

4-H Bristol County Envirothon Team
Local Effects of Climate Change on the Berkley Area
Coaches: Nancy and Angela Possinger

The team learned about global warming and climate change and applied the knowledge to implement ways to take action in our community.

The National Weather Service Outreach Educator showed our team weather records charting the recent rise in temperature. Accurate records have only been kept for 150 years and their position about climate change is that these increases in temperature may be a part of a natural cycle.

Other sources from which the team gathered information showed reasons for concern and taking action concerning CO₂, N₂O, CH₄, AND CFCs contributing to global warming. Envirothon workshops and guest speakers, Mass. Technology, Mass. Climate Changes Action Plan, Save the Bay, Overlook Farm staff and volunteers, newspaper and magazine and web articles, books, interviews with a Berkley Conservation Commissioner, and a visit to Hatch Technologies to learn about experiments with hydrogen, were sources of information.

We considered the effects on our area. Berkley is located on the Taunton River. Flooding, changes in salinity, water flow and water quality may become an increasing problem. All of the associated ecosystems will also be affected. The other outstanding problem is that most people who live in Berkley commute from the town for work and shopping. Pollution from vehicles is a major local effect.

We proceeded with an investigation and recommendation for a project knowing that our actions can make a difference in our town. We also helped with this project and intend to take part in continued community service at this site.

The Farm" at 181 Bayview Avenue is a small farm. We are recommending that the farm concentrate on improvement of sustainable practices, apply for the New England Grassroots Environmental Fund Grant for solar electric fences and then become an educational farm. The community will be able to participate in a CSA to have a source of locally and organically grown food. The farm will be a location where hands-on learning about sustainable agriculture can take place. Programs that address topics for discussion and programs that address our local resources can be offered. The farm will protect and increase the biodiversity of plants and animals. The farm will maintain an open space parcel among developed parcels. The farm will maintain trees that sequester CO₂ and vegetation that restores nitrogen to the soil and maintain buffer zones for waterway protection.

THANK YOU, Mass. Envirothon, for the education that you have offered. We have learned alot. It helps us and each one of us, in turn, is able to make a difference.

Acton-Boxborough Regional High School
Coach: Brian Dempsey

Climate change, a growing phenomenon that is occurring on an international level, has become much more prominent in recent years. Such an issue deserves, and indeed demands, attention not only from scientists, but also people of all ages. One of the many causes of climate change is global warming, which, essentially, is a result of greenhouse gasses. To address climate change, our Envirothon team decided to focus on global warming.

As a town that offers two different school system, Acton is an appealing town for many families. Our town's contribution to global warming is a small part of a colossal disruption of natural balances. A movement at the town level could contribute greatly to reducing drastic climate changes. Furthermore, if our town proceeds to implement greenhouse gas reducing steps.

Acton is a bedroom community, meaning it is only where people sleep, not where they work. This causes people to drive extensive distances to get to their jobs. And to add insult to injury, more than 80% of these commuters are commuting alone, not with a carpool or public transportation.(US Census)

After talking to various environmentalists around our town, like architect Chris Schafner, we discovered another issue with Acton's layout. Acton has six schools, all of which who are extremely energy inefficient. By leaving computers on all day and night, and leaving lights on during vacations we are burning unnecessary energy that no one is making use of. J.D. Head, the resource manager of Acton Boxborough, told us of all of the atrocities of the AB building. Not only do we leave the lights on, but despite the fact of having a brand new building, we have extremely poor insulation around the windows.

Furthermore, the dumps in Acton are unfriendly and not accessable enough to elderly. After the local environmentalist group, Acton Climate Action Team (ACAT), tried to pass a bill to encourage recycling, PAYT (Pay as You Throw). PAYT has people pay for each bag of trash one throws out rather than a flat rate for each year. This would encourage recycling because one would have to pay less if you recycle more. Unfortunately, this bill was stopped because the senior citizens was concerned that the recycling bins were not accessable to the older population of our community. Communication from ACAT is bad and the citizens do not know how environmentally friendly bills would also benefit them.

Ashland High School
Coach: Christine Scott
May 11, 2006

Global Climate Change Comes to Ashland

Located in Middlesex County in the Metro West region is Ashland, Massachusetts. With a land area of 33.5 KM squared, Ashland holds a population of 15, 305 and a 969 per square mile density. With the convenience of being located 22 miles west of Boston, Ashland contains a commuter rail service with access to the Back Bay station in Boston, estimated to be around 42-45 minutes. Our water supply comes from public wells in Hopkinton, a neighboring town of Ashland. Our state park is actually smaller than Hopkinton State Park, being 155 acres.

Global Climate change is a change in temperature over time due to global warming. Global warming is caused by high levels of green house gases. Human activities, mostly the burning of fossil fuels, have increased the greenhouse gas content of the earth's atmosphere significantly over the same period. Carbon dioxide is one of the most important greenhouse gases, which trap heat near the planet's surface. This warming will have real consequences for the entire world, for with that warming will also come additional sea-level rise that will gradually overwhelm coastal areas, changes in precipitation patterns, increased risk of droughts and floods, threats to biodiversity, and a number of potential problems for public health. People must dramatically reduce emissions of carbon dioxide and other greenhouse gases. To achieve this goal we must fundamentally change the way we power our global economy, shifting away from years and years of unrestrained fossil fuel use and its emissions in pursuit of more efficient and renewable sources of energy. A change of this magnitude will require society to come together in a concerted effort to seek out opportunities and design actions to reduce greenhouse gas emissions.

We took a survey to show how people are affecting the environment and increasing global warming. Most people try to make some cutbacks and use less of the resources they have. For example, using less water and electricity is very constructive. In the survey, one person said they travel 30-50 miles per day. Another person said they travel 50 plus miles per day. 50 plus miles per day, on one person's average, contributes greatly to the pollution we add to the air. Another question on the survey was how often do you recycle or compost? Most people answered: when it's convenient. People should be recycling at all accounts and whenever available to help conserve resources. Others responded to the question 'if they generated a lot of trash in their homes', most admitted they don't do much about helping the environment.

There are many actions that an individual can take to help reduce their contribution to global warming. First and foremost you want to recycle whenever possible. This will reduce the amount of energy used to get rid of the trash along with the energy used to make completely new products. Your car is a very big factor when it comes to global warming. You can do many things such as car pooling or using public transportation to reduce emissions that cause warming. Another idea is to reduce the amount of time you idle your car to warm it up. Driving erratically increases to amount of gas you need to power your car, so by taking it easy you're contributing to the cause. Finding ways to use less energy is always a positive effect. The less electricity and gas you use for your home the better. Low energy fluorescent light-bulbs, although they may not seem like a huge impact, can greatly reduce the amount of energy used and money spent in the long run. Recycling reduces the need to mine for raw materials. This saves energy. Although people may not be fully aware, there are glass and paper recycling sites near you which should be used. Eliminating the use of toxic chemicals around the home also helps reduce air pollution. Many of these toxic household chemicals release vapors into the air inside the home or not. This is a serious but preventable threat to humans.

The project activity is an educational video which informs people about the affects of air pollution and how we can help reduce it. Air pollution threatens the health of all human beings and living things on our planet. If you have contributed to the negative affects of global warming a good way to redeem yourself is to plant a few trees. These trees, once grown, will help fight global warming. Planting leafy trees and shrubs is believe or not also a way to greatly reduce air pollution. Whether its one tree in your backyard or many shrubs scattered about, leafy trees serve as air filters that reduce the smog and other pollutants.

For the class Envirothon Project our class focused on the topic, "Global Climate Change impacts in Ashland". For the paper and presentation we worked as a team at the State Envirothon Competition. Others worked on creating an educational video on this project. Ashland is a small suburban town of 15,305 people, west of Boston, with a total area of 12.93 square miles. Ashland also has a state park spreading 155 acres. All of Ashland's water supply is provided by town wells in Hopkinton. Global warming and climate change affects the weather conditions, animals, and how we live. Global climate change can cause flooding, water bans within towns, droughts, and mudslides, amongst other things. To reduce this threat people can drive less, turn their car off or no idling, recycle, and use public transportation. By having this video on television our goal is to make a bigger affect to the public. More people will see it and may realize how important it is that we change our lifestyles which may ultimately hurt us. People tend to try by cutting down water usage and electricity and also by recycling. However, what people are not always aware of are the harmful chemicals, CFC's, you may even have in your own home. This project is meant to increase people's knowledge about Global climate change and making the world and environment a better, healthier place to live.

Bedford High School Envirothon

Bedford, Massachusetts

Advisor: Michael Griffin

The issue chosen was to reduce personal energy consumption. This will in turn reduce your greenhouse emissions.

The main factor that we felt could influence the residents of Bedford needed to be tied to simple, realistic ideas that can be implemented on a personal level. By showing the students of Bedford and the Bedford community ways in which they could easily reduce their global footprint, we can have a greater effect on reducing some of the causes of global warming.

We feel that personal simple solutions can have a great overall impact on the environment. Before governmental solutions can be successful, personal solutions to reduce consumption and energy use must become part of our everyday lives.

The main thing we learned is that simple changes in lifestyle and consumption can lead to great reductions in energy consumption. We also learned that there is not alot of information available to the community that is relevant to them. We have developed and submitted short news briefs to the Bedford Minuteman that we hope will run in the paper. The news briefs explain how a simple change in doing a task can save alot of energy. Most of the briefs concentrate on reducing consumption and conserving energy.

The project is one that we are passing on to our club at school. We have developed 10 news briefs and are hoping to have a "Environmental Brief" each week the paper runs.

Here are 10 ways to reduce your global footprint today:

1. Buy local and in season foods.
2. Dry your sheets on a line.
3. Anything less than a mile – walk.
4. Use a cloth bag for **all** your shopping not just groceries.
5. Stop idling – turn off your car if you are sitting and waiting.
6. Use energy efficient light bulbs.
7. Turn off your computer – at least your monitor.
8. Become informed and inform a friend.
9. Compost and recycle.
10. When you leave a room turn off the lights.

Belchertown Envirothon Team
Coach: John Skorupski

Climate change is defined as the variation in the global climates over time on the Earth, or the changes in the average state of the atmosphere (average weather) over a specified time scale, usually ranging from decades to million of years. These changes are caused by internal processes and could be moved along by external pressures, mainly by human activities. Most recently, the term 'climate change' refers to the average rise in surface temperature known as global warming.

Faced with the Envirothon Current Issue- acting locally for climate protection, we have developed five potential actions our community, Belchertown, could take. They are the institution of a four day school week, building of an E85 gas station, promotion of environmental education, participation in town meetings, and introduction of Anaerobic Digestion. Our Envirothon group believes that the institution of a four day school week is one of the highest priorities in our community because of the tight budget in Massachusetts public school system.

Implementing a four day school week will require a variety of changes within our community including the schedules of parents, teachers, students, daycare centers, and sports administrators. This would require the alteration of all daily schedule including bus rotation, sports, and clubs. Also, this idea would have to include the corporation of the surrounding schools and the state. Our group does not have an exact estimate on the economic/ecological costs and benefits of our designed program due to the fact that it has not be put into effect. However, it has been proven that with a four day school week, many students have improved in academic performance as a result of the fewer disruptions to time spent in the classroom. The four day school would, also, reduce the costs of transportation (13-20%), operating expenses (9%), and absenteeism (15-50% staff and 31% student). The reduction in these costs would hopefully provide increased funding for other school expenses, like supplies, gaining new teachers, and funding for various extracurricular programs. In addition, the four day school would decrease the emissions from buses and cars, as well as emissions from the school, such as heating fuels and electricity.

Many people are opposed to the idea of the four day school week due to the significant changes that the program would alter in their personal schedules. Therefore, we have developed potential organizations called the KEY club and L.E.A.F. that foster community wide environmental protection, both clubs provide services to the community and help to enhance the environment. The KEY club would also be beneficial to parents who need daycare services because it is a form of community services for high school/ college students' activities sheets.

If we were able to accomplish our goal of reducing the school week from five days to four, we would hope to find a reduction in the amount of emissions released as a result of operating a functional school. By reducing the number of days in a school week, our group would hope the number of lights and buses used at our school, Belchertown High School, would be decreased. By reducing the need for buses or lighting/heating supplies, the school would need to spend less money on the electricity and heating bills. Thus, with the decrease in the amount of money spent, the school could focus on providing a better quality education for its students. If we could not achieve our goal of reducing the number of days in the school week, our group would propose alternative ideas of reducing emissions, like carpooling or biking to school .

Chelmsford High School
Coach: Carol Bruell

Our organization is the Chelmsford High School Cooperative Awareness and Respect for the Earth club. We are an after school club that meets once a week to learn about the environment, study for the Envirothon, and conduct the recycling of plastic bottles and cans at our school. Our advisor is Mrs. Bruell, a biology teacher at Chelmsford High School and advisor for our club C.A.R.E. Our current issue project is focused on our hometown Chelmsford, Massachusetts.

Our climate protection issue is the improvement of the energy efficiency of Chelmsford High School, a highly inefficient twenty-five year old building. This issue is important to us because it is our school producing an excess of greenhouse gas emissions and our world suffering the consequences of these emissions. The greatest contributor to climate change from our community, along with vehicles, is excess fuel consumption by buildings and facilities like our own. This issue is important to our town because our town is one of many in our community struggling to dramatically reduce emissions of greenhouse gases. Our town is part of a greater community and should make every effort to contribute.

Due to the budget crisis, our school is doing everything possible to reduce the budget. We are confident our school can succeed in becoming more efficient and environment-friendly.

David Prouty High School Panthers
Advisor: Mary McLaughlin
Town: Spencer, MA

Climate change affects many areas in many different ways. The results will affect the entire earth and are direct threat to its ecological balance. Fittingly, the Massachusetts Envirothon Program chose "Acting Locally for Climate Protection" as this year's topic. Climate change is a result of global warming due to mainly human carbon dioxide emissions. (Predominately, others include sulphur-oxide compounds) Due to these changes, a cataclysmic domino effect is becoming the future for Earth. Within the next one hundred years, an average 6.4 degree overall world temperature increase is predicted, which will then cause permafrost and glaciers to melt; this will eventually lead to more serious coastal flooding and erosion. Due to the warming of waters, mainstream air and water currents will be affected dramatically, leading this planet towards another ice age. Each person willing to make a difference has to start small, which is the focus of this project.

This year, the David Prouty Envirothon Team focused on the local causes of climate change, and the effects that they have on Spencer. After some arduous research and site visitation, the members found Spencer to be a relatively clean town. Spencer has a large portion of the Seven Mile River flowing through it, which is the cleanest river in the state. However, pollution alone is not the only contributor to climate change. With coastal real estate prices inflating, many families are moving westward as a more cost-effective alternative. Unfortunately, Spencer has fallen victim to this inundation of new residential development. This is the most direct threat to climate change in Spencer. Members found hundreds of new houses spread through Paxton and Kitteredged Roads, and Route 31 North. To lead these developments is a plot of land covering the historic Sibley Farm property and more that is the future site of 308 residential dwellings, and a strip mall along Route 9. This property extends from Route 9 beside the high school to an old horse farm (Seven Springs) on Greenville Street, where the other entrance will be. Lastly, is the already begun sitework of the Route 9 Wal Mart Super center, just east of Spencer.(In Leicester)

These developments will affect Spencer's already serious stormwater management problem due to more pollution, both point and non-point specific runoff. During construction, much high-emission construction equipment will be in use, leaving the wound to be reopened by all of the new vehicles per household on completion of the sale of each property. During the construction, many wildlife species have already and will lose their natural habitat, which will result in more road kills, and more sightings of these species until they find a new home. The selling of farmland has been a sad story in Spencer for many years. With each loss of a rural influence on the town comes more and more suburban influence. Kitteredged and Paxton Roads, both once completely wooded areas, have had enormous portions cleared out and replaced with several homes.

The David Prouty Envirothon Team discovered this information during their research and interviews with members of the highway department, select board, conservation committee, planning board, and long-term residents. Therefore, the team could not let the issue go untouched. The members, led by Mrs. Mary McLaughlin, implemented a school recycling committee at David Prouty High. They also created informational flyers to be distributed during the spring town meeting, which increased awareness in many of Spencer's citizens of climate change and its effects on even their own town. Lastly, they have done serious research for community wind power, and are planning the proposal stages for the town boards currently. For these achievements, the David Prouty Envirothon Team has been awarded The Environmental Secretary Award, and will be traveling to the State House On Monday, May 15, to receive this honor.

Essex Agricultural & Technical High School
Coaches: Charles Saulnier and Ann Witzig

Over the past few months, the Essex Agricultural and Technical High School's Massachusetts Envirothon team has been hard at work. With the help of our advisors, Charles Saulnier and Ann Witzig, we have been conducting interviews, researching, gathering information and studying this year's current event and how it pertains to the town of Danvers Mass. We considered many options; rails to trails, water conservation, helping to enforce the anti idling campaign and many others, but in the end, we determined that the best way to counter the effects of climate change is through education.

We feel that this method will be most successful because it will inspire many others to take the appropriate action. When people see what the problem is and how severe it really is, they will be instilled with a passion and determination to make a change. Another reason we chose this topic was that it didn't limit us to just one possibility. We were free to brain storm and wonder about a huge array of different options.

Because we chose such a huge topic, we broke it into three sections; educating the public or the people who can make a difference now, educating the town hall or the people who we look at to know how to act and educating children, the people who will be there in the future. Some ideas we had for educating the public are mailing brochures with factoids and tips, making posters, writing to the editor of a local newspaper and calling a local radio show. Ideas that we had for educating town hall are becoming active in the open space committee or the conservation commission and voicing our opinions, writing letters and starting petitions. Lastly, some ideas that we had for educating the children are to put on plays in which we use fun, interesting and eye catching props and methods to teach first graders the concepts, reasons and prevention of global warming.

This project has taught us many things. I speak for all of us when I say that we had no idea there were so many options and ways to go about preventing global warming on a local scale. We also learned that even just an average teenager could make a huge difference if they have the motivation and drive.

In the few months we have been meeting, we have put together a great brochure to mail out to the public. We have also drafted letters to town official outlining the benefits of joining the Massachusetts climate protection plan and have the beginnings of a children's skit in the works. Some future goals we have are to go into the schools to present to the children, do a mailing of the brochures, draft more letters to town officials, and just try to be more aware and active in our local community

Greater New Bedford Regional Vocational Technical High School
2006 Massachusetts Envirothon Current Issue Project
"Acting Locally for Climate Change"
Reduce-Reuse-Recycle

The issue of climate protection has been a well-published topic of interest in today's global environment. In order for life on this planet to thrive we must act now to reduce the amounts of green house gases that contribute to climate change. The 2006 Greater New Bedford Voc-Tech Envirothon team has been engaged in researching this years current issue topic: " Acting Locally for Climate Change". The team has researched background information on climate change, investigated environmental issues with change components, investigated how climate change will affect the community and what the community is doing to protect the climate. The Voc-Tech team has decided to put their research to work by participating in a multi faceted service project in order to raise awareness of climate change and what steps can be taken to slow of reverse this process.

The environmental issue with a change component that our team has decided take action on is recycling (Reduce-Reuse-Recycle). The team determined to act on this issue due to the following.

1. Reduce-Reuse-Recycle is a mantra that is well known.
2. There are a variety of actions can be taken in order address this issue.
3. It is easy for the youth of the community to take action and lead by example.
4. Natural resources will be conserved.
5. The actions taken will reduce greenhouse gases and conserve energy.

The Voc-Tech Envirothon team consists of students from the Geodesy/Environmental Engineering shop. We have applied our knowledge of climate change and recycling in order to serve the community by becoming actively involved in supporting and or developing the following programs.

Adopt-A-Shoreline

Adopt-A-Shoreline is a project supported by the Coalition For Buzzards Bay. The Voc-Tech Geodesy/Environmental Engineering shop has supported the program at the level of adopter. Adopters visit the area once a month and clean the trash from the beach. We also have continued support the teams Palmers Island restoration project (2005 Current Issue Project on Protecting Cultural Landscapes) by conducting an annual cleanup.

Operation Clean Sweep

New Bedford Mayor Scott Lang started Operation Clean Sweep this year. The mission of the project is to cleanup various neighborhoods and neglected areas of our community on a monthly basis. The Voc-Tech Geodesy/Environmental Engineering shop has supported the program at the level of adopter. Adopters visit the area once a month and clean the trash from the area.

Drop In The Bucket

The Geodesy/Environmental Engineering shop at Voc-Tech has started a school wide ink cartridge-recycling program. The students are collecting ink and toner cartridges, in order to be reused. The Geodesy/Environmental Engineering students hope to expand this program and recycle other materials throughout the school.

Solar Van

Dr Gerald Lemay from UMASS Dartmouth generously donated the "solar van" to the Geodesy/Environmental Engineering shop. This is a transportable renewable energy station within a cargo van that consists of a 400-watt wind turbine, and 1 KW of photovoltaic panels. The Geodesy/Environmental Engineering shop will use this renewable energy station to power aquaculture systems, power tools and recharge batteries needed for environmental field studies.

**Hamilton-Wenham Regional High School Environmental Club
775 Bay Road South Hamilton, MA 01982**

**Advisor: Gretchen Roorbach
Team Members: Ana Bisailon, Anna Evetts, Kayla Jones,
Michael Zheng, AnnePapacostas, Kevin McGrath.**

Living in the North Shore near the notorious Salem Harbor Station! USGEN Inc., our environmental group decided to concentrate on reducing the energy we use from this plant. According to the Department of Energy, 51 % of our electricity is generated by coal. This results in 81 % of the carbon dioxide emissions in the U.S. This, along with our close proximity to the Salem Harbor Station plant, spurred our group to research the power plant's effects on our local environment. To our surprise we found that from 1998 to 2001 the total production related waste ranged from 1,104,490 kWh to 1,065,661 kWh. Researching further we found that the plant was also a cause of many other problems, including cancer and asthma.

Originally deciding to monitor energy use at our school we found that the best way to reduce green house gases was to change simple habits. This year, our environmental group decided to tackle the simple issue of turning off lights (when not in use) to reduce the amount of energy consumed. Researching different ways to help reduce green house gases, we were pleased to find that our project coincided with an recent school-wide ODIT. The ODIT recommended different modifications to reduce the energy used in our school.

Reviewing the ODIT's suggestions, our group initiated a campaign to promote the switching off of lights in classrooms when they're not in use. After brainstorming effective publicity tools, we decided to print signs to hang over classroom light switches. We then posted the flyers over all the light switches in the high school and connecting middle school and made several public announcements informing the school community of our project. We also attended faculty meetings to inform all teachers of our work, so that every room would be included in our campaign. We then monitored the school's electricity bills to see if our efforts had an effect. Comparing January figures from this year and last year, we saw an marked decrease in electricity consumption. However, our February results did not match our desired trend. Despite these mixed results, we do feel that our project was successful in spreading energy awareness throughout the school as well as the community.

Our environmental group is now planning to hold an energy fair to fully educate our school and the community about conserving energy. In the next couple of weeks we also plan to air a public awareness commercial on our community TV station. This commercial will help reinforce and educate the larger community of Hamilton-Wenham. Our environmental group has now made it its goal to increase awareness of reducing light energy. It may not seem like much at moment, but it's a step in the right direction. As our new motto goes, "switch off greenhouse gases."

Hampshire Regional High School Envirothon Team
Westhampton, Massachusetts
Advisor: Tara Kisiel

Climate Protection Issue: For the Current Issue topic this year, the HRHS Envirothon Team chose the topic of global warming. We researched the international effects of climate change, global warming, and the "greenhouse effect", and then analyzed how these factors affected our town of Westhampton.

We chose global warming as our climate protection problem because we believed that it would have the greatest relevance to Westhampton. In order to answer this problem, we interviewed local residents and officials and researched books and online sources. We found that global warming had no noticeable effect on our town, due largely to lack of scientific data. A few people have observed changes, such as less snowfall accumulation, that could be related to global warming. Such changes, however, may also be related to local climate and geography.

In order to gather more information, we conducted a survey of 290 Hampshire Regional High School students. The survey asked with how Hampshire Regional families dealt with the rising cost of gas and if they had invested in alternative energy. The overall result was that most families have trucks or SUVs and drive many miles per day, although some have invested in alternative energy. From this, we were able to verify that global warming has not affected Westhampton in such a way that residents have become concerned.

Our team has learned a lot about climate change, global warming, the "greenhouse effect" and its effects on the world and our town of Westhampton. We also learned that Westhampton has been largely sheltered from any adverse effects of climate change. Right now, our team is focusing on what we can do for our Current Issue topic next year.

SAVE (Students Against Violating the Environment)!
High School of Science and Technology Springfield, Massachusetts
Coach: Jenni Manfredi

For our issue we decided to focus on education of the general populous. We chose this issue because many people are unaware of the changes that are taking place to Earth and the enormous impact human civilization has upon these changes. Within our project we focused on motivating people to participate in activities such recycling, using public transportation, renewable energy, energy efficient appliances, buying local products, and plant trees. Our team has a strong belief that when many small changes take place from people locally, larger changes will take place globally. Due to the highly populated area we live in, improvements in home appliances and waste management could make a significant difference of our collective ecological footprint.

In collaboration with SciTech's Key Club and the Green Team we implemented a paper-recycling program in our school. Our future goal is that as many as possible of the 47 schools in our city will implement recycling programs (and perhaps composting programs as well). Although the initial cost of implementing such changes will be costly, we believe that in the long run the changes will be worth the while. We would also like to persuade our school to not use Styrofoam for it's major packaging tool for lunch as it is not environmentally friendly.

Our area is the third most populated area in Massachusetts. Reducing fuel consumption and increasing energy efficiency will benefit the community economically, taking into consideration the rising costs of natural gas and other fossil fuels, as well as expenses that will arise from current lifestyles that present preventable damage to the environment. Through educating the community about climate change; explaining the process, how human society contributes to its unnatural increased acceleration, and the enormous impact this occurrence has upon our lives; we hope to motivate our audience to take action towards global climate protection and assist them with the means to do so through the background we provide on the subject and the suggestions we make to them about potential individual and societal steps that can be made in this effort. Within our goal of community outreach and education, our team has created a pamphlet, an informative environmental assembly presentation, and a website outlining individual steps that can be made to reduce human-induced climate change. Suggested steps range from methods of conserving power including improving household insulation and using energy efficient appliances to ways to reduce daily energy and material wastes, such as unplugging unused electrical devices, carpooling or using public and or human-powered transportation, and turning off a running faucet while one brushes his or her teeth. Alongside the reduction of wastes and unnecessary levels of consumption, an activity that will have enormous impact on our city as well as the entire United States as it is country uses much more than its "fair share" of energy and natural resources, our team has largely been promoting the reuse and recycling of materials. We hope to expand the recycling program we have established at our school to also implement the recycling of glass, plastic, and aluminum. Meanwhile, we hope to spread such programs and their proper management to other schools and establishments within our district as well as gain a greater professional support of the program such as that of our school committee and our city's local government.

Our team has learned that some of the smallest things such as using cold water when washing can set off a chain effect that is safer for the environment. We have also learned that education is key to the motivation and empowerment of our community to take action towards climate protection as it informs the community and enables people within it to take proper steps towards this effort. When first setting up the recycling program at our school we faced two major issues. The first issue concerned the maintaining of a continual awareness of the program. Meanwhile the second issue was related to being sure that those desiring to participate in the program were informed as to what types of paper waste were to be put in and which types were to be kept out of the bins that were placed throughout the school. The current status of project is still waiting to be fully implemented to incorporate every class room within the school and the recycling of additional materials, although the recycling program is being carried out every week.

Envirothon Summary May 2006
Leicester High School
Advisor/Coach- Joanne Bernier "Acting Locally for Climate Protection"

This year, our Envirothon team chose to focus our efforts on excessive fossil fuel consumption education.

After extensive research into climate change as a direct effect of burning of fossil fuels, the LHS Envirothon team chose this route as its best approach. We feel that we will continue to "think locally, but act globally!"

Our team created a "carpooling" pledge as well as a "bus idling pledge". The students obtained signatures of students who drive cars to school agreeing to carpool whenever possible. The team also approached all the school bus drivers and asked them to agree to turn the busses off whenever idling. All agreed and signed a "bus idling pledge". Students have also looked at the research surrounding a "Rentar Fuel Catalyst" that could be installed in all LHS buildings to reduce noxious air emission and burn less fuel. We are also trying to encourage the Superintendent, School Committee and Town Selectman to look into the possibility of utilizing an alternative energy source such as wind or solar power to provide energy to the High School.

We located several billboard on central thoroughfares in the town that, if sufficient funds were raised, could be used to education people concerning the consumption of fossil fuels and its consequences along with offering reduction recommendations.

We are in the process of creating a flyer that can be used in our elementary schools to educate the younger citizens of Leicester about this important issue. We hope to obtain approval to use this forum to gain participation in a fuel reduction pledge that these children and their parents can take.

Respectfully submitted by the 2006 Leicester Envirothon Team

Dylan Baker
Marcela Jimenez
Kelly Johnson
Julie Johnson
Thomas Killoran
Jessica Robinson

**Lexington High School
Advisor: Steve Wilkins**

We are the Lexington High School Envirothon team, overseen by teacher advisor Steven Wilkins, a Freshman Earth Science teacher at Lexington High School. Our Project of examining local effects of pollution from appliances such as gas heaters, electric lighting and appliances eventually led us to engaging in research about different types of renewable energy sources. We looked at the town of Lexington for information about how widespread alternative energy sources are being used, and the actual savings and benefits experienced. The Climate protection issue that we chose as a team was researching, and encouraging the installation of energy saving appliances and additions. The team chose this as the project issue, because dramatic changes and improvements can be seen in localized environments just by changing from say an oil water heater to a solar water heater. People would also be more willing to try this energy conserving technology, because of government rebates, relatively low cost of materials and installation, and a high yield of energy. While researching alternative energy saving methods, we all came to the realization that a world no longer dependent on oil is not the world of the future, rather it could be the world of today with enough funding and dedication from the Federal Government and taxpayers alike. We are currently in the stage of our project in which we have begun to promote the installation of either solar water heaters or photovoltaic cells throughout residences in Lexington. We are highlighting the positive effects of these systems both environmentally and economically. When including information such as the availability of tax rebates, and systems which can pay for themselves in as little as 5 years from savings alone, we hope to be able to convince families to actually install these systems. We have also been able to show the positive benefits of saving energy by doing something as simple as adding insulation to ones house. For example recently our teacher advisor Mr. Wilkins increased the insulation in his house from an R-19 to and R-4 1, saving money and energy simply through insulation

**Lunenburg High School
Coach: Peter Farmer**

Our Global Warming Project focuses on the affects on climate change on the growth of maple trees. Our focus was directed toward maple trees because of the presence of maple forests as well as maple syrup farms in Lunenburg. Also as we researched the topic we realized that Lunenburg was not likely to see many other ill effects of Global Warming. The increase in precipitation would not affect Lunenburg much, as it is located at the head of a watershed. Also there are two reservoirs in Lunenburg, Hickory Hills and Lake Shirley, in which the water level can be controlled by way of dams. So in the event of increased storm severity and frequency would not cause and overwhelming amount of flooding. And if it did the majority of the flood plains both 100 year and 10 year is undeveloped land. So a combination of significance to the town as well as a lack of other possibilities lead our team to focus on the ill affects global warming has on maple tree growth.

Through our research we found that the growth of maple trees has declined over the years due to a change in the overall temperature of the area. Many forests that were originally dominated by Maple tree are now dominated by oak or pine trees. Ewing□s, a local maple syrup farm reported that they had noticed a decrease both in the amount of sap that they were getting out of the trees, as well as in the growth of new syrup trees.

Another focus has of our project was raising awareness about global warming in the community. We created a tn-fold pamphlet that we distributed to the students that outlined what global warming is, the affects it has on maple trees. The pamphlet also contained the results of a school wide survey that our team issued regarding what students know and are willing to do about global warming.

Our goal for this project was to raise awareness that it is up to us to slow the affects of global warming. We hoped that through our efforts students and their families will realize that small sacrifices, such as turning the thermostat down in the winter or using more public transportation can make a huge difference in the quality of our world.

**Methuen High School
Coach: Mary Robinson**

We are the Methuen High School Envirothon team. The team is made up of four seniors and one junior. Our advisor is Ms. Robinson, a teacher here at Methuen High School. We chose to focus on the street lighting system in the town of Methuen, Massachusetts. By switching the light bulbs in streetlights to more energy efficient bulbs, the town could conserve energy as well as save thousands of dollars a year.

Currently the town spends over \$300,000 a year just on the electricity used in the streetlights. This could result in budget cuts that would greatly affect other programs run by the town. In addition to saving money, the town would be contributing to climate protection. Global climate change is caused by greenhouse gases getting trapped in the atmosphere. These gases are released by activities such as burning coal to produce energy needed by the town. Since streetlights are where most of the town's energy and money is spent, our team decided that this would be the best way to make our contribution to climate protection.

The one thing our team learned from this project is that it is important that we take action in our community. What we do, or do not can have a strong impact on the well being of our town. We also learned that our town can contribute to making a difference in the world. The citizens of Methuen can take part by doing something as simple as recycling, and the town as a whole by choosing to install energy efficient light bulbs in our streetlights, and even in public buildings. For the time being, our town has not made the switch to energy efficient bulbs, but hopefully by educating citizens, our town can follow in the footsteps of other towns such as Medford, that have already accomplished this goal.

Environmental Council – Millbury Junior Senior High School
ADVISOR: Terry Hamilton

Acting Locally for Climate Protection

Issue Description: Global warming and climate change has become more widely regarded as climatologists link it to more numerous and devastating hurricanes (especially last Fall) and shifting weather patterns world-wide. Movies such as The Day After Tomorrow and The Inconvenient Truth have also brought this issue to the forefront. Within our town, we focused on the impacts of increased development and increased traffic (number of automobiles) on climate change. Then we proposed what individuals in town can do to make a difference. This issue is very important in our town because Millbury is becoming increasingly more developed. More developments mean more houses to heat and cool (releasing greenhouse gases as we burn fossil fuels), more cars in town (which add more greenhouse emissions), and more blacktop with less trees to take in carbon dioxide. Another aspect that we focused our attention on is our new mall (The Shoppes at Blackstone Valley) and the increasing # of automobiles coming into town as people visit the mall. Less people are walking, riding bikes or using mass transit. We were also concerned about the loss of our town's open space and small family run farms.

What We Learned: We learned how our town is changing from a rural "Mill" town to more urban (especially within the last decade), and we learned how to read maps, conduct & organize research, and teamwork. We observed that the reason many families move to our town is that "small town charm", and we are losing it very quickly. The most important observation was the rate at which areas in town were being clear-cut and developed. The most major project being our new mall, "The Shoppes at Blackstone Valley" on Route 146. This mall is located next to a school playground, and is surrounded by farms. The mall also destroyed acres of beautiful forests and displaced many animals from their woodland home. All over our town, housing and business developments are springing up faster than areas can be environmentally protected. Since the town's Conservation Commission is only a part time board, they can't seem to keep up with the development and wetland issues. And, according to one member of the Planning Board, eight developments are stalled in litigation (mostly suits brought by abutters of development properties). We also realized that small local family farms are an important part of our town's culture.

Current Status of Project: We created an informational brochure to help people make a difference. We intend to use Environmental Council funds to make copies and distribute them to people in town. Our team interviewed many townspeople, including long-time residents, public officials and members of the Planning Board & Conservation Commission. Our recommendations are:

- * have more events at the local farms in town to create interest
- * incorporate Environmental Science education at a younger age
- * increase citizen's awareness of what they can do to individually to affect global warming (starting with our brochures)

Future projections for Millbury are noted on the town buildout map and suggest that future development will occur. Areas that can be developed, will be developed unless land can be protected. Many people see development as prosperity and will continue to encourage it.

Monson High School
Coaches: Leslie Duthie and Jennifer Ohop

The Monson Environmental Action Team from Monson High School is competing in the Envirothon Competition for the first time in 2006. The members are Adam Boucher, Lauren DuComb, Robert Matrow, Harrison Morin, and David Wulfing. The coaches for the Monson Team are Leslie Duthie and Jennifer Ohop, both of the Norcross Wildlife Sanctuary.

One of the Envirothon Competition requirements was for the team to participate in a community service project. The team chose to use Lauren's Girl Scout Silver Award project as their community service requirement. Lauren had decided that she was going to build a trail at Temple Brook Conservation Area, in Monson.

The teams' trail is a benefit to the citizens of Monson, and other surrounding towns, because it opens up a section of public protected land. Low impact usage is encouraged in Monson on many of the town-owned lands. The Temple Brook Conservation Area was a cooperative project between the Town, The Trustees of Reservations and the Norcross Wildlife Foundation that allowed them to protect over 1000 acres. By protecting town land and allowing people to access and enjoy these lands, we can begin to educate people about the importance of our open space.

The Team's trail is a little more than a one-quarter mile and allows hikers to walk along the brook for about half the trail. The trail also connects two existing trails creating a loop, back to the pipeline. By building this trail, the team has assisted Lauren in completing her Silver Award Requirement. As of the competition, the trail is complete. There is plenty of protected land at this site and there are many opportunities for trails to be added in the future for public enjoyment.

The water from Temple brook flows to the Scantic River, which is in the Connecticut Watershed. The Connecticut Watershed has been home to the Federally Endangered Dwarf Wedge Mussel. The brook water is still very good quality and provides a silt-free habitat, which is very important for the survival of the Dwarf Wedge Mussel. The Mussel is actually only found in 17 locations in the U.S., one of them being the Connecticut Watershed.

During this year we learned that there is a Federally Endangered species in our area. We also learned that the Temple Brook has very clean water – our tests show that there is virtually no copper, iron, chlorine, nitrates and nitrites in the water. The stream bed is rocky and there are numerous boulders scattered through the stream- providing good habitat for the Dwarf Wedge Mussel.

We also learned that the more trees that we save, the less carbon dioxide remains in the atmosphere – reducing some of the greenhouse gasses that cause global warming. We learned that we have the opportunity to save more land from development to help reduce the effects of global warming. We also learned that there are plans to help preserve land like the Open Space Plan and the Master Plan in Monson. This is good because the more land we protect the fewer effects from global warming that we have.

Our team enjoyed the experience of Envirothon. We hope to come back and improve our team. We liked going to the workshops the best.

The Northampton High School Summary for the 2006 Envirothon
Coach: Catherine Wanat

The Northampton High School Environmental Club, under the guidance of Ms. Wanat, has been trying to sell compact fluorescent light bulbs in partnership with the Center for Ecological Technology. In reaction to the Envirothon theme this year surrounding climate change, we wanted to sell compact fluorescent light bulbs to reduce energy use that would also reduce the amount of CO₂ put into the atmosphere. The team decided to choose this climate change protection problem because we learned that the large amounts of CO₂ that is put into the atmosphere from coal power plants is a major contributor to green house gases that cause global warming. This is an important issue to our town because we are located on the Connecticut River and rising water levels can affect agriculture, recreation and cause property damage. Northampton also has maple sugar businesses that would be negatively affected by rising temperatures. Mild winters increase insect populations including ticks and mosquitoes that can carry diseases and become nuisances to the people in our town. Our team learned a great deal more about our town and what affects it. In response to the public hearing on the Mount Tom Power Plant that we attended, we wrote a letter to State about our concern surrounding the plants emissions of CO₂ and pollutants. From attending the Mount Tom Power Plant and other public hearings we learned about what is going on in our community, the publics' thoughts and feelings about global warming and data presented by local scientists surrounding climate change. We also learned that we can play a role to try and make a difference in our town and how hard it is to raise awareness.

We are just beginning to sell compact fluorescent light bulbs to our friends, family, people in our school, work places and the public. In the monthly bulletin that our school sends out, we put an ad in for the compact fluorescent light bulbs so parents could purchase them as well. We are also planning on setting up a table at our local recycling center and trying to sell them to people there. We plan on donating the money we raise from selling light bulbs to the Northampton Tree Committee so they can plant more trees in our community.

Northbridge High School
Coach: Melissa Martin

We're the Northbridge Climateers of Northbridge High School, and our current issue took place in Northbridge, Massachusetts. Mrs. Melissa Martin is our advisor. The climate protection issue that we chose to address was global warming and its effect on the town of Northbridge. Global warming is a very serious threat to the world's environment, and we wanted to discover how we could curb this problem locally. The team chose this issue after the recent flooding that was experienced in the section of Rockdale that caused mass destruction and millions of dollars of damage. This event opened the eyes of the community on how the effects of global warming affect our community. This is important to the town because they needed to realize how their actions affected the local community. Our team learned throughout the year that people are unaware of how their actions affect the environment and the world. We learned more about global warming and brushed up on our knowledge of the carbon cycle.

After attending the Envirothon workshop at UMASS Amherst, we attempted to contact the Worcester Regional Transit Authority to find out how to restart the bus program in Northbridge. To our dismay, we found out that it would be nearly impossible to reinstate the bus program because of lack-of town assistance and support. We moved on to plan B. This plan was to educate the town and raise public awareness. Our first task was to set up an informative workshop at the Whitinsville Social Library about global warming on a local level. The workshop was opened to the whole town, and we got positive feedback from all of those who came. This presentation consisted of a detailed description of the greenhouse effect and global warming, steps citizens can take to alleviate this problem in town, and an informative lecture about alternate fuel sources.

Our next endeavor was to initiate a clean up of the Mumford River, which is located right across from our High School. Many townspeople and students helped our team to clean up the river, and a Boy Scout troop assisted in cleaning up trash in the river. We made the river walk a more beautiful view for townspeople to explore and enjoy. We also did a clean up around our school. We picked up trash from each of the student and teacher parking lots and put it on display for everyone in school to see.

Also one of our members, as part of his senior project, worked with Mass Audubon Society and the Blackstone Valley Heritage Commission to map and remove water chestnuts in the Mumford River and to map water-testing sites on the Blackstone River.

Lastly, our most impressive endeavor was to join the National Arbor Day Foundation. We received 10 trees as membership gifts and raised the saplings over the winter in our school greenhouse. We planted the trees recently in our bird-watching area. All of these events helped to shape our understanding of the current issue acting locally to affect the global climate.

**Old Rochester Regional High School
Coach: Lynn Connor**

The name of our team is OREO, which stands for Old Rochester Regional Environmental Organization. We are a tn-town regional school and are representing Mattapoisett, MA. Lynn Connor is our advisor. Our Climate Protection Issue is also three fold. We have chosen community education, land protection and alternative energy.

We chose community education, land protection and alternative energy for our topic because we live in a coastal town and we have many important resources that could be severely affected. Our economy rests on tourism, fishing, shellfishing, boating, beaches and cranberry agriculture. Each one of these activities that brings money to our town will be affected by global climate change. If our beaches are destroyed by violent storms and beach erosion, tourists will not want to spend summers and money in our town. If marine ecosystems are disrupted and fish and shellfish stocks are affected, the fishing industry could collapse. And the violent storms may decrease the number of days fishing by commercial fishermen. The rising oceans will destroy our cranberry bogs by tainting the freshwater with salt. All of these issues, if altered by global climate change, would greatly change the way of life we are used to here.

Our team learned what global climate change is, what causes it, and how it will affect us. W also learned that we all need to do our part to be part of the solution. We learned how to get the community involved by our Earthfest musical festival and by distributing informational pamphlets in school and around town.

This year we held our third annual Earthfest environmental fundraiser. We raised money which will be donated to the Mattapoisett Wind Board. This project is now in the testing stages. Test towers are going up around town to measure average wind speeds. It is projected that one wind tower placed behind our football field will provide our school with at least 100% of the total energy bill. I guess it pays to live along the windy coastline.

**Oliver Ames High School Envirothon Team
Easton, MA
Coaches: Maria Annunziato, Ed Hands, Debbie Marguerite**

Under our advisors, Maria Annunziato, Ed Hands, and Debbie Margarite our Envirothon team is working on a climate protection project to reduce the level of CO₂ emissions in Easton, Massachusetts. Our team is focusing on introducing the idea of solar panels to the school system in order to decrease the amount of coal burned to power the school. We began our quest to reduce the release of CO₂ by researching the possibility of hydro-turbines on local ponds. However this idea proved to yield little electricity and therefore our team was forced to explore the idea of solar electricity. We decided that it was very important to keep people well aware of the importance of our atmosphere and the climate around us. Through our research, we have learned much about the benefits of solar power and the advantages of renewable resources. Our school is currently under construction and we feel This would be an opportune time to propose the use of photovoltaic power in lieu of fossil fuel. Our new roof will provide ample flat space for panels, and in the future we may even take advantage of the existing schools that also have flat roofs. After consulling members of the local Adhoc committee, our construction manager, and a local electrician we are confident that solar power is the wayto go. To fund this project, we plan to consult the MSR group (Millions Solar Roofs), General Electric, our state government, and our local community. Although our plan is complex, we feel that in the end it will be very beneficial to both the environment and our community, reducing CO₂ emissions and also electricity costs.

Pioneer Valley Regional School
Press Release/Summary
Coach: Karen O'Neil

This year the Pioneer Valley Regional School Envirothon team has taken the subject of Climate Protection to heart. We started off by finding out what our town of Northfield has been working on to help protect the climate. We looked at our towns newly introduced Pay- Per- Throw program, where small bags are \$.75 and the large bags are \$1.25. Having the Pay- Per- Throw installed in the town has decreased the amount of trash that the community of Northfield throws out.

We then turned inwards towards our own school where the Global Science class has started up a recycling program again after its small failure two years ago. There now are recycling bins in all class rooms and throughout the school. Our trash bins have been converted into recycling bins for bottles and can which are placed strategically around the school. This has been a great help to eliminate excess waste. The recycling efforts have produced up to 50% recycling of waste.

We also conducted a workshop for the 8th graders on Climate Change and Recycling. We started off with a Power Point and then asked them if they knew any of the Greenhouse Gases and such questions about Climate Change. Then we did an activity and if they gave as a way that they themselves at home help to recycle or cut down they use of energy we gave them an Easter Egg with candy inside! We also gave out two Energy Star Light Bulbs to two of the 8th graders who did not already have them in their homes. To get the message across, we asked a few of these students what they intended to do when they grew up – and what measures they could take to decrease their energy and fossil fuel output.

In attempting to educate students and others about the situation of our current day climate, we talked to a few different officials as well as citizens, and we asked them our burning questions on what our town is doing to help save our climate. With the help of this information, we have put together a presentation on the recycling and climate change.

Provincetown High School
Coach: John Hanlon

This year Provincetown High School did a project on the Cape Wind Farm that is supposed to be located in Nantucket Sound also known as Horseshoe Shoal. Our advisor this year is John Hanlon. We chose this project about the Cape Wind Project because the goal of this project is to take a renewable energy source and convert it into energy that many people can use as an alternate source to electricity just by using wind turbines that will be located in Horseshoe Shoal. This project would help to save the planet because people will not be burning as much as oil as they previously were. Not only would this project help with burning oil (which would cut the cost it takes to heat one house by quite a bit), but it also would help to prevent global warming because it helps to reduce the number of greenhouse gases that are being produced. We think this is a perfect example of climate preservation because this project will help to protect the environment in several ways. This project is designed to help provide energy for the Cape and the Islands which is just a start. This is what makes it so important to the town. This will be the United States first wind turbine project and if this proves to be a success, which it most likely will, more will be designed.

There will be 130 offshore wind turbines located in Horseshoe Shoal that will be plotted in a grid pattern. Each turbine in a row will be .34 nautical miles apart (about 6 football fields in length) and each row will be .54 nautical miles apart (about 9 football fields in length). The turbines will be 247 feet in length starting from the surface of the water and reaching to the center of the blades. It will be 75 feet from the lowest blade to the water and 417 feet from the highest blade to the water. The diameter of the base of the turbine will be 16 feet. The turbines will be mounted on poles that will be embedded 80 feet into the floor of the sea. Each turbine can produce up to 3.6 megawatts of energy (468 in total), but at a maximum will probably only produce 454 megawatts of energy. On average, it is expected that the wind farm will produce 170 megawatts of energy which is 75% of the energy used on the Cape and Islands.

Some people were concerned that this project would disrupt aquatic life and bird life in the area but this won't be the case. There is very little marine life in this area and the turbines aren't expected to affect the marine life that is in the area. While there are birds in the area, the turbines are huge objects that they can easily spot so very few birds are expected to die because of the wind turbines. Another problem that people are anticipating is the visual the turbines will provide. These turbines are located 5.2 miles away from Point Gammon, 5.6 miles from Cotuit, 6.5 miles away from Craigville Beach on Cape Cod, 9.3 miles away from Oak Bluffs, and 13.8 miles from Nantucket. They will be very hard to spot even on clear days. If spotted they will stand about 1/4 of an inch high in sight. The location is out of the way of the ferry routes and very few fishermen come down into this area.

From this project, our team was able to learn all of the benefits (and the few disadvantages) to having this project located off the coast of Cape Cod. We were able to learn all of the factual information and how we can all use this project to be a wonderful model for more to come. Currently, this project is being disputed amongst our politicians. It is hopeful for the permitting to be done by 2007 and for the project to be fully operational by 2009.

**Quabbin Regional High School
Barre, MA
Coach: Rebecca Bottomley**

**Team Members: Phil Bock, Jill Burkett, Maria Cerce,
Jon Gorman, Nathan Nesbitt, Elizabeth Stefanik**

Climate Protection IssueOne Page Summary

Our team chose to focus on the energy use at Quabbin Regional High School in Barre, Massachusetts. The Quabbin Regional Middle/High School is for students from five towns in central Massachusetts, including Barre, Hardwick, Oakham, Hubbardston and New Braintree. The Regional Middle/High School has over 1600 students in grades 7-12.

We chose to investigate the energy use at Quabbin Regional because it is such a large facility in our community, and uses a great deal of energy for bus transportation, electricity, heating and cooling. Carbon dioxide is a by-product of burning fossil fuels (oil, gasoline, coal), which is contributing to global warming. The energy costs for the school are increasing and putting a strain on the school budget. We investigated how the school could reduce energy consumption and energy costs.

We found out that Quabbin Regional High School was working with National Grid on an energy audit in an effort to cut heating and electricity costs. We met with the Plant and Facilities manager to learn about the energy use at the school. We went on a tour with the maintenance custodian to see the boiler and electrical rooms of the school. We also interviewed the Superintendent of Schools to find out about the energy use and costs for the school district.

The team attended an Action Plan meeting with National Grid and the engineers who worked on the energy audit at the school. For the first phase, the school has replaced lighting fixtures in the gym and cafeteria with energy efficient fluorescent lights. The 150 exit signs were replaced with low wattage LED light bulbs.

The Quabbin Envirothon team decided to educate the staff and students about energy conservation and global warming. The team designed posters to raise awareness in the school to reduce energy consumption in the "turn off the lights" campaign. The team also did a power point presentation to the faculty at a staff meeting about using natural daylight in the classroom. The team also challenged the teachers to the Energy Star "Change a light pledge" and gave out CFL (Compact Fluorescent Lights) to help reduce energy consumption at home.

We learned that global warming is earth's greatest environmental threat and we must convince people to change their behavior to live a more sustainable lifestyle.

**Ralph C. Mahar Regional School
Orange, Massachusetts
Advisors: Kurt Enko and Mike Magee**

**2006 Massachusetts Envirothon
Acting Locally for Climate Protection**

Our team's primary objective for this project was to attempt to develop a strategy that would allow our community to have less of a negative impact on the global climate. We felt that instead of focusing on one particular issue, we would explore a number of areas that are "reasonable practices" that may be part of the solution.

We believe that there are many resources in our community that we can "tap into" to make a small positive contribution to some of the issue associated with global climate problems.

The areas that we explored were the use of "biofuels" and solar power, utilizing different methods of waste disposal, reducing the number of building projects in our community, increasing the number of people participating in our recycling program, and growing more food locally (less fuel used for transportation).

Our major concern is to amount of greenhouse gases that we are producing. It is our hope that if we could make people aware of how much damage we are causing by our current practices, and how easy it is to make small positive changes in our lifestyles, every community can contribute to the greater good of this planet.

We are very aware that these changes will take time and that changing the behaviors of the general public is a daunting task, but as idealistic as this may sound, we feel that it can and must be done. With the climate data that is presently available, the time before we see catastrophic changes is limited and unless we start acting now, who knows what the future has in store for us.

Somerset Envirothon Team
Coach: Matt Talbot

Our Project: Global warming is defined as an increase in the average temperature of the earth's atmosphere (especially a sustained increase that causes climatic changes).

Carbon dioxide and other air pollution that is collecting in the atmosphere like a thickening blanket, trapping the sun's heat and causing the planet to warm up.

Coal-burning power plants are the largest U.S. source of carbon dioxide pollution; they produce 2.5 billion tons every year.

Automobiles, the second largest source, create nearly 1.5 billion tons of CO₂ annually. In the early 1900s the surrounding area was infiltrated by industrialization. However, unlike modern industry there was no governmental legislation to monitor the industries dumping injurious materials and chemicals into the environment. Therefore the effects of such neglect has influenced the development of global warming.

Power plants such as the ones that burn coal and natural gases, are the country's largest industrial source of the pollutants that cause acid rain, mercury poisoning in lakes and rivers and global warming. To combat this pollution, new, renewable sources of energy should be used (things such as windmills and solar cells can be used to fight these conditions).

Somerset is home to two of the most unhygienic power plants in the country, Dominion Power and Montop. These two environmental eyesores are a major contribution to the heavy pollution of this region. The Tauton river has suffered many reprocutions do to the heavy thermo-pollution from the power plants.

America's invaluable, to the sustaining of its modernized society, cars, trucks and buses account for 20 percent of U.S. global warming pollution, as well as soot and smog that damage human lungs through the natural process of inspiration. It also accounts for numerous detrimental effects on humans such as cancer, cataracts, skin cancer.

Additionally, the effects of global warming resulting from the automobiles surpass the effects on humans and extend to the biosphere of the whole. And our vehicles' inefficient design leaves the United States, a nation with just 3 percent of the world's known oil reserves, in a precarious position. America should look for alternate fuel sources to replace the high levels of oil use (hydrogen fuel and such).

Catalytic converters, which are tools used in cars to clean emissions, are helping to reduce the harsh level of pollutants released by cars. Catalytic converters work by providing a large surface area which is covered with catalysts and when the exhaust travels through it, the catalysts break down some of the substances in the exhaust and make it cleaner and healthier for all of human kind.

Global warming is already causing damage in many parts of the United States. In 2002, Colorado, Arizona and Oregon endured their worst wildfire seasons ever. The same year, drought created severe dust storms in Montana, Colorado and Kansas, and floods caused hundreds of millions of dollars in damage in Texas, Montana and North Dakota. Levels of snowfall have been on a steady decline and winters, in many areas, are becoming shorter. These intense weather conditions are projected to get worse if nothing is done to stop the worsening of global warming. A direct effect of this intensified global warming can be seen in the nation's hurricanes.

Global warming doesn't create hurricanes, but it does make them stronger and more dangerous. Because the ocean is getting warmer, tropical storms can pick up more energy and become more powerful. So global warming could turn, say, a category 3 storm into a much more dangerous category 4 storm. In fact, scientists have found that the destructive potential of hurricanes has greatly increased along with ocean temperature over the past 35 years.

The government is now in the process of cleaning these power plants. We will talk about this after in the interview we had with Robert DeMoranville. We sat down with a representative from Dominion Power and asked him a few questions. He had this to say to our following questions. Here's a little flash back to the day of the interview.

- Q: So, Robert, how long have you worked at Dominion Power Plant?
A: 26 years
Q: On a scale of 1 to 10, how clean would you say the power plant is?
A: 5
Q: How would you say the effort to clean it up, same scale?
A: 8
Q: What are they doing to clean the plant?
A: Installing catalytic converters, which treat the exhaust, scrubbers, which take the particulates out of the air, and injecting ammonia into the exhaust, which does almost the same thing as the catalytic converters.
Q: What is the name of this clean-up project?
A: SCR Project
Q: What would say the effect has been on the community surrounding the plant?
A: Positives – The plant has helped to provide tax money for the schools and such Negatives – It has sent ash and coal dust into the surrounding areas
Q: What would you say the effect on the ozone has been?
A: Not good – the government has stepped in and is making us clean up our act
Q: Which plant in town is dirtier, Dominion or Montop?
A: Dominion, because we produce more energy.
Q: How much coal do you burn a day?
A: 10,000 tons – 3 out of our 4 burners run on coal.
Q: How much power do you produce daily?
A: 1650 mega-watts
Q: Is it necessary to use that much coal?
A: Yes, in order to produce that much energy. Oil is dirtier than coal to use and natural gas, while being cleaner, is too expensive to use.
Q: What effect, would you say, would closing down one of the power plants have on the community?
A: There would be huge tax increases in the town of Somerset and a large amount of loss of jobs.
Q: What effect on the water in the Taunton River and Narragansett Bay does the plant have?
A: It raises the Bay temperature, which greatly affects the wildlife – the government is litigating right now in an attempt to make the plant cool the temperature of the wastes they dump into the water – in order to do this, cooling towers would have to be installed

We will actually be doing many small projects in order to lessen the effects of global warming in our community.

- Implement Recycling Program at school
- Can and Bottle drive
- Contact important people – like Senators or selectman and see what steps have been taken to clean the community
- Tree planting
- advocate the termination of cows, sending the beef to Africa
- Plant sea-life in surrounding areas
- Go Yellow
- Educate community with flyers and such
- Donations
- Low energy Day
- Run campaigns on public access channel

Community is a major role in our project. Somerset is a tight knit community and we will be attempting to get the population in on this project to help us with every step.

South Hadley High School Envirothon Team
Coaches: Jacob Masenoir and Ramona Smith

South Hadley is a town of approximately 17,000 residents in the Pioneer Valley area of Western Massachusetts. Our town contains a mixture of farmland, residential suburban development, small businesses, manufacturing, and college land. Directly across from South Hadley Falls, the more urban part of South Hadley, is Holyoke, which is an urban city that is connected to us mainly through the Connecticut River. Although South Hadley is home to all three classes of settlement; urban, suburban, and rural, the developments that have been progressively popping up throughout the town has made South Hadley less rural and more suburban and urban. With increasing development, South Hadley's consumption of natural resources and subsequent greenhouse gas emissions have been steadily increasing.

Over the course of the last year the South Hadley Envirothon team has worked on a number of projects aimed at reducing our greenhouse gas emissions. Our team has focused on two main projects. The first project involves reducing electrical consumption at the high school. The High School building was renovated in 1999 and contains multiple conservation measures. We are working with the Principal to retrofit the building with additional energy saving technologies and strategies. The second part of our project involves research into "High Performance Schools," which are schools that incorporate the best technology for being green. We hope this research will help us appeal to the school committee to encourage them to rebuild Plains Elementary School in an environmentally conscious fashion. Green Building Design techniques are environmentally friendly, also provide significant benefits in terms of the health of the building's occupants and in terms of student performances. Some communities that have High Performance Schools include: Upton, Great Barrington, Ashland, Milton, and Dedham.

High performance Schools are more economically friendly than regular schools. Where a regular school might use \$120 per student per year, a green school may bring that number to as low as \$65 per student per year. Utility costs in the school will generally fall from 30 to 40 percent in a new green school and 10 to 20 percent in a renovated green school. Often times high performance schools are more expensive upfront (typically by 2-5% based on national studies), but the initial investment is returned and significant savings (as much as \$100,000 in annual energy related savings alone) are accrued over the life of the building

At the High School, we have used the internal timers on the television sets around the school to automatically turn off all TV sets after school hours. This prevents them from wasting energy over night, extended weekends, and vacations. Out of a total of 50 televisions, 27 were not being shut off and now all of them automatically shut off between 4:30 and 6:30.

We are developing a school-wide campaign for classes to use half of the lights in their rooms. The lights available provide an excessive amount of lighting for the small rooms and by only using half of the lights, we not only save energy, but also help the school by reducing the frequency that light bulbs need to be replaced.

We are also working with the IT people in the school to automatically reduce the energy consumption of idle computers. Through the school network we are attempting to implement a program which puts computers into a low energy state after a uniformly short period of time.

We are in the process of organizing a car pool/ bike/walk to school day to raise environmental awareness and show people in our community convenient ways to not only help the environment but also save some money. This not only supplies a way for community members to help the environment but also provides an incentive to do so. We are scheduled to make a presentation on the benefits of high performance schools at the May 23rd school committee meeting.

**Taconic High School
Pittsfield, MA**

**Coach: Laura Schneider
Team members: Crystal Tarjick, Samantha Robertson,
Jeremy Best, Caitlin Partridge, Katie Russett**

Upon learning that the topic of the Envirothon this year was climate change and reduction of greenhouse gases, the first thought that came to mind was reducing combustion. We decided to focus our project on our school. Not only was the trash in our building incinerated, much of the total volume was recyclable paper products. Further more, our inefficient oil heating system must compensate for the poorly insulated windows.

For part of our project we decided to record heat loss and temperatures near some of our classroom windows since we knew that the windows in our school are single paned, do not close well, and are not well insulated, thus losing potential energy. For the second part of our project we conducted a feasibility study by dividing the building into five sections and collecting recyclable paper items. Each day the paper was weighed and collected to find its volume of how much could potentially be recycled. Though there are many factors contributing to the hemorrhaging of heat from our building, the heating system and the inefficient windows were major causes. When heat is lost, more fuel is used to produce more heat, thus creating more greenhouse emissions. Our goal in this project was to find out how much energy we use, and what we can do to help reduce heat loss and greenhouse emissions by consuming less fuel and proposing ways to make our school more energy efficient. After working on this project we learned that reducing the heat in the building would save us up to 6-8% in fuel and that to save in larger ways for our school we would need to find ways to repair, or replace the windows and our heating system. For the recycling we found that approximately 1,020 lbs. of paper could be collected each week and we hope to make recycling a more permanent practice in our school to show others in our community what a difference it could make.

In conclusion, we have gained a greater understanding to our communities' impact on our local environment. We have also found out that there are simple steps in which we can take to reduce greenhouse emissions. It was surprising to find out how much our building alone contributed to greenhouse gas emissions. If many of the other public buildings took these similar steps we could significantly reduce the greenhouse gas production in our area.

**School: Tahanto Regional High School
Berlin and Boylston
Advisor: Sue Moore
Current Issue: "Acting Locally for Climate Protection"**

The Tahanto Envirothon Team contacted Selectmen, Conservation Commission members, and the Tahanto Building Committee of the Berlin —Boylston Regional School District to determine how climate change is affecting the 2 communities and what actions need to be taken related to climate change in the towns and in the schools.

Our Team used the environmental educators' concept of the 3 A's for Awareness, Appreciation, and Advocacy to educate the Tahanto community of students, teachers, and parents about how we affect global warming, how we can decrease our ecological footprint, and how we can advocate for green buildings and schools in our community by using solar or wind energy, Energy Star appliances, and geothermal heating and cooling.

There are natural causes of global warming caused by the variations in solar activity, variations in volcanic ash in the atmosphere, variation in the position of continents and oceans, variations in the Earth's orbit around the sun, and variations in greenhouse gas concentrations. Greenhouse gases include water vapor, ozone, and carbon dioxide with trace amounts of methane, chlorofluorocarbons, nitrous oxide, and sulfur dioxide. Humans add to the intensity of global warming, however, when they add greenhouse gases to the atmosphere by burning fossil fuels such as coal and oil, which add even more carbon dioxide to the atmosphere, adding to the greenhouse effect. If global warming continues at the present rate, Massachusetts could be 6-10 degrees Fahrenheit warmer in 100 years and have a climate like Virginia. This warmer climate can cause extreme weather events such as flooding and drought and affect not only people's lives and property but animal and plant wildlife as well.

Humans need to calculate their "ecological footprint" which estimates how much of the Earth's productive land and sea that is used to produce the food, materials and energy that we consume and to assimilate our wastes. The "ecological footprint" shows us our own personal "environmental sustainability". It is used to manage and/or measure the use of resources in a community and how much of those and other nation's resources we use to maintain our lifestyles. For example, the ecological footprint of people in Bangladesh is only 1 acre but the ecological footprint of a typical American is 24 acres (that is, one person needs 24 acres of land and water resources). Ways a person can decrease his/her ecological footprint include carpooling to decrease the use of oil and gas, using energy efficient light bulbs, turning off computer monitors when not in use, checking for air leaks in our houses, lowering our thermostats, and using water aerators to save water. In his book, "When the Rivers Run Dry", Fred Pearce predicts that the lack of water will be the defining crisis of the 21st century.

Tahanto High School is more than 40 years old and the Tahanto Building Committee needs to address the need for renovations and for energy-efficient heating, cooling, lighting, and electricity. These can be addressed in several ways. With a grant for green schools from the Massachusetts Technology Collaborative, Tahanto can do a feasibility study for solar and/or wind energy for lighting and electricity. Geexchange for heating and cooling is also cost effective in the long run, especially with the skyrocketing cost of gas and oil. Other components of a green school include the use of Energy Star appliances, skylights for natural lighting and the use of thin fluorescent bulbs and motion detectors for lights.

The Tahanto Envirothon Team urges the Tahanto Building Committee and the towns of Boylston and Berlin to use these energy saving methods for its buildings.

Massachusetts Envirothon Community Research Summary
Team: Tantasqua Regional Senior High
Town: Sturbridge, Massachusetts
Advisor: Steve Kelly

Project Description:

Students from Tantasqua studied the role of urban and rural forests in the prevention and mitigation of climate change. Forests make up over 70 percent of the land in Sturbridge although the population growth and the rate of development in town are increasing rapidly. We chose this topic because of the importance of forest resources regarding the climate issue and because of the rate of change occurring here.

Trees in rural forests as well as in urban settings help in the prevention of climate change in the following ways:

growing trees sequester CO² – for every ton of wood a forest grows, it removes 1.47 tons of CO²

- the sustainable and renewable harvest of locally grown wood biomass for heating fuel eliminates the need for the burning of other fossil fuels and results in zero-net CO² emissions
- shade trees in an urban setting reduce the need for summer use of electricity for cooling
- well-placed trees in an urban setting can act as a wind break, reducing the need for winter heating fuel
- preserving forests goes hand in hand with smart growth and reduction of residential sprawl, saving on transportation fuel use

Urban and rural forests also help mitigate some of the damage global warming will cause. With a major river running through the town of Sturbridge, the town is vulnerable to flood damage especially if the water cycle intensifies as is predicted with a warming climate. Preserving forests and urban trees can significantly reduce runoff and flooding. To bring public awareness to the value of urban trees and their connection to climate change, our team has been soliciting nominations for champion trees in Sturbridge. The measuring and inventorying of the largest urban trees in town will benefit the entire community.

One of the most interesting things we learned from this project was how little thought people have given to the topic of climate change on the local level. With the federal government dragging its feet on climate change policy, change may need to start locally.

Uxbridge High School Environmental Science Club
Uxbridge, Massachusetts
Advisor: David Worden
Climate Protection Issue: CO₂ Reduction

I. Climate Change
 A. Global Warming

Causes	Effects
Greenhouse gases in atmosphere	Extreme weather
CO ₂ emission: more and more heat (energy) is brought in the climate system and is unequally distributed	Natural disasters (floods and droughts): these have negative effects on agriculture, economy and residences

B. Uxbridge's Unique Topography

- 3 rivers (Blackstone, Mumford, and West) create extensive wetlands
- Quarry Hill: highest point in Uxbridge
 - a. High wind speeds

C. Wetland Facts

- CO₂ sink
- Biodiversity
- Flood control

D. Our Project

- Purple Loosestrife Project (bio-control)
 - Objective: to preserve local wetlands and natural biodiversity we introduced European beetles which feed on Purple Loosestrife (an non-native plant that is destroying our wetlands)
 - Hypothesis: By using the plants' natural predators, we will achieve a natural balance of biodiversity in the wetland ecosystem

E. A Solution

- By preserving the wetlands, we lower the percentage of greenhouse gases in the atmosphere because wetlands function as CO₂ sinks. Furthermore, we create protection against droughts and floods because wetlands work as sponges, absorbing excess water in times of high water levels and releasing water in times of droughts.
- The use of a wind-powered plant on Quarry Hill, in Uxbridge, would provide electricity without CO₂ emissions.

Future Projections: We plan on continuing the purple loosestrife project in hope of establishing balanced biodiversity at Rice City Pond, as well as preserving the wetlands.

**Town of Waltham, Massachusetts Team
Advisor: Ellen Stanton**

The Waltham High School Environmental Club, comprised of Jackie Carlozzi, Stella Lee, Pearl Lung, Gabriella Rivera, and Sana Zehra, and Jackie Zuppe, all Waltham High School Juniors, are in preparation for the annual Massachusetts Envirothon, held this year in Uxbridge. The team under the advisement of Waltham High School Biology teacher Ellen Stanton and retired Waltham High School Chemistry teacher Sonya McKnight, are putting together a service project under this year's theme of Global Warming. The students are looking into Carbon Dioxide, (the main contributor of Global Warming) and coming up with a counter attack (recycling reduces Carbon Dioxide production significantly) and its consumption and production in and around their Waltham area. The students are scheduled to work with the Fifth Graders of MacArthur Elementary school in preserving the environment on May 30th. The team has come up with a curriculum for the students where they will investigate the harmful effects of Carbon Dioxide in their lives and the future. The Club hopes to reach out this way to Waltham's most essential citizens; the children, and help them to realize a better tomorrow begins today. Without spoiling their presentation, some aspects include Earth Friendly Games, We Care Letter Writing through their Wee Deliver Mail Service and other Visual compliments that will enhance the student's understanding. That's not all the Club has been up to lately. Serious discussions are in works about cleaning up and refurbishing local playgrounds, creating a stronger recycling campaign and working with city official on what exactly Waltham as a community of the world is doing to be better earth friendly. Through plans of community awareness, the program's main objective is to connect with the children of Waltham and help them alert their parents, siblings, neighbors and relatives of Waltham's stance in environmentally friendly actions. The Club has already met with the Mayor and discussed 2006-2007 time frames. Having already contacted with Eileen Zubrowski, the Waltham Recycling Coordinator, the Club has learned of city plans to "reduce auto emissions from vehicle idling in municipal departments and the City schools. This program will serve as a pilot and model in the community" beginning in April 2006. This is a huge step for the City of Waltham; idling creates unnecessary contributions to Global Warming and cutting down on it can make a gigantic change. Thanks to a generous grant from the Massachusetts Department of Environmental Protection (MADEP) Waltham is working on promotion of conservation with rain barrels sold at a reduced price, just in time for gardening season, and The Mayor created a Solid Waste Advisory Committee made of volunteer residents, City employees, and officials to assess Waltham's current solid waste management actions. The reduction of Global Warming starts with recycling, which the Club hopes to campaign this spring, including a Carbon Dioxide Diet for Waltham citizens and helpful service reminders from the students. The students are busily working on their project and hope to accomplish a lot for their community, knowing that the baby steps have to start somewhere.

Provincetown High School
Coach: John Hanlon

This year Provincetown High School did a project on the Cape Wind Farm that is supposed to be located in Nantucket Sound also known as Horseshoe Shoal. Our advisor this year is John Hanlon. We chose this project about the Cape Wind Project because the goal of this project is to take a renewable energy source and convert it into energy that many people can use as an alternate source to electricity just by using wind turbines that will be located in Horseshoe Shoal. This project would help to save the planet because people will not be burning as much as oil as they previously were. Not only would this project help with burning oil (which would cut the cost it takes to heat one house by quite a bit), but it also would help to prevent global warming because it helps to reduce the number of greenhouse gases that are being produced. We think this is a perfect example of climate preservation because this project will help to protect the environment in several ways. This project is designed to help provide energy for the Cape and the Islands which is just a start. This is what makes it so important to the town. This will be the United States first wind turbine project and if this proves to be a success, which it most likely will, more will be designed.

There will be 130 offshore wind turbines located in Horseshoe Shoal that will be plotted in a grid pattern. Each turbine in a row will be .34 nautical miles apart (about 6 football fields in length) and each row will be .54 nautical miles apart (about 9 football fields in length). The turbines will be 247 feet in length starting from the surface of the water and reaching to the center of the blades. It will be 75 feet from the lowest blade to the water and 417 feet from the highest blade to the water. The diameter of the base of the turbine will be 16 feet. The turbines will be mounted on poles that will be embedded 80 feet into the floor of the sea. Each turbine can produce up to 3.6 megawatts of energy (468 in total), but at a maximum will probably only produce 454 megawatts of energy. On average, it is expected that the wind farm will produce 170 megawatts of energy which is 75% of the energy used on the Cape and Islands.

Some people were concerned that this project would disrupt aquatic life and bird life in the area but this won't be the case. There is very little marine life in this area and the turbines aren't expected to affect the marine life that is in the area. While there are birds in the area, the turbines are huge objects that they can easily spot so very few birds are expected to die because of the wind turbines. Another problem that people are anticipating is the visual the turbines will provide. These turbines are located 5.2 miles away from Point Gammon, 5.6 miles from Cotuit, 6.5 miles away from Craigville Beach on Cape Cod, 9.3 miles away from Oak Bluffs, and 13.8 miles from Nantucket. They will be very hard to spot even on clear days. If spotted they will stand about 1/4 of an inch high in sight. The location is out of the way of the ferry routes and very few fishermen come down into this area.

From this project, our team was able to learn all of the benefits (and the few disadvantages) to having this project located off the coast of Cape Cod. We were able to learn all of the factual information and how we can all use this project to be a wonderful model for more to come. Currently, this project is being disputed amongst our politicians. It is hopeful for the permitting to be done by 2007 and for the project to be fully operational by 2009.