmful to our environment even below 1% and that other methods should be addressed if we are to protect our creeks and streams. Any type of car soap is harmful to our environment if it is allowed to run down our streets, into our storm drains directly to our creeks and ocean. My belief is that all individuals should be educated to the effects they pose on our environment and seek better methods to stop this type of pollution. Better use of organic pesticides, such as vinegar, garlic oil and cornmeal. Washing your car on your lawn so there is no runoff, or local carwashes that dispose of detergents ecologically would greatly reduce the amount of deadly pollutants that run directly into our creeks, steams, and ocean.

Summary Statement
Determining the effects of pesticides and detergents on our creek life.

Help Received
Mother helped with board layout and editing; father supervised with baseline concentrations.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Melissa E. Weyant

Project Number
J0930

Project Title
Modeling the Effects of Storm Drain Pollutants on San Fransquito Creek using Water Quality Studies and Toxicity Testing

Abstract

Objectives/Goals
My objective is to determine how storm drain pollutants affect creek health.

Methods/Materials
I simulated trace contamination and chemical spill of storm drain pollutants on creek health. In one experiment, I studied three different chemicals, each one at eight different levels of concentration in one gallon tubs of creek water. I monitored all mixtures over three days and repeated the entire experiment three times. All tubs were in a darkened garage, with temperature, light exposure, and air exposure being controlled. I varied levels of chemicals. I used a multi-meter to conduct water quality testing and performed toxicity studies on all tubs using ghost shrimp. After I determined toxicity values for each chemical, I subjected a smaller number of tubs to light/stagnant, dark/aeration, and light/aeration. I also conducted ammonia, nitrate, nitrite, and phosphate testing. I am now conducting LC50 toxicity testing and applying what I have learned to San Fransquito Creek.

Results
Almost all of the chemical and creek water mixtures that were toxic to ghost shrimp were safe according to water quality measurements. In my stagnant water simulation, a car wash product was toxic at the level of 1 teaspoon to ½ tablespoon per gallon of creek water, depending on the size of the ghost shrimp. A deck wash was toxic at ¼ to ½ teaspoon per gallon of creek water. A fertilizer was not toxic by itself. However, at the chemical concentrations that were toxic to ghost shrimp, creek water quality values were almost entirely within normal ranges. Furthermore, subjecting select mixtures to light/stagnate, dark/aeration, and light/aeration did not affect toxicity levels.
In my testing for ammonia, I found that the car wash had high levels of ammonia. However, the manufacturer reports that no ammonia is in the product. The high ammonia may be caused by a chemical reaction of the preservative or may be a non-active chemical in the product which the company is not required to report.

Conclusions/Discussion
My conclusions are important. Stream Keepers who use water quality testing to assess if a creek is healthy may overlook toxic events that will definitely harm creek health. In addition, we need to be careful about chemical labeling and be sure to report potential chemical interactions that may involve a preservative or harmful reactions associated with non-active ingredients.

Summary Statement
I performed detailed water quality studies and toxicity testing to evaluate the effects of storm drain pollutants on creek health.

Help Received
My parents helped me collect water and supervised my use of chemicals. The Environmental Compliance Group in Palo Alto mentored me, especially Karin North and Brad Eggleston. They let me borrow their multi-meter and pipettes. Stream Keepers Mr. Jackson, Ms. Elliot, and Mr. Frost helped answer questions.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Brandon P. Whitney

Project Number
J0931

Project Title
Locals Only: Are Areas with Native Trees More Biologically Diverse than Areas with Non-native Trees?

Abstract

Objectives/Goals
The purpose of this experiment was to see if a difference in biological diversity on the macroscopic invertebrate level can be observed between an area with mostly native vegetation and an area with mostly non-native vegetation, and if so, which area would be more biologically diverse. My hypothesis was that a difference could be observed and that the native areas would be more biologically diverse.

Methods/Materials
Over a three week period I collected leaf litter from two native plant areas and two non-native plant areas. I put the leaf litter in a Berlese funnel (see Berlese funnel page and diagram), and identified the specimens that collected below the funnel.

Results
My results showed the non-native plant areas to be much less biologically diverse in terms of macroscopic invertebrates than the native areas.

Conclusions/Discussion
My conclusion supported my hypothesis and showed that a difference in biological diversity on the macro level can be observed and that areas with native vegetation have a greater diversity of invertebrates than do areas with non-native vegetation. The native areas had 120% more unique species than the non-native areas.

Summary Statement
It is a bio-diversity study on the invertebrate macro level between areas with native trees and areas with non-native trees.

Help Received
Dad helped in the designing of the berlese funnel.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Olivia E. Wong

Project Number
J0932

Project Title
Chemical Disinfections and Sanitization of Recycled Water

Abstract

Objectives/Goals
The objective is to compare the bactericidal effects of chlorine versus iodine disinfectants on the recycled wastewater.

Methods/Materials
Water sample from septic wastewater S, septic water treated with chlorine solution C1 and chlorine solution C2 (10% of chlorine 1), septic water treated with iodine solution I1 and iodine solution I2, (10% of Iodine 1), were plated aseptically to each nutrient agar plate. The numbers of bacterial colonies were counted after twenty- four hours of incubation period. The procedure was repeated for two more trials. Then, the average numbers of bacterial growth versus different concentration of disinfectants and septic water were graphed. The morphology of the bacteria was studied under the microscope after the bacteria was heat-fixed on the glass slides and stained with gram stain.

Results
The slope of chlorine disinfectants is steeper than the slope of iodine for bacterial growth. Thus, the bactericidal effects of iodine is more than chlorine.

Conclusions/Discussion
Chlorine is less effective than iodine in sanitization of recycled water.

Summary Statement
The disinfection effects of tincture iodine versus chlorine is compared in the sanitization of the recycled water.

Help Received
Sincere thanks to Mrs. Griego for her invaluable help of presenting the information needed. Secondly, I appreciate Suzie Khoo for giving me access to microbiology equipment. Thirdly, special gratitude to San San Wong for visual displays of the science board. Lastly, I give recognition to David Wong for editing.