CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Aamna J. Abbasi

Project Number
S1101

Project Title
Evaluating Black Carbon Concentrations in Urban Aerosols

Abstract

Objectives/Goals
Recent studies indicate that Black Carbon (BC) is a major culprit of Global Climate Change, second only to CO2 as the most important climate-warming agent #BC is the most strongly light-absorbing component of particulate matter and is formed by the incomplete combustion of fossil fuels. It absorbs solar radiation, influences cloud processes, and alters the melting of snow and ice cover. Regulation of BC emissions has been proposed to reduce future climate warming and to improve air quality. However, BC concentrations, as well as emission sources, are poorly constrained by measurements, posing a major challenge for developing future climate scenarios and mitigation strategies. The goal of this project is to measure BC concentrations for two urban areas # Irvine, California and Salt Lake City, Utah.

Methods/Materials
A time series of air filter samples, collected at the University of California, Irvine (UCI) over the summer of 2012 and in locations in Salt Lake City in the fall of 2012, were analyzed, using a sunset OC/EC aerosol analyzer. The instrument uses the IMPROVE_A temperature protocol, which allows a measurement of the BC, separate from the rest of the particulate matter on a given filter and is widely used for air quality monitoring.

Results
Concentrations of BC were highly variable in both basins and we found no significant differences between seasons. We found no difference in BC concentration between week and weekend days in either basin. BC concentrations were higher in the Salt Lake City than in the Los Angeles basin. BC accounted for a larger percentage of total carbon in the Salt Lake City than in the Los Angeles basin.

Conclusions/Discussion
Future studies will include collection and analysis of a larger data set to explore the effect of temporal and spatial variations on urban BC aerosol concentrations. In addition, more information about the contributions of different BC sources to the total BC load are needed to better understand and mitigate BC aerosols in urban air.

Summary Statement
Evaluating Black Carbon Concentrations in Urban Aerosols

Help Received
My thanks to Professor Claudia I. Czimczik & Gergana O. Mouteva, Department of Earth System Science, University of California, Irvine, for allowing me to participate in this amazing project.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Arka Bagchi; Rachit Kataria

Project Number

S1102

Project Title

The Maximization of CO2 Intake through Phytochrome Genetic Overexpression, Chemical Enhancement, and Fungal Alteration

Abstract

Objectives/Goals

The objective is to maximize the amount of Carbon dioxide taken in during photosynthesis by Red Mangrove plants in order to alleviate the problems caused by Global Warming.

Methods/Materials

We implemented a powdered chemical called Kinetin, a fungi known as Endomycorrhizae, and a chromatic tinge of Far Red Light. These factors were applied singularly and in pairs to root tips and leaves of 14 plants per combination or single factor. The intake was recorded using several Vernier Labquest Carbon dioxide gas sensors within closed environments replicating tropical atmospheric conditions and compared to the intake of the control group of Mangroves.

Results

The combination of Mycorrhizae and Kinetin yielded an intake of 32 ppm, or parts per million, left of Carbon dioxide, as opposed to the 410 ppm remaining from the control's intake after the recording period of 10 hours. This is an inherent 12-fold increase in intake of Carbon dioxide.

Conclusions/Discussion

With the prevalent detrimental impacts of excessive Carbon dioxide damaging the Earth's biosphere today, our project shows the ability to neutralize this excessive amount of gas by maximizing Carbon dioxide intake rather than adopting the mindset of wasting biomass and planting more plants. We estimate that by implementing this procedure on 20,000 Mangroves per each of the world's coastal countries, we can save 400,000,000 tonnes (1,000 kg per tonne) of Carbon dioxide annually.

Summary Statement

This project maximizes the amount of Carbon dioxide intake in Mangrove plants in order to alleviate the detrimental impacts of global warming with a potential impact of a 400,000,000 tonnes decrease of Carbon dioxide in the world annually.

Help Received

Used Vernier Labquest Carbon dioxide sensors provided by Lynbrook High School

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Stella L. Chen

Project Number
S1103

Project Title
Field Study of Carbon Dioxide Concentration Variability in Los Angeles County

Abstract

Objectives/Goals
My project objective is to compare the greenhouse gas carbon dioxide (CO2) concentrations at different times of the day in different locations of Los Angeles (LA) County. The goal is to observe the impact of human activities, geography and other factors on the CO2 concentrations.

Methods/Materials
Using gas cells, air samples were collected from four locations: the La Canada mountains, the La Canada town center, Jet Propulsion Lab and downtown LA (at USC). The collection times were around 11am to 12pm and 4 to 5pm. The air samples were measured using an Infrared (IR) spectrometer and the IR spectra of CO2 were obtained to determine its concentration.

Results
The town center has much higher CO2 concentration than the mountains at all times of the day. In the town center, which is close to the freeway, the CO2 concentration is greater during rush hours (around 4 pm) than at mid-day (around 11 am). In downtown LA and La Canada town center, the CO2 concentrations fluctuate significantly at different days, while in the mountain the concentrations are low and relatively stable.

Conclusions/Discussion
The primary source of CO2 in the air is human activities. Transportation is a major factor towards CO2 emissions. Human activity causes instability in CO2 concentration. Plants play an effective role absorbing CO2 in the mountains. CO2 is a good indicator of the amount of other, more dangerous, pollutants in the air.

Summary Statement
My project measured carbon dioxide concentrations at different times in different locations of LA County and provided important numerical evidence that human activities contributed greatly to the increase of CO2 concentration.

Help Received
used lab equipment at JPL

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Sydney Clark; Tanvi Gambhir

Project Number

S1104

Project Title

Determining Most Effective Root System for Absorbing Nitrates from Soil to Reduce Groundwater Pollution: A Continuation

Abstract

Objectives/Goals

The overall goal of this project was to find a way to reduce the amount of nitrate contamination in groundwater. This project focused on the root systems to observe whether plant root systems had an effect on nitrate levels in water leachate. It was hypothesized that out of three different root systems (fibrous, modified adventitious, and tap), the fibrous root system will be the most effective for absorbing the nitrates from the soil due to its large coverage and reasonable depth.

Methods/Materials

Cat grass was used to represent the fibrous root system, narcissus the modified adventitious root system, and lettuce the tap root system. Bare soil was used as the control. Five plants for each root system were used and grown from seed or bulb. A soil test was conducted before and after the first application of the liquid fertilizer. 24 hours after adding the fertilizer, the water leachate was collected. This was done five times over two weeks. Water samples were analyzed using a Reagent free Ion Chromatography System.

Results

The fibrous root system experienced the least amount of nitrate leaching form the soil with an average of 266.67 mg/L. This was followed by the tap root system(733.34 mg/L) and the modified adventitious root system (753.34 mg/L). The bare soil experienced an average of 403.34 mg/L of nitrate leaching.

Conclusions/Discussion

The results supported the hypothesis that the fibrous root system is the most effective for absorbing nitrates from the soil. This study demonstrates that different root systems can have a drastic effect on the nitrate levels in leached water. This is important to know because this contaminated water eventually makes its way down to the groundwater, which supplies our drinking water and leads to our natural water systems. Excess nitrates in groundwater can lead to negative health effects and eutrophication.

Summary Statement

This project finds a way to reduce the amount of nitrate contamination in groundwater.

Help Received

Used lab equipment at USDA of Salinas under the supervision of Dr. McCreight; Analyzed samples at Monterey Health Department; Parent drove to and from USDA and supported us financially

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Olivia R. Cooper

Project Number
S1105

Project Title
Ocean Acidification: Its Effects on Mussel Shells

Abstract

Objectives/Goals
My objective was to determine whether or not mussels shells are affected by relative acidification of their environment in order to collect more information about effects of ocean acidification.

Methods/Materials
I simulated ocean acidification in 9 jars by making 'sea water' using Instant Ocean salt and filtered water, I then tested the pH and added salt or water until it was between 8.05 and 8.14. In 3 jars labeled "Control", I filled the jars with the sea water, acting as normal sea water. In 3 jars labeled "Acidic 1", I added vinegar until the pH was between 7.75 and 7.84, acting as projected sea water after ocean acidification in the year 2100. In 3 jars labeled "Acidic 2", I added vinegar until the pH was between 7.45 and 7.54, acting as a the most acidified sea water. In each jar, I added exactly 1 oz of cleaned, dried, crushed mussel shells from the Puget Sound, a salt water source. I secured each lid and placed the jars in an undisturbed area for one month, observing them regularly. After a month, I drained the jars, collected and dried the shells. Then, I weighed and observed the shells.

Results
On average, the shells in the "Control" jars had no weight change, the shells in the "Acidic 1" jars had a -0.01 oz weight change, and the shells in the "Acidic 2" jars had a -0.01 oz weight change. I observed more fading and disintegration of the shells over time in the "Acidic 1" and "Acidic 2" jars compared to the "Control" jars.

Conclusions/Discussion
The shells did change visually and in weight, however subtle to demonstrate with the measurement tools I had. Over time, the shells in the acidified jars lost their vibrance, thinned, and were somewhat transparent. The shells in the "Control" jars showed little to no change. I believe this suggests the idea of ocean acidification to be a real issue in our oceans, however, I think further research and experimentation would show more powerful results.

Summary Statement
I am studying the effects of ocean acidification on mussels by exposing mussels shells to seawater with various levels of acidity.

Help Received
Mother helped me critically think through the various aspects of my experiment; Teacher helped me revise report; Mother helped me purchase materials; Mother helped me clean mussel shells

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Stacey Dojiri; Kelly Woo

Project Number

S1106

Project Title

The Response of a Coastal Phytoplankton Community to Hyperion Treatment Plant's Effluent: An Environmental Study

Abstract

Objectives/Goals

In 2014, the Hyperion Treatment Plant will divert its effluent from the 5-mile outfall to the 1-mile outfall. This diversion may cause increased phytoplankton growth, therefore disrupting the surrounding environment. So, our experiment will test whether it is best to divert in the spring or in the fall to minimize the potentially negative effects of harmful phytoplankton growth.

Methods/Materials

In both our spring and fall trials, seawater was collected and different dilutions of seawater and effluent were made. Our dilutions included a true control consisting of only natural seawater, a dilution control consisting of deionized water and natural seawater, and 1:1000, 1:84, and 1:13 effluent dilutions. After 6 days of incubation, the phytoplankton were preserved and counted and samples were taken for chlorophyll and domoic acid analysis.

Results

We hypothesized that a certain harmful species, Pseudo-nitzschia seriata, would be more prevalent in the spring. However, our results showed that Pseudo-nitzschia seriata was more abundant in the fall, while the less harmful species Pseudo-nitzschia delicatissima was more abundant in the spring. In the 1:13 dilution, which mimics the concentration of effluent to seawater during the diversion to the one-mile outfall, Pseudo-nitzschia seriata made up 5.69% of total cells in October while making up 0% of total cells in June. Also, in the October 1:13 dilution, Chaetoceros spp. and Cylindrotheca spp. increased significantly in number compared to June, together comprising over 50% of the phytoplankton abundance.

In addition, the domoic acid and choloropyll levels were higher in the October trial than in the June trial.

Conclusions/Discussion

Pseudo-nitszchia seriata produces a toxin called domoic acid, which can lead to amnesic shellfish poisoning and death of large mammals, such as humans. So, its significant presence in the October trial leads us to conclude that Hyperion Treatment Plant should divert its effluent in June of 2014 rather than October to minimize the negative effects on the environment. Our results will also be compared to USC's in-situ experiment so we can form a final conclusion together. Furthermore, our results will be compared to a field study done in 2014 to see if this experiment's results were predictive of what happens to the environment during the actual diversion.

Summary Statement

Based on the results of our project, the planned 2014 diversion of Hyperion Treatment Plant's effluent from the 5 mile to the 1 mile outfall should occur in June to minimize harmful effects on the coastal environment.

Help Received

Used lab equipment at Hyperion Treatment Plant; Dr. Masahiro Dojiri helped organize project; Dr. Caron and Erica Seubert provided information on phytoplankton and experiment setup; Hyperion Treatment Plant boat crew drove the boat

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Emily J. Elder

Project Number
S1107

Project Title
Vermicomposting

Abstract

Objectives/Goals
In this generation, more people are trying to raise awareness to the three R#s: Reduce, Reuse, and Recycle. Humans create abundant amount of waste every day and have no other place to put it other than in the trash. Now we can put waste in our gardens and have nature#s tillers also known as worms REUSE our wasted food and turn it into nutrients. Which worms can help lessen waste and till our soil? How many do we need? The purpose of this experiment is to measure how the type and the total number of earthworms can affect the amount of turned over organic material in the soil.

Methods/Materials
10 inch diameter buckets or plastic pots,Top soil,Earthworms (night crawlers and red worms),Grass clippings,Metric ruler,Kitchen measuring cup,Gardening tools.1)Put soil in the buckets and add water to make the soil a moist environment for the worms.2)Place the required number of worms per bucket:Red Worms and Night Crawlers:0,5,15,30,50,100 worms per bucket.3)Allow the worms to work down into the potting soil.4)Place 5cm of grass clippings evenly over the surface of the potting soil per pot 5)Every other day measure the left over grass clippings in each pot and record your findings.6)Record Monday, Wednesday and Friday afternoon.7)Repeat for 6 additional weeks and check and record data.

Results
The results were that the red worms composted the most organic material within the 7 weeks of observation. Unfortunately, the night crawlers were very unsuccessful especially the bucket with 50 night crawlers. The buckets with the fewer amounts of night crawlers did better than the most night crawlers. The night crawlers did so poorly because they need to be in a larger environment with more space. Moreover, night crawlers prefer to be at least 4ft deep into the soil. The buckets were only about a foot and a half deep. As for the red worms, they thrived in tilling the organic material. Red worms are more common and flourish on the surface of the soil,in the top 10 inches or so of the topsoil under the litter layer because they are epigamic worms.

Conclusions/Discussion
In Conclusion,although the difference in the number of worms moderately affected the amount of grass clippings left,it will affect the amount of nutrients in the soil. The more red worms,the more nutrients there will be for plants to go even though we did not test it. Basically week by week the numbers gradually decrease the red worms more than the night crawlers.

Summary Statement
My project was about what type of worms, and the amount of worms, help speed up the process of composting.

Help Received
My Mom purchased the materials and help me glue the items on the board.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Cesar G. Garcia

Project Number
S1108

Project Title
Impacts of Urban Runoff on Rocky Intertidal Biodiversity

Abstract

Objectives/Goals
Urban runoff has become an increasing threat for marine organisms due to high toxicity levels, lower salinity and extra nutrients supplied from drain outflows. An experiment was conducted to determine whether urban runoff had an impact on rocky intertidal organisms by measuring relative abundance of colonial anemone (Anthopleura elegantissima) and sea lettuce (Ulva lactuca) as well as species richness. So, what impact, if any, does urban runoff have on the species richness and relative abundance of the rocky intertidal? It was hypothesized, that an increase of foreign toxins would have a negative impact on both relative abundance and species richness of rocky intertidal.

Methods/Materials
A series of observational measurements were conducted in three sites that were impacted by urban runoff, each with a corresponding control site, in order to assess relative abundance of two key species: colonial anemone and sea lettuce as well as species richness of the entire rocky intertidal. Percent coverage, and average count served as indicators for relative abundance. Other species were then identified and recorded to calculate species richness.

Results
Data from both impact and control sites were compared through statistical tests to see if there was a significant difference in relative abundance and species richness. The results proved to partially contradict the original hypothesis of a negative impact on rocky intertidal caused by urban runoff. None of the three sites showed any correlation for percent coverage or average count. Additionally, two of the sites had a high species at the drain-impacted site. The third site showed the contrary: there was higher species richness at the control location.

Conclusions/Discussion
The patterns observed throughout the entirety of the data collected at each site were contrary to the original hypothesis. One explanation for the occurrence of higher species richness near the drains is the supply of extra nutrients, such as phosphates and nitrates, provided by urban runoff. Wave exposure may also have significant influences on the impacts urban runoff can have on rocky intertidal due to the washing away of toxic substances. Further research and analysis is needed to formulate a concrete conclusion and gain a better understanding of the impacts of urban runoff on rocky intertidal.

Summary Statement
Possible negative impacts of urban runoff on rocky intertidal were measured by quantifying relative abundance of colonial anemone and sea lettuce as well as species richness of the entire rocky intertidal.

Help Received
Cheryl Zurbrick, Kristin de Nesnera and Jenn Yost helped in the experimental design process. Assistance in the field was also received by Cheryl Zurbrick , Kristin de Nesnera, Kristin McCully, Burnne Yew, Jessica Garcia and Ryan Romero

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
McKenna R. Gibson

Project Number
S1109

Project Title
Copper Concentration in Stormwater Runoff South of Carmel

Abstract

Objectives/Goals
A current environmental concern is the level of copper concentration in storm drainage runoff water into the ocean. Much of this copper originates from brake pad dust on streets and also common architectural materials leaching into storm drainage. The copper is washed into the ocean during rains, especially during the first heavy rains of the wet season. Copper levels above the Central Coast Basin's Water Quality Objective for the protection of marine life have been frequently found in the southern more urbanized area of Monterey County. This project measured the levels of copper at two previously unmonitored drainage sites south of the area of any earlier study. The sites were in the Carmel Highlands/North Big Sur area - one site more urban, and one less so.

Methods/Materials
Two previously unmonitored runoff sites were selected south of Carmel - one with more surface streets. Three samples were taken at each site on four different days: one day at the end of the dry season; the next on the day of the first heavy rain of the wet season; and on two days post the first heavy rain. Samples were collected in 100ml collection bottles which were previously washed and then rinsed with distilled water. The samples were tested to insure the pH was between 2 and 6. Reverse-osmosis cleansed vials were used for testing in the colorimeter. Each sample was tested using the Porphyrin Method with an HACH Colorimeter.

Results
The test results indicated a substantial increase in the copper concentration level in the runoff water from the more urbanized site after the first heavy rainfall. Copper levels did not rise in samples from the less urbanized site on the same date. All but one sample from both sites were still well below the Water Quality Objective for copper.

Conclusions/Discussion
There was a lower level of copper concentration in each of the selected sites than found in many of the previously monitored sites in south Monterey County. Both of the selected sites are more rural than the previously monitored south county sites, so there appears to be a relationship between greater urbanization and copper concentration levels in storm drainage runoff water. The next steps in this project will be to monitor more southern sites, taking a greater number of samples at each site, and possibly using a Spectrophotometer. Another idea would be to compare sites with more surface versus subsurface drainage.

Summary Statement
This project measured the copper concentration levels in storm drainage runoff water entering the ocean at two previously unmonitored sites south of Carmel - one site with more surface streets.

Help Received
Mom assisted with some of the typing and gluing. Dad aided in retrieving the stormy weather runoff samples. Roger Phillips, Dir. of Applied Research, Monterey Bay Aquarium, advised with topic and site selection. Eric Kingsley, Water Quality Lab Mngr., Monterey Bay Aquarium, loaned some lab materials.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Emily Hernandez

Project Number

S1110

Project Title

Nutrient Content beneath Native and Non-Native Plants

Abstract

Objectives/Goals

Stakeholders interested in preserving native plant communities do much to restore degraded habitats. They encourage us to employ native plants in our gardens because every so often the plants that we put in our gardens escape and become invasive in natural areas. Given that native plants are better for native biodiversity I was motivated to test if native plants had any further positive impact. If that's the case, then perhaps more people would be interested using natives in their gardens.

Methods/Materials

I tested the three major macronutrients: N, P, K and pH. I hypothesized that there will be less N, P, and K under non-native plant soil(Cultivator,Soil bags,Sharpie)Soils were collected under individual native/non-native plants in areas that were dominated by a single species. Soils were poured into bags, labeled informatively and made sure that the soil samples contained decomposing leaf litter. A test kit was used to measure: N, P, K and pH. To measure pH I filled the test chamber with a soil sample, opened a green capsule over the test chamber to pour a powder , added water, fitted the cap onto the comparator and shook thoroughly, I allowed the soil to settle and develop a color for a minute. I then compared the color of the solution against a pH chart, I repeated this test ten times.To measure N, P and K for every native and non-native sample I filled a clean container with 1 cup of soil and 5 cups of D.I water, stirred and allowed the mixture to stand undisturbed until it settled for one day. Once the mixture was ready, using the dropper provided I filled the test with the solution, then removed one of the appropriate colored capsules, hold the capsule over the test chamber, fitted the cap onto the comparator and shook thoroughly, I allowed the soil to settle and develop a color for ten minutes. To record the results I compared the color of the solution against the color chart. I did the same steps for each of N, P, and K tests.

Results

My results showed mixed support for my hypothesis. P and K were close to being significantly higher under non-native as compared to native plants

Conclusions/Discussion

Non-native species are complex. One of the reasons why conservationists encourage us to use natives is because natives are adapted to their environments. To conclude, even though I did not find a major difference in soil macronutrients,I still reason that native plants may have a beneficial effect

Summary Statement

Testing the amount of the three major macronutrients(N, P, K), and pH within native and non-native soil to prove that in addition to biodiversity, native plants do in fact have an affirmative impact.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Raymond P.M. Hurst

Project Number
S1111

Project Title
Cut It or Keep It? A Study of Carbon Sequestration in Redwood Trees

Abstract

Objectives/Goals
Carbon Sequestration in Coastal Redwoods is a valuable resource to reduce Global Warming. My project#s purpose was to evaluate whether or not Coastal Redwood owners should cut their trees or keep them so they sequester more carbon.

Methods/Materials
My experiment determined the Carbon Density of Coastal Redwoods sampled in a previously harvested area from a 1997 Timber Harvest Plan. I then compared my results to a standard Carbon Sequestration formula. My hypothesis was that Carbon Sequestration (not harvesting) was a more valuable Timber Management practice than harvesting for Coastal Redwood trees.

Results
Analysis of the data made it clear that the standard formula measures Carbon Content incorrectly. The formula also greatly overestimates the dry weight biomass of a tree at 70% whereas my findings indicate 34% biomass.

Conclusions/Discussion
Analysis of the data made it clear that the standard formula measures Carbon Content incorrectly. The formula also greatly overestimates the dry weight biomass of a tree at 70% whereas my findings indicate 34% biomass. Based on the data and the formula#s room for error, it is clear that harvesting trees is more lucrative than it is to save them and be compensated for Carbon Credits. As long as standard formulas remain in use, they will be measure Carbon Sequestration incorrectly and therefore Carbon Credit will be allocated improperly and owners of coastal redwoods will be motivated to harvest their trees rather then keep them growing.

Summary Statement
Carbon sequestration in Coastal Redwood trees.

Help Received
Father supervised experiment; Mother drove and filled out forms

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Zhiqiang Liao

Project Number
S1112

Project Title
Is Variation of Caribbean Benthic Foraminiferal Shell Size Linked to Water Temperature?

Abstract

Objectives/Goals
Although benthic foraminifera are very common in the world ocean, little is known about how the shell size of benthic foraminifera responds to the surrounding environment. Here, I study shell size variation of modern Caribbean benthic foraminifera with the purpose to better understand the environmental variables that control foraminiferal shell size distribution in Caribbean Sea. According to Bergmann#s rule, terrestrial animals found at higher latitudes, and thus colder environments, have larger body sizes, whereas animals found in warmer regions tend to be smaller. In accordance with Bergmann#s rule, I hypothesize that decreasing water temperature along an increasing water depth gradient in the Caribbean Sea will favor larger benthic foraminifera in the deep sea.

Methods/Materials
To test this hypothesis, I compiled biogeographic (latitude and longitude) data for modern benthic forams living in the Caribbean Sea. I measured the length, width and thickness of holotype (the ideal representative) of Caribbean foram specimens from a published compilation of monograph illustrations along with factors that might influence shell size distributions such as temperature, salinity, and dissolved oxygen concentration. To determine the environmental variables that best predict size, I used R to analyze my data set by applying linear regression models and an ANOVA analysis to test for statistical significance and fit a best-fit model.

Results
My results show that no one environmental variable predicts the size for all groups of benthic foraminifera. Water temperature does not significantly predict the shell size of benthic foraminifera, but latitude does. In addition, the shell size of each type of benthic foraminifera responds to marine environment in different ways.

Conclusions/Discussion
Therefore, my results did not support my hypothesis that Caribbean benthic forams will follow Bergmann#s Rule. When latitude was analyzed to see how well it predicts size, latitude did prove to be statistically significant. However, since latitude represents a combination of variables, it is hard to determine which variable best predicts the shell size. A thorough analysis of the effect of each latitude-dependent factor on the shell size of benthic foraminfera will need to be further investigated.

Summary Statement
Here I study shell size variation of Caribbean benthic foraminifera with the purpose to better understand the environmental variables that control foraminiferal shell size distribution in Caribbean Sea.

Help Received
Used lab equipment at Stanford University under the supervision of Ms.Caitlin Keating-Bitonti, who is a graduate student of Department of Geological and Environmental Sciences.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Shannon K. Louie

Project Number
S1113

Project Title
Water World: How Does Water Quality Affect Living Organisms in the Arroyo Seco Drainage Basin?

Abstract

Objectives/Goals
This project was researched to unravel the secret of how water quality affects living organisms. The objective of this research project was to emphasize how water quality is a good indicator of the health of organisms in an environment.

Methods/Materials
In this investigation, nitrate, dissolved oxygen (DO), biochemical oxygen demand (BOD), pH, and coliform levels were tested and recorded at three different streams near La Canada and Pasadena. Water samples from the Hahamonga Watershed National Park (the stream near the top of the hill), Devils Gate Dam, and Lower Arroyo Park (the stream near the bottom of the hill) were collected and nitrate, DO, BOD, pH, and coliform tablets were added to the samples. Then, the results from the color changes were analyzed and compared to a chart provided by the LaMotte Water Monitoring Kit.

Results
The nitrate level was at an average of 0 ppm for all three sites. Similarly, the DO and BOD levels also had averages of 0 ppm for all three sites. At all three water testing sites, the coliform test resulted in positive readings. This meant that there was fecal contamination in the water. At the first and highest elevated site (Hahamonga Watershed National Park) the pH was at an average of 7. The middle site (Devils Gate Dam) had a pH average of 7.67 while the third site (Lower Arroyo Park) at the bottom of the hill had a pH average of 7.75.

Conclusions/Discussion
After countless hours of research and numerous experiments, a conclusion was reached and it proved that life near the top of the hill was indeed more profound than life near the foot of the hill. Some of the actual results differed from the hypothesis because of the possibility that the tablets from the kit might have been old.

Summary Statement
This project is about how the quality of water affects living organisms and whether or not a stream can support life at certain elevations.

Help Received
Father drove me to the test sites; Father's co-worker also drove me to the sites and helped to take pictures.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Madison P. Meredith

Project Number

S1114

Project Title

Ground Water Preservation: Using a Water-Based Microbial Mix as a Nitrate Sequestration Agent in Agriculture

Abstract

Objectives/Goals

Ground water pollution is a growing concern, not only nationally but globally as well. Many activities of developed and developing countries, with regard to agriculture, have contributed to nitrate contamination of ground water through the expanded use of nitrogen fertilizers. However, even though nitrogen fertilizers have an adverse impact on ground water quality, it continues to be used nationally and globally because it has turned into one of the most effective tools for increasing agricultural production. This study seeks to find the feasibility of using a water based microbial mix that will sequester nitrogen fertilizers to reduce contamination in the ground water.

Methods/Materials

Twenty-four plastic, ten centimeter (cm), pots with a single hole in the bottom were separated into Group A (12 pots) and Group B (12 pots). Groups A and B were placed on a 55 x 25 cm wire shelf. Twenty-four plastic 500 milliliter (ml) cylinders were separated into two equal groups, Group C (12 cylinders) and Group D (12 cylinders). Group C cylinders were placed under Group A pots; Group D cylinders were placed under Group B pots. The environment of Groups A and B resembled a crop field. Group A and Group B received equal soil per pot, one beta vulgaris plant per pot and sunlight per pot. Also, during the watering process that occurred every four days, Group A and Group B were each given 720 ml of nitrates and 720 ml of water. In addition, Group B received 480 ml of the water based microbial mix. Core soil samples were taken, every four days for a total of twenty days, and sent to the Valley Technical Agriculture Lab.

Results

Data revealed that the average amount of excess nitrates for Group A was 5.76 parts per million (ppm), and the average amount of excess nitrates for Group B was 3.90 ppm. The data was also converted to find the pounds of nitrogen per acre foot (lbs N/ac-ft), resulting in Group A having 23.04 lbs N/ac-ft, Group B having 15.60 lbs N/ac-ft. After using the efficiency formula, the efficiency of the nitrogen in Group A was 41.67%, the efficiency of the combination of nitrogen and the water-based microbial mix in Group B was 61.54%.

Conclusions/Discussion

The use of a water-based microbial mix to sequester nitrogen fertilizers to reduce nitrate contamination in groundwater has proved feasible by increasing nitrogen efficiency by 19.87%, and reducing the amount of excess lbs N/ac-ft by 7.44 lbs.

Summary Statement

A study on a water-based microbial mix and its feasibility to sequester nitrogen fertilizers in agriculture.

Help Received

Consulted with Professor Craig Britton at Porterville College on the subject of nitrogen in agriculture.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Gathenji B. Njoroge

Project Number
S1115

Project Title
Exploring the Removal of Salt from Local Soils

Abstract

Objectives/Goals
To determine whether it is possible to remove salt from soil. The problem is, #Is it possible to remove salt from soils?# It is an attempt to find out whether methods exist for decreasing the high sodium content of local soils. It is hypothesized that the experiment involving the growing of beans will remove the most soil.

Methods/Materials
Six soil types were collected. Eighteen plastic containers were arranged on a table in three rows of six pots. Each pot in the first row of pots was used to grow two cilantro plants. Each pot in the second row of pots was used to grow two bean plants. Each pot in the third row was used to grow corn plants. The soils were watered every other day with distilled water and observed daily. At the end of the experiment, the plants were disposed of and the soils used were placed in small Ziploc bags that were labeled with the name of the soil sample. The second part of the experiment involved leaching of the soils. For this, the original soil samples were distributed among the pots in the same manner. Each pot was placed in a coffee filter and put on top of a plastic container. The pots in the first row were unaltered. Thirty-eight grams of salt were added to the pots in the second row. Nineteen grams of salt were added to the pots in the third row. The pots were leached with distilled water at regular intervals. After the leaching experiment, the soils were allowed to dry and were put into small Ziploc bags. The Ziploc bags were labeled according to which samples they contained. All soil samples, including original samples, were sent to Agriserv Inc. for analysis.

Conclusions/Discussion
My hypothesis was partially correct. I was correct in saying that it is possible to remove salt from soils. However, the soils that grew corn plants removed as much sodium from the soils as the first leaching experiment did.
The soils that grew beans on average lost about 8.5 equivalents per million (EPM).
The soils that grew corn lost an average of 8.7 EPM. The soils containing cilantro seeds lost an average of 4.6 EPM.
By comparison, in experiment 1 of the leaching experiment, an 8.7 EPM decrease was observed in the soils.

Summary Statement
To explore ways of removing salt from soil

Help Received
Mother bought all the supplies for me. Mike Carr of Agriserve Inc. helped to test the soil samples

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Ruchi S. Pandya

Project Number

S1116

Project Title

Water Purification by Photoactivated Degussa P25 Nanoparticles to Eliminate Chemical and Microbiological Impurities

Abstract

Objectives/Goals

Globally one billion people lack clean drinking water. 3.4 million people die from water borne illnesses each year, making it the leading cause of death in the world. The purpose of this project is to find a practical way to purify water, using nanoparticles as a photocatalytic agent. This provides an economic, eco-friendly treatment method to purify chemicals and microbiological contaminants from water.

Methods/Materials

The photocatalytic properties of Nano-TiO2 were used to degrade Methylene Blue and E. Coli. Methylene Blue and E. Coli serve as proxies for chemical and microbiological contaminants in drinking water and industrial wastewater. 96 well assay trays were set up using impurity solutions and various dilutions of a Nano-TiO2 suspension. Images of the assay tray were taken using the IVIS photon emission-imaging camera, to determine the Fluorescence and Bioluminescence of Methylene Blue and E. Coli respectively. The fluorescence images were taken at 2 minute intervals for 10 minutes, and the bioluminescence images were taken at 5 minute intervals for 20 minutes. The images were analyzed using LivingImage.

Results

It was proven that the majority of Methylene Blue was degraded within 2 minutes of UV exposure. After 10 minutes of UV exposure, 99.04% of Methylene Blue had been mitigated. After 20 minutes of UV exposure, 92% of E. Coli was eradicated. Nano-TiO2 proved to be most effective in the 0.0625mg/mL concentration. The results show that Nano-TiO2 is an extremely effective and efficient water purification agent.

Conclusions/Discussion

Since Nano-TiO2 is a photocatalytic agent, it is activated by light. In the presence of light, Nano-TiO2 reacts with water to form hydroxide radicals, which repeatedly hit the surface of Methylene Blue and degrade the molecule#s structural integrity. The hydroxide radicals permeate through the cell membrane of E. Coli and interfere with the cell#s metabolic processes, releasing potassium ions and causing lipid peroxidation. The cell then loses its structural integrity, and dies.

Further Research: Once immobilized with Activated Charcoal, Nano-TiO2 can be used in a "trap-n'-kill" filter. The physical filtration properties of Activated Charcoal would trap impurities, and the Nano-TiO2 would degrade them, resulting in a sustainable, self-cleaning filter. Such a filter would be an economical, Eco-friendly, and effective solution to the worldwide water problem.

Summary Statement

The photocatalytic properties of Nano-TiO2 were used to create a cost effective, energy effective, and environmentally friendly solution, to degrade chemical and microbiological impurities from drinking water and industrial wastewater.

Help Received

Lab equipment used at Stanford University under the supervision of Dr. Jonathan Hardy.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Jazlynn G. Pastor

Project Number
S1117

Project Title
It's Getting Hot in Here!

Abstract

Objectives/Goals
The purpose of the experiment is to determine if an increase of temperature affects the life cycle of plants and animals. Also, how and why an increase of temperature does or does not affect the plant or animal.

Methods/Materials
Four caterpillars were grown during this experiment; two were raised with normal room temperature, and the other two were raised under a clamp lamp (to serve as a fixed heated temperature). Each day, the caterpillars were measured in weight and length - until it reached the third stage of metamorphosis. In the second part of the experiment, two separate pots of calendulas were grown. One pot was grown in normal room temperature, and the other was grown under a clamp lamp (for a fixed heated temperature). When the flowers began to sprout, their height and weight were measured daily. Also, the temperature of the soil in both pots were measured.

Results
The variable, the caterpillar raised in a hotter temperature, hatched two days earlier than the controls. It grew with a thicker body and smaller wings which were brown and dark orange. Its behavior was hostile and alarmed towards movement. The variable was unable to fly because its wings were dried out and wrinkled due to the heated atmosphere - It died two weeks later(a week shorter than the average span of a butterfly). The results of the second variable created a new statement to my hypothesis: an animal can die if it is raised in a warmer climate. The second variable was not able to pass the third stage of metamorphosis. It turned brown and shriveled. The larva is visible because its greenish tint appears through the cocoon. In comparison, the controls, the caterpillars raised in regular temperature, grew colorful and lively. Their wings were orange, red, and yellow, and their bodies were slender and evenly proportioned with its wings. Their behavior was not threatening like the variable. When released, the controls flew away without difficulty. For plants, their life span occurs faster if their atmosphere#s temperature is increased. The variable grew two days earlier than the control, and was taller and greener. Compared to the control, the variable#s soil was usually warmer (because it was constantly under a heated temperature).

Conclusions/Discussion
An increase of temperature affects the life cycle of plants and animals. It may also affect their behavior and appearance.

Summary Statement
The effect of global warming on the life cycle of plants and animals.

Help Received
I performed this experiement independently.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Anthony D. Sorace

Project Number
S1118

Project Title
e-ROAD-ed

Abstract

Objectives/Goals
My objective was to deterine if using modern road building techniques implemented by the Mendocino County Resource Conservation District, would reduce sediment load to our local streams.

Methods/Materials
During the same storm event, water samples were collected above and below culverts on stream crossings from a road with recent improvements from M.C.R.C.D. and from a road without recent improvements. The samples were filtered and weighed using a 1 milligram scale and the results recorded.

Results
In all instances except one the amount of sediment sampled below the road was greater than above the road. There was a greater percentage increase in sediment below the road on the unimproved road than on the improved road.

Conclusions/Discussion
It was demonstrated that using modern road building techniques helped to reduce sediment delivery to streams. These techniques help to "hyrdologically disconnect" the road system from the stream system. This will greatly improve water quality and fish habitat in the future.

Summary Statement
My project was to test water samples to determine if the road improvements made by M.C.R.C.D. help to reduce sediment delivery into Forsythe Creek.

Help Received
Elias Steinbuck gave some guidance and direction throughout the project via email and telephone. My biology teacher, Ms. Pealatere reviewed my notes and gave suggestions for my presentation. My Mom took photos during the experiment. My Dad helped me read topo maps for the sites studied.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Natalie J. Wu-Woods

Project Number

S1119

Project Title

Determining the Microbial Diversity in Chaparral Soils Before and After Wildfires through DNA Barcoding

Abstract

Objectives/Goals

In this study I tested the effects of fire on microbial communities in chaparral soils through DNA barcoding and the comparison of microbes found in burnt and unburned soil samples.

Methods/Materials

The Soil Sample was collected in the chaparral area, a location was found in December of 2012 where there had been a wildfire in May of 2012. Two areas of collection were found nearby one another around the same elevation where one area was exposed to the fire while the other was not. The gene used for DNA barcoding was the 16S rRNA gene. For PCR two sets of primers were used, one for bacteria and another for archaea. After PCR amplification gel electrophoresis was performed to visualize the DNA. The DNA was then purified and subcloned into the TA plasmid. Sixty-two plasmids were sent to Genwiz for sequencing. The resulting DNA data was used to search the National DNA database (NCBI) using the blastn program.

Results

After receiving nucleotide sequences from the GeneWiz, I ran them through the NCBI online database using the blastn program in order to identify each 16S ribosomal DNA barcode sequence. From the sequences sent in from unburned soil using Bacteria primers, a huge diversity was found. None of the microbes from either burned or unburned soil samples yielded any similarities with each other and other samples. Similar to the unburned soil samples from the Ar primers, many of the samples contained similar microbes, however there were more similarities present in the unburned soil samples.

Conclusions/Discussion

The purpose of this experiment was to determine the long-term affect wildfires have on the microbial community found in chaparral soil. I have found that the arachaea microbes found in both the burned and unburned soil samples have similarities. The data shows that the most abundant microbe found in the unburned samples are much less prominent in the burned samples. I was also able to see a much larger variety in the burned samples meaning that many of these soil arachaea microbes might have quickly moved in after the fire, after the community begins to stabilize, these microbes might displaced.

Summary Statement

Testing if wildfires change the microbial community in the soil and can this information be used to measure recovery after a fire.

Help Received

My mother suggested the project and my father provided guidance in the experimental design.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Brian Zhang

Project Number
S1120

Project Title
Analyzing a Method to Measure the Health and Stability of the Salt Marsh by Various Biotic and Abiotic Factors

Abstract

Objectives/Goals
Salt marshes are an important ecosystem, providing services to many species, but are declining due to factors such as global warming and pollution. This investigation attempts to formulate a method to measure the salt marsh health.

Methods/Materials
First, 3 125mL samples were removed from the salt marsh by use of a plankton net. 10 drops of acetone was spread across a paper filter by use of a glass pipette, and the first 125mL sample was ran through the filter, where the acetone extracted the chlorophyll. Chlorophyll absorbance was found by using a spectrophotometer. Plankton density was found by counting the number of plankton in a certain volume and dividing the number of plankton by volume. The number of algae was counted by use of the hemocytometer.

Results
From analyzing the data, an increase in one of the variables was matched by an increase in the others. Total numbers of birds were higher when the densities and numbers of the other factors such as plankton density were higher. Over time, the average number of birds dropped due to winter migration, but relative rises and increases were still possible to observe.

Conclusions/Discussion
The conclusions of this investigation demonstrated a number of concepts. Salt marsh health relies upon stability, so health cannot be measured by the success of just one organism. High tide results in an influx of organisms due to water gain, attracting higher numbers of birds, while low tide reduces productivity because producer organisms are lost with the water draining back to the ocean. Overall, salt marsh health is evaluated by multiple factors.

Summary Statement
The project is determining an accurate method to measure the health of the salth marsh so government measures that are being taken can be proved successful and continued and those that do not can be stopped, conserving time and resources.

Help Received
Lab supplied equipment, project developted and conducted indepedently of facility, parents helped drive

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Corey A. Davis

Project Number
S1194

Project Title
What Are the Effects of Petroleum Oil on Plant Life?

Abstract

Objectives/Goals
Objectives and goals for this project were to investigate and fin the effects that petroleum oil have on plant life.

Methods/Materials
In this investigation 4 Antirrhinum Majus or Snapdragon flowers of the same age and type were taken and given 704mL of water and 118mL of Hydro Organic Plant Nutrient with a low concentration of petroleum oil (6mL). Another 4 plants were taken and given the same amount of water and mineral nutrients with medium concentration of petroleum oil (10mL). A third group was taken and given the same amount of water and mineral nutrients but was given a high concentration of petroleum oil (16mL). And then 4 plants also of the same age were taken and given 704 ml of water and 118ml of Hydro Organic Plant Nutrients with no concentrations of petroleum oil. These 4 plants were used as the control group. During a 5 week period the plants physical characteristics as well as growth and flower loss was monitored and recorded.

Results
After the 5 week period the data showed that the plants given the smaller doses of petroleum oil (6ml) had more growth, less flower loss and indicated signs of malnourishment later into the five week process when compared to the Antirrhinum Majus given 10ml or 16ml of petroleum oil. The plants given the medium doses of petroleum oil (10ml) experienced a small amount of stinted growth, an increase in flower loss and indicated signs of malnourishment soon into the five week process when compared to the Antirrhinum Majus given 6ml of petroleum oil. Antirrhinum Majus given large doses of petroleum oil experienced a more severe amount of stinted growth , a significant amount of flower loss and indicated signs of malnourishment almost immediately into the five week process when compared to the Antirrhinum Majus given 6ml or 10ml of petroleum oil. Overall however, all plants when compared to the control group which wasn#t given any doses of petroleum oil experienced a significant deterioration of health and appeared unhealthy and malnourished.

Conclusions/Discussion
The results indicated that petroleum no matter the amount has a negative affect on plant life. It stints growth, causes flower and leaf loss as well as deterioration of the plants physical appearance. These affects appear to be caused by the inability by the plant to suck up nutrients or water from the soil due to clogged stems thus causing the plants to die.

Summary Statement
My project is about the affects that petroleum oil have on plant life.

Help Received
Father helped supply petroleum oil.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Nisha S. Rao

Project Number
S1195

Project Title
An Analysis of Solar Activity vs. Atmospheric CO2 on Earth's Surface Temperature & the Effect of Excess CO2 on Flora

Abstract

Objectives/Goals
The objective is to analyze if CO2 or solar activity has more influence on the Earth's increasing surface temperatures. I conducted an experiment to determine the effect of excess CO2 on plants.

Methods/Materials
To analyze the relationship between solar activity, Earth's surface temperatures, and atmospheric CO2, I used data from NASA (temperature), The Royal Belgium Observatory (Sunspot Number) and Berkeley Earth (CO2). I imported the yearly data(1880 to present) from these organizations into Microsoft Excel and graphed & analyzed the data.
To simulate the effect of high CO2 levels on plants, I used 2 greenhouses, 4 tomato seedlings, soil, 1 bowl, baking soda, vinegar, fenugreek and turnip seeds. I placed 2 tomato seedlings and half of the seeds in each greenhouse. To create excess CO2, I mixed baking soda and vinegar in the bowl, placed it one of the greenhouses, and sealed it. The experiment lasted for one week.

Results
The data demonstrates that Earth's temperatures conformed to solar activity until CO2 levels started to rise rapidly, overtaking solar activity as the dominant factor. Contrary to my hypothesis, the plants in the excess CO2 greenhouse did not fare well. The tomato seedlings wilted; the seeds' germination was delayed and stunted compared to the control greenhouse.

Conclusions/Discussion
The correlation between the number of sunspots and Earth's temperature is very clear. Once the carbon dioxide levels started rising, the global temperatures started reflecting CO2 levels rather than the sunspot cycle. The results of this research indicates that once the carbon dioxide levels are stabilized, the temperature patterns will again start to reflect the sunspot cycle. While excess CO2 initially improved the rate of growth of live plants, in was not sustained throughout the experiment; excess CO2 also delayed the germination of the seeds.

Summary Statement
This project's purpose is to understand if Earth's temperatures are influenced by CO2 or solar activity, and the effects of excess CO2 on plants.

Help Received
Mother helped fill forms, helped with board. Parents help with greenhouse setup. Teacher guided the writeup.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Prabhjot K. Grewal

Project Number

S1196

Project Title

Ocean Catastrophe: An Analysis of the Effects of CO(2) on the Dissolution of CaCO(3) in Marine Organisms

Abstract

Objectives/Goals

Ocean acidification is the process of CO2 in the atmosphere reacting to ocean water to create carbonic acid, which then lower the pH of the water and results in the dissolution of calcium carbonate, the main component in shells and corals. The objective of the experiment is to prove that such a process can have harmful affects on marine organisms, and not only does the acidification affect the chemistry and environment of the water, but also prevents organisms from thriving in their natural habitat.

Methods/Materials

Materials used were a CO2 gas tank, 6 Erlenmeyer flasks, samples (a piece of calcium carbonate, coral, a small bivalve shell, a large bivalve shell, a small slipper shell, and a large slipper shell- 6 samples for every flask)and litmus paper, to check pH. Each flask had .500L of salt water; two flasks (A&B) had no CO2 bubbled through and had a pH of 7.5, the next two flasks (C&D) had enough CO2 released to have a pH of 6.26 (on average) and the last two flasks (E&F) had more CO2 released for a pH of 5.62 (on average). After 2 weeks, flasks A, D, and E were stopped and after 4 weeks flasks B, C, and F were stopped. Initial and final masses were recorded for every sample.

Results

For the samples that were in an environment of 6.26 pH (on average) had an average of .05 g of loss and a 1.749 % loss. The samples that were in a 5.62 pH (on average) environment had a .078 g of loss and a 2.696 % loss. The samples that were exposed to the acidic water for a longer period of time displayed more dissolution compared to the samples that only had two weeks of treatment. Lastly, the samples that were of smaller mass and size experienced more dissolution than larger samples.

Conclusions/Discussion

The smaller samples had a higher percentage of mass loss compared to the larger samples because of the ratio between mass and surface area, especially evident in shells. More area of the smaller samples were exposed to the carbonic acid compared to the larger samples, in correlation to mass. The experiment proves the relationship between CO2 dissolution and CaCO3 loss, which is crucial in the understanding of marine food webs. Many microscopic shelled organisms can be left vulnerable in these acidic environments, and - as in the case with phytoplankton and butterfly shells- are the main producers of said food webs, resulting into a collapse of ecosystems that are vital to marine and human life.

Summary Statement

Ocean acidifcation occurs when CO2 in the air reacts with water to form carbonic acid, which affects marine life as their main form of protection-their shells- dissolve, resulting in the collapse of food chains that humans are dependent on.

Help Received

I used lab equipment from University of California: Riverside under the supervision of UCR graduate Leanne Hancock

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Sanjita Gowda; Reysha Patel

Project Number

S1197

Project Title

An Analysis of the Effects of Urban Runoff on Sycamore Canyon Creek

Abstract

Objectives/Goals

This experiment was conducted to determine the effects of urban runoff on the water quality of Sycamore Canyon Creek. If the tests of various water quality components indicate that urbanization has affected the water quality of Sycamore Canyon Creek, then the concentration of these particles will increase as they flow throughout Riverside.

Methods/Materials

On June 21, 2012, November 20, 2012, and December 28, 2012 water samples were taken from seven sites along the Sycamore Canyon Creek. These sites were two tributaries near the upper reach of the creek, the lower end of the canyon, the middle of Canyon Crest Golf Course, the middle of Victoria Golf Course, the concrete ditch at Andulka Park, and the middle of Riverside Community College parking lot. Water samples were tested for dissolved oxygen, carbon dioxide, pH, total dissolved solids, and temperature on site. After additional water samples were collected and tested for nitrate, nitrite, phosphate, total hardness, alkalinity, coliform, ammonia, chloride, and salinity, then data was recoded. Titration, VACUette kits, and electrode meters.
were used to collect this data.

Results

The results collected were scattered, indicating that other variables, such as the environments of each individual site also affected the water quality of Sycamore Canyon Creek. The most significant results found were that of nitrate.

Conclusions/Discussion

A major contributor to the ammonia, nitrite, nitrate, and coliform levels in the creek was due to the construction of the Perris Valley Pipeline. The approximate 6.5 mile/8-foot diameter Perris Valley Pipeline was constructed to transmit Metropolitan Water District water from a facility located near the Oleander Ave intersection to the Henry J. Mills Water Treatment Plant located within the Orange Crest area of Riverside CA. When the excess groundwater from the septic tanks was intercepted by a trench, it started to flow eastward into Moreno Valley and towards the Perris Valley Pipeline. To prevent this, a horizontal well was placed to drain effluent from the septic tanks on Gem St. into a tributary of Sycamore Canyon Creek. The results collected were scattered, indicating that other variables also affected the water quality of Sycamore Canyon Creek.

Summary Statement

This experiment was conducted to determine the effects of urban runoff on the water quality of Sycamore Canyon Creek through the testing of seven sites along the creek for various physical and chemical components.

Help Received

Lab kits were provided by a chemistry teacher, Michelle Hampton; a hydrologist named Tom Deane helped by answering questions regarding this project.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Jessica Lemus; Berenise Lopez

Project Number

S1198

Project Title

Is Rubidoux's Water Polluted?

Abstract

Objectives/Goals

The objective of this investigation is to inform Rubidoux resisdents about the water quality they consume and are being surrounded by.

Methods/Materials

-Four Water Sources (Rain, Tap, Storm Drain, Santa Ana River)
-Drinking Water Basics Test + Bacteria Water Test Kit
-Fisherbrand Test Tube
-2011 EPA Standards
-Gloves

Results

After testing the water sources and comparing the obtained results with the 2011 EPA standards, one can claim that the water in the Rubidoux Community is safe for the health of its residents.

Conclusions/Discussion

The data collected supported the hypothesis that all water sources would have pollutants, but the level of their pollution would not be hazardous to a person. The experiment expands the knowledge of this category subject because it informs about the pollutants in a body of water and the effects the pollution has to the health of a person.

Summary Statement

Determining whether the water in Rubidoux is a benefiting factor or a disadvantage to the health of Rubidoux residents.

Help Received

Steven Mains provided the 2011 EPA standards, Steve Appel provided the Rubidoux Community Service District: Tap Water Standards, Gordon Snyder provided the Water Test Kit

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Ilora S. Naik

Project Number
S1199

Project Title
Bioremediation in the Santa Ana River

Abstract

Objectives/Goals
My objective was to determine if bioremediation occurs in the riparian zone of the Santa Ana River and if there is a seasonal difference.

Methods/Materials
I went to four specific locations along 75 miles of the Santa Ana River and collected water samples in all four spots in both the summer and winter. I used test kits to measure levels of iron, phosphate and nitrate, among other things. I also used B.A.R.T. test kits to measure levels of nitrifying and denitrifying bacteria.

Results
Water tested in the riparian zone proved to have the lowest levels of contaminants. In the summer, the warmer temperatures aided bioremediation.

Conclusions/Discussion
Riparian zones play an important role in bioremediation and should be expanded and/or developed near the ocean as well as in places like the concrete-lined LA River.

Summary Statement
The role of riparian zones and the associated bacteria in the bioremediation of the Santa Ana River.

Help Received
Parents drove me to locations and purchase testing materials.