

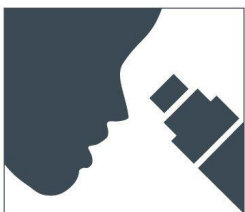
# Youth Policy Summit

## Finding the Balance:

### Water Quality and Human Health in New Jersey

**Final Student Policy Recommendations**

June 25—July 1, 2010  
Montclair, New Jersey



**Merck  
Institute for  
Science  
Education**



# About Youth Policy Summit

The power of *Youth Policy Summit* lies in the ambition of its alumni. Young women and men come to the Summits as students, curious and ready to learn. They leave, after a week of intensive study and collaboration, active and inspired citizens of their local communities, our nation, and the world.

In June 2010, *The Keystone Center* hosted the inaugural New Jersey Water Quality and Human Health Summit for 23 high school students from New Jersey and New York City. Five high schools from across the region came together in Montclair, New Jersey to address the challenges, opportunities and concerns associated with developing consensus-based policy recommendations for water issues in the region and ultimately, the nation.

After researching divergent stakeholder groups and aspects of the water resources puzzle, students spent a week ardently discussing the possibilities for sustainable solutions to meet current and future water demands of the region. During the Summit, participants took stock of the larger technical, legal, environmental, social, economic, and political problems and shared their own research to prioritize issues and options. They interacted with leaders in the fields of water, government, and the non profit sector who are actively grappling with these same issues day to day.

With guidance from professional educators and facilitators from *Keystone's Centers for Education* and *Science and Public Policy*, students produced viable solutions to dealing with a problem that is confounding policy makers nationally. This report represents the results of the students' deliberations: a written set of recommendations that will be shared with leaders in education, policy, water, youth development and government.

These young leaders received training and practice in skills essential for the 21<sup>st</sup> century work force such as critical thinking, creativity, leadership, negotiation, and innovation. Freshly aware of their own potential for leadership and change, the students are inspired to take their recommendations to leaders in their own communities, demonstrating the undeniable power of working together.

Since 2004, The Keystone Center has conducted YPS programs for over 500 young leaders from 23 states across the nation. Topics focus on current issues facing our country in the areas of energy, environment and public health. With eight Summits planned nationally for 2011, we encourage teachers, students, private and public organizations and government leaders to visit [www.youthpolicysummit.org](http://www.youthpolicysummit.org) to learn about opportunities available in your region and how to get involved.



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*“When I first arrived at the Youth Policy Summit, I looked upon the world very cynically. All I was able to see in the news and the world around me every day was about how people could not and would not reach a compromise on whatever policy they were discussing.*

*Yet, during my time at YPS, I learned that people can agree, people can come to a compromise, people can learn to come together and see that not a single voice was left unrepresented.”*

**Andrew Hahm, Participant**

CONNECTING

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EDUCATION

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TO REALITY

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## Overview of Student Research

### The Group's Task

**What should be done, and by whom, to bring about the changes necessary to sustainably meet the water needs within the state of New Jersey while balancing water quality with human health concerns? Participants should consider three time frames: near-term (4-8 years), mid-term (10-20 years), and long-term (up to 50 years). They should analyze the political, economic, social equity, environmental, technological and legal aspects of each time frame. Specifically, students should answer the following:**

To begin answering these questions, students were asked to research the following topics related to water resources and uses prior to their arrival at the Summit. As a group, the participants became experts on the current issues, barriers and opportunities as they exist today.

**Non-urban Land Use** – These will all be non-point source. Examples include but are not limited to organic and non-organic agriculture, forestry, wetlands, recreation and tourism uses etc.

**Urban Land Use** – These will all be non-point source. Examples will include but are not limited to urban sprawl, loss of farmland, transportation, storm water run off, historic preservation, etc.

**Home Use** – Examples include but are not limited to micro-chemicals

**Industrial and Commercial Point Source** – Examples include but are not limited to manufacturing, consumption and development.

**Water Utilities and Treatment for Consumption** – Examples include but are not limited to what is taken out and what goes in.

**Interstate Water Issues** – Examples include but are not limited to conflicts with federal and state regulation, border issues with shared water sources as well as monitoring and regulation of water systems that span state boundaries.



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## PESTLE Analysis

To broaden the depth of their research, students worked in groups to perform a PESTLE analysis of each research topic listed on page 5.

### **Political.**

Describes how, and to what degree government should intervene in the economy and society.

### **Economic.**

Includes economic growth, job market, inflation and taxes. What education currently exists (or not) among the general population and the existing and developing workforce?

### **Social.**

Includes cultural aspects, demographic differences, environmental justice (are some impacted more than others), does everyone or all uses have an equal right to water? What education currently exists (or not) among the general population?

### **Environmental.**

Encompasses all negative and positive impacts on the environment, including air and water quality, and impacts from climate change. What education currently exists (or not) among the general population?

### **Technological.**

Includes the rate of technological change and impacts from research and development. What education currently exists (or not) among the general population and the existing and developing workforce?

### **Legal.**

The laws of the land, including environmental, as well as health, safety and discrimination laws and regulations. Congress and the State Legislature enact laws and the US Environmental Protection Agency and state environmental agencies create their own regulations to limit some activities and encourage others.



## Stakeholder Assignments

In addition to their water research topics, each student was asked to represent the interests of an important stakeholder involved in the Water Resources.

- **Non-Governmental Organizations** (NGOs) composed of environmental groups, consumer advocacy groups, coalitions and social justice groups who are non – profits.
- **Public Sector**, including federal, state and local government agencies
- **Private Sector**, including corporations and organizations that are in the water treatment or distribution sector, provide engineering services or who are large consumers of water.
- **Academia, Education and Research institutions**

### 1. Non Governmental Organizations:

The New Jersey Environmental Federation (NJEF), State Chapter of Clean Water Action

World Water Relief- US Emergency Response

New England Interstate Water Pollution Control Commission

Garden State Preservation Trust

New Jersey Public Interest Research Group (NJPIRG) Law & Policy Center

New Jersey Recreation and Park Association

### 2. State Government:

New Jersey Department of Environmental Protection

New Jersey Drinking Water Quality Institute

State of New Jersey Department of Health and Senior Services

State of New Jersey, Board of Public Utilities, Division of Water

Delaware River Basin Commission

New Jersey Economic Development Authority (EDA)

### 3. Utilities:

New Jersey Utilities Association

New Jersey American Water

### 4. Agriculture, Food, and Forest Products:

New Jersey Farm Bureau

New Jersey Forestry Association

### 5. Industry:

Phillips Lighting

Commerce and Industry Association of New Jersey

DuPont

Green Mountain Energy Company

Exelon Corporation

### 6. Federal Government:

US Environmental Protection Agency

Army Corps of Engineers



## Summary Timeline and Goals

By Year	Idea/ Goal
<p style="text-align: center;"><b>2015</b></p>	<ul style="list-style-type: none"> <li>• Reform the Clean water Act and Safe water Drinking Act to ensure stricter enforcement and to provide a regular cycle of revising toxin control level and new regulation for new toxins and chemicals.</li> <li>• Educate the public and legislature on the critical importance of water infrastructure issues to be addressed.</li> <li>• Educate the public that recycled gray water is usable</li> <li>• Create a state level program designed to increase efficiency of water use and low use appliances in residential settings</li> <li>• Pilot a low flush toilet replacement in public spaces, large corporations and government buildings to determine the most cost effective way for a community and homeowners to reduce water use.</li> <li>• Provide education for homeowners to increase awareness and decrease pollution from lawns and household products and manage the proper disposal of Pharmaceuticals</li> <li>• Institute fines for industrial point source polluters to fund education in water quality.</li> <li>• Educate farmers about the problems associated with synthetic pesticides and fertilizers through public seminars</li> <li>• increase awareness about the benefits of composting and implement composting in food companies, restaurants, and schools</li> <li>• Host a contest to invent or improve upon existing technologies for efficient and inexpensive irrigation (in terms of water and energy)</li> <li>• Develop a funding mechanism and marketing campaign to implement the first WATER WEEK education program</li> </ul>
<p style="text-align: center;"><b>2020</b></p>	<ul style="list-style-type: none"> <li>• Provide funding for and transfer CERCLA-Superfund program to state level management, control, monitoring and enforcement.</li> <li>• Reformation of State laws to require use of best available technology for oil tankers</li> <li>• State tax incentives for low water use appliances in homes</li> <li>• All new homes are constructed with gray water reuse and storm water collection systems where feasible in the State</li> <li>• Revise K-12 standards to include water conservation and efficiency education.</li> </ul>





By Year	Idea/ Goal
<p><b>2025</b></p>	<ul style="list-style-type: none"> <li>• establish the necessary agencies, standards, and public support needed to begin water infrastructure improvements in the state.</li> <li>• Conduct a fair, financially supported by corporations, to support continuing education for farmers to learn techniques to improve water efficiency, make better use of improved composting systems and for the participating companies to advertise their new products</li> <li>• Pass legislation to formally designate WATER WEEK (May) for education at the State level</li> </ul>
<p><b>2030</b></p>	<ul style="list-style-type: none"> <li>• Require the water quality infrastructure organization mandated in Section I to consider the recapturing of wastewater in their creation of water quality infrastructure standards</li> <li>• Use of safer, alternative building materials for infrastructures, which contain fewer sources of toxic elements and a timeline for implementation over the next 15 years which includes education and funding for new research of alternative materials.</li> <li>• Builders will be familiar with and make use of low water use designs in all new homes.</li> </ul>
<p><b>2040</b></p>	<ul style="list-style-type: none"> <li>• Require all counties to utilize at least 35% of their wastewater for non-drinking water purposes</li> <li>• Set an industry manufacturing standard for irrigation systems of 60% reduction below 2010 levels and associated non-compliance fine structure</li> <li>• Set up subsidies for farmers to replace old systems with those that meet or exceed new efficiency standards</li> </ul>
<p><b>2050</b></p>	<ul style="list-style-type: none"> <li>• All toilets in NJ homes, businesses and public spaces will be low flush</li> <li>• Through education and habit changes, non-point source pollution from residential properties is reduced drastically</li> </ul>
<p><b>2055</b></p>	<ul style="list-style-type: none"> <li>• Repair at least 75 percent of the water infrastructure in New Jersey's urban areas and at least 40 percent of the water infrastructure in New Jersey's suburban/rural areas such that the infrastructure is deemed to be high quality and economically sustainable.</li> </ul>



### Introduction

Water quality is an issue that has universal interests. Whether one is a member of the public, the government, or a private organization, at the end of the day, everyone needs water to survive. However, it is inevitable that methods to improve water quality and conservation vary upon the interest at hand. In our work of creating policy for water quality improvements and conservation in New Jersey, we have looked upon our policies through multiple lenses and perspectives, weighing our policies' effects on interests ranging from the average taxpayer to the corporation. We have investigated different implementation processes, measured costs, and weighed different rationales for each different implementation. It can be guaranteed that each issue was carefully and thoughtfully considered upon for its benefits and disadvantages to the New Jersey taxpayer, corporation, governmental organization, and non profit /advocacy group. From county infrastructure funds to Water Week fairs, from the dissolution of the national Superfund into smaller state Superfunds to setting up a tri-state pharmaceutical disposal system, we hope that we have provided a comprehensive water quality policy recommendation that will not only improve water quality and reduce water usage in New Jersey, but allow New Jersey to be a national model for the realization and dealing of the water crisis that is engulfing this planet.



### Federal and State Level Government

In order for many of our collective policy recommendations to be successfully enacted, there needs to be much reform within the existing government policies to strengthen enforcement. Reform will ensure that all policies, both new and existing, are strictly enforced and that the government will have the power to ensure that they are enforced. Reform needs to address both how the government enforces current and future laws and regulations as well as the actual federal and state legislation and agencies that will carry out policies. By combining our new policy recommendations and the reformation of existing policies, the government of New Jersey, as well as the federal government can start on a track towards having ensured water quality and conservation.

#### *Updating Regulations and Standards*

Updating and tweaking federal and state legislation already in place regarding water quality is an action that needs to be taken into consideration. As time goes by and we learn more about new chemical compounds and how they can affect our water, we cannot afford to be naïve; we must pay attention and ask ourselves the following questions;

- What can happen to the new chemical component if it gets into our water?
- Where does it come from?
- Is it harmful to the environment and if so, how?

We have to ask tough questions like “*what can we do to make sure that toxic chemicals are regulated?*” We also have to insure that science and government facilities are aware of what is going on with any new findings. We often count on getting answers



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and insuring proper regulation through legal action such as the water acts. As a population we need to be able to read and understand these acts and how they work and the main purpose behind the act or regulations being enacted.

These acts address how to regulate pollution from different sources. They also discuss punishment for those responsible for pollution. The U.S. Environmental Protection Agency (EPA) is responsible for two main water acts that we feel need some crucial amendments; the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). Some of the sections in these acts have not been updated since the acts were first passed or since new information has been gathered important to these regulations. The Clean Water Act was established in 1972 has not been updated to meet the standards of today. The Safe Drinking Water Act was established in 1974 (US.EPA, 2010). While the SWDA was updated in 2000, there have been many changes that need to be incorporated. There are many chemicals that no longer fit the standards they once did and some new chemical compounds that have been found have not been added into the act.

The way that chemical compounds are tested for the level or potential damage is based on the LMS or Linearized Multistage Model<sup>1</sup> (CRUMP, 1996). The LMS is a graph, which has been used for 30 years, but to some scientists this is not the best method as the graph is not consistent. This graph is used for calculating

A substance is assigned to one of six categories as shown below:

<b>Group A</b>	<i>Human Carcinogen</i>	sufficient human evidence for causal association between exposure and cancer
<b>Group B1</b>	<i>Probable Human</i>	limited evidence in humans
<b>Group B2</b>	<i>Probable Human</i>	inadequate evidence in humans and sufficient evidence in animals
<b>Group C</b>	<i>Possible Human Carcinogen</i>	limited evidence in animals
<b>Group D</b>	<i>Not Classifiable as to Human Carcinogenicity</i>	inadequate evidence in animals
<b>Group E</b>	<i>No Evidence of Carcinogenicity in Humans</i>	at least two adequate animal tests or both negative epidemiology and animal studies

Source: Encyclopedia of Earth

1: The linearized multistage (LMS) model has for over 15 years been the default dose-response model used by the U. S. Environmental Protection Agency and other federal and state regulatory agencies in the United States for calculating quantitative estimates of low-dose carcinogenic risks from animal data. The LMS model is in essence a flexible statistical model that can describe both linear and non-linear dose-response patterns, and that produces an upper confidence bound on the linear low-dose slope of the dose-response curve. (CRUMP, 1996)



quantitative estimates of low-dose carcinogenic risk from animal data. This is a flexible statistical model that can describe the linear and non-linear dose-response patterns, which describe the linear low-dose slope of the dose-response curve.

Any revision of policies, both major and minor, to the Clean Water Act and the Safe Water Act require robust science. This would consist of highly reliable risk assessment and risk management. Risk assessment has four stages that must be followed:

1. Risk identification
2. Dose response relationship
3. Exposure assessment
4. Health outcomes

Inverting a higher certainty in the LMN or an alternate model such as the Two Stage Clonal Expansion Model will require more stringent toxicological chronic testing and harmful chemicals. The stringent testing needs to be at the mechanistic and epidemiologic levels to determine the mechanistic action and toxins in water at a chronic, sub-lethal, low-dose exposure levels. **Agency officials as well as politicians need to look at these matters very closely. It is imperative that they work to revise these acts as soon as possible, preferably by 2012. We would like to see the federal government enact a policy that calls for these acts to be reviewed and revised every 15 years at the least to ensure that the development of new chemicals or changes in information about chemicals could be incorporated as necessary.**

### ***Reforming Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)***

To gain sustainability in water quality, we need to worry not only about the pollutants in the water, but also about the pollutants in our water sources. The quality of treated drinking water is not as significant a problem because the pollutants are in very minute and trace amounts and any negative effects from them are very unlikely. However, if we do not improve or maintain the quality of our **current sources of water**, future generations will not have access to water fit for consumption or water that is economically feasible to treat for consumption.



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The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), otherwise known as the Superfund Program enacted by Congress in 1980 (US.EPA, 2010) was designed to clean up toxic waste sites. This program is not focused solely on marine sites and often take many years to actually implement any action. A more efficient and purposeful method of action is needed to ensure that polluted water sources will be cleaned. CERCLA is implemented by the federal government, which is why it takes a long amount of time for action to be taken. It is hard for the government to put a lot of time and money into clean-up efforts when it has to monitor all the Superfund sites in the country. Thus, it would be easier and quicker for the polluted sites to be cleaned up if the policy was implemented by smaller governing bodies, such as by states or cities. Because these governing bodies are smaller, it is easier for them to give their water sources the time, attention, and money that they need.

**To make this policy feasible, our short term goal is to provide funding for states (or cities) to set up a smaller version of the federal Superfund program.** This would require funding and there are several options as to where this money would come from:

- Raising taxes in specific region to address current sites.
- Putting taxes on items that are known to be especially detrimental to the environment (Windex [made of plastic, chemical], Comet [chemical cleanser that washes down the drain after usage]).
- Fines for pollution violators in all sectors (civilians, agencies, and private industry).
- If the federal Superfund is dissolved, split the money in the fund between the states (based on current need).



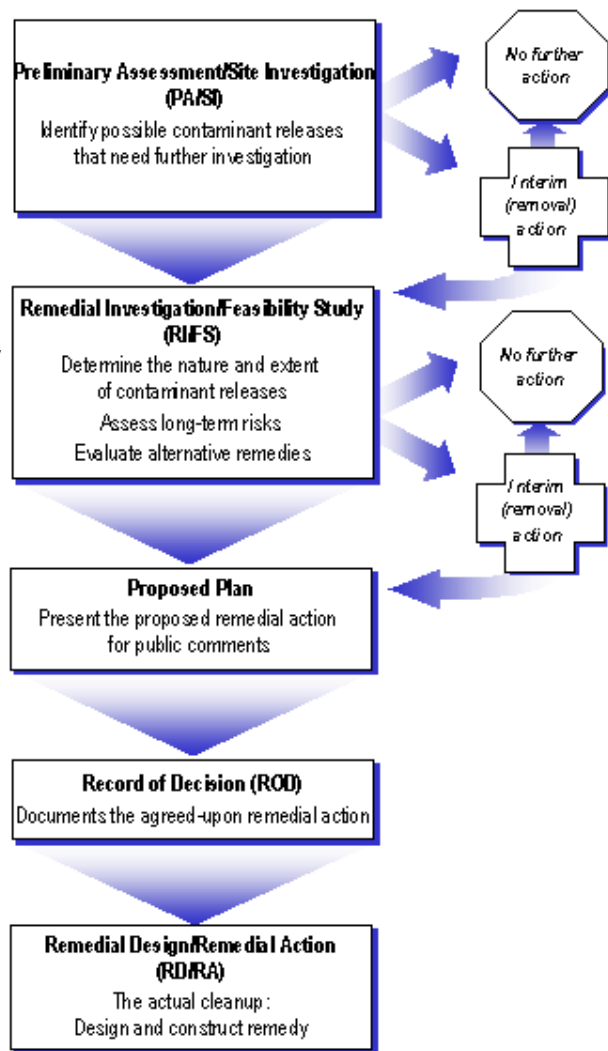


## Water Quality and Human Health

When the original federal Superfund was enacted by Congress in 1980, the funding was collected by putting a tax on companies and corporations that worked in either the chemical or oil industries. It also allowed the federal authorities to respond quicker to environmental problem, like dumping wastes. The money that was collected was placed into a trust fund and left for five years to grow. By 1985, the fund had \$1.6 billion amassed, which is an extraordinary amount of money that can have a huge impact on cleaning the environment (US Environmental Protection Agency, CERCLA Overview, May 2010).

Having a Superfund program at the state-level will create more jobs at the state's Department of Environmental Protection (DEP) for the increased infrastructure. The creation of new jobs is beneficial to local economies, especially now with the high unemployment rate. In the state of New Jersey alone, the unemployment rate is 9.7%. (US Dept of Labor, Unemployment Rates for States, May 2010)

The state-level Superfund will also collect money and save it in a trust fund. **Thus, the mid-term goal of this policy is to collect money using one or more of the aforementioned options and save it in a trust fund to allow for continued sustainable funding for new and existing Superfund site cleanup.** Just like in the federal Superfund, the money will be left in the trust fund



### Environmental Restoration Process

Source: Naval Facilities Engineering Command



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for five years, so until 2015. The exact amount of money that should be in the trust fund cannot be estimated properly because different states have different needs concerning polluted sites. A state that has more polluted sites than another state would also need more money. For some reason, if there are more polluted sites than funding to cover clean up, there are also several options that can be used to prioritize which sites are selected for clean up:

1. Vote and allow the public or legislature to choose sites to clean up.
2. Pick the sites based on a pollution scale (most polluted has priority).

The State DEP needs to ensure that they are keeping stringent watch to catch violators (if they follow the option to raise money through fines) through their correction officers. **The long-term goal of this policy is to have the state Superfund working fully and cleaning the polluted sites by 2016, after the money has grown in the trust fund.** The Superfund will apply to sites that are already polluted (whether heavily or lightly); however, sites that are polluted more have priority on the Superfund's sites list. Thus, implementing this policy will allow our current sources of water to be cleaned and allow sustainability in our water quality for future generations.

### *Oil Tanker Pollution*

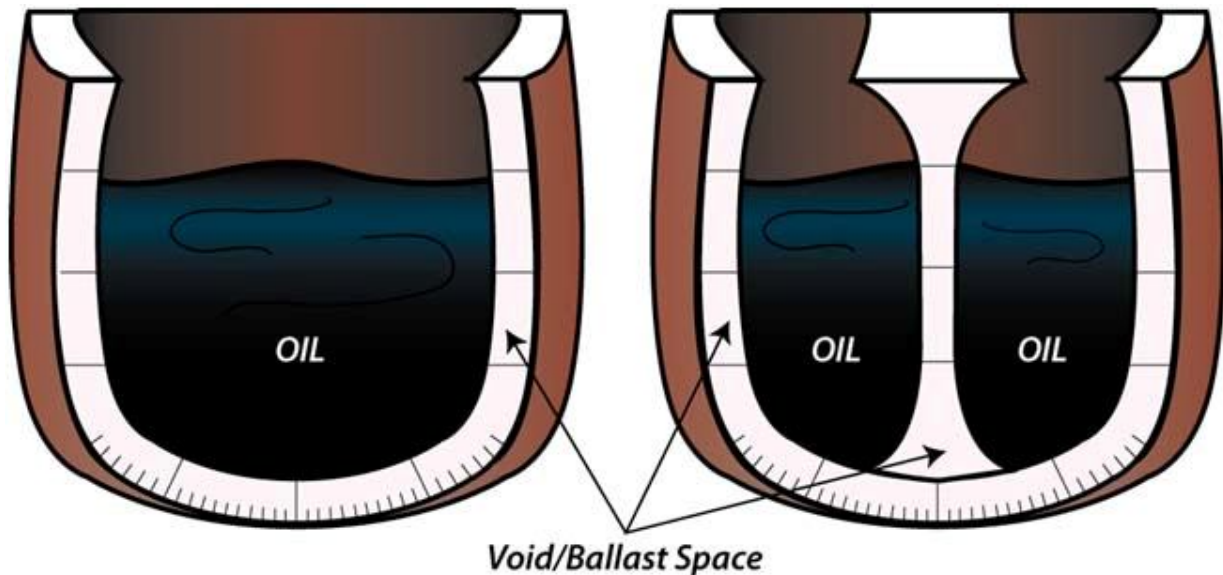
The Oil Pollution Act of 1990 set the standards for how to manage with oil spills by providing a structure “to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the money and resources necessary, to respond to oil spills” (EPA, 2010). However, these spills have continued to be a major problem around the world and the waterways of New Jersey and the surrounding region. Oil tankers often enter the Delaware Bay, Lower Hudson River, the New York Harbor, and the Newark Bay. In these harbors around New Jersey, oil spilled has harmed wildlife in the water and surrounding wetlands (NJDEP, 2010). Oil spills are extremely detrimental to ocean and bay wildlife. A large spill will also cause extreme damage to wetlands along the coast lines. In order to stop oil spills not only in New Jersey but around the world, a new policy requiring the use of the best available technology for oil tankers by 2020 should be enacted.





## Water Quality and Human Health

Most new oil tankers are built with a double hull and numerous holding tanks for oil. Double hull tankers greatly reduce the risk of losing oil and other cargo. There is an outer hull and an inner hull, with cross beams keeping the outer rigid. The outer hull and cross beams are made of a lightweight steel that is still very durable. Inside the two hulls, besides for the crossbeams, is empty ballast space. Down the center of the ship is another ballast space, which helps with balance. All ballast areas are generally two to three and a half meters wide (Australian Maritime Safety Authority).



Source: Prince William Sound Regional Citizen's Advisory Council

If either hull is broken, the other is still intact. This keeps the ship from sinking most of the time. If the outer hull breaks, some water enters the ship but not enough to sink it. If the inner hull breaks, oil escapes into the ballast area, but the ship can still function properly, and the oil can be removed once on shore. With double hull tankers, oil is rarely lost. Situations where single-hull and double-hull tankers were in the same exact situations, the single-hull tankers lost their cargo while the double-hulled ships did not (*Nissos Amorgos* and *Olympic Sponsor*, for example; Australian Maritime Safety Authority). The tankers are also generally fitted with many different tanks. Rather than have just one or two oil tanks in the ship, there are numerous. This way, in the event that both hulls are broken, only a fraction of the oil is actually spilled, rather than half or even all the oil. This would imply that because less oil is spilled, there is much less

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harm to nearby ecosystems. Also, since less oil is lost, it would make sense that it is more economically sound than a tanker with only one cargo tank.

In the past decade, many single hull oil tankers were still being used. Many companies kept outdated tankers in use to have as many ships transporting oil at once. Nearly all of the most recent oil spills have come from single hull oil tankers, such as the *Prestige* in late 2002 (United Nations Environmental Programme World Conservation Monitoring Centre, 2003). The purpose of this policy is to enact a new legislation or an amendment to the Oil Pollution Act. The legislation will require that by 2015, all oil tankers with a single hull and or two or less holding tanks will be out of commission and scrapped. In other words, all outdated tankers can no longer exist by 2015. This will give oil companies time to build enough new tankers and scrap old ones to continue making a profit.

In addition, the legislation would require all regulations to be enforced. On oil tankers and rigs, inspections aboard the ship or rig will determine if any violations of any source are occurring. If so, heavy fines will be imposed on the company. This will not be implemented in 2015, but rather within a year. The year given is to make sure that the government has the time and resources to ensure that regulations will be enforced. In the long run, this is will lower both the amount and magnitude of oil spills not only in the New Jersey are but around the world. This policy, we believe, will prevent all that damage to the environment and the economic loss that comes will spills.



Source: Vigilant Press

# Utility and Development Infrastructure

It is generally acknowledged that existing water utility infrastructure all over the country is facing critical conditions, and standards do not exist for the creation of new infrastructure (General Accounting Office, 2004). Therefore, we recommend that the following new policies in municipal water delivery infrastructure, water reuse infrastructure, and water-quality-related building infrastructure are considered for the sustained quality of American water and improved quality of infrastructure;

- Municipal Water Utility and Delivery Structure.
- Water Reclaiming and Reuse Policy.
- Residential and Commercial Buildings Water Infrastructure.

### *Municipal Water Utility and Delivery Infrastructure Policy*

According to the United States Geological Survey, 1.7 trillion gallons of water are lost very year throughout water distribution systems, costing the country up to \$2.6 billion (“Modernizing”). This is the amount of water used by the state of California in a year (“Water”), and there are nearly 250,000 water main breaks every year in the United States (Kinge).

One of the greatest problems that we face in the implementation of better water quality management systems in New Jersey is that the infrastructure currently in place in much of the United States is of low quality and not economically sustainable. Many statistics and news events point to the degradation of water infrastructure in the United States, such as the. New Jersey's 2007 grades for wastewater and drinking water issues were D and C, respectively (ASCE).



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In addition to this, it has been cited that many measures to improve water quality in an area have failed due to the high costs associated in maintaining current water quality infrastructure. current need “for a utility to make \$1, \$3.40 needs to be invested in infrastructure” (“Water”). It is clear that American water infrastructure needs improvement, and New Jersey also needs to be aware of this problem.

### *Existing Policy*

There are some suggested policies that have been made concerning water utility infrastructure. For instance, a report by UCLA's Institute of the Environment (IoE) stated that Proposition O, which provided \$500 million in bonds for water quality improvement projects in Los Angeles, allowed proposals to be submitted by citizens but required the proposals to be of high technical quality.



Therefore, IoE recommended that any water quality improvement projects, including infrastructure improvements, maximize public participation, saying that “all policy tools need an emphasis on openness, transparency, and inclusive decision-making” (Pincetl, et. al 20).

In addition to that, IoE notes that California's fund structure does not facilitate the improvement of water infrastructure, saying that “[local governments] cannot keep up with infrastructure repairs and have no money for maintenance and monitoring” (Pincetl, et. al 20) because of legal funding restrictions (i.e. Proposition 213) and the reduction of property taxes. Thus, IoE calls for tax reform in California, stating that this may bring about more consistent funding.



## Water Quality and Human Health

The U.S. Chamber of Commerce recommends “*Lifting the cap on private activity bonds for water infrastructure*” as one of four improvements for water quality. There are state-level caps on the amounts of money that can be used by the government to fund private projects. The federal Sustainable Water Infrastructure Investment Act of 2008, which would have eliminated these caps for water infrastructure projects, was sent to committee and never heard from again (“Sustainable Act”). “Leveraging local and private investment through federal investment” was the second recommendation of the Chamber.

One current policy that the EPA is employing is the heavily investing (\$3.3 billion) in the State Revolving Fund system, which would provide low-interest loans for water quality projects, while encouraging urban infrastructure repairs as opposed to investing in building new infrastructure elsewhere. “Strengthening the New Jersey Clean Water State Revolving Fund system” was a third recommendation of the US Chamber and lastly to “employ an efficient government model for improving water infrastructure.”

### *Suggested Policy*

For purposes of improving the quality and economic sustainability of New Jersey’s water quality infrastructure, **the short term goal (by 2015) would be to ensure that both the public and legislators realize that water infrastructure is a critical issue that must be immediately addressed.**



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**By 2025, we would like to see the establishment of the necessary agencies, standards, and public support needed to begin water infrastructure improvements in the state. And the long-term goal (by 2055) would be to have repaired at least 75 percent of the water infrastructure in New Jersey's urban areas and at least 40 percent of the water infrastructure in New Jersey's suburban/rural areas such that the infrastructure is deemed to be high quality and economically sustainable.**

We recommend creating a state panel to be named the *New Jersey Water Infrastructure Council* (NJWIC) that will have the power to recommend standards for economically sustainable and high-quality infrastructure. This organization would directly report to the New Jersey Department of Environmental Protection's (NJDEP) Municipal Finance and Construction Element and will comprise of members of the New Jersey state government, the NJDEP, non-governmental organizations, corporations, and the general citizenry in a 2:4:4:4:3 ratio.

The Council is meant to be modeled after the New Jersey Drinking Water Quality Institute. The NJWIC recommendations are subject to approval by both the NJDEP Commissioner, the head of the NJDEP Office of Planning and Sustainable Communities, and the head of the NJDEP Municipal Finance and Construction Element.

The standards recommended by the NJWIC will concern the economic and material quality of all new water delivery infrastructure, all new residential water infrastructure, and existing municipal water delivery infrastructure. In other words, the NJWIC must create standard methodology in determining the quality and economic sustainability of water infrastructure, meeting twice a year.

# Water Quality and Human Health

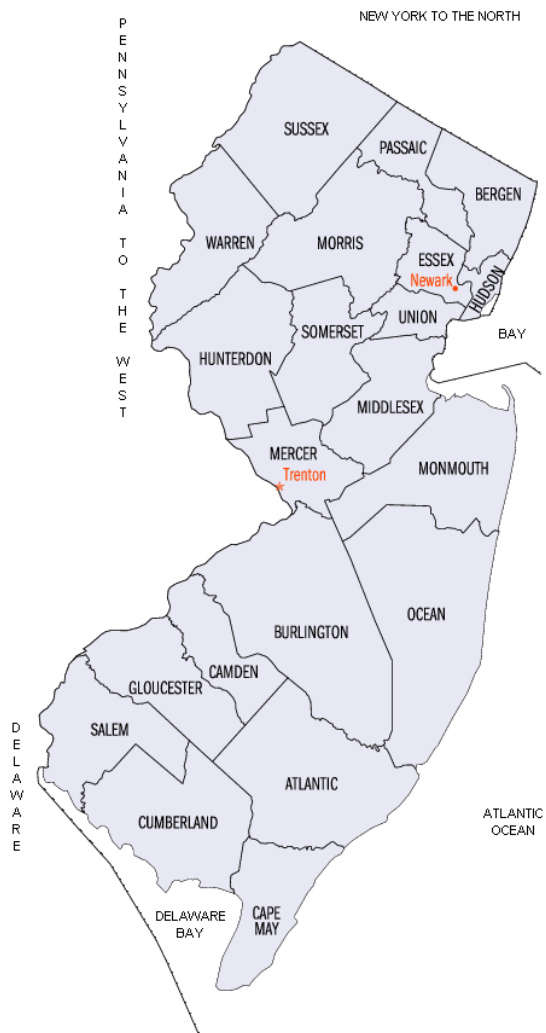
The criteria for determining economic sustainability and material quality must include, but is not limited to the following

- Typical maintenance costs
- Costs for installation
- Costs for upgrading
- Jobs created during installation and upgrading
- Effects of piping on human health
- Amounts of common water contaminants in building material

NJWIC criteria for economic sustainability

The NJWIC would work with each county in New Jersey to create a water infrastructure organization, to be referred to as the CWIC or County Water Infrastructure Council, with the power to create a county-level fund to assist municipalities in updating their infrastructure. We suggest that the initial money for each county's fund will be funded 70% by the state and 30% by the New Jersey Environmental Infrastructure Trust (NJEIT), subject to approval by the New Jersey General Assembly.

The NJWIC will be responsible for establishing criteria for the fair distribution of money between the counties. Afterwards, additional annual money for the fund must be provided by the state, the county, and the NJEIT.



Source: CencusFinder.com



## Finding the Balance

Additional roles of the new policy would be to;

- Require all municipalities in New Jersey to thoroughly review the quality of their water supply/delivery infrastructure every 3-10 years.
- Require municipalities repairing or otherwise modifying their water supply/delivery infrastructure to review sustainable solutions with the NJWIC or their county's CWIC and contract at least two third-party entities, one of which must be a corporation with a focus on water management and another which must be a non-profit organization, to advise the municipality in the modification process. At a minimum, the CWIC must pay for the contracting services.
- Require that all water quality infrastructure in New Jersey be economically sustainable and high-quality according to the above organization's standards within 75 years of the implementation of these measures.
- The NJWIC should recommend that solar-powered UV lights be installed in piping in increments that will be determined by the municipalities in question.

Requirements concerning the actual updating/creation of infrastructure are very few in order to give municipalities flexibility in choosing the best water infrastructure solution specifically tailored for them.

### *Water Reclamation and Reuse Policy*

Water reclamation is a way of making use of our wastewater or gray water<sup>2</sup> by applying it to irrigation and agricultural systems before it is returned to a river or the water table. Water reclaiming will allow for both the preservation of groundwater levels and the reduction of costs associated in finding new sources of water when increased development causes future need.

**2: Gray Water**—Wastewater from sinks, showers, kitchens, washers, etc. Unlike black water, gray water does not contain human waste. Typically gray water, after purification, is used for non-potable uses such as flushing, irrigation, etc

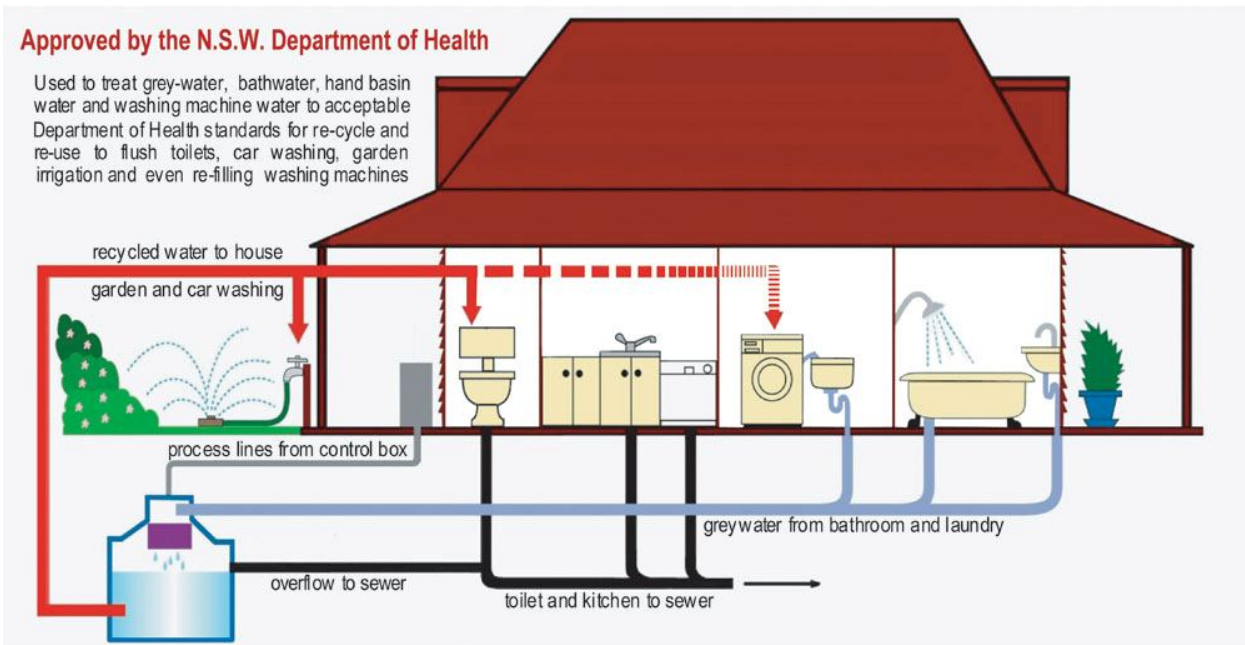
**Black Water**— Water containing human waste from toilets and urinals. Black water contains pathogens that must be neutralized before the water can be safely reused. Typically black water, after neutralization, is used for non-potable uses such as flushing or irrigation. (Source: Moraine Valley Community College –Green Team.)





## Water Quality and Human Health

If this reclaimed water is used for purposes that do not require high quality water (i.e. some agricultural uses, watering lawns, etc.), the normal costs and processes associated with water acquisition, cleaning, and distribution can be reduced and become streamlined.



Source: Universal Design Consortium, [udcinc.org](http://udcinc.org)

The following programs are already being implemented in many states, such as California, so it is feasible. We in New Jersey still have no federal legislation for recycled water uses. Some examples of working policies in other locations are:

- Irrigation project in Livermore, CA where they use water collected by the sewer system and put it through three treatments – primary, secondary, and tertiary. Primary treatment removes grit, stones, sand, etc., secondary uses bacteria to reduce complex matter to less complex matter and metabolizes it, and tertiary uses chemical coagulation and filtration to remove any remaining solids.

## Finding the Balance

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- The State of California also has laws to regulate the recycled water. The State Water Resources Control Board regulates the production, conveyance and use of recycled water through its Regional Water Quality Control Boards (RWQCBs), and the RWQCBs issue permits, referred to as "Water Reuse Orders," to recycled water producers.
- In Aurora, Colorado recycled water for irrigation has been used since the 1980s. It irrigates the Aurora Hills Golf Course and three city parks. Also since 2001, they have irrigated golf courses at Saddle Rock, Springhill, Lowry, Murphy Creek, and Fitzimmons, and greenbelt areas along the I-225 corridor and additional city parks with reclaimed water.

***Our goals are to; educate the public that recycled water is not disgusting or unusable starting in 2015, require the suggested infrastructure improvements mandated for utilities considers the recapturing of wastewater in their creation of water quality infrastructure standards by 2030. And finally, require all counties to utilize at least 35% of their wastewater for non-drinking water purposes by 2035.***

The water recycling and reuse policy would be helpful to New Jersey's water quality because it would help us to more efficiently use water. By using the following policy measures we feel it will mean there is less contaminated water in the waterways.

On a local level, each county would create a pilot program for the reclaiming and reuse of waste water with a dedicated committee of scientists and policy makers mandated with assessing the benefits and reducing costs associated with creating new infrastructure that will allow for the recycling and redistribution of this water. Water would be taken from waste treatment plants to provide the reclaimed water.

Covering the initial cost of the pipeline building (which can cost millions depending on how big the town is) through funding from state grants, the NJWIC mentioned above, and the county government, would be the responsibility of the county to manage.



## Water Quality and Human Health

Reclaimed water is cheaper than treated water because it doesn't have to go through such intense transportation, purification and distribution as it is not cleaned to drinking quality.

This policy would have very low impact on citizens because the quality of the water will not change drastically and most will most likely not even notice it. The only worry is the initial building of the pipeline. California and Florida are two leading states already using recycled water. New Jersey needs to follow their example and make use of our wastewater as our water supplies are slowly being depleted.





## Finding the Balance

### *Residential and Commercial Buildings Infrastructure*

One of the issues concerning water quality is the contamination that is evident from chemicals that leach from infrastructure materials. Leaching is the process by which a liquid dissolves and removes the soluble components of a material (“Leachability”). Water quality is continuously degrading due to exposure of high chemical concentrations.

The most common violations found through sampling were high levels of arsenic, found in 1,445 wells; nitrates, found in 1,399 wells; fecal coliform or E. coli, found in 1,136 wells; volatile organic compounds, found in 702 wells; and mercury, found in 215 wells (“Radioactivity”). The chemicals in the water, when ingested, contribute to chronic diseases and disorders, like cancer and various disabilities. These are health concerns that people should be aware of in the general public.

Infrastructure damage can also create further pollution. The chemicals from building materials can have a direct impact on the water. An interview with Youth Policy Summit panelist Deborah Mans, of the NYNJ Baykeeper organization, revealed that there were occasional lead contamination problems in Newark because of lead piping in the city's water delivery system, affecting the people who consume this water directly. The proposal recommended involves risk management for these chemicals.



Source: Home Tips.com

**Our main and long term goal is to prevent the chemicals that are evident in infrastructure components from entering the water since they pose an environmental and social threat to society.**

A proposal that has been considered in many other states and we feel should be reinforced in New Jersey, is **use safer, alternative building materials for infrastructure, which contain fewer sources of toxic elements.** The National Academy of Sciences has expressed similar ideas by saying, “The most desirable solution to preventing chemical releases is to reduce or eliminate the hazard where possible, not to control it. This can be achieved by modifying processes where possible to minimize the amount of hazardous material used [...]” (NAS, 2010).

By modifying certain structures, the policy intends to include safer alternatives as a feasible way to prevent unnecessary health damage. There should be set standards and limits to the number of contaminants allowed in infrastructure design. Another important policy solution would be to provide **funding for a program designed to challenge researchers to find potential alternative materials.** This is important because the more alternatives we have, the more options we could use for building. They can all contribute in the sense that progression would take place and more ideas would be used. This would encourage sustainability for our infrastructure.



Source: ICIS Green Chemicals

## Finding the Balance

We want to focus our policy in cities, where exposure is higher. Big companies can also be involved by participating first. This way, prevention of chemical contamination will take place in a great extent over a short time. **The short term goal is that by 2015, research should be conducted in finding alternative building materials.** By 2030, these materials will start to be used in new developments. **The mid term goal is convincing people it is okay to make infrastructural changes because of the economic and environmental advantages.** Using alternative materials would be very cost effective because they are a lot cheaper compared to what is normally used. Also, the research program would help provide jobs for a lot of people. By informing the public about this, it would most likely help convince people that using different materials would be a good idea. This way, there will be less opposition to any necessary changes and restrictions.

**Our longer term goal is to develop 15-year timeline and benchmarks in order to allow organization and thorough implementation of the policy.** The long term goal is that by 2045, the water quality in New Jersey will contain rare amounts of chemicals evident in the water due to infrastructure materials.

Many treatment facilities were constructed over 40 years ago in response to the Clean Water Act, so they have reached the end of their useful lives and now is the time to act



upon this. Because development will continue, more sustainable materials and technologies can be used in the new buildings easily. New alternative materials include having maintainable pipes and sustainable pipe lining. Currently, pipes are only sustainable for 50 years and can leach toxins in the water.

Source: FedCenter.gov

## Water Quality and Human Health

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As an alternative to this, cement pipes would be a better source because they do not leach chemicals and they would last for about 100 years (Leachability and Concrete, 2010). They are also useful because in addition to lasting for a long time, they are low maintenance. UV lights can also be used because they help eliminate the need for chlorine and sulfur dioxide gas (nhpirg.org, 2010).

The New Jersey Environmental Infrastructure Financing Program (EIFP) is responsible for managing costs involved with improving infrastructure. Over the past several years, this program has funded more than \$4.3 billion in infrastructure projects. They have also helped provide tens of thousands of jobs for people and saved New Jersey's taxpayers and ratepayers from paying nearly \$2 billion in financial costs (NJEIT.org)

This program would most likely be able to contribute to the proposal by providing research money to find out more information regarding chemical contaminants. These researchers would be able to determine important alternative sources that could be used for building infrastructure. They would be the ones responsible for coming up with newer materials that would be feasible to use, keeping in mind the costs and efficiency. If more money is needed to sustain the program, they would require help from federal funding and/or additional funding from state bond acts (NJEIT.org).

Other non- governmental organizations (NGO's) would also be able to help pay for hired researchers and developmental costs. Although a lot of money would be put to research, finding out which materials are cheaper and resourceful would still save money and be an economic advantage. These organizations can greatly help implement this policy because the researchers provide the basis for actual changes in development. This idea can be considered part of the short term goals, because it is one of the first steps to making improvements. The fact that financial backing is provided by these organizations makes the proposal feasible in the economic sense.





### Residential Use and Public Spaces

Water is continuously expended in households all over New Jersey and the nation. However, homeowners are often not aware of how much. According to the American Water Works Association, American households use, on average, 127,400 gallons annually (1999). This statistic is a reflection on the lack of awareness about water usage in suburban communities. These suburban households expend water through many appliances in their home including dishwashers, toilets, washing machines, water heaters, plumbing leakages, baths, showers, faucets, and other domestic appliances, according to the American Water Works Association.



In most cases, more water is expended than is needed which contributes greatly to higher annual water usage in residential households in New Jersey. Another aspect of water that is affected by residential usage is water quality. Pollutants such as cosmetics and pharmaceuticals and household chemicals such as Comet and Windex are often added to the water and pose a risk to the environment and other water resources in the area. However, many residential households are ignorant of the hazardous nature of these chemicals and products and are continuing to contaminate various water resources through their actions. Therefore, it is crucial to address in these policies the concerns of water quality and quantity in New Jersey as well as educate the masses about the current state of water and any future issues that may be associated with it.



### *Water Efficiency -Incentives Based Conservation Approach*

The goal behind this policy is to decrease the amount of water currently used in NJ residential households and public places such as restaurants, schools, and malls. The ways in which water is used in these locations is innumerable and include the use of appliances. These appliances contribute significantly to the total water used daily in New Jersey households because many of these appliances are not technologically up to date, and they do not use water efficiently as compared to newer and more eco-friendly models (American Water Works Association, 1999). Therefore, this policy aims to incorporate more water-efficient appliances in households and public places all over New Jersey while providing citizens with an incentive to join the water conservation movement.



Source: Inhabitat.com

## Finding the Balance

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Currently, there is a program run by the United States Environmental Protection Agency known as Energy Star, which creates the standards for energy efficiency for many appliances (USEPA, 1992). In addition, the Public Service Enterprise Group (PSE&G) held a program called New Jersey Energy Choice, in which customers were allowed to choose their energy source supplier from a variety of eco-friendly choices (PSE&G, 2010). Through this initiative, New Jersey customers have been able to protect the environment through their own choices. Our new policy also supports a customers' choice to conserve water in their state while saving money at the same time.

**Our first policy suggestion seeks to improve water quality in New Jersey households and public places by addressing the need for water efficiency in appliances.** This program, Water Star, will be an extension of Energy Star which also offers tax credits to residents who switch their household appliances to certain Energy Star approved appliances. These appliances include biomass stoves, water heaters, geothermal heat pumps, and windows that conserve energy. For this program, we seek to expand the list of tax creditable products for those that are also water-efficient.

There are dishwashers and clothes washers that are approved by Energy Star, but currently there are no incentives such as a tax deduction available for the purchase of these appliances. In addition, another major contributor to water consumption in households and public places is toilets, an appliance that is not approved by the organization. Therefore, it is critical that Energy Star works towards approving toilets as well as other appliances that contribute to water expenditure. With this program, we aim to work with Energy Star to offer tax credits to consumers who change their appliances to these approved models.

As for the old appliances themselves, there are many programs already in existence that recycle large appliances. For example, Sears allows customers to bring in old appliances as long as they have purchased their new appliance at one of their stores



## Water Quality and Human Health

(Sears, 2006). In addition, participants may contact their local recycling center or solid waste service provider for recycling information.

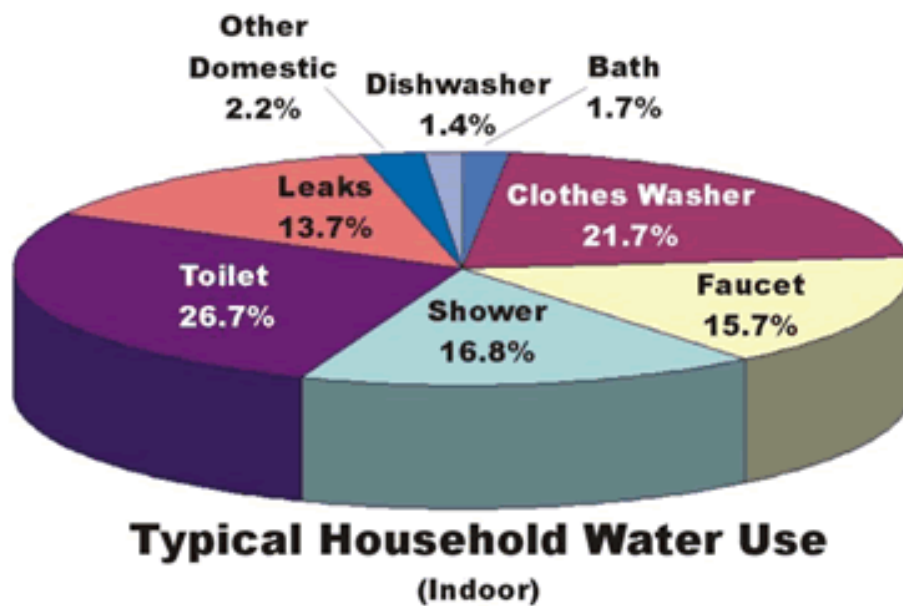


**Our second policy is to promote water conservation by having the State of New Jersey provide a tax refund incentive.** The New Jersey public needs to learn how to conserve water because we have limited fresh water resources to provide to the general public. Not only does conserving water save money on your water bill but it also reduces your heat and energy bill. When a New Jersey citizen uses water wisely, that citizen is helping the environment by helping to preserve drinking water supplies and to ease the burden on waste water treatment plants.



## Finding the Balance

According to the American Water Works Association, a household uses an average of 350 gallons per day (2010). Under our new suggested law, all New Jersey citizens who use under 80 gallons of water a day on average for a year will get a 6% tax refund. If a New Jersey citizen uses under 100 gallons of water a day for a year they will get a 1% tax refund. If a New Jersey citizen uses under 120 gallons of water they will get a 0.6% tax refund. We recommend the government will make available a refund to all New Jersey residents, with no requirement to apply for this policy. The trial run for this policy will start on December 31, 2010 and run until December 31, 2013. The policy may be continued if it is found successful and feasible for the State to maintain.



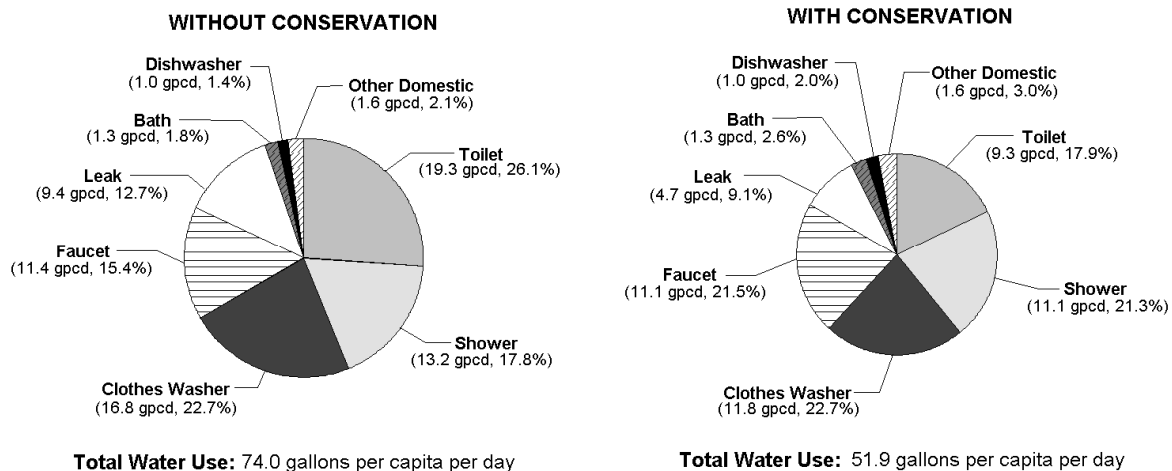
After "Residential End Uses of Water," by permission.  
Copyright 1999, American Water Works Association and AWWA Research Foundation

Source: American Water Works Association

This program strives to target all classes of residential homeowners and facilitators of public places in New Jersey. In times of economic stress, these appliances and incentives for conservation are a means of acquiring tax credits while having a positive impact on the environment and specifically on water conservation. Essentially, this program will be a means of lowering water usage in all areas of the households and public places. This is more of a problem in New Jersey households because residents use

## Water Quality and Human Health

water expensively and do not consider the implications of their daily habits such as washing clothes and flushing toilets frequently. Currently, the average daily indoor water use is 69.3 gallons per person in the United States. This is due to clothes washers that use 15 gallons or 21.7% of the total use, toilets that use 18.5 gallons or 26.7% of the total use, and dishwashers that use 1 gallon or 1.4% of the total use daily (American Water Works Association, 1999). If some of these appliances were to be switched to more efficient ones, the total daily indoor use of water would dramatically decrease to 45.2 gallons per person. The clothes washers would only use 10 gallons or 22.1% of the total use, the toilets would only use 8.2 gallons or 18% of the total use, and dishwashers would only use 0.7 gallons or 1.5% of the total use daily (American Water Works Association, 1999).



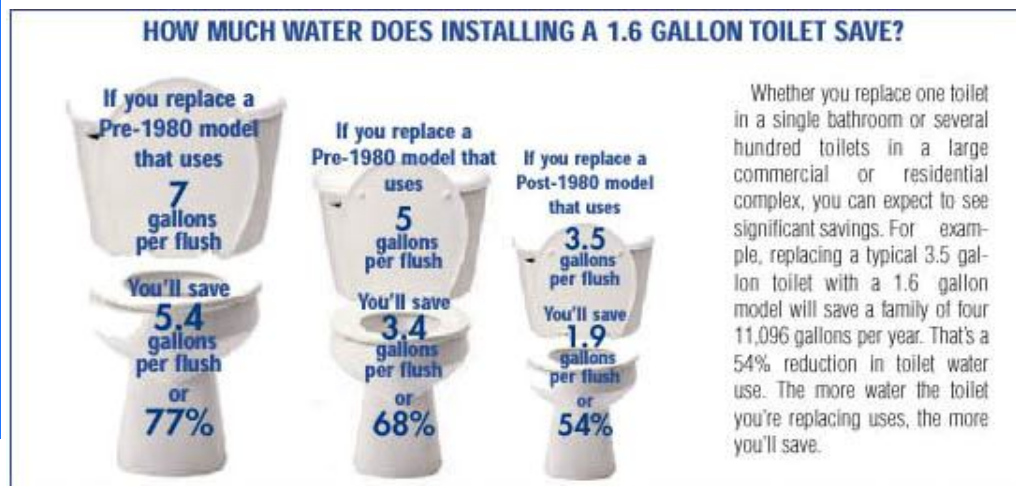
Source: Water Resources Research Center

We recommend that this program be started as a small pilot project in just residential households and public places in the state of New Jersey, but eventually it would be expanded nationally. Because Energy Star is run by the EPA, an agency under the federal government, it will impact both the federal government and the state government branches of the EPA.

## Finding the Balance

The cooperation of the EPA as well as industrial companies that manufacture these appliances will be crucial for the success of this program. The money for the tax credits will come from the state or federal government, but since households and public places will not replace appliances such as toilets on a yearly basis, it will not be a huge budget deficit for the government. In order for this plan to be most efficiently implemented, public education is key to its success. Homeowners and facilitators of public places in New Jersey would need to be informed of this statewide initiative through public campaigns over the radio, newspapers, and television commercials. After this initial campaign, the participants of the program would need to learn about large appliance recycling programs in their community. This is a crucial aspect of this program because the purpose is to not create environmental stress in New Jersey by forcing participants to dump their large appliances in landfills or donate them to certain organizations such as the Salvation Army.

**This program seeks to come into effect by 2015 in the short term with appliances that are currently available and that will be approved for water efficiency such as dishwashers and washing machines. In the mid term this program aims to have toilets, newer models of dishwashers and washing machines, approved by the program and available for a tax credit in New Jersey by 2020. As a long term goal, we hope to expand this initiative to a national level, thus ensuring the use of water efficient appliances. This goal will be achieved by 2060.**



Source: Massachusetts Water Resources Authority



### *Water Efficiency -Mandatory Conservation Approach*

The current problem with toilets in businesses, residential homes and institutions is that many people still have their ancient toilets that use as much as three and a half gallons per flush and sometimes even more. This wastes more than seven thousand gallons of water per year if flushed once daily. By switching to low-flush water toilets, the amount of water used per flush drops from three and a half gallons to one gallon. This will ideally save twenty thousand gallons of water per person per year (ABCs of Toilets, 2010). Currently, many low-flush toilets are marked by the EPA Water Sense Label. We recommend that this policy will be implemented through education in public places first which will expose and educate people using low-flush toilets outside their homes and encourage them to do the same inside their homes, strengthening the above incentive based policy.

**Our group recommends implementing a pilot program in by 2015 in a major city in NJ that will switch all toilets to approved low-flush, water efficient models.**

This includes toilets in public facilities, government buildings and select large private companies. Tests or surveys will be conducted to see if water usage decreases and how people react to these new toilets in public and private buildings as well as in their homes. If this program does save great amounts of water in this pilot community, then it will be implemented throughout the whole county and eventually the state by 2050. According to water conservationist George Whalen, “switching to water-saving fixtures can save as much as \$100 a year in utility costs” (Nash, 2010). After four to six years, the cost of the toilet will balance out and there will be a profit for the toilet buyer. By choosing a community that is more affluent, the pilot program can be tested in an area without great financial burden to a lower income community before a funding mechanism can be developed.

**By 2030, contractors of public or private buildings would develop an interest to build homes and buildings with low-flush toilets as a part of their building plan.**



## Finding the Balance

For home buyers and businesses, low-flush toilets would save them more money on their water bill in the long run since most low flush toilets pay for themselves within 5 years. As for contractors, they would simply add the cost of installing low-flush toilets on to the price of the home or building. This will also impact businesses who are selling “water



Source: City of Hillsboro

efficient” toilets. It will encourage businesses to produce more low-flush toilets and make it cheaper and easier to manufacture as demand increases.

**In the long run, by 2050, all toilets in New Jersey would be low-flush (use one gallon or less per flush).** To give incentives to homeowners who want to switch their toilets would be essential to the success of this program statewide, especially in lower income communities. This policy would be an extension of Energy Star and Water Star, and would give people tax credits for switching to water efficient toilets.

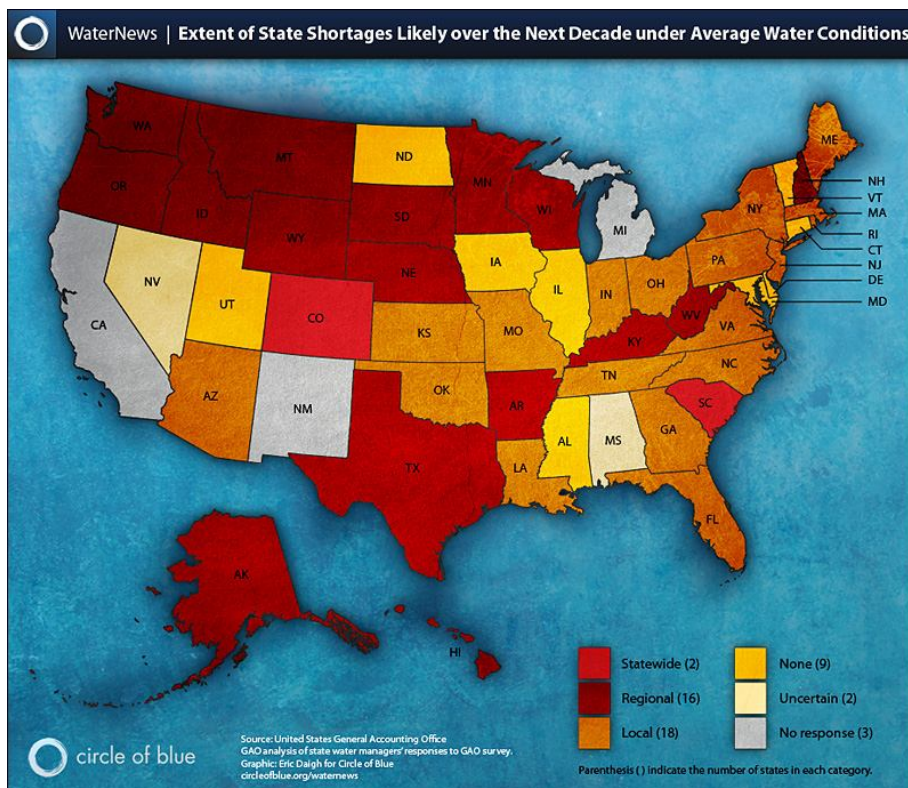
Another aspect to consider is where the old toilets will end up. It would not be ideal if they ended up in the landfill. Therefore, a proper recycling method must be established where consumers can discard their old toilets. One example is GreenYour.com, a website that helps people recycle their toilets properly. It would be in everyone’s interest to recycle their toilet after they install their new low-flush one.



## Storm Water Capture and Use

Most people use clean drinking water for purposes that do not require treated drinking water. For example, some use treated freshwater to wash a car or to water their plants. If this current rate of consumption continues, freshwater resources will not be available for future generations and we will need to look for other alternatives if we do not conserve now. Many states also do not have many rivers and lakes, so they have become dependent on groundwater. Once their supply of groundwater is gone, they will start to look toward rivers or reservoirs that other states use. This could lead to conflict over the control of water. If residents did their part to conserve water by storing runoff water for uses other than personal consumption and cleaning, they would allow water companies to use their money to help improve water quality instead of to develop new infrastructure for additional water sources.

Currently, the Department of Environmental Protection of Massachusetts has a storm



water management policy. The purpose of this policy is to improve water quality and address problems caused by urban runoff. Urban runoff and discharge from storm water are largely responsible for water quality problems in the rivers, lakes, ponds, and marine waters of Massachusetts.

Source: United States General Accounting Office



## Finding the Balance

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The Storm Water Management Standards established clear guidelines for management and are designed for use under regulatory authorities and policies such as the Department of Environmental Protection (DEP), the Wetlands Protection Act, the Rivers Protection Act, and the Clean Water Act (Policy & Guidance Documents, 2010).

Storm water discharge occurs when rainfall carries pollutants to surface and groundwater sources. New and existing development increases impervious surfaces, which alters natural drainage features, increases peak discharge rates, and reduces recharge to wetlands and base flows in streams. At construction sites, storm water carries pollutants away from the site and into water systems. According to the storm water management standards mentioned above, development also results in corresponding increases in the concentration and types of pollutant loadings, including nutrients, solids, metals, salt, pathogens, pesticides, and hydrocarbons. Best Management Practices (BMPs) reduce or prevent pollutants from reaching water bodies and also controls the quantity of runoff from a site.

The BMP's were intended to be applied during routine project review by issuing authorities under the Wetlands Protection Act. The use of these standards prevented or minimized unfavorable environmental impacts due to unmanaged storm water while limiting unnecessary costs and recognizing site constraints. Applicants submitted a DEP form explaining how the Storm Water Management Standards were met. The form also allowed Commissions and the DEP easy access to the storm water management components of the project while overall simplifying the review process for the applicant. However, this policy expired in February of 2008.

Our policy proposes that all who are able be required to collect storm water in barrels or other large containers which would later be used for non-drinking purposes such as washing cars, watering lawns and gardens. These collecting tanks may also be built on the roof of these homes, or for aesthetic reasons, placed underground. The water would enter through a pipe or drain leading down to the storage container. This policy





***Stormwater Capture & Reuse Tanks***

Source: [RestoretheRivers.org](http://RestoretheRivers.org)

meant for new buildings and houses that are being developed. Contractors would be required to include in all new house designs that includes a storage tank for storm water on the property. Contractors in general may have to pay a bit more when they have a house built because of the cost of placing a storage tank on the roof or underground.

By the year 2020, citizens should be storing and using storm water for non-drinking purposes. Landowners and homeowners would be required to install a collecting tank on their roof or underground. There are companies that sell storm water collection and storage barrels for homes as well as products to prevent mosquitoes from gathering near stagnant water which is a health concern with water storage.

A financial incentive for these policies would be for each citizen to receive an annual refund or monthly reductions on their water bill. An alternative incentive is that every year that a resident or homeowner collects and uses storm water, they will receive a small refund through their tax return. Non-profit organizations or utility/government partnerships (public-private partnerships) could provide less financially stable citizens with a small sum of money to help them purchase barrels or containers. Otherwise, citizens would purchase the barrels on their own. To keep a record of the number of citizens who store their storm water, citizens must submit a form to the DEP. Again, this policy would be piloted in a specific suburban area, monitored and tested. If this policy proves to be a success after a period of time, then this policy could be implemented on a county, state and ultimately federal level.

## Finding the Balance

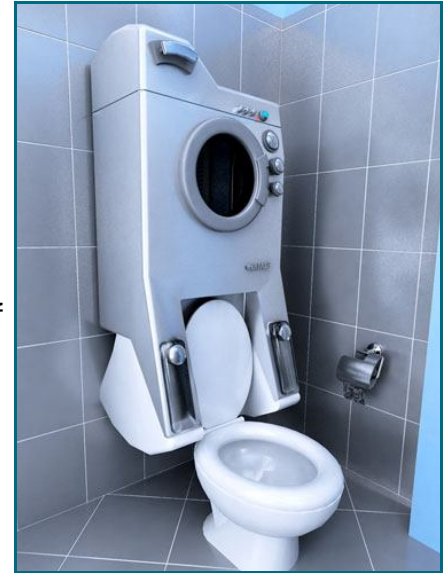
### Grey Water Reuse Policy

A major component of the over consumption of freshwater and treated drinking water is household water mismanagement. As discussed above, millions of gallons of freshwater are used to flush toilets, wash cars, and water lawns. Because these actions do not require extremely clean water, grey water can be used as an alternative and conserve much needed drinking quality water. Grey water is the water generated after bathing, washing dishes, doing laundry, and other domestic activities. Waste water from toilets is considered black water and is treated in waste management facilities before being reused or released. In order to take advantage of this alternative water source, homes and buildings will be altered to include a dual pipe system.

This pipe system would reroute grey water, and store it in underground water tanks to be used later. These pipes would also divert a portion of the grey water to toilets, so that grey water could be used in place of freshwater for flushing. Because rerouting pipes in already existing homes and buildings would be too costly, this would be implemented in all residential and non-residential buildings being constructed after the year 2015, in conjunction with the storm water policy mentioned above. In addition to the similar financial impacts of storm water collection on homeowners and contractors, al-



Source: TLC- The Learning Channel



Source: GoodGreenTips.com,  
Toilet uses gray water from washing machine cycles to flush

tering the way pipes are constructed would require the partnership of utility companies who manage wastewater systems. Utilities could create a method to divert the flow of water that would have normally gone into the sewage system and send it to an underground water tank instead. The utilities that reside over water would



be faced with lower revenue, as a result of the conservation of water, but would avoid costly investment in additional water treatment infrastructure as development and demand for water increases in the future.

### *Household Non Point Source Pollution-Medicine Disposal Process*

It has been shown that trace amounts of pharmaceuticals found in our water may not necessarily harm humans, but they can harm the environment. According to Dr. Ed Orlando and Wendy Hessler from Environment Health News, birth control pills such as estrogen and progesterone are flushed down the drain and can negatively alter animal life cycles dramatically (2010). Without proper pharmaceutical disposal, we are may be adding to teen drug abuse and addiction, but we are also disturbing the precious balance of the ecosystem. Proper pharmaceutical disposal should be operated locally by the town or municipality but administered by a pharmacist office or a pharmaceutical company.



Currently, the Federal Drug Administration (FDA) has no regulations or policies for the disposal of pills and other medicines but they do however have guidelines. These guiding principles basically forbid the disposal of any pharmaceuticals that are not on their list of flushable medications, as follows;

**Actiq** (fentanyl citrate)

**Daytrana Transdermal Patch**  
(methylphenidate)

\ **Duragesic Transdermal System**  
(fentanyl)

**OxyContin Tablets** (oxycodone)

**Avinza Capsules** (morphine sulfate)

**Baraclude Tablets** (entecavir)

**Reyataz Capsules** (atazanavir sulfate)

**Meperidine HCl Tablets Percocet**  
(Oxycodone and Acetaminophen)

**Zerit for Oral Solution** (stavudine)

**Tequin Tablets** (gatifloxacin)

**Xyrem** (Sodium Oxybate)

**Fentora** (fentanyl buccal tablet)

## Finding the Balance

The FDA also recommends that the consumer find a program in their municipality or county that deals with the disposal of non flushable pharmaceuticals. Furthermore, they recommend mixing medications with unappealing substances such as kitty litter, and then throwing them out with the other household garbage.

Setting up a system for counties all around the tri-state area for the proper disposal of pharmaceuticals is our recommended the short term goal. The time frame for this is the next 6-18 months. **The long term goal is to create and enforce regulations for the proper disposal of pharmaceuticals in New Jersey. The time frame for this is the next 20-50 years.**



Source: Kumoh National Institute of Technology

### ***Non Point Source Pollution-Education for Homeowners***

Many people do not know the proper ways to dispose of chemicals in addition to pharmaceuticals that they use on or around their homes and yards. Some questions homeowners need to consider are what safe places exist to dump chlorinated pool water, what should be done about pharmaceutical disposal, how much fertilizer is really needed to help a lawn grow, and where to dispose of small amounts of leftover toxic chemicals.

The use of synthetic fertilizers and pesticides contribute to a decrease in water quality because of the runoff they produce in urban and suburban areas. It is a form of non-point source pollution<sup>3</sup> and contributes to water pollution with nitrates and phosphates.

**3: Non-point source pollution** Pollution generated by diffuse land use activities rather than from an identifiable or discrete facility. It is conveyed to waterways through natural processes, such as rainfall, storm runoff, or groundwater seepage rather than by deliberate discharge. Non-point source pollution is not generally corrected by "end-of-pipe" treatment, but rather, by changes in land management practices. (Chesapeake Bay Critical Area Commission)

## Water Quality and Human Health

We feel that a policy for non-agricultural uses (e.g. lawns), should be more strict because the needs of such actions (having a green lawn) do not have as big an impact on society as food production. Thus, every 4 years, homeowners should reduce their use of synthetic pesticides and fertilizers by 10%.



An updated pamphlet and website for homeowners and gardeners should be created to inform populations what to do regarding their homes, lawns, and pools, teaching them about the right ways to use and dispose of certain chemicals and gardening equipment along with pool water discharge. Each town or municipality or county can add a homeowner section on their town or city website, which can be found at any information section of a community website or link to a central generic site. It will not cost much more than is currently being spent on existing city and town websites. It would just be a small addition to current websites so people can get informed about the right ways to do things as homeowners.

Residential households in New Jersey can improve their water quality through education, innovation, and technological advancements. Therefore, these policies are ahead of its time in that they address various aspects of residential living and seek to improve pre-established practices that may contribute to the overall decline in water quality. In the future, an overall improvement in water quality and quantity in New Jersey can be seen with the implementation of these policies. Proper regulation and cooperation from the public are the fundamentals to these policies' overall success.

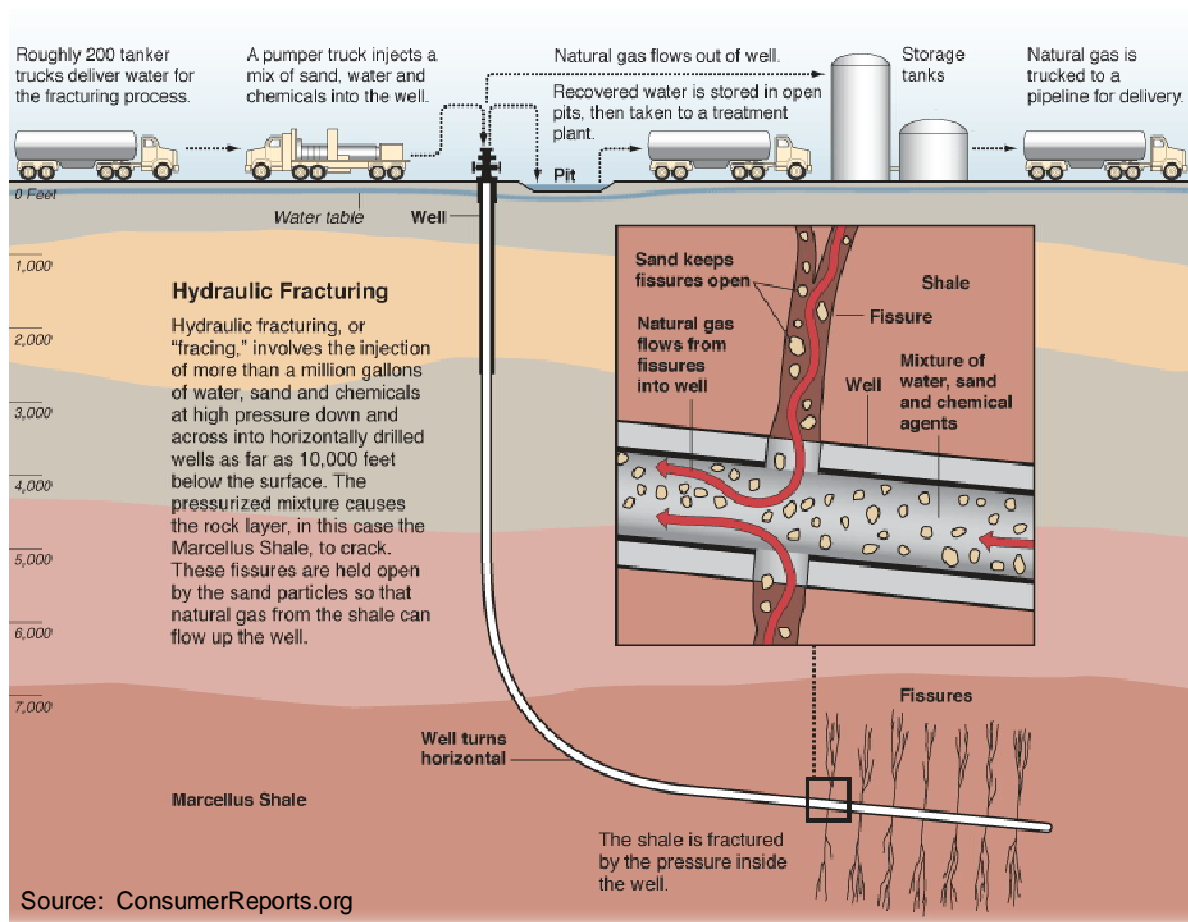


# Finding the Balance

## Industrial Use

### Hydraulic Fracturing Point Source Pollution

Hydraulic fracturing, otherwise known as hydrofracking, is a new development in natural gas extraction that can utilize up to 6-8 million gallons of freshwater per fracking (NOON, 2007). The environmental impacts of this drilling process are tremendous as it damages forestland, well sites and groundwater, in addition to disturbing the animal's natural habitats (NOON, 2007). The advantage of this process would be efficiency of obtaining the natural gas, however, with the extraction of additional gases, it will further contribute to the emissions of greenhouse gases.



Graphic by Al Granberg



## Water Quality and Human Health

The process of hydraulic fracturing involves adding carcinogens such as benzene and formaldehyde in order to act as friction reducer or scale inhibitors. Although these chemicals aid in the process of retrieving the injected water, only 20 – 40% of the million of gallons of contaminated fracking water is retrieved during this process. For example, currently in Pennsylvania, about 15% of the flow back returned to the surface within 2 – 8 weeks, leaving the other 85% to be transformed into water vapor or disposed as wastewater (Tinahm, 2009).

Current members of congress like Congressman Maurice Hinchey (D-NY), have already been pushing for the passage of legislation such as H.R. 2766 , designed to essentially repeal the exemption for hydraulic fracturing in the Safe Drinking Water Act (SWDA) (111th Congress, 2009). In addition, Senator Robert



Source: Light Hawk

Casey (D-PA) has also proposed a companion bill, S.1215, in 2009, which will amend the Safe Drinking Water Act to repeal a certain exemption for hydraulic fracturing, and for other purposes (111th Congress). With a mindset already established in Congress, repealing hydraulic fracturing is not only feasible, but it is also a good step towards preventing future contamination of our freshwater resources.

The process of hydraulic fracturing was developed by Halliburton Inc., Schlumberger Inc., and Messina Inc. in order to drill for natural gases more efficiently (NOON, 2007). Before hydraulic fracturing was introduced, a drilling company would use a normal, old fashioned natural gas well in which they would drill a hole straight into the ground until reaching an underground pocket of natural gas. Once tapped, the gas is under pres

## Finding the Balance

sure and flows naturally to the surface, where it is captured, purified and fed into a pipeline. Once all the gas is released, the well goes dry (McClatchy, 2010).

It has been discovered that shale often contains trapped natural gas, for example the Marcellus shale in the United

States. This deposit's ap-

proximate area is 48,000 square miles, stretching from eastern Ohio to the Catskills and south through northern and western Pennsylvania and West Virginia (NOON, 2007). Hydraulic fracturing aids gas companies by fracturing the shale deposit and then having the drilling operator drill down to the shale deposit and then drilling horizontally through the deposit (McClatchy, 2010). This is especially an issue here in New Jersey due to the fact that the Marcellus shale exists partially in New Jersey.

The dilemma that arises with this issue is the 2005 Energy Policy Act signed by President George W. Bush, which limited EPA's investigative authorities (Stedman, 2010). In order to implement this policy, we propose to lobby for bills H.R. 2766 or S.1215 to pass, which will repeal the exemption for hydraulic fracturing in the Safe Drinking Water Act. In addition, as a supplement to S.1215, we request to grant the EPA power to fully investigate hydraulic fracturing sites as well as the environmental cleanup sites. This will not only provide scientific support for our actions, but also inform the public of the seriousness of the issue.

### Marcellus shale

This map shows the extent of the Marcellus shale in New York state. The area has the potential for natural gas drilling.



Source: NYS Department of Environmental Conservation The Post-Standard

## Water Quality and Human Health

The H.R. 2766 was introduced on June 9, 2009 and has yet been updated since the referral to the House Committee on Energy and Commerce. Currently there exist a total of 58 cosponsors and the most recent addition occurred on June 17, 2010 from Representative John M. McHugh of New York. Similarly, S. 1215 currently has 8 supporters, with the most recent addition of Senator Russell D. Feingold from Wisconsin on May 4th, 2010, and was proposed on the same day. If the trend of the cosponsor is observed, this policy can be successful within three years. However, our hopes for this policy would be that the process would be shortened to two years in order to ensure minimum damage to our environment.

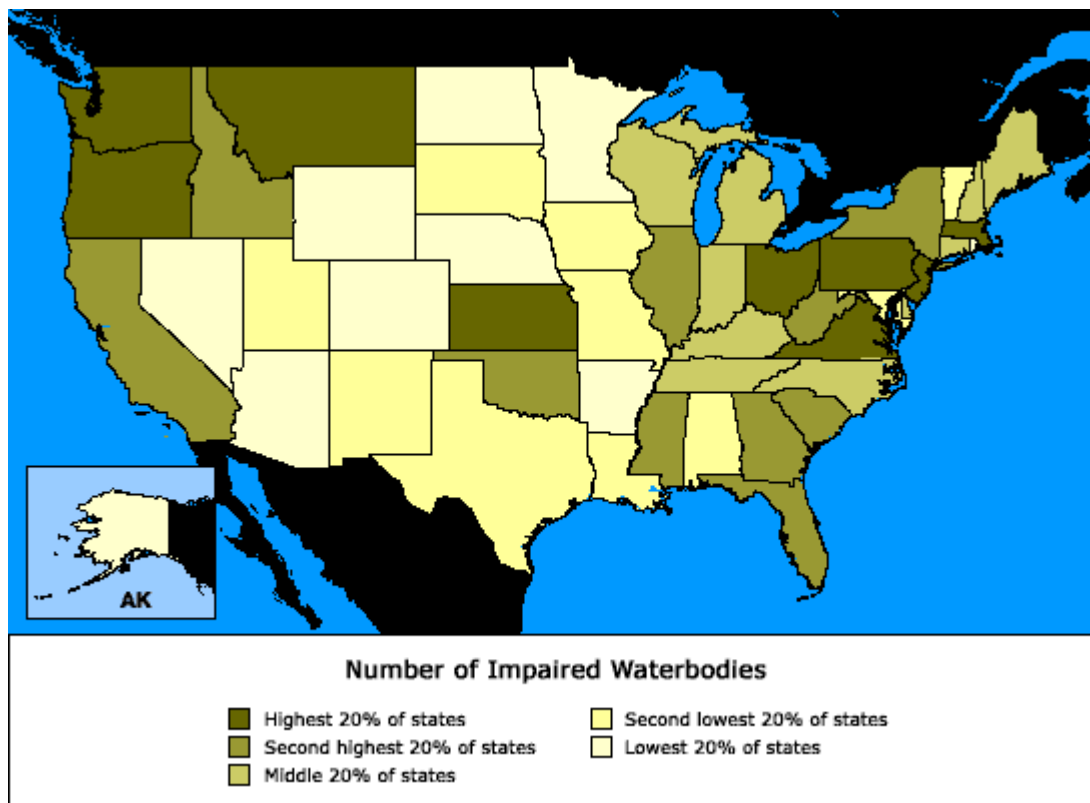


Henry Waxman, Chair  
House Committee on Energy and Commerce

### ***Monitoring Dumping Sites***

Sewage pollution costs Americans billions, of dollars every year in medical treatment, lost productivity and property damage. Sewage contaminates shellfish beds, pollutes drinking water supplies, harms fish and other aquatic wildlife, and damages coral reefs. (Lipták.102) Sewage is a major source of the nutrient pollution in many waters around the country that robs the waters of the oxygen that fish and shellfish need to survive and feeds toxic algal blooms. Sewage discharges also harm local economies and small businesses. Sewage is the second largest known source of beach closures (Robertson, 95) a direct threat to businesses reliant upon coastal tourism.

## Finding the Balance



Source: [www.scorecard.org](http://www.scorecard.org)

According to EPA estimates, coastal waters support 28.3 million jobs and generate around \$54 billion in goods and services each year (Lipták. 57) Sewage contamination of shellfish beds is a serious threat to many small businesses. As noted by the Pacific Coast Shellfish Growers Association "harvest closures not only lead to the loss of a wholesome food that is produced domestically, they also lead to the loss of family-wage jobs in rural communities which otherwise provide little in the way of employment opportunities.

On the West Coast alone, the farm-gate value of our shellfish exceeds \$89 million annually, which provides jobs and an important tax base in coastal communities. (Robertson,135) As mandated by the Blending Policy put forth by the EPA in 2010 the main purpose is for it to reduce overflow and increase of treatment of wastewater to protect human health and the environment around. With many industrial companies now days, chemical, oil, sewage, and many other wastes are dumped in many random areas. (Lipták. 64) In accordance with this policy, many companies must comply with



this rule and reduce their waste output. With our new policy suggestion, the Blending Policy would be strengthened.

With the Clean Water Act, the Blending Policy is able to further the quality of water and environment for not only humans but also sensitive ecosystems. Wastewater treatment plants are often able to comply by these plans put forth the EPA, but many industrial companies are very nonchalant about wastewater and where it ends up (Lipták. 79).



To provide clarity in the way peak wastewater flows are handled, the agency proposed a policy in November 2003 that addressed National Pollutant Discharge Elimination System (NPDES) requirements for municipal wastewater treatment during wet weather conditions. (Lipták. 225) After receiving more than 98,000 public comments, the agency is now in the process of determining other options to address pollutant discharges during wet weather conditions.

Illegal dumping control as a management practice involves using public education to familiarize residents and businesses with how improperly disposed materials can affect storm water. By locating and correcting illegal dumping practices through education and enforcement measures, the many risks to public safety and water quality associated with illegal disposal actions can be prevented. For storm water managers, illegal dumping control is important in preventing contaminated runoff from entering wells and surface water, as well as averting flooding due to blockages of drainage channels for runoff.

## Finding the Balance

Cleanup projects will require a coordinated planning effort to ensure that adequate resources and funding are available. Once a site has been cleaned, signs, lighting, or barriers may be required to discourage future dumping. Signs should indicate the fines and penalties for illegal dumping, and a phone number for



Source: NOAA.gov

reporting incidents. Landscaping and beautification efforts may also discourage future dumping, as well as provide open space and increase property values. This tool involves the use of ordinances to regulate waste management and eliminate illegal dumping through methods such as fines, cost recovery penalties for cleanup, and permit requirements for waste management activities, to name a few.

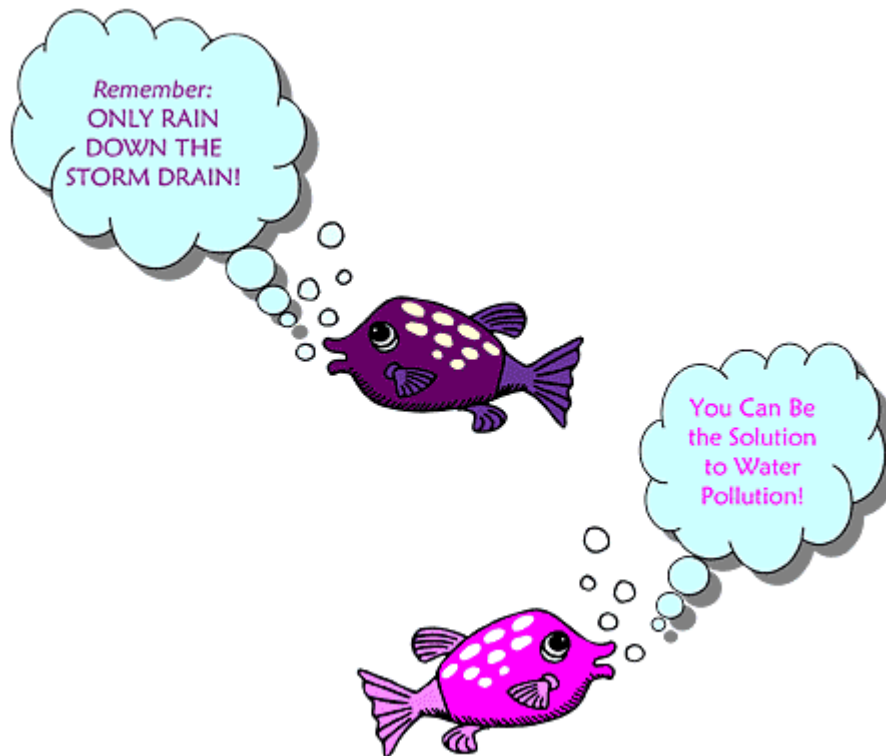
These fines and penalties can be used to help fund the prevention program or to provide rewards to citizens who report illegal dumping activities. Other recommendations for this tool include training of staff from all municipal departments in recognizing and reporting illegal dumping incidents, and dedicating staff that have the authority to conduct surveillance and inspections, and write citations for those caught illegally dumping.

This tool measures the impact of prevention efforts and determines if goals are being met. Using mapping techniques and computer databases allows officials to identify areas where dumping most often occurs, record patterns in dumping occurrence (time of day, day of week, etc), and calculate the number of citations issued and the responsible parties. This allows for better allocation of resources and more specific targeting of outreach and education efforts for offenders.



## Water Quality and Human Health

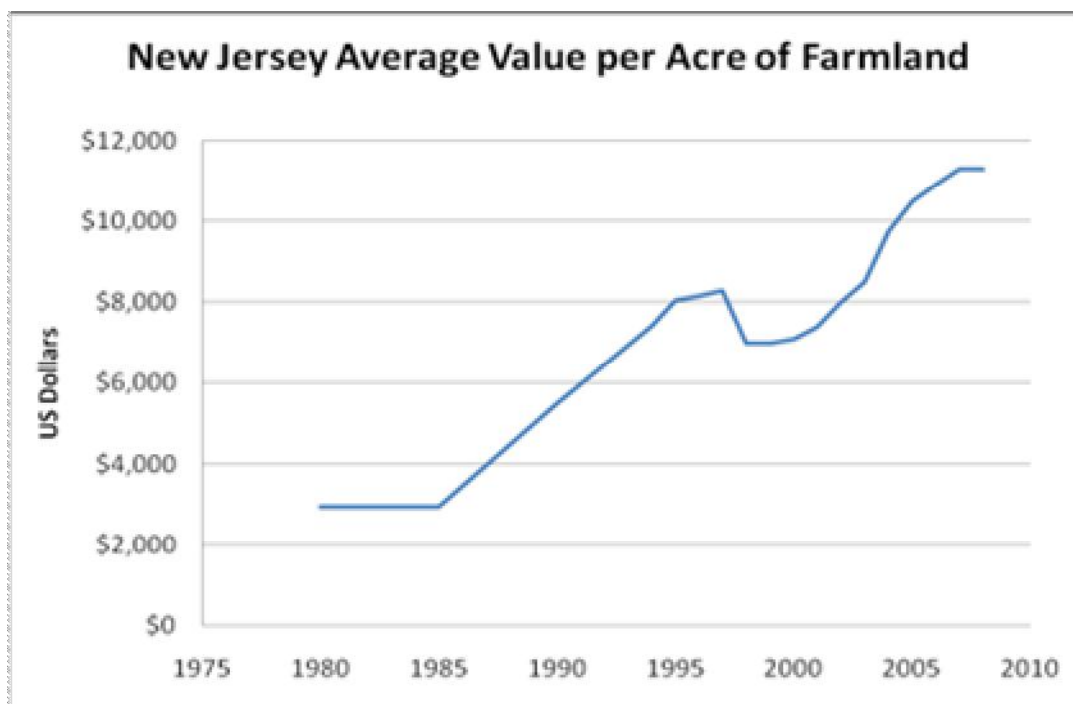
Illegal dumping is often spurred by cost and convenience considerations, and a number of factors continue to encourage this practice. The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law. The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.



# Agricultural Use

We believe the water crisis in the United States can be combated in two ways: reducing pollutants in the water and simply using less water. The U.S. government estimates that 36 states will face water shortages within the next three years. This number may grow because of factors such as climate change (rising temperatures), and increasing demand, due to increasing sprawl, population, and inefficient use (Gutierrez, 2008).

Agriculture has historically played a significant role in the history of New Jersey, “The Garden State”. Therefore, it is important that the state’s farms can still thrive, while the environment is still preserved. Efforts to reduce water pollution from fertilizer runoff and by conserving water can make reconciliation between the two interests possible. We believe our following recommendations can put this great state on the right track to achieving both a thriving agricultural sector in our economy, a healthy environment, and a public with greater awareness of what is at stake in this water crisis.



Source: County of Middlesex

## Commercial Composting Systems for Agriculture

Over the past century, use of chemical fertilizers has increased drastically (APEC, 2010). One very important ingredient in these fertilizers is ammonium nitrate, because nitrates help plants grow bigger and healthier (APEC, 2010). However, because nitrates are water-soluble, excess fertilizer can cause these chemicals to runoff into rivers, lakes, and ponds. The nitrates then become a food source for algae and other plant life, which can cause algae blooms, which are the first indication of eutrophication<sup>4</sup> in a pond or lake. Eutrophication can ultimately cause a body or region of water to become a “dead zone”, an area where the dissolved oxygen level in the water is too low to sustain life (USGS). It is clear that in order to preserve New Jersey’s aquatic life and healthy environment, pollution from fertilizer runoff should be reduced.

Although excess use of fertilizer is very damaging to New Jersey’s environment, farmers still need to use the fertilizers so that they can achieve the maximum crop yield. How to reconcile the two? Our proposal suggests composting as part of the solution. This is an especially effective solution because not only do landfills add to pollution by leaching chemicals into the soil and groundwater or running off into larger



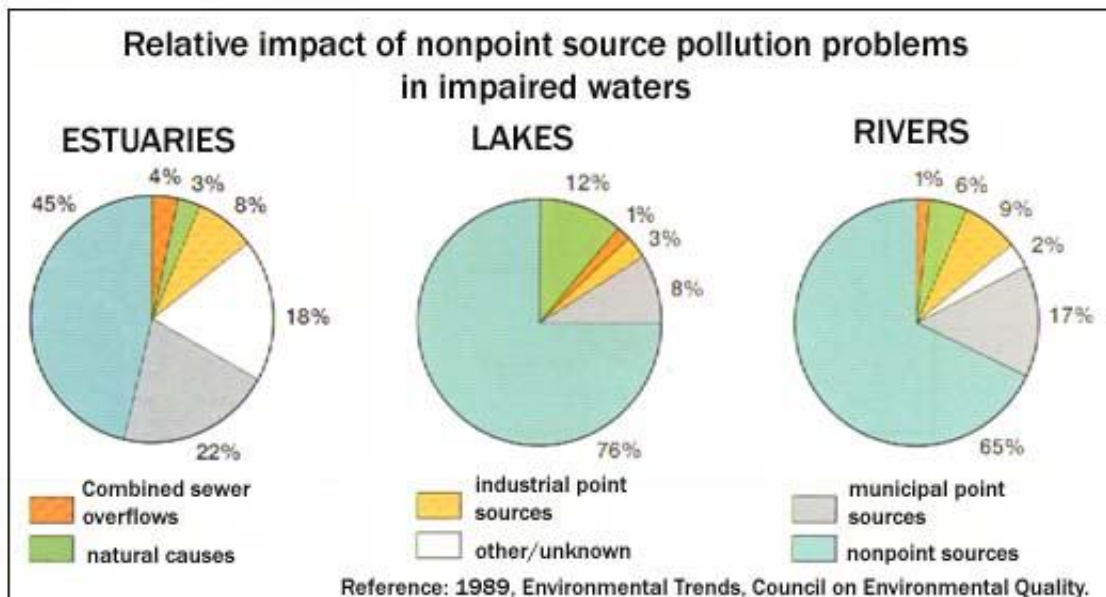
Source: Carlton College. Dead Zone in Gulf of Mexico

bodies of water, but New Jersey’s landfill capacity has also decreased sharply in recent years according to the New Jersey Department of Environmental Protection (NJDEP), and composting can significantly reduce the amount of garbage that goes to the landfill, adding economic benefit to our plan for municipalities.

**4:** Eutrophication is the excessive nutrients in a lake or other body of water, usually caused by runoff of nutrients (animal waste, fertilizers, sewage) from the land, which causes a dense growth of plant life; the decomposition of the plants depletes the supply of oxygen, leading to the death of animal life).

## Finding the Balance

Every year about 31 million tons of waste is thrown away into landfills, which is equal to half of the food produced in the United States. Since 70% of the waste is compostable, if we could implement composting effectively, an estimated 21.7 million tons would avoid being dumped in landfills (Toney, 2010)



There are more benefits in composting than not. These include, but are not limited to: improving soil structure, root growth and yield, nutrient-holding capacity for plants, water infiltration and drought tolerance. Composting is also proven to reduce soil compaction and crusting, necessity of fertilizer, and to prevent erosion of roadsides, embankments and hillsides, pollution prevention and remediation. It also helps with the restoration of wetlands, and is used in storm water filtration, and biofilters. Not only does it increase microbial and earthworm populations in soil, it protects plants from disease, increases the ease of cultivation, and slowly releases nutrients to plants. Compost is even tough enough to be able to bind heavy metals in contaminated soils, degrade many pesticides and volatile organic compounds, and absorb odors. In addition, composting on a large scale creates new jobs and a new market (Earth911, 2007).

## Water Quality and Human Health

Besides being environmentally friendly, composting opens up a new market that many members of the community can benefit from. “The following are potential end-users for compost: growers (greenhouse, container, sod, field, agriculture, silviculture), landscapers/turf managers (commercial properties, sports turf, residential, lawns, cemeteries), government agencies (parks, schools/universities, roadsides/highways, sports turf), companies conducting land reclamation (landfills, sand/gravel pits, strip mines), blenders/resellers (topsoil dealers/brokers, garden centers), companies or agencies involved in environmental projects (wetlands, bio-filters, erosion control, soil remediation, water filters), Farmers (growing fruit/vegetables, and field crops organic), owners of golf courses and cemeteries, homebuilders and buyers (new home builders, renovators, organic gardeners, homeowners)” (Sherman, 2010).



Source: City of Santa Barbara



## Finding the Balance

**The first part of the policy relating to composting requires all food companies, restaurants, homeowners, and schools in New Jersey begin to practice composting.** Each town would provide citizens with a composting bin, which should be picked up regularly by the municipality, similar to the way towns collect recycling and trash. Towns that cannot afford to pick up composting on their own can enter a public-private partnership with an interested company (for example, a fertilizer company or private waste management company). The town would share the costs of picking up the compost with the company, the two can accordingly agree on how to divide the compost between them. The company can sell the compost for profit to, for example, a farmer who needs very large quantities of fertilizer, and the town can have a public supply that citizens can help themselves to and use for their gardens as an alternative to pricey chemical fertilizers.

**But in order to make this possible by our target year, 2015, some preliminary steps must be taken in the short term:** The general public must be informed of the benefits of composting so that they will actually participate in the municipal composting program and make use of the municipal compost fertilizer supply instead of chemical fertilizers. Some effective ways of educating the public include holding fairs, workshops, and even including compost and conservation education into the required curriculum for New Jersey children. We hope to have begun these efforts by 2012.



Source: Waste Management of Colorado



## Water Quality and Human Health

Next, each town would need to find an area in the community to build the composting facility, and then eventually start constructing it. Depending on which method of composting the town decides to use, the facility will look different, and the necessary equipment will vary. If construction begins soon after education, hopefully the facility can be ready for use by 2013 or 2014.



**The third step is to provide all citizens with a composting bin in which they can put their food scraps.** These bins would have instructions written on the side about what can and cannot be composted; there should also be pictures so that children can also get enthusiastic and involved in composting. Trucks should come to pick up the compost at least twice a week, so this program works in a way that is very similar to the current recycling procedures that towns use. This similarity would make life simpler for the town's citizens because there would be nothing significantly different between recycling and composting, as far as they would be concerned.

There needs to be a staff to build and manage the composting facility and pick up the compost, so this plan would also be a source of jobs for the town. Because employment is in high demand today, it would probably be easy for the town to fill the jobs. Furthermore, if the town has trouble paying employees, it can attach a small fee to the compost fertilizer. If the town can keep the unit price of the compost fertilizer lower than

## Finding the Balance

that of chemical fertilizer, they should still have customers. Finally, the town must prepare to use and maintain the facility and distribute the compost. This includes buying certain necessities, like worms to help the compost break down faster.

**All towns in New Jersey should have begun the above steps by 2015 to help the state reach a more sustainable future.** Hopefully, following the above recommendations will reduce the use of chemical fertilizers in New Jersey by 25%. The timeline for enacting this policy will be less aggressive for agricultural uses than previously suggested for Homeowners. Farmers have larger needs and are more dependent on these substances because of their role in providing food for our society, and thus have to be managed for economic sustainability more carefully. Thus, every 10 years, we suggest that farms reduce their use of synthetic pesticides and fertilizers by 5%. To re-



Source: Bow Valley Waste

place that, they can use up-and-coming organic substances or whatever else may have been developed by that time.

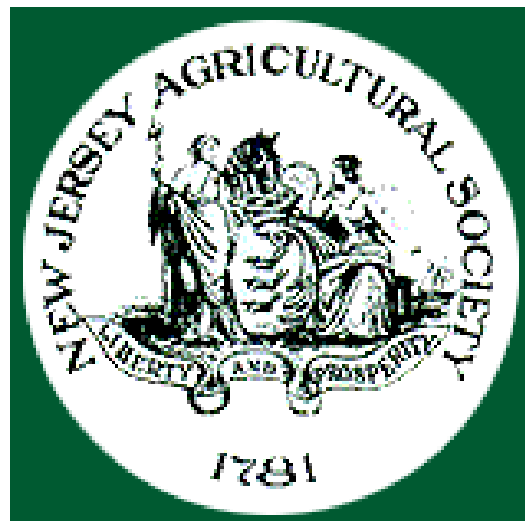
By following our suggestions, farmers would be able to use fertilizers without chemicals, so neither their crop yields nor the environment would be significantly adversely affected, while towns would be able to create jobs and possibly turn a profit from selling compost, and citizens would be more in-

involved in their community. Meanwhile, companies that have entered a private-public partnership with a town would turn a profit, helping business grow and further publicizing more environmentally-friendly ways of fertilizing plants to other parts of the country. Hopefully, New Jersey will be able to set an example for others and encourage similar programs across the United States.

### *Conservation and Efficiency for Agriculture*

While reducing pollution from agricultural sources is important for maintaining high water quality, it is also important to conserve because if demand reduces, then the strain on our water resources will be eased. Considering that over 40% of the water used in the United States goes towards irrigation (USGS, 2000), changing current agricultural practices can significantly impact water quality and conservation. Educating farmers about the problem and how they contribute to it would be the first step to reducing pollutants and waste. Farmers must learn how they can contribute to the solution without seeing negative impacts on their farming practices. Also, there would need to be incentives given to irrigation system manufacturers to invent highly efficient systems and to farmers to update their old systems to new, more efficient ones. **Companies need to be given the opportunity to advertise their products, but will be required to ensure all products achieve an agreed upon industry standard of efficiency by 2030.**

Efforts to achieve our short-term goals should begin as soon as this policy takes effect. Over the following two to five years, farmers would have access to free seminars, which would inform them of the water crisis and how they contribute to it and can be part of the solution to it. Experts in the field from organizations that advocate for farmers, such as the New Jersey Agricultural Society (NJAS), the New Jersey Farm Bureau (NJFB), the New Jersey Farmland Preservation Program and the New Jersey Department of Agriculture would teach these seminars. This way, the information being taught would be more credible to the farmers and they would be more likely to listen from industry experts rather than environmental non-profits.



Source: New Jersey Farm Bureau



## Finding the Balance

Meanwhile, over three years, a statewide contest would take place. Although there currently are several methods of irrigation that use very little water, they are all quite expensive to maintain. This contest would help speed up the effort to find more efficient, inexpensive methods of irrigation. Members of the public, universities and private companies would be able to participate. Contestants would have to invent or improve upon existing technologies to create the most efficient and inexpensive method of irrigation.

The winner would receive a cash prize of \$1 million.

Members of the public who have little experience in engineering or do not have access to a facility where their ideas could be tested, but who have ideas and still wish to participate, would be able to attend workshops that would take place periodically over the three years.



Source: Waterwright Solutions

To maximize accessibility, there would be one workshop spread out regionally across the state, every 50 miles. Funding could come from non-profit groups, corporations and federal and state government entities that have agricultural funding programs already in place. Over the following ten years, farmers would be able to attend fairs and classes to learn techniques to improve water efficiency. These events would be paid for by companies that manufacture and/or install efficient irrigation systems, like a normal trade show and would serve as an advertising platform for participating companies, as well as a way for farmers to find the irrigation system that is best for them.



**By the end of the following 15 years (2040), we recommend a target to have all irrigation systems be 60% more efficient than today's current standard irrigation system within the State of New Jersey.** If the standard is not achieved, the offending company would have to pay up to \$10 million for every year their systems are not up to par, depending on the size of the corporation and relative amount of irrigation system revenue they receive each year. Meanwhile, systems that meet or exceed this standard would apply to a program in which farmers who update their old, inefficient irrigations in exchange for a new, efficient system would receive a subsidy to help offset the costs of the new system (from 2030-2035). The money to pay for this program would come from sponsoring non profits, irrigation system companies, the EPA and NJDEP as well as the above mentioned fines.

*“My experience at the summit was a very unique and memorable one. After all the research we did , I learned so much about water quality and water management in New Jersey that I never knew before.*

*I learned how to negotiate so that our policy satisfied as many stakeholders as possible. In the end, I was really excited to have helped write something that could be used for actual policy in the state .”*

***Arundathi Sharma, participant***



### A Campaign for Water Education

It is estimated that by 2025, one-third of all humans will face severe and chronic water shortages (The Global Water Crisis, 2010); as the population of the world increases, the water people have available to them decreases. This shows that something must be done about the water resources that people have access to, to make sure that everyone has clean water they can use and drink. Many people have very little knowledge about the water crisis, and must be educated about the situation to take steps of their own to preserve the precious water sources humans have left.



There are limited programs and legislation which involve educating students about water. This is part of what makes this issue so relevant. There are programs which educate students about water; however, these programs are not mandated. The first environmental education-related act was passed in 1970, during Richard Nixon's term in office, which established the Office of Environmental Education or the OEE (National



## Water Quality and Human Health

Environmental Education Act, 2010). This office gave grants for the development of environmental education and “provide professional development for teachers” (National Environmental Education Act, 2010). This office was eliminated later on, but the National Environmental Education Act was passed instead. The Office of Environmental Education was actually reestablished, although it was put under the Environmental Protection Agency (EPA). This act’s authorization expired in 1996; however, it has continued to receive funding from the government. The National Environmental Education Act of 1990 required that all public school districts teach environmental education in grades K through 12. There was some controversy over the amount of money distributed to environmental education, though; some argue that there is too much funding given for this, while some think it is an adequate amount (Arizona Water Education Programs, 2010).

Many water education programs currently exist through government, private and non-profit institutions. A few of note are; Project WET, the Anglian Water Corporation, The Municipal Water District of Orange County (MWDOC) and The Water Education Foundation. Project WET, a non-profit organization, has a mission of worldwide water education and they plan on reaching this goal by offering training workshops that cover different water-related topics, such as watersheds, water quality and water conservation. (Project Wet – Worldwide Water Education, 2010). The Anglian Water Corporation was founded to develop an education program that with a goal of influencing the behavior of target groups, to promote responsible attitudes toward water usage and waste disposal, and to encourage concern towards the environment.



## Finding the Balance

MWDOC Water Assemblies are free water education assemblies provided throughout Orange County, California and explore certain topics, such as: the importance and scarcity of water, the water cycle, water storage, filtration, treatment, recycling and conservation, and 3 sources of water. In this program, students use role playing to understand more about water (Water Education: MWDOC-Sponsored Programs, 2010). The Water Education Foundation, a non-profit organization, wants to create a better understanding of water resources through public understanding and resolution of water resource issues through facilitation, outreach, and education (Water Education Foundation, 2010).

### *Reforming K-12 Education standards for Water Efficiency*

According to the National Science Education Standards, there are standards for natural resource education from grades K through eight, but not until the ninth grade do students start to learn about the environmental qualities and impacts (National Academies Press, 1996). This is an issue because in order to promote a change in the way people think about conservation and behave, we must teach younger students about water management and keep enforcing those ideas throughout their career as a student.

**The first part of this policy proposes is that we create an education standard from kindergarten to twelfth grade that will specifically deal with education about water management and quality in the United States by the year 2015.** This revision needs to occur because the current National Science Education Standards are too vague allowing states to have leeway in what environmental qualities are taught. This creates a minor discrepancy between the states in the amount of education towards water



Source: Rous Water Educational Supply

## Water Quality and Human Health

management and water quality. This plan will close that margin while promoting the conservation and improvement of water quality in New Jersey and the rest of the United States. In order to achieve this goal we also need to increase the funding towards the education of water quality and management. In order to accomplish this goal we must consider three things; *where does the money come from and how much is directed to water management, how will the funding be sustained, and how to support the long lasting knowledge of water management?*

**To answer the funding question, we have to understand who has the capability to supply funding for education to the whole nation.** The sources of capital that can meet both requirements are large corporations. These businesses are able to jointly endorse the education of individuals striving to acquire a better understanding of water management without losing their cooperation. To be fair to the companies that responsibly manage their use and impacts on water quality, this policy will only target the point source pollution companies who are not managing pollution responsibly. A concern that would arise from the choice of only targeting point source companies might be along the lines of “why only the point source polluting companies and industries?”



Source: Regional Water Authority

The reason that this policy will affect these types of companies and not others is that they are a source of water pollution that can be traced back to one specific company. This allows the government to know who is causing the problem in the water of New Jersey, allowing the government to prevent these industries from creating a bigger problem than what already exists. On the other hand, non-point source pollution is something that cannot be traced to one source, preventing proper identification of the true source of pollution, making any fines for pollution virtually impossible to enforce.

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To address *'how much of the money will be used for water management education'* we recommend that state lawmakers and industrial companies creating point source pollution discuss and debate to determine a recommendation that industry supports. Our group would like to see a minimum amount of four percent. This may seem to be a small amount of money that is being taken from the companies but we have to understand two things. First, because it is a percentage rather than a set amount it will fluctuate with the company's size and income.

This will prevent smaller point source polluters from losing all of their money and prevent larger corporations and conglomerates from paying too little. The second consideration is that companies will increase their positive publicity. This is because even though the four percent may seem like a small percentage the amount of money will increase with the amount that the company makes meaning that media can portray such companies as proactive contributors to and leaders in society. This will not only better the companies' image but leave corporations feeling satisfied that they were able to create sustainability and create a lasting impact on future generations.

**The second question, *how will the funding be sustained*, deals with the problem of economic sustainability.**

What we propose is that for the first three years that this policy is in place there will be a mandatory four percent of revenue that will be directed from corporations that create point source pollution towards water management education. Every three years after that (sixth, ninth, twelfth, etc.) the percentage would increase or decrease





## Water Quality and Human Health

depending on how much point source pollution they were creating compared to the first year.

The third question, *how to support the long lasting knowledge of water management*, also deals with sustainability but on an educational level. The knowledge would be sustained because after a period of time because the ideology would become a habit. An example of this is that people that come from places where the water quality is poor they tend to boil the water or drink bottled water for better taste. This becomes a habit and even when they go to other locations with adequate water, they boil it or purchase bottles. This same idea will apply to the education towards water quality. The first two or three generations would be taught about water management. The good practices that are taught from generation to generation will eventually become a cultural habit.

To sum up the recommended policy, we hope to create a standard that specifically includes water management education within the National Science Education Standards. Also provide funding for this new branch of education within the nation by diverting four percent of point source pollution companies revenue to water management education. This amount would incrementally increase over time creating more of an incentive to stop polluting.



Source: ScienceForce.org





## Finding the Balance

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### *Water Week - A Policy for Comprehensive Water Education*

Our group believes that education is a key issue for helping future generations become more aware of the water crisis and to be more involved in it. Although students should be taught of the importance of water early on, they cannot start too young; they will not be able to retain the information taught to them. Therefore, we believe that our main program should be geared to students in New Jersey from grades 3 through 12. The main program we propose is called Water Week. This program has already been implemented by the American Water Works Association in the past, and has proven to be successful. This event runs during the first week of May in other regions. Our Water Week would also be held in May, but will run differently.

Water Week will be a straightforward plan to apply. This plan will consist of a two-part implementation. The first will be the creation of a county to county fair. The second would be a professional development that would educate teachers in the proper ways to present issues of water quality and water contamination clean-up for 6<sup>th</sup> - 8<sup>th</sup> students.

The county to county fair will cover 2-3 counties over the span of water week. During this fair, the general public will be allowed to attend free of charge and have a chance to get educated on what their current water status is in their community. During this week, a pamphlet will be sent out to all participating students that encompasses the different sectors of water usage (home and residential use, agriculture and industry, and infrastructure). The pamphlet will also contain details about a water unit that will be mandatory in certain science courses in high schools.

They will be able to receive information in the pamphlets outlining various political, economical, social, technical, legal, and environmental aspects that directly affect water and water quality. Guest speakers from non-governmental organizations, local



coop-



erative organizations, and from the educational field will be able to give lectures and seminars detailing what they feel are the major factors of water quality and pollution. There will be different lectures held throughout the week that focus on these different sections, at which volunteers will teach students about the major issues that are involved in their issues.

Finally, booths for non profit organizations and other sponsors will be available for even more information about this pressing issue. We will focus on promoting eco-friendly products for the community, such as efficient water filters and low-flush toilet pouches. This could be an activity for students that will allow them to learn and realize how serious the water crisis is, and be more motivated to help better the water crisis.

### *Professional Development for Teachers*

The professional development programs for teachers will be very similar to that of the Water Week fair. However, here non-profit representatives, heads of corporate administration of water related corporations, and voluntary educators would help to train and create a set of lesson plans for New Jersey educators. This training could take place

## Finding the Balance

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during the annual New Jersey Education Association Convention held in Atlantic City every November. These educators would learn how to teach their students about the water crisis, and the importance of preserving water in various areas such as Agricultural use and Home use.

### *Media and Awareness*

To spread more awareness about the water issue, we will be issuing PSAs (Public Service Announcements) over the radio with the help of our sponsors, as well as issuing them online, on our website. We could also seek out publicity from the local media, and get people from small newspapers or local news shows involved.

Schools could also start clubs to raise more awareness about the environment and the water issue. An example of such a club is the *EarthKnights* program at Bergen County Academies, which works on using aluminum to replace the use of plastic bottles in the school (Bergen County Academies, participating students, 2010).

Our Water Week program will have a website that will be kept up-to-date with the latest information about the Water Week Fair, as well as general information about the water crisis. We would advertise our information on Facebook, the radio, newspapers, school websites and through e-mail. We would also advertise through commercials lasting only for the span of Water Week and paid for by our sponsors, word-of-mouth through a group of dedicated volunteers, and presenting in colleges and to company representatives.

For the teachers' seminar part of our program, our instructors will be trained by highly qualified professionals. These professionals will be people who not only understand the subject of water conservation, but also are passionate about it. Teachers will attend a training camp, where they will be taught everything they need to know about water quality, consumption, and pollution. The teachers will then pass on the information to their students. Other than teachers, we will also have volunteer lecturers. These

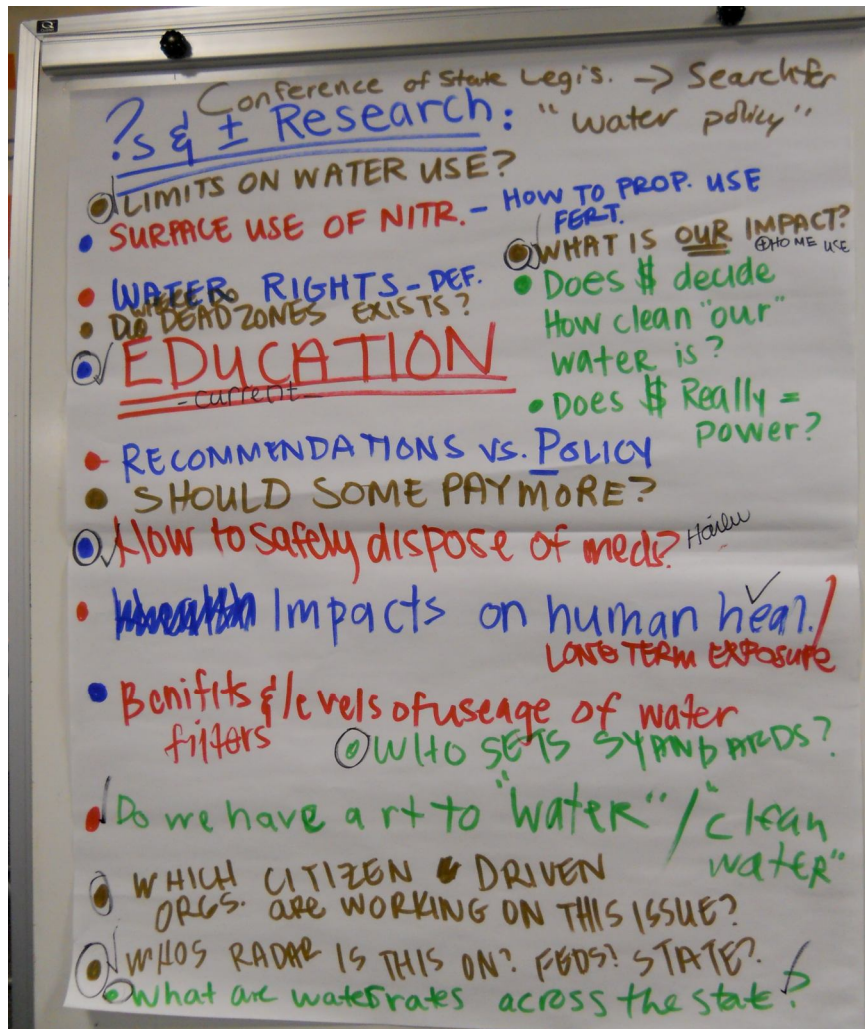


## Water Quality and Human Health

will be people who have a strong passion for the issue at hand but also know what they are talking about, but work for free. They will also be trained at our training camps.

Our educational policy is looking for a lot of corporations as sponsors. Those companies, whom sell eco-friendly products, would be promoted as a better choice for a household. In a way, there is an equal benefit, since we reach our goal of teaching the students how to properly assess the water and the eco-friendly companies get more exposure to targeted customers. Other organizations whom we view as possible allies in funding and education are; General Electric, New Jersey Environmental Federation, American Water Works Association, World Health Organization, CDM (Engineering firm), Buchart-Horn, Inc, MWH Global (water products and programs), New Jersey American Water, and United Water.

The New Jersey Public Interest Research Group (NJPIRG), would also be a strong resource as they have a program called Water Watch which provides a camp to educate students about water preservation as well as internships and community service opportunities for students, giving them more of an incentive to create or join such a club at their own schools ("NJ Water Watch." NJPIRG Student Chapters. 9 Jul 2010).





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Source: Brunswick & Topsham Water District

General Electric is incorporated on our sponsors list because of their mission statement: imagine, solve, build and lead, is one that seems to indicate that they will be a major contributor to this project (General Electric, 9 Jul 2010). That is because the process by which we want to improve the quality of water requires all of these, imagining, solving, building and leading. GE is a company that will undoubtedly be a major ally. CDM is a large organization that provides consulting, engineering and construction services to public and private clients worldwide ("CDM-History", 2010).

MWH is an organization that seeks to improve the world by improving and starting a variety of water projects across the world. As a global program, it has a great amount of experience regarding water. That expertise is crucial to our organization ("CDM-History", 2010). They could help us by letting us know what information we should tell to the students in New Jersey about the water situation around the world.



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The New Jersey Environmental Federation is another possible sponsor because NJEF is a non-profit organization that seeks to protect natural resources of New Jersey ("About the New Jersey Environmental Federation," 2010). The American Water Works Association is yet another important partner whose mission is the promotion of the water quality and exceeding the goals of the Clean Water Act, education and action ("AWWA's Story - About AWWA", 2010). The New Jersey American Water Corporation is one of the most important local water companies. By having the cooperation of the New Jersey American Water Corporation we will know what issues are there with the water utility sector. Other programs similar to the one we are trying to launch are numerous, just not very popular. These include the NJ Water Watch, launched by the NJPIRG. The Water Watch educational project allows for firsthand experience for students which will motivate them to actually participate in the movement for better water.

**Our proposal for the Water Education plan will be successful because it does not require as much funding as other plans. In the long run, education pays off the most; it manages to achieve a multitude of goals, like spreading awareness of the water issue, explaining to people how to participate, and helping them develop solutions.** The fairs outside of school will allow for adults to get more informed as well. We need the participation of populations from all areas of the community and this is the best way for them to get involved. The companies who sell the eco-friendly products would support us because we are providing advertisement and would appreciate the publicity that we provide for them, and, again because they care about water issues. NJEF and other organizations which focus on community service would help us because they care about water issues, and we would also provide advertisement and publicity for their organizations.

We propose to use the funding that our sponsors provide to manage a variety of our activities. These include covering the costs of renting out fair grounds, transporting and

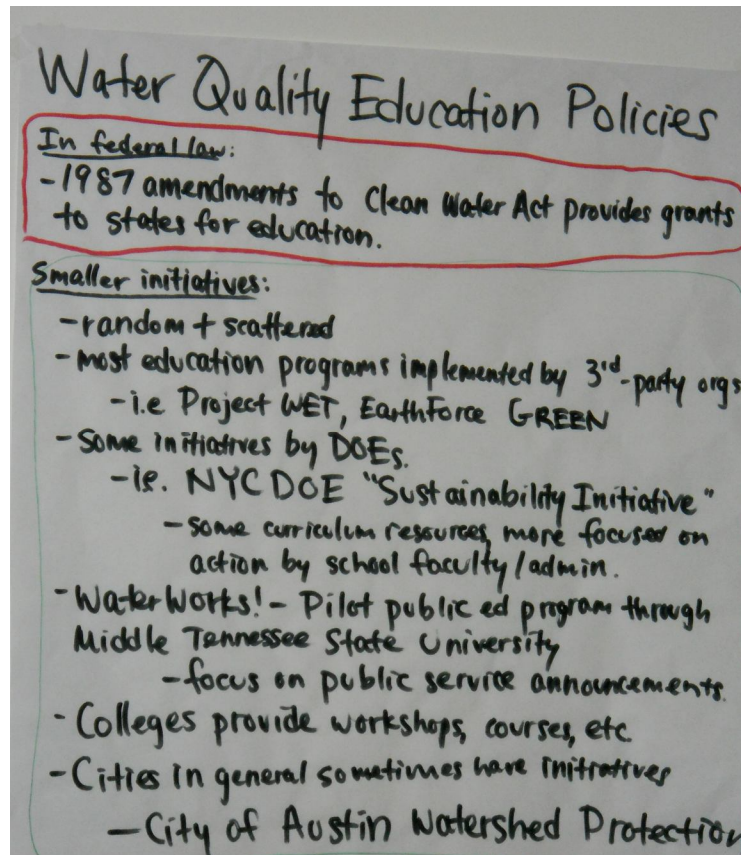


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setting up the fair booths, acquiring electrical equipment, publicizing our advertisements (through the Internet, the radio, and the television), hiring educators and guest speakers, creating a course plan, and keeping the course plan up-to-date with the latest information and materials. The way contributing companies and organizations would sponsor us, would be through collected donations, at certain intervals, and then pool these donations into a fund for the program as a whole.

Every program needs benchmarks and goals to help it achieve full effectiveness. **Our short-term goals are to find sponsors (such as the organizations listed above) and volunteers who would teach our lectures, as well as volunteers to help with the publication of our pamphlet to help make our plan work.** By 2012, we should have selected fair grounds in the different counties where we want to implement our program, and have a draft of our policy sent to New Jersey legislature. We should also have secure relations with some form of the media, such as newspaper reporters or news anchors. We need to find possible lecturers and recruit reliable volunteers. Our first Water Week would be in May 2013, along with the first Water Week Fair.





**Our mid-term goals are to make Water Week an annual event in New Jersey, and get this policy passed by state legislature and make the designation of Water Week as a law by 2025.** Our long-term goal is to spread this policy and awareness of the water crisis not only throughout New Jersey, but also throughout the United States by 2050. There are many steps that would be involved in order for us to make our policy into a law. First of all, we would have to draft a version of our policy that we could submit to our legislators. We would mail it out to all our congressmen and contact them in any way available (such as sending e-mails, letters, or calling them) to make sure that they received our policy and were considering making it a law. We would spread awareness about the policy at the first Water Week fair and through our numerous advertisements, so that other people would also lobby to make this policy a law. If enough people show they care about educating students about water, the government will be persuaded to pass the policy through legislature.



## Finding the Balance



## Conclusion from the Students

New Jersey is a state that prides itself on its innovation; from Thomas Edison to Bell Labs, New Jersey has always been the one of the major congregating sites for the best minds in America. Yet, innovation is driven by need. People like Edison envisioned a necessity for their improvement to society. We have seen the need to propose an innovative new policy for the positive development of New Jersey's water quality, water infrastructure, and water supply. While we acknowledge that our policy is not perfect, we hope that our sole intention of clean and accessible water is realized and our policies are refined, if need be, and implemented for a better New Jersey and a better America.





## Bibliography

- 111th Congress. "H.R. 2766: Fracturing Responsibility and Awareness of Chemicals Act of 2009 (GovTrack.us)." GovTrack.us: Tracking the U.S. Congress. 2009. Web. 30 June 2010. <<http://www.govtrack.us/congress/bill.xpd?bill=h111-2766>>.
- "The ABCs of Toilets." 30 June. 2010.
- "About Energy Choice." PSEG - Home. PSEG, 2010. Web. 30 June 2010.
- "About NJPIRG - NJPIRG." *Home - NJPIRG*. Web. 30 June 2010.
- "ADASK" Alcoholism and Drug Addiction Statistics, Trends, and Costs. 2004. 30 May 2005
- "American Shipbuilding Association. N.p., n.d. Web. 30 June 2010.
- "American Water Works Association." Water Use Statistics. American Water Works Association, 2010. Web. 30 June 2010.
- *Anglian Water | Home*. Web. 30 June 2010.
- "American Society of Civil Engineers Gives Sewer Systems "D" Grade". New Jersey Environmental Infrastructure Trust . June 29, 2010
- APEC, "Just What do Nitrate and Phosphate Do Anyway?". FreeDrinkingWater.com. 2010 <[http://www.freedrinkingwater.com/water\\_quality/quality1/1-what-nitrate-and-phosphate-do.htm](http://www.freedrinkingwater.com/water_quality/quality1/1-what-nitrate-and-phosphate-do.htm)>.
- "Arizona Water Education Programs." *College of Agriculture and Life Sciences*. Web. 30 June 2010.
- Barone, Jennifer. "From Toilet to Tap | Environmental Policy | DISCOVER Magazine." *Science and Technology News, Science Articles | Discover Magazine*. 23 May 2008. Web. 01 July 2010.
- Brown, Cynthia L. "American Shipbuilding Association - CONGRESSMAN RODNEY FRELINGHUYSEN (R-NJ) STANDS UP FOR ENVIRONMENT -- DOUBLE HULLS ON OIL TANKERS.
- *CDM - Www.cdm.com*. Web. 30 June 2010.
- "CERCLA Overview." *United States Environmental Protection Agency*. US EPA, 10 May 2010. Web. 29 June 2010.
- *Clean Water Action*. Web. 30 June 2010.
- Cody, Betsy, and Claudia Copeland. "Terrorism and Security Issues Facing the Water Infrastructure Sector." *Congressional Research Service*. PDF file.
- "Comparison of Single and Double Hull Tankers." Australian Maritime Safety Authority. N.p., n.d. Web. 30 June 2010.
- Crump, Kenny S. "The Linearized Multistage Model and the Future of Quantitative Risk Assessment". 1996, ICF-Kaiser, 602 East Georgia, Ruston, LA 71270, USA
- "Dishwashers: Green Buying Guide." GreenerChoices.org. Consumer Reports, Sept. 2008. Web. 30 June 2010.
- "Double hulled tankers to prevent oil disasters." EurekAlert! - Science News. N.p., n.d. Web. 30 June 2010.
- *Environmental Protection Agency*. N.p., n.d. Web. 30 June 2010. <<http://www.epa.gov/superfund/policy/cercla.htm>> <http://www.epa.gov/oem/content/lawsregs/opaover.htm>
- "Eutrophication". USGS. 2010 <http://toxics.usgs.gov/definitions/eutrophication.html>.
- Free Management Library. *FML*. N.p., n.d. Web. 30 June 2010.
- Fumento, Michael. "Bestselling author Michael Fumento reports: "Footnotes in the Love Canal." *Michael Fumento.com*. Michael Fumento, 3 Jan. 1996. Web. 30 June 2010.
- *GE : Imagination at Work*. Web. 30 June 2010.





## Finding the Balance

- Geology.com, Permission Of. "What Is Hydrofracking?" Syracuse Peace Council.
- Neighbors of the Onondaga Nation. Web. 30 June 2010.
- "Gray Water Policy Center." Gray Water Policy Center. Art Ludwig, 2010. Web. 30 Jun 2010.
- "Guidelines for the Use of Recycled Water." *CITY OF LIVERMORE WATER REUSE PROGRAM*. May 2003. Web. 30 June 2010.
- "How Much Does That Hamburger Really Cost? | NJ.com." *Blogs - NJ.com*. Web. 29 June 2010.
- "How We Use Water | WaterSense | US EPA." US Environmental Protection Agency. US Environmental Protection Agency, 2000. Web. 30 June 2010.
- Jordan, Rick, and Jeff Peters. "Reclaimed Water System." *Reclaimed Water System*. Web. 01 July 2010.
- Kinge, Hamida. "What's on Tap: America's Failing Water Infrastructure." *Metcalf Institute*. PDF file.
- "Leachability and Concrete". Portland Cement Association. June 29, 2010
- Lipták, Bela G. "Municipal waste disposal in the 1990s", CRC Press, 1991
- "Livestock's long shadow: environmental issues and options ." FAO: FAO Home. Food and Agriculture Organization, n.d. Web. 1 July 2010. <<http://www.fao.org/docrep/010/a0701e/a0701e00.HTM>>.
- McClatchy, and Tribune. "How Stuff Works: How Fracking (or Hydraulic Fracturing) Works." Stock Market Opinion and Analysis, Breaking News, Stocks Quotes, Earnings Estimates. How Stuff Works Inc., 28 June 2010. Web. 30 June 2010.
- "Modernizing Our Infrastructure to Free the Flow of People and Commerce." U.S. Chamber of Commerce, *MWH*. Web. 30 June 2010.
- Nash, Jenny. "The Lowdown on Low-Flow Toilets." 30 June. 2010.
- National Committee on Science Education Standards and Assessment; National Research Council. National Science Education Standards. National Academies Press, 1996. Web. June 2010.
- "National Environmental Education Act." *American Geological Institute - Serving the Geosciences Since 1948*. Web. 30 June 2010.
- National Academy of Sciences, "Safer Alternatives to Toxic Chemicals". June 29, 2010. <[https://www.nhpirg.org/uploads/XA/\\_2/XA\\_284kSY8tD1HJ5ljzLJA/chemsecurityfactsheet.pdf](https://www.nhpirg.org/uploads/XA/_2/XA_284kSY8tD1HJ5ljzLJA/chemsecurityfactsheet.pdf)>.
- New Jersey Department of Environmental Protection. <http://www.state.nj.us/dep/srp/ber/>. 2010.
- "New York State Water Resources Institute - Gas Wells - Waste." New York State, Water Resources Institute - Home. Web. 30 June 2010. <[http://wri.eas.cornell.edu/gas\\_wells\\_waste.html](http://wri.eas.cornell.edu/gas_wells_waste.html)>.
- News Natural. "At Least 36 U.S. States Face Water Shortage | Water | AlterNet." *Home | AlterNet*. Web. 29 June 2010. <<http://www.alternet.org/water/82378/>>.
- *Project WET - Worldwide Water Education*. Web. 30 June 2010.
- NOON. "What Is Hydrofracking?" *Syracuse Peace Council*. 2007. Web. 30 June 2010. <<http://www.peacecouncil.net/NOON/hydrofrac/HdryoFrac2.htm>>.
- Orlando, Dr. Ed, and Wendy Hessler. "Health Impacts of estrogen in the environment, considering complex mixture effects." *Environmental Health News. Environmental Health Sciences*, 5 Sept. 2007. Web. 30 June 2010
- Perlman, Howard. "water question and answer: water use at home." <http://ga.water.usgs.gov/edu/qahome.html>; usgs, march 29, 2010. Web. 30 Jun 2010.
- "Policies & Guidance Documents | Water, Wastewater & Wetlands | MassDEP." *Mass.Gov. N.p.*, n.d. Web. 30 June 2010.
- "Radioactivity, Arsenic Contaminate New Jersey Drinking Water". *Environment News Service*. June 29, 2010
- "Recycling Infrastructure". *Business Maps of India*. June 29, 2010.



## Water Quality and Human Health

- "Recycle Your Old Toilet | GreenYour.com." 2010. Web. 30 June 2010.
- "Residential Water Use." NYC.gov. New York City Government, 2010. Web. 30 June 2010.
- Robertson, A. "Offshore Disposal - Results of the 106-Mile Dumpsite Study: Water Column and Sediment Fates", Taylor & Francis, 1997
- *Safe Drinking Water - American Water Works Association - AWWA*. Web. 30 June 2010.
- "Safer Alternatives to Toxic Chemicals". June 29, 2010, Science Direct. *Science Direct*. N.p., n.d. Web. 30 June 2010.
- Sherman, Rhonda. "Large Scale Organic Materials Composting". NORTH CAROLINA COOPERATIVE EXTENSION SERVICE. 2010 <<http://www.p2pays.org/ref/02/01372.pdf>>.
- Stedman, Lis. "IWA Publishing - US: EPA Finds Groundwater Contaminants near 'fracking' Sites." IWA Publishing - Home. IWA Publishing. 11 January 2010. Web. 30 June 2010. <<http://iwapublishing.com/template.cfm?name=news412>>.
- "Student Educational Employment Program Introduction." *US Office of Personnel Management*. Web. 30 June 2010.
- "Sustainable Water Infrastructure Investment Act of 2008." Govtrack.us. Govtrack, n.d. Web. 30 June 2010.
- "Teen Substance Abuse" GDCADA. 9 March 2005. 28 May 2005
- Tinahm-Again. "Hydrofracking: An Environmental Disaster Waiting to Happen." *Popular | Environmental Graffiti*. 2009. Educational Resources, Inc. Web. 30 July 2010. <<http://www.environmentalgraffiti.com/oil-and-gas/news-hydrofracking-verge-next-big-environmental-disaster>>.
- The National Center for Biotechnology I. *NCBI*. N.p., n.d. Web. 30 June 2010.
- "THE TOTAL COSTS OF CLEANING UP NONFEDERAL SUPERFUND SITES." *Congressional Budget Office*. Congressional Budget Office, n.d. Web. 30 June 2010.
- "USAID Environment: Water - Global Water Crisis." *U.S. Agency for International Development*. Web. 29 June 2010.
- "Unemployment Rates for States." *U.S. Bureau of Labor Statistics*. U.S. Department of Labor, 18 June 2010. Web. 30 June 2010.
- "UNEP-WCMC - Prestige oil tanker." UNEP World Conservation Monitoring Centre. N.p., n.d. Web. 14 July 2010. <[http://www.unep-cmc.org/latenews/emergency/spain\\_2002\\_update/](http://www.unep-cmc.org/latenews/emergency/spain_2002_update/)>.
- "Use of Recycled Water for Irrigation to Triple in Aurora, Colorado." U.S. WATER NEWS - THE LATEST NEWS CONCERNING WATER AND WATER ISSUES. Dec. 1999. Web. 01 July 2010.
- "WATER INFRASTRUCTURE Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments." United States General Accounting Office. Report to the Ranking Minority Member, Committee on Environment and Public Works, U.S. Senate. March. 2004.
- "Water Education: MWDOC-Sponsored Programs." *Discovery Science Center, Orange County California Science Center*. Web. 30 June 2010.
- "Water Efficient Toilets." 9 Sep. 2009. 30 June. 2010.
- "Water Infrastructure." *uschamber.com*. U.S. Chamber of Commerce, 2010. Web. 30 June 2010.
- "Water Science for Schools: Water Questions and Answers: Water Use." *USGS Georgia Water Science Center*. Web. 29 June 2010.
- "Water quantity FAQ." *Water Treatment and Purification - Lenntech*. N.p., n.d. Web. 30 June 2010.



# Acknowledgements

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### Expert Panel

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**Mary Beth Baker** – Merck & Co. Inc.

**Bart Ruiter** – DuPont Engineering

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**Fred Sickels** —New Jersey Department of Environmental Protection

**Suzana Duby and Mark Lechevallier** — New Jersey American Water

**Deborah Mans** — NY/NJ Baykeeper



# Participating Schools

*Regional YPS programs are open to all high schools in a region. Schools attending the 2010 New Jersey Youth Policy Summit:*

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Daniela	Velez
Quincy	Smith
Desiree	Whitehead
Courtney	Fleming

### ***Bergen County Academies***

Hackensack, NJ

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<i>Eric</i>	<i>Zhang</i>
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Sherry	Zhang
Kyung Hwa	
Stephanie	Jeong
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Varsha	Subramaniam
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# INNOVATION

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