ESF
in the
High School

Environmental Summit

June 7, 2017

Hosted by

What is *ESF in the High School*?

ESF in the High School is a partnership program between SUNY ESF and High Schools throughout New York State that enables qualified students to:

- Experience college-level course work while still in high school.

- Understand the complex scientific and social perspectives behind the environmental issues that make headlines every day such as the relationship between energy and the environment.

- Learn about and explore diverse interests and career opportunities in environmental science, engineering, management, policy and design - and in related areas such as law, communications, technology and medicine.

Table of Contents

Platform Presentations

Posters

WELCOME AND INTRODUCTION

The Environmental Summit is the culmination of a year's worth of scientific inquiry, skill development, and hard work. Today you will engage in an age-old tradition within the scientific community as you present your work and discuss your results with others who share your passion and interest in your subject. We hope this experience will inspire you to embrace the importance of scientific research and its influence on your day to day experiences and choices. We also hope that you've become active citizen scientists who are concerned with the science behind the headlines as a result of your involvement in an *ESF in the High School* course.

Dr. Richard “Rick” Beal, Assistant Dean for K-12 STEM Education and Director of ESF in the High School

Jake O’Connell, Project Coordinator

Maura Harling Stefl, Administrative Assistant

Schedule for the Environmental Summit

8:00 – 9:00 AM	Registration/Check-in Baker Laboratory Lobby and poster setup in Gateway Center.
9:00 – 11:45 AM	Student Presentations in Baker Laboratory Presentation Rooms.
11:45 – 11:55 AM	Transition to Gateway Center for Keynote Speaker.
11:55 – 12:15 AM	Keynote Address – Gateway Center.
12:15 – 1:15 PM	Lunch and Poster Sessions (Mixer Style) – Gateway Center and Judging of Posters.
1:15 – 1:30 PM	Awards Presentation.

Keynote Speaker: Christopher T. Nomura

Vice President for Research

Dr. Nomura is a graduate of Alhambra High School, Alhambra, CA. He earned a Ph.D. in Biochemistry, Microbiology and Molecular Biology from the Pennsylvania State University. In addition, he served as a Postdoctoral Associate at the RIKEN Institute in Japan from 2001-2006. He also holds a B.A. in Biology from University of California, Santa Cruz.

His research interests center on using molecular techniques to improve the supply of precursors for biobased products. Examples include using protein and metabolic engineering techniques to generate recombinant bacterial strains to enhance production of polyhydroxyalkanoate (PHA) biodegradable polymers from renewable resources such as sugars and plant oils. Current and previous studies have used rational design of fatty acid biosynthetic enzymes based on x-ray crystal structures to alter their substrate specificity to provide monomers for PHA biosynthesis. Other research interests include genomic and microarray studies, in vitro evolution for enzyme improvement, microbial physiology, biodegradable polymer production, and polymer characterization studies. He has also authored numerous publications and was the recipient of the 2011 SUNY-ESF Exemplary research award.

In 2016 Dr. Nomura was appointed Vice President for research at SUNY ESF.

Environmental Summit Presentations

Baker 145				
Time	**Topic Category**	**Student Name(s)**	**Project Title**	**School**
9:15				
9:30	Sustainable Food Production	BOUSQUET, J., A. Batteall, C. Dunn, C. Mong	YEAR ROUND SUSTAINABLE FOOD PRODUCTION USING A COMPOST PILE TO HEAT A BROWN HOUSE IN CENTRAL NEW YORK	East Syracuse-Minoa
9:45	Alternative Energy	HODGE, J. and L. Russell	THE EFFECT OF INCREASED FEED RATE AND TEMPERATURE ON AN ANAEROBIC DIGESTER	East Syracuse-Minoa
10:00	Sustainable Food Production	CASTRELLO, M. and L. Hager	COMPARISON OF AFRICAN CLAWED FROGS AND GOLDFISH IN AQUAPONICS WITH CORRESPONDING VEGETATION GROWTH	East Syracuse-Minoa
10:15	Sustainable Food Production	CARDARELLI, S.	COMPARING YIELD AND WATER EFFICIENCY OF AQUAPONIC SYSTEMS VERSUS CONVENTIONAL AGRICULTURE	East Syracuse-Minoa
10:30	Ecological Footprint and Energy Audits	ENDRENY, N, P, Fudesco	BENEFITS OF TREES: A CASE STUDY OF NOTTINGHAM HIGH SCHOOL	Nottingham
10:45	Ecological Footprint and Energy Audits	FLORES, C.	Reducing the Amount of Cobalt in Lithium Ion Batteries	Vestal
11:00				
11:15				
11:30				

Baker 146				
Time	**Topic Category**	**Student Name(s)**	**Project Title**	**School**
9:15				
9:30				
9:45	Ecology and Climate Change	PETTIT, Z	MICRO BIOMES	Fulton: G. Ray Bodley High School
10:00	Ecology and Climate Change	ROWLEE, M. and M. Kitts	BIAS ON THE BRAIN: PERCEPTION AND INFLUENCE IN NEWS	Fulton: G. Ray Bodley High School
10:15	Pollution and Remediation	NGUYEN, C.	THE FUTURE OF EARTH: COMPOST AND WATER TREATMENT PLANTS	Nottingham
10:30	Pollution and Remediation	ROOSEVELT, J., C. Temple and T. Shane	CONSTRUCTED WETLANDS AS AN ALTERNATIVE TO TRADITIONAL WASTEWATER TREATMENT METHODS	East Syracuse-Minoa
10:45	Pollution and Remediation	ASHBY, L. and A. Shaughnessy, O. Vought	WATER QUALITY IN SYRACUSE AREA HIGH SCHOOLS	Nottingham
11:00	Biodiversity and Natural History	HILL, M., A. Field, O. Guerrette, M. Kolonko, J. Renner, E. Sickler, and R. Ward	HISTORICAL PERSPECTIVE OF THE EFFECTS OF LAND COVER ON THE OWASCO TRIBUTARIES	Weedsport
11:15	Pollution and Remediation	GREENIER, A. and J. Samson	WHAT PERCENTAGE OF LITTER IS RECYCLABLE?	Fulton: G. Ray Bodley High School
11:30				

PLATFORM PRESENTATIONS

Alternative Energy

HODGE, J. and L. RUSSELL - *East Syracuse-Minoa* **THE EFFECT OF INCREASED FEED RATE AND TEMPERATURE ON AN ANAEROBIC DIGESTER** As the population of the world increases to over 7.5 billion people, wastewater is becoming an increasing problem. Due to such a high population count, the demand for natural resources, like oil, is on the rise. Anaerobic digesters, or biodigesters, can take wastewater from homes, farms, and on a larger scale, towns or cities, and turn it into multiple energy sources. These sources include methane and syngas. They can heat houses, fuel cars and provide electricity for small towns. This solves both problems of increasing wastewater and an energy crisis on the rise. Students from ESM went to the Cleanwater Educational Research Facility (C.E.R.F.) in Minoa, NY to test C.E.R.F's biodigester to test if using wastewater from the nearby village could produce enough methane to be sustainable. After 2 months of collecting samples to test the pH, temperature, and methane production, the students slowly increased feed rate and temperature. The data shows that over time, as the feed rate and temperature increased, the methane production stayed the same. In conclusion, the energy being produced by this process can save money by being an alternate source of energy. The methane produced can be used to fuel cars while the syngas can fuel houses or other buildings.

Biodiversity and Natural History

HILL, M., A. FIELD, O. GUERRETTE, M. KOLONKO, J. RENNER, E. SICKLER, and R. WARD – *Weedsport* **HISTORICAL PERSPECTIVE OF THE EFFECTS OF LAND COVER ON THE OWASCO TRIBUTARIES** The correlation of the Owasco Lake tributaries' watersheds and the water quality were examined in this experiment. Students travelled to various streams in the Owasco watershed to test the physical and chemical parameters from 2011-2016. Other water quality data that was studied was back to 1992 from the Owasco Lake Association. The hypothesis for this experiment is that there is a positive correlation between land cover and water quality. When looking at the Owasco Inlet, from 1992 to 2001, the total acreage of forest has decreased by about 17%, and the total acreage of wetlands increased by over 4,000 acres. The average phosphorus level in 1990 was around .236 mg/L. In 2001, the amount of phosphorus had decreased to .035. This number is below the EPA water quality criteria, which states the phosphorus level should be from 0.01 to 0.075 mg/L (Nitrogen, 2005). The reason why the stream's phosphorus level improved is likely an effect of the increase in wetlands. Wetlands provide services, such as water purification and flood protection. An increase in wetlands leads to an increase in water quality. Overall, Owasco Lake is a mesotrophic body of water, meaning that it has a fairly good amount of dissolved nutrients in the water, due to different factors. The hypothesis was correct because land cover and water quality are positively correlated.

Ecological Economics

None

Ecological Footprints and Energy Audits

ENDRENY, N. and P. FUDESCO – *Nottingham* **BENEFITS OF TREES: A CASE STUDY OF NOTTINGHAM HIGH SCHOOL** Our project focuses on the benefits of planting trees around Nottingham High School. Using the program i-tree we hope to calculate the potential reduction of cooling costs. This project is in light of the student government's proposal to install air conditioning throughout the school. Though a survey we can determine what other tree benefits students prioritize. We will choose which species of tree to plant based on the desired benefits gathered in the survey and the species ability to reduce cooling costs. In determining the location of the trees we will gather data on ground temperature around the school; the trees will be "planted" where needed the most. We will then use the program i-tree to calculate the benefits of these trees in terms of US dollars. The results will be presented to the student government and hopefully taken into consideration.

FLORES, C. – *Vestal* **Reducing the Amount of Cobalt in Lithium Ion Batteries** In this paper, I investigate materials in lithium-ion batteries. My research question is: “Is it possible for cheap and environmentally benign metals to substitute for cobalt, which is toxic and expensive, in the commercial layered cathode material, LiCoO2, without compromising the structural properties and electrochemical performance of the lithium-ion battery?” Among the different storage devices, lithium-ion batteries are the major contenders because of their high energy densities and long cycle life. The most commercially used cathode material is LiCoO2. Cobalt is expensive and toxic, hindering the further development of such batteries. The motivation of this project is to study mixed metal oxides with reduced amounts of cobalt, replacing it with other cheap and environmentally benign metals without compromising the electrochemical performance and properties of the battery. Three different compounds were investigated: LiCoO2, LiNi0.33Mn0.33Co0.33O2 (containing 30% cobalt), and LiNi0.5Mn0.3Co0.2O2 (containing 20% cobalt). The results show that nickel and manganese can indeed be substituted into the layered LiCoO2 structure as confirmed by the absence of additional impurity peaks in our XRD patterns. The unit cell volume is observed to increase due to the decrease in the amount of cobalt in the structure, and increase in the amount of nickel. The electrochemical performance, capacity, and electrochemical stability of the substituted samples results in comparable or even better: LiNi0.5Mn0.3Co0.2O2 shows a capacity of about 180 mAh/g while LiCoO2 had a capacity of around 170 mAh/g and the standard cathode has 150 mAh/g.

Ecology and Climate Change

PETTIT, Z - *Fulton: G. Ray Bodley High School* **MICRO BIOMES** The micro biomes project plans to see the direct results of the greenhouse effect and how it causes a rise in the earth's temperature. Reasons for this project began with a simple questioning of the greenhouse effect and how it affected our ozone specifically. One problem ran into during testing was how to test different areas of earth with carbon dioxide supplied, this was solved with more than one test being used. Concluding the tests showed a clear rise in temperature from the greenhouse effect.

ROWLEE, M. and M.KITTS - *Fulton: G. Ray Bodley High School* **BIAS ON THE BRAIN: PERCEPTION AND INFLUENCE IN NEWS** In 2017, news is more accessible and immediate than ever before. A sense of bias in international news sources has aroused a popular suspicion of the inclination we may see in everyday news. Both elected officials and average persons have questioned the validity of local and national news due to the growing problem of artificial news on the internet that plagues social media. By surveying 380 community members and students, finding studies, and cross-referencing them with several articles pertaining to the study, it became apparent that the news we receive is not always trusted. With the abundance of so-called “fake

news" apparently circulating around, it was interesting to uncover both what people in the Fulton community thought of mass media, and also what mass media sources were publishing compared to other sources and the studies they were referencing. If people are being told by elected officials that their news is, in fact, fake then they are more likely to speculate stories that are truthful. It is important to have confidence in the legitimacy of local and national news sources, to develop an appreciation of the significance of keeping up with current affairs.

Pollution and Remediation

ASHBY, L. and A. SHAUGHNESSY, and O. VOUGHT – *Nottingham* **HISTORICAL PERSPECTIVE OF THE EFFECTS OF LAND COVER ON THE OWASCO TRIBUTARIES** The intentions of this research project is to determine the quality of the water in schools in the Syracuse area. This is an important issue as multiple cities have had issues with their water quality, and as schools are large public places, their water quality is an important issue to a wide variety of people. After collecting water from both drinking fountains and bathroom sinks in ten schools in the Syracuse area, we used a multitude of tests to determine the pH, as well as other factors that contribute to the healthiness of water in these schools. Our original predictions had the Syracuse city schools having worse water quality than non-Syracuse city schools, with Henninger in particular being the most likely to have poor water quality.

GREENIER, A. and J. SAMSON - *Fulton: G. Ray Bodley High School* **WHAT PERCENTAGE OF LITTER IS RECYCLABLE?** This investigation was conducted because there is a large amount of litter throughout the city of Fulton and around the school, G. Ray Bodley. A good portion of litter that was found is in fact recyclable. Even though littering is almost 100% preventable, everyone could reduce the amount of litter by recycling all recyclables. The problem that was approached was "What percentage of litter is recyclable?" The hypothesis was that a minimum of 50% of all litter is recyclable. After collecting around the school and many different areas around the city of Fulton it was found that roughly 45% of all litter collected was recyclable. Some interesting facts are that car parts were found in almost every pickup that was conducted including an entire valance (the plastic piece under a front bumper), a gas cap, and many more miscellaneous pieces. Another interesting fact is that it was found that there were the most litter items on the school grounds than any other area in the city, mainly by the student parking lot.

NGUYEN, C. - *Nottingham* **THE FUTURE OF EARTH: COMPOST AND WATER TREATMENT PLANTS** Our world today is experiencing various ways of water pollution.
Until the Industrial Revolution, different living species received their water from bodies of freshwater. Those bodies of freshwater are now polluted. Bottled water is an alternative for freshwater, but it has been proved that bottled water is not as healthy. It's not green, and surrounded by plastic with unhealthy compounds for the body. Humans' best bet to save our freshwater is sewage treatment plants. Sewage treatment plants filter the water coming out of homes, from rainwater, and bodies of water and transport the clean water into homes and bodies of water. The pH of Onondaga County's tap water is much cleaner than most bottled water brand. If it's not an exact 7, it'll be basic and not acidic so it wouldn't be as harmful. Having sewage treatment plants can improve the water from our taps and from the water.
Agriculture is also improving itself. Fertilizer and pesticides have been created to quicken the amount of time taken to grow crops and to keep it safe from insects. Current evidence demonstrates that new fertilizers and pesticides cause runoff in bodies of water, notably our bodies of freshwater. Runoff is proven to cause eutrophication. Eutrophication can cause an intense growth spurt of plants, causing oxygen leaves to decrease and eventually killing any forms of living in the water. Alternatives for fertilizer can be compost soil and eggshells. It is waste, but has the potential to renew Earth.

ROOSEVELT, J., C. TEMPLE and T. SHANE - *East Syracuse-Minoa* **CONSTRUCTED WETLANDS AS AN ALTERNATIVE TO TRADITIONAL WASTEWATER TREATMENT METHODS** Access to clean water that has been rid of disease and bacteria in developing countries continues to be an issue as many developing countries are unable to afford the complex wastewater treatment reactors found in developed countries. Subsurface constructed wetlands serve as a physical, chemical and biological method of treating wastewater due to the diverse organisms and process which occur within them. Due to the low costs of the construction and the lowered maintenance cost of the constructed wetlands, they are more cost effective than traditional wastewater treatment methods. Due to this wetlands appear viable as a primary method of wastewater treatment in developing countries. 3 students from East Syracuse Minoa Central High School completed research at the Clean Water Education Research Facility in Minoa, New York on the constructed wetlands utilized by the Village of Minoa to treat wastewater. This research examined the relationship between the ammonia, pH and temperature of collected samples during the treatment process to the cleanliness of the water during the progression of treatment. To accomplish this, samples were taken throughout the treatment of wastewater within 2 constructed wetlands and then examined by students in the Village of Minoa Wastewater Treatment Plant Laboratory. Samples collected over the last 7 months have shown an average decrease in the concentration of ammonia from 11.2 to 0.3 parts per million through treatments in the two constructed wetlands. This decrease in the concentration of Ammonia makes subsurface constructed wetlands a viable solution for treating wastewater in developing countries, as this process can remove the bacteria, diseases and high ammonia concentrations found in untreated wastewater.

Sustainable Food Production

BOUSQUET, J., A. BATTREALL, C. DUNN, and C. MONG - *East Syracuse-Minoa* **YEAR ROUND SUSTAINABLE FOOD PRODUCTION USING A COMPOST PILE TO HEAT A BROWN HOUSE IN CENTRAL NEW YORK** The use of fossil fuels to transport food long distances is damaging to the environment. Using brown house and greenhouse technology, the production of local foods can be increased. Additionally, the use of this technology reduces fossil fuel consumption and pollution by producing food locally. Students from East Syracuse Minoa High School analyzed multiple sources to create a better understanding of this form of food production. Temperature of a decomposing leaf pile was taken to see how much heat would be going into the brown house. Kale, tomatoes, and snow peas were then planted into the brown house. A Vernier Labquest data collector with two temperature probes was set up. One probe was put into the soil, and the other was hung in the air to get the ambient temperature. Temperatures were compared with the outside temperature. As the outside ambient temperature decreased, the brown house ambient temperature decreased. The air temperature of the brown house was kept substantially warmer than the outside temperature. Future studies hope to use a greenhouse in place of the brown house. A greenhouse is currently being constructed at the brown house site. The greenhouse will be 4488 cubic feet, which is much bigger than the brown house, so the challenge will be heating it, using the same source used for heating the brown house. The larger scale greenhouse can produce more plants and vegetables than the brown house. This will increase local food production while reducing food miles and reduce fossil fuel consumption.

CARDARELLI, S. - *East Syracuse-Minoa* **COMPARING YIELD AND WATER EFFICIENCY OF AQUAPONIC SYSTEMS VERSUS CONVENTIONAL AGRICULTURE** Aquaponics presents solutions to challenges of modern societies, including producing agriculture efficiently to provide nutrition amidst a global water crisis. The benefits and challenges of aquaponics versus traditional methods of agricultural production are discussed. An aquaponic system was hypothesized to yield higher levels of plant matter despite low input of water. Data comparing the agricultural yield of a conventional system to hydroponic and aquaponic systems was analyzed. The results show that water is processed more efficiently in a hydroponic or aquaponic system than in a conventional system, in addition to supporting greater agricultural yield. However, in the future more

sophisticated devices may be required to maintain the controlled environment at a low economic cost. Student research ultimately failed to duplicate results supporting greater plant growth in an aquaponic system; however, findings support greater water efficiency versus a conventional system in addition to a need for sophisticated technologies to maintain the necessary environmental conditions.

CASTRELLO, M. and L. HAGER - *East Syracuse-Minoa* **COMPARISON OF AFRICAN CLAWED FROGS AND GOLDFISH IN AQUAPONICS WITH CORRESPONDING VEGETATION GROWTH** In some western areas of the United States, 80-90% of freshwater usage is used for agriculture. Without action, freshwater sources may be depleted (USDA ERS - Irrigation & Water Use). In home, sustainable, food production can combat food security threats of corporation reliance (Jorgensen et. al., 2009). Using an aquaculture, where water is recycled, the system can be utilized and innovated to find alternatives to traditional methods. A small scale aquaponics system was reused; half of the system was connected to African Clawed Frogs (Xenopus laevis) and the other half to Goldfish (Carassius auratus). Tomato seeds were planted symmetrically in a grow bed. A second bed was left as a bioreactor for each half. Over twelve weeks, growth for each system was quantitatively recorded. The African Clawed Frogs and Goldfish were both found to support vegetation in a small scale environment at a comparable level. This illustrates that African clawed frogs can be used as an alternative to traditionally used goldfish in an aquaculture. Higher nitrate levels were measured from the system with the frogs which correlates to the larger plant growth due to higher bacterial production of the frogs. The increased bacterial productivity of the frogs led to higher bioreactor activity and greater Nitrate levels in the frog system. Through further optimization, African Clawed Frogs could possibly exceed the overall vegetation production of the Goldfish. Further studies may include increased optimization of systems and scaling system variations.

POSTERS

Alternative Energy

AMADI, Y and HUSSEIN, S - *Rochester Academy of* Science **Feasible Alternative Energy Sources** We as humans have realized that the earth has suffered years of pollution due to our need for energy, we have not been considerate of the environment in achieving this through nonrenewable resources which are easy to access but harmful and are finite. Thus we have developed renewable energies. Some energy sources are more efficient or useful than others, such renewable energies like solar and wind that are cleaner than coal and fossil fuels but are less efficient. Through this literature review we found that of all the other renewable energies, Geothermal is cost effective and efficient making it the most feasible. It is both economically profitable and causes virtually no pollution. It is attainable in every country and it can produce a mass amount of energy. Geothermal energy is not as popular as the other energies but is developing and can revolutionize the way we use energy.

CEDENO, A - *East High School Rochester* **USING EDUCATION TO INFLUENCE USE OF ALTERNATIVE ENERGIES** Switching to Solar energy is the brightest thing you can do. Due to our current problems regarding fossil fuels, switching to alternative energies, such as solar power, is the way to go. “If alternative energies are the way to go why haven't we switched?” you ask. Well, this research paper examines people's opinions, on solar power specifically, and the effect of education on them. In this research paper people were given basic information about solar power and a survey on whether the information changed or encouraged them to switch to a more eco-friendly energy. This review proves that education on solar power encourages people to be more proactive in regards to switching from fossil fuels to solar energy. This paper encourages education to be a main resource for positively influencing people.

HERLOWSKI, J. - *Fulton: G. Ray Bodley High School* **THE POWER IN A PLAY** Herlowski has participated in Quirk's Players, the theatre group at G. Ray Bodley High School for several years. Herlowski plans to attend the University at Albany with a major in Digital Forensics. Herlowski met with Richard Rutishauser, an electrical engineer at Siemens in order to gather the data needed for this project. Both Rutishauser and Herlowski went into the high school auditorium and started to gather data from the popcorn machine, refrigerator, air handling unit, and lighting panel. After running numbers on a gargantuan 4 MB excel spreadsheet, Herlowski found that the average kWh for one performance of a production at G. Ray Bodley is 9.7475 kWh. So, what does this number mean? If we find out how much energy is used in a play, then what could we do with that energy? After one week of shows, the kWh is 77.98, with this number one could charge around 21,000 cellphones, or charge their own phone for about 58 years. After one year of shows, the kWh is 4054.96, with this number it would cost $486.60 to run an electric car on that many kWh (using $0.12 per kWh). The list of equivalents goes on, but these are just a few of the many interesting equivalents Herlowski has found. A common error is one assuming "Well, that's just the high school, so what?" And they fail to consider something a wise man once said, "You aren't stuck in traffic, you are traffic".

KALUMBWE, E. and W. BROOKS - *Rochester Academy of Science* **Hydropower Hypothesis** Hydro power is an alternative energy source that has been cultivated by humans for centuries. Then, humans discovered that hydropower can be used to conduct electricity, and hydroelectricity was discovered. The discovery of this form of alternative energy was beneficial as it provides energy for millions of people worldwide. These people have access to electricity thanks to dams being built that could contain the water long enough to use it for power. Many nations have access to this source, but those nations that do not and instead rely on other sources are missing out.

LEBRON, X and APPLEWHITE, N - *Rochester Academy of Science* **How the Carbon Dioxide that is Released into the Atmosphere can be Decreased by using Geothermal Energy** Geothermal Energy is the one of the oldest and versatile forms of energy in the world. The increase in the development of technologies that use fossil fuels resulted in an increase in CO2 amount in the atmosphere. We hypothesized that using geothermal energy will help to decrease CO2 level in the atmosphere. With our research we've found that geothermal energy can decrease the CO2 emissions and improve the environment. Nowadays even under-developed countries use geothermal energy efficiently and the United States use geothermal energy more. With the use of this energy our world can be greener.

Biodiversity and Natural History

BUTLER, K – *Weedsport* **How Historical and Cultural Development is Driven by the Area's Environment** To properly study the history of an area there must first be a comprehensive study of its ecosystem. They are instrumental in how the community will develop. This is a compilation of historical evidence from the Village of Weedsport, New York compared to the ecology of the area. The historical research was acquired via several historical databases and crossed referenced with the town's environmental resources. It can be concluded that not only does the environment shape the culture of the area but shaping said environment can also affect the culture. This is shown specifically in the major transportation developments of the area, The Erie Canal and The Interstate Highway. The economic changes of these brought to the town clearly indicate that while the natural environment first limited the advancement of the town, the citizens overcame this with ingenuity. This included a rise in the population and an improvement in societal structure, not only proving the original hypothesis but adding a surprising new element.

MATTISON, D – *Weedsport* **DO OVER-WINTERING BIRDS DEPEND ON FEEDERS?** The purpose of this experiment was to determine whether or not over-wintering birds depend on bird feeders for most of their diet. I set up bird feeders and counted birds weekly for three months, recording information to help determine an answer to this. Working with Project FeederWatch as a guide to follow and having a platform to record my data online, I determined some trends. I would count birds every weekend, observing their habits, and watching every week as some of the same birds returned time and time again. Certain species such as the dark-eyed junco, European starling and hairy woodpecker were in every count but were also daily visitors. The dark-eyed juncos would often come in small flocks of 8-13 but could be as high as 16 individuals at one time, the European starlings often flocked in 6-12 birds but once had a group of 80 come to the feeders, and the hairy woodpecker would come alone almost every day to feast on the suet. While these birds visited often, they weren't dependent on the feeders for their entire diet. Other birds came frequently to supplement their diets but were also not completely dependent. While these birds may have needed the food provided at the feeders to help them survive during the harsh winter, my data shows that they were still finding food on their own, which is the important thing. Birds aren't dependent on bird feeders; they only use them to supplement their diet, and maybe a bit more in harsher conditions.

Ecological Economics

GIARDINE, T. AND J. SANFORD – *Nottingham* **ECOLOGY OF WETLANDS** Our project is about the role and significance of wetlands within an ecosystem. Not only that but the effort that is being made to clean up, repair, and even replace wetlands that have been damaged by human activity. Including our own lake's (Onondaga) wetlands and the effort that Honeywell is taking part of in order to repair the ecosystems around the lake. We are going to speak with a representative of Honeywell and ask them questions. Why did Honeywell decide to take part in repairing the ecosystems around the lake? What specific things are scientists looking for in an ecosystem? What type of native species of plants and animals are returning to the area as a result of the improved ecosystems? All of this relates back to how significant wetlands play in an ecosystem.

HYMES, B - *World of Inquiry* **Racial Bias In Outdoor Participation** This study seeks to highlight the participation in outdoor events with different races. I hypothesized that there would be more Caucasians that participate in outdoor events more than any other race. I also chose to investigate which of the following reasons why people may not go outside: fear, money, or lack of exposure or something else. To answer this question I conducted a survey and distributed them to one group of adults that are members in outdoor events, and also to students in an inner public school. In this survey that consisted of nine questions that asked about race, feelings towards the outdoors, and barriers. In result of the research and survey it came in conclusion that mostly Caucasians participate because they love the outdoors, Hispanic people don't participate because of money, and Africans Americans don't participate because of fear and lack of exposure. I also found out that going outdoors was a source of happiness and peace for people who go outdoors. Therefore my hypothesis was correct; there is a disparity between participation of different races. This also emphasizes that mixed and African Americans have certain barriers that caused restrictions to them participating. Schools and governments should invest in getting more kids in the city outdoors.

LACEY-BALDWIN, J., M. KNITTEL, and E. TURNER – *Nottingham* **SYRACUSE: THE NEXT FLINT, MICHIGAN?** The municipal water system of Syracuse has been overdue to be fixed for decades. This water is essential for day-to-day life, as many people rely on it for bathing, washing clothes, and other essential tasks to live and maintain a clean, healthy, lifestyle. The city of Syracuse would experience countless benefits if it improved its municipal water system, and the quality of life of the city's constituents would increase. The benefits of subsidizing money for improving the infrastructure of the fragile pipes that are so prevalent in the city of Syracuse, as well as improving the infrastructure of the municipal water system as a whole, would be much greater than the potential costs that it would experience. In this project, the researchers hope to conduct interviews with both a representative from the Syracuse Department of Public Works and the Syracuse Department of Water in order to get to the root of how the city has let this water problem go on so long without proposing a solution. The municipal water system of Syracuse, if left untreated, could very well end up experiencing the same problems as Flint. The city of Flint has experienced massive problems with contamination of municipal water, largely due to fragile and aging pipelines that deliver water to constituents across the area. The problems that the city of Flint is continuing to face could very well be the problems that the city of Syracuse will face in the near future.

COMBS, M, M. HUSEINOVIC, and C. WILLIAMS - *Nottingham* **ENVIROMENTAL RACISM** The research project has been decided on the notice of a growing body of evidence reveals that people in poverty have been experiencing greater environmental and health risks than the society at large. In these neighborhoods, workplaces and playgrounds are a few of the places where these risks can be described. Now in recent years, there has been a substantial rise in activist groups whose campaign is to battle this environmental/civil injustice. Which leads to the thought of environmentalism is now social justice and civil rights.

Ecological Footprints and Energy Audits

MARDEN, J. and N. SHATRAU - *Fulton: G. Ray Bodley High School* **STEP BY STEP** Our project is the carbon footprint of cars just to arrive to the Oncenter in Syracuse for a Silver Knights soccer game. We calculated three different years from different cars to different prices of gasses. A carbon footprint is defined as the amount of carbon compounds emitted because of the massive consumption of fossil fuels by a person, group, etc. Our reason for doing this was our interest in the carbon footprint concept and the involvement of soccer. We both thought that finding out how much carbon dioxide the cars emitted would be a fascinating discovery. To begin the project we researched the average attendance of the Oncenter/Silver Knights games through the years of 2013-2016. After that we researched what cars were most commonly bought between those years and found out the cost of gas at which each car consumed per mile. Then we estimated and cut the attendance in half and said that's how many cars traveled. (exp: if 3,000 was the average attendance of 2013 then 1,500 cars were driven to the game) Finally after all the calculations we put the information in a carbon footprint calculator and came up with our total carbon emissions.

RUFFINS, A. - *World of Inquiry* **EFFECTS OF BEDDING PROPORTIONS ON VERMICULTURE** This study focused on vermiculture compost with red wrigglers by experimenting with three different percentages of bedding to see what the "best environment" for the worms. This experiment tested the different ratios of food scraps to bedding to see which proportion is the most efficient over a 3 months period- measuring the rate of decomposition and nutrient composition of phosphorus, nitrate, and sulfur in each of the three ratios. All of the bins were in a greenhouse and checked once a week. Food added at estimated amounts to the different percentages. My hypothesis was that the 50 percentage was going to be the "best environment" for the worms. I found there was no significant difference between the bins they each all had different characteristics to them. There were factors that could have affected the results like time management and modification of procedures. There was also a delay in getting materials and change in what data that was going to be collected to determine what the "best environment" for the worms were.

Ecology and Climate Change

NGUYEN, H. – *Fowler* **VELOCITY OF HARBOR BROOK** My project is about measure the velocity of Harbor Brook. Stream velocity is the speed of the water in the stream. Units are distance per time (meters per second or feet per second). Flow velocity is generally presumed to influence flood damage. Calculation of velocity of the stream/water is very important for demands such as water management, water supply, irrigation and flood control. My prediction is that the stream is going to be slow moving. A stream with low water flow rate is better than high water flow rate. Because of its density, flowing water has large effect on organisms. Stream life, such as fish, are impacted by velocity and varying rates on velocity and depth. These changes in velocity within a stream cross section will result in different habitats, some areas slow water flow will encourage scuds, High amounts of water flowing in streams often leads to flooding, and flooding is one of the most common types of natural disasters. I calculated the velocity of the stream using a ruler, timer, tape measure to calculate the width and length, depth of water then use a piece of cork to calculated how fast the water move. My result is the velocity of water increased depending on the wind speed and weather.

Pollution and Remediation

AUNG, B. – *Nottingham* **THE EFFECT OF GREENHOUSE GASES** The Earth is roughly about 4.6 billion years old and humans have only existed about 200,000 years ago. In that just short amount of time humans are the one who have changed the Earth the most. The brightest and smartest specie on this planet, we are also the one who are destroying this Earth. Climate change viewed by some scientists is a normal thing but human's impact increased it . The moment where it all started was the discovering of fire. As time went on humans got smarter and new technologies contributed immensely to global warming. Greenhouse gases such as carbon dioxide, methane, nitrous oxide, and fluorinated gases caused the atmosphere to warm up. This warms up the planet Earth and we can see it through the melting of the polar ice caps, depletion of ozone layer, ocean acidification, and plants growth. This is not good thing and we need to be more aware of it. The purpose of this study was to explore the knowledge of Nottingham High School students on greenhouse gases and to analyze graphs from past research to show the increase in greenhouse gases in our atmosphere. Students will be surveyed with multiple questions and this data will be put in graphs to illustrate the knowledge of students here in Nottingham High School.

BLACKMAN, N. – *Fowler* **ESCHERICHIA BACTERIA: ON HARBOR** BROOK The test that I am doing right now is Escherichia. I am testing Escherichia to see if there are any bacteria in Harbor Brook. By testing E.coli you have to measure the amount of glucose molecules ingested in Harbor Brook that cause target microbes contained in the sample to produce a color change or fluorescence. The purpose of E.coli is to see if there is any bacteria such as E.coli are living in Harbor Brook because it can cause human risk. My prediction was that there were going to be Bacteria living in Harbor Brook, the E.coli acceptable limits for this test were if the number is 0 then that means it is excellent for humans to drink, if it reaches 1 to 3 it is safe to swim, 4 to 6 is safe for boats to be in the water, and anything greater than 6 is poor it's not healthy at all to drink, go boating or swim in the water. Testing Escherichia I am hoping to find out if there are any bacteria living in Harbor Brook and to see if the water is healthy for any animals or plants; also to see if there are nutrients. The researchers have found about E.coli that are similar are one article effect of human development on bacteriological water Quality in coastal watershed they examine how these indicator microbes were related to physical and chemical water quality parameters and to demographic and land use factors throughout the system of coastal creeks.

BOIKO, A - *Fulton: G. Ray Bodley High School* **I WET MY PLANTS** This project was designed to find out the effects of simulated acid rain on sunflower growth. It was expected that the seeds watered with higher pH levels to grow the tallest. This experiment was performed indoors using sunflower seeds, pH water, pH scale, a greenhouse and a ruler. 20 sunflower plants were divided into 5 groups labeled control pH 5.0, pH 4.0, pH 3.0 and pH 2.0. Each group was watered with 2.5mL of different concentrations of sulfuric acid each day for 5 weeks and were measured with a ruler daily to find plant height in inches. Based on the data collected, the plants watered with the highest pH levels of 4.0 and 5.0, grew the tallest with an average growth of 20 inches. On the other hand, the plants that were watered with lower pH levels of 3.0 and 2.0, only showed an average growth of 13.5 inches. Acid rain hinders plant growth by removing minerals and nutrients from the soil that plants need to grow. The hypothesis that plants will stop growing if the pH water is lower was strongly supported by the results.

CAMPBELL, J - *World of Inquiry* **PH LEVEL AFFECTS ON DAPHNIA** This project takes place in Rochester, New York 2017. The purpose of this project is to find out if there were issues with acid rain in Rochester and how the lower pH concentration affects freshwater invertebrates. Daphnia magna is a small invertebrate that lives in multiple freshwater environments. This project studies water samples from Rochester's Genesee River Watershed which eventually leads into the Lake Ontario's Watershed. The study measured the pH levels of the water samples and they were very close to neutral 7. In this experiment daphnia mortality was measured when exposed to the following: pH level of 3, pH level of 5, Genesee river water, tap water from a Rochester city school and melted snow. To measure mortality, the amount of casualties collected at least checked by 2 hours intervals. During the collection of the data the study shows that in the within 2 hours of exposure, 16 daphnia out of 40 in the samples have been counted as deceased. The study also shows that the lifespan of the daphnia in the Genesee water sample lasted a whole 24 hours later. In conclusion of this experiment studies showed that Rochester had no issue with acid rain currently but freshwater invertebrates can greatly be affected when toxicity is in the environment.

GAINES, T - *East High School Rochester* **HOW DO HUMANS' DAILY SUBSTANCE IMPACT SURROUNDING WATER ECOSYSTEMS?** Have you ever wondered what's in the water you're drinking? Pharmaceuticals are known to contaminate water world-wide. This can lead to many health risks that many people don't know about. Previous research has found tiny amounts of pharmaceuticals including antibiotics, hormones, mood stabilizers, and other drugs. My hypothesis that I'm going to study is if we limit the use of pharmaceuticals in runoff then it will reduce the amount of pharmaceuticals in water. This topic was very interesting to investigate because I have seen may people flush drugs and many other pharmaceuticals down the drain, not knowing the effects it could have on the water we drink. After my research is done I hope to find different ways to treat the water.

GERMINARA, B. and N. CURRIER – *Weedsport* **ERIE CANAL/SENECA RIVER WATERWAY ANALYSIS** Concerns over the water quality of the Seneca River inspired a test to see if the nearby Route 34 Highway had any effect of chloride and nitrate levels within the river. Predictions pointed to chloride and nitrate counts being higher downstream and higher levels in spring. Using LaMotte test kits, our tests included a set of three samples in December, and a set of three in May that were taken along the river. Out of the three samples there was one control group up river, and two experimental groups down river. At these sites testing for pH, nitrate, chloride and dissolved oxygen occurred. The results of the test did reject our original hypothesis that the nitrogen and chloride levels within the river itself would increase in the spring, with chloride (ppm) decreasing by a $20<x<30$ margin from winter, and nitrate remaining the same through both testing dates. We also see a decrease in chloride count as it's carried downstream, which disproves the prediction that chloride counts would actually increase. Our results show a high oxygen level downstream, reaching 6.8(ppm) in winter and 11.2(ppm) in spring, which possibly indicates that the flooding carried large quantities of chloride from road salt downstream, possibly affecting microorganisms. This would correlate the low chloride levels recorded to the heavy spring flooding washing these pollutants into the nearby Cross Lake, causing the nutrient overload reported in a 2007 water analysis study involving our study area. More research is needed.

HARDAWAY, E. - *Rochester Academy of Science* **SYNTHESIS METAL-ION UPTAKE PROPERTIES OF A NEW DITHIOCARBAMATE-BASE RESIN** In this research my hypothesis is that as our economy grows so does the amount of pollution we produce. Due to the need of basic essentials such as food, clean drinking/bathing water and raw materials. To get these materials we use resources that are the main cause pollution such as oil rigs malfunctioning and causing oil spills and using factories burning fossils fuels to produce electricity and other products. This also just doesn't involve air pollution but water pollution. A scientist outside the country came up with an idea to use polymers to absorb pollutants. The process involves the use of analytical science. The name of the project was Synthesis Metal-Ion Uptake Properties of a New Dithiocarbamate-Base Resin which I and a colleague got to test. I go into better detail about the experiment in my research paper.

JONES, O.- *Rochester Academy of Science* **RAISING EDUCATION ON RECYCLING** In this research, I have investigated the importance of education in recycling. The United States make up 30% of the world's garbage with only having 5% of the world's population. Therefore, it is important for American people to find ways to decrease the amount of garbage they produce. One of the most important ways is "recycling", and we do not recycle enough. I hypothesized that educating people on recycling would help to recycle more. In my research, it is known that some members of society actually do not know how to recycle.

KNITTEL, M., J. LACEY-BALDWIN, and E.TURNER– *Nottingham* **SYRACUSE: THE NEXT FLINT, MICHIGAN?** The municipal water system of Syracuse has been overdue to be fixed for decades. This water is essential for day-to-day life, as many people rely on it for bathing, washing clothes, and other essential tasks to live and maintain a clean, healthy, lifestyle. The city of Syracuse would experience countless benefits if it improved its municipal water system, and the quality of life of the city's constituents would increase. The benefits of subsidizing money for improving the infrastructure of the fragile pipes that are so prevalent in the city of Syracuse, as well as improving the infrastructure of the municipal water system as a whole, would be much greater than the potential costs that it would experience. In this project, the researchers hope to conduct interviews with both a representative from the Syracuse Department of Public Works and the Syracuse Department of Water in order to get to the root of how the city has let this water problem go on so long without proposing a solution. The municipal water system of Syracuse, if left untreated, could very well end up experiencing the same problems as Flint. The city of Flint has experienced massive problems with contamination of municipal water, largely due to fragile and aging pipelines that deliver water to constituents across the area. The problems that the city of Flint is continuing to face could very well be the problems that the city of Syracuse will face in the near future.

LEVU, L – *Fowler* **THE EFFECTS OF CHLORIDE LEVELS ON AQUATIC POPULATIONS ON HARBOR** Throughout the course of six months, we tested the waters of Harbor Brook to determine the status of it; whether it was polluted or not. While doing so, I predicted that as the levels of chloride increased, the aquatic species population will decrease as a result from salt use in the winter time. This is supported by the research done by several other scientists. For example, samples from 15 sites in east, central, and west-central areas, collected primarily in winter, had chloride concentrations higher than the U.S. Environmental Protection Agency recommended chronic criterion concentration for aquatic life of 230 milligrams per liter. (John Mullaney, 2007). The purpose of my test is to determine whether Harbor Brook contains acceptable levels of chloride or not. The test is done by using a Quantab Strip that has a scale from 1-8 and is then converted to ppm(mg/L). Once converted it is determined 0-50 as excellent quality, 50-250 as good quality, and 250-450 as fair quality, anything higher is considered poor quality. Research shows both predation and salt treatments had an effect on the aquatic invertebrate abundance, richness and community composition.(Science of the Total Environment). So by doing these tests it helps to determine a course of action to protect our aquatic life species. I found that the chloride levels fluctuated but mostly increased as the winter months went on, which supports my hypothesis of the aquatic population decreasing.

LUGO,J - *East High School Rochester* **SHOULD STYROFOAM BE IN SCHOOL CAFETERIAS?** My research is about reducing the use of Styrofoam in schools. Styrofoam takes 200 years to degrade and schools are using then at increasing rates. All of the plates are sent to landfills. If Styrofoam continues in schools, we will reach the point of no return. The point where stopping the use of foam will be pointless because the damage will become irreversible. Making the world a better place for our future generations is key. Styrofoam cannot biodegrade, also it is impossible to recycle due to high cost. Because style font can't biodegrade, it goes into the streams and oceans of the world. The marine life eats them and due to the food chain, people of the world are also digesting the harsh chemicals used to create Styrofoam. Styrofoam contains chemicals such as styrene, toluene, methyl chloride, benzene. Many more that could cause cancer and various other types of diseases.

MUTHANA, E - *World of Inquiry* **The Impact of Herbicides on Daphnia in Genesee Watershed** Waterways in New York have a history with water pollution and many parts of these waterways have not been assessed. Genesee River is located in Rochester, New York. This study was designed to investigate the effect of herbicides on the living organism. Water samples for this experiment were collected from the Genesee River and local tap water. These water samples were mixed with herbicides to create varied concentrations, 50%, 60%, and 70%. Daphnia magna were introduced into these concentrations and were checked at specific time intervals for mortality. It was predicted that significant daphnia mortality would happen with 70% concentration of herbicides. Daphnia mortality was significant in the 50% concentration, in which all daphnia died within the first 25 minutes. Surprisingly the 70% concentration took longer to die. The controls of Genesee River took longer to die (they lasted 36 hours) than daphnia that was in the tap water that was used from the school sink, but they both took longer to die compared to the water samples with herbicides concentration. Therefore the initial hypothesis was generally right, since the water samples with the concentration of herbicides killed the daphnia faster than the control.
Additionally, the unexpected results, specifically the 70% concentration, of the experiment draw up the conclusion that, although herbicides did play some role, there might be other factors involved in the effect of the water toxicity on aquatic livings in the Genesee River environment.

NADIA, A. – *Fowler* **MACROINVERTEBRATES IN HARBOR BROOK** STREAM My project was to test macroinvertebrates in stream and see if the stream at Harbor Brook was a healthy or polluted stream. My hypothesis was that the more sensitive animals we find in the stream will show that the stream is healthy. We started this experiment on November 1st until April 5th. We went to the stream at Harbor Brook and tried to catch as much macroinvertebrates we could for every two weeks and recorded what types of macroinvertebrates we found. The 3 categories of macroinvertebrates were sensitive, less sensitive, and tolerant. We didn’t find a lot of the sensitive animals, which we were aiming for but we found some of the tolerant and less sensitive animals. Finding those vertebrates from tolerant and less sensitive tells us that Harbor Brook is not a good or healthy stream.

PARTLOW, T. and E. LALLY – *Weedsport* **EFFECTS OF ACID RAIN ON PLANTS** The purpose behind this project was to observe the effect that acid precipitation had on the growth of plants and how the plants reacted and adapted to the lowered pH of the soil. Our hypothesis is that plants with higher molarities of acid, and in turn a lower pH, will have less growth. To solve this we used five different plants with different qualities such as root vegetables or fruit bearing plants and used three different molarities of acid, which were .01 M, .07 M, and .12 M and a control group given only water in order to see how the plants would grow in our environment without the effects of acid added in. The plants used were beets, beans, tomatoes, sunflowers and Swiss chard. Our experiment consisted of simulating different solutions of acidic water used to water the plants. The acidity was the independent variable with the type of soil; location, temperature, and amount of water were all kept constant. The results show that acid precipitation has a large effect on growth of the plants. While some plants fared better than others, all of the plants that were tested experienced a significantly lower rate of growth ranging from roughly a 50% decrease to 80% decrease to average height, as well as looking discolored and unhealthy. Two types of plants (beets and Swiss chard), did not grow at all at the highest molarity of acid.

PROSSER, M. and C. WOOD - *Fulton: G. Ray Bodley High School* **DO COVERS AFFECT RECYCLING** Cassandra Wood and Miranda Prosser decided to investigate whether or not, putting a cover on a recycling bin affected the outcome of trash in recycling bins. With their experience with the recycling program, they had noticed a lot of trash in recycling bins. Wood and Prosser split up the school and made covers for half of them. They then recorded the difference between trash in recycling with and without covers. Something interesting that was discovered was that, there was less paper in the bins with covers. Wood and Prosser believe this has to do with the fact that people actually have to lift the cover to put paper in, rather than just throwing it in.

ROMERO, M – *East High School Rochester* **WHO IS RESPONSIBLE FOR THE ALGAL BLOOMS IN LAKE ONTARIO?** Algal blooms can affect others bodies of water .Should we ignore the fact that we have algal blooms growing or do something about it? If we can find the main source that is causing this we can find ways to decrease or try to completely stop the algal blooms from affecting our other body or water. My hypothesis is if a nutrient run off can be point sourced upstream from Lake Ontario, then nutrient levels can be mitigated to decrease the effect of eutrophication in the water body. Eutrophication is when the environment becomes enriched with nutrients. This can be a problem in marine habitats .The bloom of algae may also block sunlight from photosynthetic marine plants under the water surface. Algal blooms can give a negative impact to other organisms

WALLACE, T, S. ADAIR, and D. BOWMEN – *Nottingham* **Environmental Hazards** For our final project we are doing environmental hazards, in which we going to interact about each specific kind of hazard or even just one specific hazard that has a major impact on human society. We are very determined to present a great lesson of environmental hazards that is influential, reachable, and inspiring, so people in our environment have a key clue about what an environmental hazard is and examples of a specific one that's never been heard of. We as the researchers, feel that we are going to try to find ways to install, with some sort of knowledge, and that can spread to create a more prosperous environment through our extensive research and what we learned throughout the ESF Global Environment class through many of our lectures and drawing on our continents this year that we have to keep a natural way of living to keep a healthy environment. These are our key hazards we thinking about using: Chemical Hazards, Physical Hazards, Biological Hazards, and Psychological Hazards

WILLIAMS, J. - *East High School Rochester* **PLASTIC BAG CONTROVERSY: YOUR SHOPPING FRIEND OR FOE** Ever wonder where all those plastic bags go when you just throw outside? We waste many plastic bags because we have unlimited access to them. When you go to the store Wegmans and shop they give you as many plastic bags you want. As well as you can ask for them and when the bag tear or have no use for them we throw the bags outside. So we see more Wegmans bag outside in our fields and streets. The large consumption of plastic bags that we take in from stores like Wegmans and then littering the bags is killing our environment. One way to help is follow what the store Price Rite does and charge for the bags. If all stores charge for the plastic bags instead of giving them away for free we would limit the amount of littering of plastic bags. I can see the difference in the store littering by going around and seeing which store bags are in the environment damaging it the almost. I think that if all stores charge for plastic bags in would decrease the amount of bags in the environment and help bring in use for the recycle bags that you can use over and over.

Sustainable Food Production

None

NOTES

235 Gateway Center
SUNY-ESF
1 Forestry Drive
Syracuse, NY 13210

Tel. 315-470-6817
Fax 315-470-6890
Email: outreach@esf.edu

Website: http://www.esf.edu/outreach/

2017 Platform Presentation Addendum

Ecology and Climate Change

FITZPATRICK, M. AND A. HARRINGTON. – *Lafayette HS* **Climate Change Hitting Close to Home** During February break of 2017, we had unusually warm temperatures. This sparked our curiosity and made us dig deeper into the topic. Our question turned into “have winter temperatures risen in the past 20 years?” We decided to look at the week of February 19th-25th. In addition to this, we are also looking at the use of artificial snow use on ski mountains. We have found that from February 1997 to February 2017, temperatures have risen by an average of three degrees. Unfortunately, the ski mountains did not respond to us in time. Instead, we asked peers who are regular skiers what they thought about the amount of artificial snow use. Most were skewed toward their being a decrease last year, going against our hypothesis. We also looked at which days were good to ski, and which were not. Most mountains can still continue to have skiers come unless it is warm and rainy. Therefore, these warm temperatures, it may affect business for the mountains over spring break.

GRASS, J. – *Lafayette HS* **Chemicals from Near Estuary Causing Deadly Algae Growth Known as Brown Tide** This research, aimed to investigate the brown tide problem in Long Island, New York, will show the correlation between the brown tide bloom and chemicals being put into the water from local farms. Additionally, the amount of boat activity was researched in order to determine if gasoline in the water may also be contributing to the algae bloom. A survey was conducted to gather information from local farmers and vignerons about what they put into the soil to accelerate the growth of their crops. Despite regulations being passed in Suffolk County to limit fertilizer products in order to prevent it from ruining the water table, four companies, two farms and two vineyards, were asked which fertilizer they use and what elements that fertilizer contains. The main element being looked for was nitrogen, which is an accelerant for algae blooms. The results of the survey showed that most farms and vineyards did use nitrogen based fertilizers. The runoff from its use causes damage to fresh groundwater and enters bay areas and local streams. In terms of boat use being a possible contributor to the brown tide algae bloom, it is concluded that since gasoline contains mostly carbon it does not contribute to the problem. Carbon promotes bacteria growth, but does not accelerate algae growth.In conclusion, while there are other contributors to be taken into consideration, it is likely that nitrogen based fertilizers used by local farms and vineyards plays a large role in the brown tide algae bloom.

Ecological Economics

THRALL, B. – *Lafayette HS* **Hydrofracking and Those Who are Involved** Hydrofracking has been a big topic of debate since the ability to pump crude oil out of the ground has become significantly harder. The Marcellus Shale, located in the Northeastern part of the United States, contains a lot of natural gas found within the shale that can be hydrofracked out of the ground. Hydrofracking, also known as deep horizontal drilling, has been said to be dangerous and environmentally impactful to other resources underground as well. Water that is underground can be negatively affected by hydrofracking, which has led some people to question if hydrofracking is worth the risk to obtain. There are several pros and cons argued when it comes to hydrofracking and depending upon which side of the fence someone stands on, can really help to determine a person’s view of hydrofracking. Hydrofracking is found to be both negative to the environment and human health, which is mainly the reason why it is under great debate. Hydrofracking is a way to make good money, which is why major drilling companies support it. My hypothesis was “What influences drilling companies to decide where to hydrofrack among various shale rich locations that are scattered throughout northeastern communities?” The data supports that economically deprived communities are targeted because of their vulnerability. Those who are less likely or capable of taking action against hydrofracking on their land are more likely to be hydrofracked on.

2017 Poster Presentation Addendum

Biodiversity and Natural History

BROHTERS,M. – *Lafayette HS* **Comparing Intelligence of Different Species of Animals**. Animal intelligence is something that us humans have been trying to investigate and interpret for a prolonged time. Why do we care about the intelligence of animals? Animals provide us with evidence and data to questions that even human minds could not even answer. Animal intelligence testing can give us more of an understanding of the animals that live amongst us. The problem with determining who is the most intelligent is that it cannot ever really be answered. We think that humans are the superior race because we can do difficult tasks that perhaps an animal possibly could not do. I will be looking at research to determine if the intelligence of an animal relates to the type of species. Along with looking at species i will see whether or not if an animal is a mammal determines their intelligence ranking. Additionally, I will be looking at animals that are invertebrates and vertebrates to see if that correlates to its own intelligence. Using the technique of field data analysis I have used other people's research to determine the ranking of animals intelligence. It seems that there are a multitude of ways to go about researching information to determine an animal's intelligence. Researching this topic will help us get an understanding of the animals more as well as it could benefit us in a considerable amount of ways.

CREWS, C., BRILL, A., and RUMNEY, A. - *Onondaga Central HS* **EXPOSURE TO NATURE AND ITS EFFECTS ON CHILDREN WITH ADHD** Children with ADHD often find themselves struggling with concentrating on schoolwork and problem-solving. However, it has been theorized for many years that spending time amongst nature improves these children’s attention spans and reduces the amount of time it takes for them to solve problems. In a controlled experiment conducted by A. Faber Taylor and F. E. Kuo, children with ADHD were offered a puzzle to solve, then were taken for walks in several different environments and asked to solve a similar puzzle after each walk. The children were unequivocally more concentrated on their tasks after walking through a nature setting, which shows that our hypothesis is correct. This means we now have a viable solution to help reduce kids’ symptoms that is cheap and very widely available.

Ecology and Climate Change

CORRENTE, J. and A. MYER – *Onondaga Central HS* **Migration of the Monarch Butterfly Threatened by Habitat Loss and Climate Change** If climate change and habitat destruction are examined in correlation to declining Danaus plexippus (monarch butterfly) populations, then there will be a direct relationship. We used an experiment by Nathan P. Lemoine done on how climate change may alter breeding ground distributions of monarchs (Danaus plexippus) through the expanding range of Asclepias (milkweed) plants in North America. Lemoine used MaxEnt species distribution modeling to assess potential changes in Asclepias and monarch distributions under moderate and severe climate change scenarios. The summer breeding range will become less stable from climate change, which is less

REISS, R. and E. SPRATT- *Lafayette HS* **The Influence of Volcanoes on Plant and Animal Development and Why Each is Different** The data shows various locations of volcanoes and the succession of the areas having different times they have taken to go through succession. We are determining if these different amounts of time they take to go through succession are influenced by the climate the volcanoes and areas they are in and the location they are in. We have chosen this topic because volcanoes are something that are frequently occurring and can be such a devastating thing and cover such a large spatial scale. Many areas are left in such damage and shock that it is very hard for the environment to get back on track and recover to its normal state again. Therefore we have decided to figure out if things like the climate and location of the areas are reasons for how easy and how long it takes for succession to happen. We have looked at three different volcanoes Mount Tambora, Mount St. Helens, and Volcano Krakatau, and the various climates they each have along with where they are located. The information we have found is that the climate and location they are in can have an impact on how long it takes for succession. Depending on the climate and location a number of things happen for the differences in succession such as more nutrients, rain and available water, and tectonic plates at the areas.

Pollution and Remediation

STAFFORD, M. AND N. GRISKAUSKAS – *Onondaga Central HS* **If Oyster Mushrooms Decrease Toxic Waste, Can We Use Them In Landfills?** This study involved seeking to find whether or not Pleurotus ostreatus, also known as oyster mushrooms, can reduce wastes such as plastics, wood products and agricultural wastes. To determine if this idea can be a success or not, an experiment was conducted at Vertically Integrated Farms in New York City. The experiment involves placing any food waste, in a container containing soil and Pleurotus ostreatus. The data collected will be based on how much of the food the Pleurotus ostreatus decomposes on a daily basis. Through research, we have discovered that using Pleurotus ostreatus to break down waste has been a success. It is still yet to be conducted on a large scale, but results have shown that this will prevent tons of waste from sitting in place and producing methane, and instead will decompose it in an organic matter.