The Quest for an Environmental Ethic Acceptable to Ecologists, Industrialists and the Public

Mary P. Martinasek, M.P.H.
Christian Watamaleo, B.S.
Claudia X. Aguado Loi, M.P.H.
Cynthia Pace, B.A.
Selina Radlein, B.A.

ABSTRACT
Environmental ethics have many different facets. The proceeding discussions focus on international water-related ethics citing two specific case examples, the Gulf of Mexico and the Baltic Sea. This paper also defines ethics, cites specific water-related examples, discusses stakeholder actions, and offers recommendations to bridge an understanding of an environmental ethic among lay individuals, ecologists, and industrialists.
Umwelt und Gesundheit Online, 2009; 2, 59-66.

Introduction

"Water is not a commercial product like any other but, rather, a heritage that must be protected, defended and treated as such" (Armstrong, 2006, p.9). Water ethics strive to maintain the flows and transfers of water, to enhance the quality of the life of the entire land–air–water–life system (Armstrong, 2006). Ecological communities sustain life above and under water. Humans must come to a common understanding of the ethical importance of helping to sustain these communities, not devastate them. This paper defines ethics, cites water-related ethics specific to two case studies, discusses stakeholder actions, and offers recommendations to bridge an environmental ethic among lay individuals, ecologists, and industrialists. It is hoped that other countries will learn from the mistakes and the successes of the Baltic Sea in Northern Europe and the Gulf of Mexico in the United States to develop a sound environmental ethic to protect the future of coastal waters.

Environmental Ethics

The field of ethics involves decision making based on deciphering what is considered good and bad according to moral duty and obligation (Ethic, 2008). Ethical issues are found in an array of disciplines that overlap the actions of humans, such as health care, research, and law. Ethical issues may also encompass the environment. An environmental ethic is a systematic account of the moral relationship between human beings and the environment (Des Jardins, 2001).

The History of Environmental Ethics

The theory behind the need for ethics is that neither technology nor science is capable of solving all problems faced by humans. Technology offers a "quick fix" for issues, but is not indefinitely sustainable. Parts may need to be fixed, replaced or upgraded. Science is logical and offers rational solutions to problems, but it can be inappropriate for addressing social issues involving moral behaviors. Ethics provide a framework that can be applied to specific cases from which a solution can be deduced. Ethics offers solutions that may or may not be inclusive of science and technology. Regardless, it serves as a balance between the aims of the two, and has an effect that is a long term one (Des Jardins, 2001).

The basis for contemporary environmental ethics stems from the movement in 1962 led by Rachael Carson (Brennan & Lo, 2008). Carson's book, *Silent Spring, was* in response to the concerns involving the overuse of pesticides and other chemical contaminants used in commercial farming (Carson, 1962). Agricultural industry was thriving at that time with no regard for its potential effect on the environment and public health. Carson's book has been cited repeatedly as a pivotal point in the movement towards environmental ethics. Her call to action was followed by an era of environmental awareness that has transitioned today into the green movement. On April 22, 1970 the movement was solidified with the inaugural celebration of "Earth Day" when 20 million people across America protested against the degradation of the environment (Earth Day Network, 2009).

Though this movement molded the current philosophy behind environmental ethics, some argue that ideas behind this concept are rooted in classic Judeo-Christian beliefs. Historian Lynn White Jr. (1967) first described this argument. The suggested context of the essay was that some higher-being placed man on the earth as the superior life form. According to this viewpoint, all other life forms were placed on the planet for man's use, and should be utilized regardless of the harm it poses to the environment. These views differ from what would be described as ethical in present times, and have served as the primary opposition to modern views on environmental ethics. This perspective is known as the anthropocentric perspective on ethics (White, 1967).

White (1967) argues that modern Western culture is stuck in this mindset of arrogance towards nature. This mindset is apparent in the way business and science are conducted without regard towards the long term effect on the planet. The extent of the damage done can be partly attributed to technology and science. Technological advances have afforded the ability to carry out tasks at alarming rates, producing more product, and waste, faster than ever before. White (1967) theorized that given the modern form of science and technology, Judeo-Christianity provides the original deep-rooted drive to unrestricted exploitation of the environment.

Though the viewpoint may seem archaic, the anthropocentric perspective often serves as the opposition for proposed environmental ethics. Often, the reason for lack of cooperation with or consideration for many environmentally friendly proposals is the effect it would have on the economy, or the inconvenience it may cause the individual. However, with the recent realization that humankind may not be able to sustain its existence on the planet, there has been increased compliance with these ethics. The reasons for adherence may vary depending on an entity's or individual's perspective.

According to Armstrong (2006), there are four major positions taken on environmental ethics. These positions are important to understand because knowing which position a person or organization will take on an issue allows for better communication and cooperation between all involved parties to complete the task at hand. The utilitarian viewpoint identifies value in the environment only because it serves a purpose for mankind. According to this view, water, for example, is valuable because we need it and so we protect it in so far as it benefits us. The consequentialist's view on ethics argues that people are responsible for the consequences of their actions, that this responsibility rests on all human beings, and extends to the consequences for all human beings, both present and in the future. Therefore, a decision to deplete natural resources in the present will have direct consequences on future generations and responsibility for this decision lies with the present day leaders. The intrinsic argument states that the environment has value in and of itself and is not just an object for human exploitation or enjoyment. Thus, the environment is in need of protection from abuse by human beings. Lastly, theistic beliefs argue that the earth is the creation of a divine being; therefore, human beings have a responsibility to that divine being for their use of this creation.

These various schools of thought are applied in different ways by ecologists, industrialists and lay people. Unfortunately, to date, these parties do not have an agreed-upon set of ethics, a fact that only continues to hinder progress towards a cleaner, healthier, and more habitable world for the future. A more thorough understanding of the coastal water issue within the various ethical viewpoints is warranted to provide a back drop for understanding the complexity in developing an environmental ethic that can be agreed upon by multiple stakeholders.

International Coastal Water Concerns

Coastal waters around the world have been troubled with an overabundance of pollutants being fed from point sources (one direct source), nonpoint sources (multiple sources), and from atmospheric deposition (Scavia & Bricker, 2006). This pollution is of concern because of the biological diversity in the ecosystem as well as the resulting human effects. Several pollutants are to blame for the degradation of coastal waters; however, the largest cause of pollution comes from the nutrients nitrogen and phosphorus. Nitrogen is considered the primary pollutant in coastal waters and phosphorous is considered the primary pollutant in freshwater lakes.

Small amounts of nitrogen are necessary to maintain aquatic life; however, in the 1970s and 1980s, awareness of the overabundant loading of nutrients and the detrimental effects on the coastal ecosystem prompted scientific research (Boesch, 2002). The concern with excessive nitrogen is the subsequent increase in organic matter that relies on vital oxygen for its decomposition. This formation of organic matter is referred to as eutrophication and has been linked to numerous aquatic problems (Howarth, Anderson, Cloern, Elfring, Hopkinson, Lapointe, et al., 2000). Eutrophication results in excessive algae growth that decreases the clarity and quality of water, affects the biodiversity of aquatic life forms, and results in low oxygen level (hypoxia). When eutrophication deals with anthropogenic sources of nitrogen addition, the process is called cultural eutrophication (McIsaac, David, Gertner, & Goolsby, 2002).

Sources of nitrogen-containing pollutants have been categorized into point sources, nonpoint sources, and airborne sources. The main source of pollutants stems from population increases and is related to population density (Smith, Swaney, Talaue, Bartley, Sandhei, McLaughlin, et al., 2003). Humans have nearly doubled the nitrogen supply in coastal waters (Tilman, Fargione, Wolff, Antonio, Dobson, Howarth, et al., 2001). Human production includes, but is not limited to, domestic and industrial sewage, destruction of natural wetlands, domestic animal waste, fertilizer, and atmospheric dispersion from vehicular and industrial nitrogen emissions.

Point source pollution typically has a direct release of pollutants from one localized area into the aquatic systems. The main point source of nutrient pollution is discharge from wastewater treatment plants (United States Commission on Ocean Policy [USCOP], 2005). Because of localization of the source of pollution, policies have been in place for point sources relegating them as less of a threat to the coastal waters.

Nonpoint sources of nutrient intrusion involve more than one site responsible for the pollution. The sources of most concern when dealing with nitrogen is the runoff from agricultural land and animal feeding operations, as well as general urban runoff (USCOP, 2005). Buffers of wetlands to filter nutrients have been eliminated and replaced with crops. This phenomenon doubled the negative effects of nitrogen loading into the water.

Atmospheric deposition can be categorized as either wet or dry deposition. Wet deposition falls as either rain or snow, and dry deposition exists as particles or vapors suspended in the atmosphere (Lawrence, Goolsby, Battaglin, & Stensland, 2000). Both wet and dry deposition affects the Gulf of Mexico waters. Airborne sources that affect the water quality are often spawned from both point source and nonpoint source polluters and is a contributor to coastal waters (Lawrence, et al., 2000). Fossil fuel emissions and animal farming practices have garnered the most attention with regards to nitrogen, and atmospheric nitrogen has been cited as a major contributor to eutrophication of the Gulf or Mexico (Lawrence, et al., 2000).

Effects on Ecological Communities

Eutrophication affects the ecological communities either by increasing nutrient concentrations or depleting oxygen. Nitrogen is of importance as it both causes and controls eutrophication in the Gulf of Mexico and the Baltic Sea (Howarth et al., 2000; Scavia & Bricker, 2006). These unwanted changes in the aquatic ecosystem have resulted in shifts in the biodiversity of aquatic organisms and have altered the density of the various organisms. Hypoxia that is caused from eutrophication often changes the makeup of the aquatic communities by killing sensitive aquatic life and reducing viability to those less mobile. Zooplankton, for example, is forced to the surface waters to avoid the hypoxia. This movement makes them more vulnerable to prey.

Harmful algae blooms have been a result of overabundance of nutrients in the coastal waters. The impact of these blooms include damage to larvae, contamination of fish and shellfish, and death of marine mammals and seabirds (Tilman, et al., 2001). For example, with eutrophication, red and brown toxic algae growth has the propensity to increase, resulting in shellfish poisoning and even water mammal demise.

Increased nutrients also lower the diversity of the kelp and sea grass communities which normally help sustain an array of marine animals by providing food, shelter and protection (Scavia & Bricker, 2006). The decrease in biological diversity may alter sea grass and kelp communities. This, in turn, may expose some aquatic organisms to predators (Howarth, et al., 2000). In addition, coral reefs are being affected by nitrogen through “coral bleaching,” whereby algae that lives inside the coral is depleted and is unable to nourish the coral reefs (Howarth, et al., 2000; Scavia, et al., 2003).

A worldwide concern is hypoxia and anoxia (lack of oxygen) as a result of eutrophication. When this situation arises there can be an increase in fish kills and creation of what is known as a “dead zone” (Howarth, et al., 2000). Eutrophication is not central to any one particular location. The largest area that is impacted by lack of oxygen in North America is in the Gulf of Mexico, along the continental shelf. A similar effect takes place in the Baltic Sea. Other areas of concern around the United States consist of the Chesapeake Bay, Long Island Sound, and the Florida Keys (Smith et al., 2003). These so-called dead zones also are found in coastal ecosystems of most developed nations in North America, Europe, Asia, and Australia (Boesch, 2002). Of the many dead zones that are developing around the world, the Gulf of Mexico and the Baltic Sea have drawn the attention of lay persons, researchers, scientists, industrialists, and policy makers seeking to find suitable ways to combat the increasing areas of pollution deposition and ultimate water degradation.

Case Study I: Gulf of Mexico

From the Mississippi River to the Texas coast lies the site of the largest zone of hypoxic water in the western Atlantic Ocean coastal zone (Goolsby, Battaglin, Aulenbach, & Hooper, 2000; Rabalais, et al., 2001). The dead zone is estimated to be the size of the state of New Jersey (Rabalais, et al., 2001). Between 1990 and 1999 the size of this dead zone nearly doubled (Howarth, et al., 2000). It is estimated that nearly 1.6 million tons of nitrogen are entering the Gulf of Mexico from the Mississippi Basin (Earth Policy Institute [EPI], 2004).

Hypoxia is defined as dissolved oxygen less than $2 mgL^{-1}$ for this region and occurs mostly in the lower water column (Goolsby, et al., 2000; Rabalais & Turner, 2001). This is the level below which trawlers are unable to capture shrimp in their nets. Hypoxia is at a high level during late summer and disappears during the autumn (Goolsby, et al., 2000).

Both the Mississippi and the Atchafalaya Rivers drain into the Gulf of Mexico and account for approximately 80% of the total fresh water input into the Gulf (Goolsby, et al., 2000; Rabalais, et al., 2001). This area has historically been known as the “fertile crescent” due to the abundance of economically and ecologically important fish (Stow, et al., 2005). The amount of water flow between the Mississippi and Atchafalaya River have been regulated by the U.S. Army Corps of Engineers per a Congressional mandate (Rabalais, et al., 2001). The delivered riverine water flow has been increased steadily over the past two decades and accounts for nearly 90% of the nitrogen flux that is discharged into the Gulf of Mexico (Goolsby, et al., 2000). This nitrogen flux increased nearly three-fold between 1955 and 1978 (McIsaac, et al., 2002). The principal identified sources of nitrogen are the watersheds located in southern Minnesota, Iowa, Illinois, Indiana, and Ohio that drain from agricultural land, accounting for nearly 41% of the continental United States (Goolsby, et al. 2000; Stow et al., 2005). The influx of nutrients causing this hypoxia occurs through water constituents rather than the changes in amount of freshwater runoff from the rivers into the Gulf (Scavia, et al., 2003). The Mississippi River's nitrogen flux into the Gulf has been linked both to eutrophication and hypoxia (Lawrence et al., 2000).

In the United States, point sources are currently being regulated and do not pose a major threat to watershed and coastal water nutrient intrusion. For example, direct discharges must have a permit which sets limits on pollutants in the effluent. With regards to nonpoint source pollution, there is no governmental enforcement on nonpoint and atmospheric sources of nitrogen input affecting the coastal waters. A recommendation from many experts is to take a systems approach to both location of all sources and development of policy. A cooperation of all stakeholders is vital to the success of policy in this arena.

One of the current ongoing state programs is the Gulf of Mexico Alliance (GOMA). GOMA was a result of the economic impact and destruction of costal habitat caused by the devastating hurricanes in recent years and the five surrounding Gulf-state (Florida, Mississippi, Texas, Alabama, and Louisiana) governors' shared vision for a healthy and resilient Gulf of Mexico coast. GOMA, specifically seeks to identify ways to improve water quality, support costal wildlife conservation, educate, and characterize the Gulf's habitats and reduction in nutrient input to the coast ecosystem through its various partnerships at the federal, state, and local level and its citizens (Gulf of Mexico Alliance [GOMA], 2006).

There are several other programs and policies that have addressed the environmental issues related to the Gulf of Mexico; however, economic interest and beliefs systems are sometimes barriers to gaining political support for enactment of policies within the states surrounding the Gulf of Mexico. In 1998, the Harmful Algal Bloom Hypoxia Research and Control Act became law (Committee on Environmental and Natural Resources [CENR], 2000). The result of the act was a comprehensive assessment of hypoxic zones in the Gulf of Mexico, including the distribution of these zones, causal agents, and economic and environmental consequences (CENR, 2000). Other programs mandated by the states' environmental protection agencies also have been implemented with the goal to regulate nutrient input from agriculture non-point sources. This regulation has created concerns among farmers who are hesitant to under-fertilize with the potential of losing their valuable crops (Mitsch, Day, Gilliam, Groffman, Hey, Randall, et al., 2001).

States surrounding the Gulf of Mexico have the authority to ban oil drilling off their coasts. Although lay persons may be opposed to drilling due to the negative effects on the shoreline and the unsightly rigs, this opposition sometimes is outweighed by the economic thrust that it provides for the state. Often what is deemed ethical for a layperson is not in concordance with policy makers' master plans.

Case Study II: Baltic Sea

Although the Gulf of Mexico has one of the largest contingents of hypoxic water on earth, it is the Baltic Sea which currently claims the earth's largest geographical dead zone (Environmental News Service [ENS], 2008). Even more disastrous are the numerous areas within the Baltic Sea that are hypoxic year around (ENS, 2008).

Because of the locale of the Baltic Sea, Denmark, Estonia, and Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden all are relevant to the Baltic's environmental ethics. Of the many contributing factors, agricultural runoff, the burning of fossil fuels and poor wastewater procedures are the major sources of the Baltic's current diminished status. St. Petersburg, Russia may be one of the largest contributors to wastewater in the Baltic Sea (HELCOM, 2009). Professor Markku Viitasalo of the Finnish Institute of Marine Research stated that many of the environmental agricultural financial assistance have not been effective at swaying many of the agriculturalists from reducing their fertilizer yields (HELCOM, 2009).

This unfortunate ecological condition is not only detrimental to many of the marine wild life, but also of concern to the population that inhibits the area. For example, 30% of the oxygen rich area of the Baltic Sea has been lost thus far, a loss that directly affects many of the fisheries that rely on the fish with in the Baltic Sea (HELCOM, 2009).

One of the greatest threats from a coastal water environmental pollutant standpoint is the agricultural industry within Germany's borders. Over 80% of Germany's land is agricultural, and is a huge economic driver for the country (Nations Encyclopedia, n.d.). Individual farms account for 80% of agricultural output in Eastern Germany, thus representing a difficult and distinct group to regulate. Up to 60% of world agricultural irrigation water is either lost to evaporation or leaches fertilizer into the eastern coastal waters (Moore, 2002).

In 1992, the European Union cut market price support for agricultural businesses, replacing artificial prices with government subsidies, and put stricter controls on output volume (Nations Encyclopedia, n.d.). Within Germany, the federal and state governments assisted the farmers with agricultural development, land consolidation, village renewal, and construction of country roads. To encourage loyalty in smaller farm areas, the governments financially assisted the people who strongly relied on agricultural production. The government's requirements of good agricultural practice required that fertilization and plant protection did not exceed an established maximum, and farmers who used environmentally friendly farming methods received financial compensation in recognition of their environmental policy.

In addition to the agricultural changes, Germany has become a strong advocate for recycling, fuel cell, hydropower, and wind power. One can find the industrialist's and ecologist's ideas meeting at residual waste plants in North Rhine-Westphalia. Plants such as the one in Cologne, utilize residual waste to create energy for nearby businesses (AVG Köln mbh, n.d.). Moreover, because of governmental emissions regulations, it follows strict processes to ensure minimal emissions exit the plant.

International Policies to Reduce Ecological Harm

One of the well known international plans to reduce the global ecological damages was the Hot Air Treaty presented by Japan. The convention took place in Kyoto, Japan in December 1997. The goal of the treaty was to have Western nations reduce their greenhouse gases to pre-1990 levels by 2010. There were a few reasons why the goals were never met. For example, although the treaty was created in 1997, the actual implementation would not occur until 2008 (BBC News, 2003). Also, although the Japanese government had good intentions, none of the developing nations agreed to the treaty's goals (even though they will probably surpass the more developed countries). One explanation is that developing nations have the serious problem of providing for an exponentially increasing population. Further inducing the use of fossil fuels is unlikely because it is the cheapest means of energy for lesser developed countries. In addition, inexpensive labor and unregulated industry could attract business from the West; thereby propelling jobs, machinery, and CO_2 production in the lesser developed countries. Consequently, these countries will continue to expel harmful chemicals throughout the country, and eventually, into the atmosphere. Therefore, the lesser developed countries could add to the increase of the dead zone, even if countries that surround the Baltic Sea try to reduce their individual chemical output. Finally, in 2001, the treaty took another devastating blow when President George W. Bush of the United States declared that he would not sign a revised treaty. In a last ditch effort, a scaled-down version of the treaty was drawn up four months later, and finalized at climate talks in Bonn, Germany in 2002. The revised treaty changed the original goal of a 5% reduction to only 2% (BBC News, 2003). This treaty cannot be considered a winning situation for anyone interested in reducing the levels of atmospheric pollution. Most ecologists would argue that the goals of the newly ratified treaty would not be significant enough to change any of the current environmental issues within the earth's atmosphere.

Although the Kyoto Treaty would not be considered successful, there have been more recent international policies that can be considered beneficial to all of the invested stakeholders. One example is the Helsinki Commission (HELCOM) Baltic Sea Action Plan. The HELCOM action plan is an intergovernmental co-operation among Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The goal of the plan is to re-establish the ecological stability of the marine environment by 2021. The primary goals are monitoring and reporting the status of and trends in the marine environment, reviewing the efficiency of measures to protect the marine environment, and providing information about common initiatives and positions that form the basis for decision-making in other international forums (HELCOM, 2008). In 2007, a new plan was created to address economical and governmental changes for some of the committee's stakeholders. The revised plan's goal was to take an ecological approach to the problem. When referring to their ecological approach, HELCOM states, "application of the ecosystem approach, the protection of the marine environment is no longer seen as an event-driven pollution reduction approach to be taken sector-by-sector. Instead, the starting point is the ecosystem itself and a shared concept of a healthy sea with a good ecological status" (HELCOM, 2008). This approach shows not only the commitment of the committee and its governments, but is sensitive to the mindset of ecologist. Since the implementation of the HELCOM initiative, there has been a 40% reduction in nitrogen and phosphorus discharges, a 40% decrease in emissions of nitrogen to the air, and a 50% decrease in total discharges of about 50 hazardous substances (HELCOM, 2008). Much work is still to be done to decrease the dead zone within the Baltic Sea; however, the HELCOM shows much promise, and is a viable plan that can be considered acceptable to ecologists, industrialists, and the public.

Stakeholders in Environmental and Ethical Decisions

Personal and economic benefits from these waters in concert with detrimental effects from pollution of coastal waters have drawn a cadre of stakeholders, ranging from the federal level to the lay community. Of special interest are the ethic decisions and debates of the surrounding coastal waters (National Ocean Service [NOS], 2008). These stakeholders have a direct interest in, or involvement or investment with the Gulf of Mexico or the Baltic Sea. Federal Agencies related to the Gulf of Mexico include the U.S. Food and Drug Administration (FDA), U.S. Navy, U.S. Geological Service (USGS) and the U.S. Environmental Protection Agency (EPA), to name a few (GOMA, 2006). At the state level, there are several programs, organizations, and universities, as well as ecologists that monitor the water quality, conduct research, educate, and preserve and restore costal habitats. Local organizations (including non-governmental organizations), industries (e.g., farming and fishing), businesses, and Gulf citizens also have a role in the protection and the destruction of the coastal waters and habitat. In fact, run-off from agricultural industry and other nonpoint sources is one of the major contributors to eutrophication (NOS, 2008; HELCOM, 2009). Thus, these stakeholders' participation in the decision process is critical to adopting healthy water practices. Lastly, policy makers and environmental advocates are key players to influencing, enacting, and implementing laws and policies to which citizens and organizations should abide. This group can participate at any level of government.

Many of the stakeholders related to the Gulf of Mexico are also critical to the protection and destruction of the Baltic Sea. The distinguishing stakeholders are at the federal level. Since the unification of the European countries (with the exception of a few countries and European territories), the European Union has commissioned several organizations to address the hypoxic conditions of the Baltic Sea such as the European Commission (environment section), European Environmental Agency (EEA), European Union for Coastal Conservation (EUCC), and Community Fisheries Control Agency (CFCA). In addition, partnerships among countries also have been formed to resolve and prioritize environmental issues related to the Baltic Sea. The Baltic Marine Environmental Protection Commission or Helsinki Commission (HELCOM), as previously mentioned, is one such example. The goal of this agency is "to protect the marine environment of the Baltic Sea from all sources of pollution, and to restore and safeguard its ecological balance" (HELCOM, 2009). This organization has been responsible for developing policies, reporting the state of the Baltic Sea, providing recommendations, policy enforcement, and coordination of agencies and response units in case of a major incidents.

Competing Agendas and Moral Values

Environmental and ethical decisions depend on the various stakeholders' moral and intrinsic value in the upkeep and conservation of the costal habitat (Armstrong, 2006; Warner et.al., 2009). Although an optimal goal is to improve water quality and restore and conserve the costal habitat, developing an acceptable ethic to achieve this goal is challenged by stakeholders' diverse moral values, competing priorities and personal agendas, structural barriers, or apathetic beliefs. One could say ecologists and other environmental advocates place an absolute value on costal habitats, thereby making it a moral responsibility to protect all living specimens. However, this view is not shared by all involved stakeholders, not even *all* ecologists and advocates. Stakeholders may view the need for coastal habitat preservation as a moral responsibility for human well-being, the benefit of the next generation, or its fundamental utility for living (Armstrong, 2006). Depending how the problem is framed, stakeholders are more likely to agree to an environmental decision if it is in accord with their moral values (Lakoff & Dean, 2004).

Other factors to consider in the decision process are competing priorities and personal agendas. For instance, policy makers may be motivated to partake in a decision only if it has a direct benefit to their careers such as an increase in their approval ratings or if the decision will not harm them politically. Competing priorities may include time limitation, complying with business deadlines and goals, natural events (e.g., war, health care, natural disasters), and economic hardships, to name a few. Structural barriers are other issues, that include lack of financial resources, infrastructure (e.g., no recycling center in the local area), and technology (e.g., advance technologies to keep lagoons from overflowing due to storms or faulty filter system for animal waste) (Prato, 2001). How these are addressed may determine how stakeholders will adopt or accept healthy environmental policies and practices. For example, some housing ordinances require residents to maintain the appearance of their lawn; however, the high cost of fertilizers may force residents to choose the non-expensive, yet harmful, fertilizers. Industrialists and businesses also face ethical dilemmas when dealing with profitability and social responsibility (Kulkarni, 2000). An example of this is the farming industry where profitability is critical for survival. To date, low cost environmentally safe technology and fertilizers may not be available to maintain profit margins. Thus, policies that place restrictions on industries result in economic loss (Kulkarni, 2000). Lastly, dealing with apathetic individuals or organizations can hinder progress of environmental policies and practices. These groups may feel no need to take action and may find other issues to take precedence, a problem related to the competing priorities.

In summary, working with and understanding the various stakeholders' personal goals, values, competing agendas, and barriers are necessary to reach acceptable environmental ethics. A multidisciplinary and collaborative approach that combines not only scientific communities, but policy-making communities and citizens may be required to achieve the desired results. Case examples from Europe and the United States demonstrate actions taken to identify and address the environmental ethical issue and illustrate the lessons learn such as an open dialogue with multiple stakeholders. Additionally, these case examples emphasize the need for a systems approach to understanding the environmental problem from a more global point of view. In some cases, implementing a solution on a shared environmental ethical issue is often hindered by various competing agendas and barriers. From these examples, it is suggestive that financial barriers or interest are the driving force to whether an acceptable ethical decision. Furthermore, examples demonstrate that solutions that are feasible, offer monetary reward for actions, or hold stakeholders accountable are likely to result in a sustainable environmental ethic.

References

Armstrong, A. (2006). Ethical issues in water use and sustainability. *Area, 38*(1), 9-15.

AVG Abfallentsorgungs-und Verwertungsgesellschaft Köln gbH, (n.d.). Aufgaben. Retrieved July 26, 2009, from http://www.avgkoeln.de/unternehmen/aufgaben.php.

BBC News. (2003). Europe What is the Kyoto treaty? Retrieved May 12, 2009 from http://news.bbc.co.uk/2/hi/europe.

Boesch, D. (2002). Challenges and opportunites for science in reducing nutrient over-enrichment of coastal ecosystems. *Estuaries*, *25*(4b), 744-758.

Brennan, A., & Lo, Y. (2008). Environmental Ethics, *The Stanford Encyclopedia of Philosophy*. Retrieved May 13, 2009 from http://plato.stanford.edu/entries/ethics-environmental/.

Carson, R. (1962). *Silent Spring*. Boston: Houghton Mifflin.

Committee on Environment and Natural Resources. (2000). *An Integrated Assessment: Hypoxia in the Northern Gulf of Mexico*. Washington, D.C.: National Science and Technology Council Committee on Environment and Natural Resources.

DesJardins, J. (2001) Environmental Ethics: An Introduction to Environmental Philosophy, 3rd edition. Belmont, CA: Wadsworth Thomas Learning.

Earth Day Network. (2009) The History of earth day, Retrieved July 30, 2009 from http://www.earthday.net/node/77.

Earth Policy Institute. (2004). Dead zones increasing in world's coastal waters. Retrieved June 30, 2008 from www.earth-policy.org/Updates/Update41.htm.

Ethic (2008). In Merriam-Webster Online Dictionary. Retrieved May 7, 2008, from http://www.merriam-webster.com/dictionary/ethics

Environmental News Service. (2008). Once rare, coastal dead zones Are multiplying worldwide. Retrieved May 11, 2009 from http://www.ens-newswire.com/ens/aug2008/2008-08-15-01.asp.

Goolsby, D., Battaglin, W., Aulenbach, B., & Hooper, R. (2000). Nitrogen flux and sources in the Mississippi River Basin. *The Science of the Total Environment*, *248*, 75-86.

Gulf of Mexico Alliance. (2006). Gulf of Mexico Alliance: Governors' action plan for healthy and resilient coasts. Retrieved September 29, 2009 from http://www2.nos.noaa.gov/gomex/.

Helsinki Commission. (2009). *HELCOM Activities 2008 Overview. Baltic Sea Environment Proceedings*. Retrieved September 29, 2009 from http://www.helcom.fi/stc/files/Publications/Proceedings/bsep118.pdf.

Howarth, R., Anderson, D., Cloern, J., Elfring, C., Hopkinson, C., Lapointe, B., et al. (2000). Nutrient pollution of coastal rivers, bays, and seas. *Issues in Ecology*, *7*, 2-15.

Kulkarni, S. P. (2000). Environmental ethnics and information asymmetry among organizational stakeholders. *Journal of Business Ethics*, *27*, 215-228.

Lakoff, G., & Dean, H. (2004). *Framing 101: How to Take Back Public Discourse. Don't Think of an Elephant! Know Your Values and Frame the Debate: The Essential Guide for Progressives*. White River Junction, VT: Chelsea Green Publishing Company, 3-34.

Lawrence, G., Goolsby, D., Battaglin, W., & Stensland, G. (2000). Atmospheric nitrogen in the Mississippi River Basin- emissions, deposition and transport. *The Science of the Total Environment*, *248*, 87-99.

McIsaac, G., David, M., Gertner, G., & Goolsby, D. (2002). Relating net nitrogen input in the Mississippi River Basin to nitrate flux in the lower Mississippi River: A comparison of approaches. *Journal of Environmental Quality*, *31*, 1610-1622.

Mitsch, W.J., Day, J.W., Gilliam, J.W., Groffman, P.M., Hey, D.L., Randall, G.W., et al. (2001). Reducing nitrogen loading to the Gulf of Mexico from the Mississippi River Basin: Strategies to counter a persistent ecological problem. *BioScience*, *51*(5), 373-388.

Moore, G. (2002). *Living with the Earth: Concepts in Environmental Health*, 2nd edition. Boca Raton, Florida: CRC, 363, 378, & 419.

National Ocean Service. (2008). *The Gulf of Mexico at a Glance*. Washington, D.C., U.S. Department of Commerce: National Oceanic and Atmospheric Administration.

Nations Encycopedia (n.d.). Retrieved May 30, 2009 from http://www.nationsencyclopedia.com/Europe/Germany.html

Prato, T. (2001). Water quality issues facing agriculture and rural communities. *Agricultural Outlook Forum*. Retrieved September 29, 2009 from http://purl.umn.edu/33079.

Rabalais, N., Turner, R., & Wiseman, W. (2001). Hypoxia in the Gulf of Mexico. *Journal of Environmental Quality*, *30*, 320-329.

Rabalais, N. N., & Turner, R. E. (2001). *Coastal hypoxia: Consequences for living resources and ecosystems*. Washington, D.C.: American Geophysical Union.

Scavia, D., & Bricker, S. (2006). Coastal eutrophication assessment in the United States. *Biogeochemistry*, *79*, 187-208.

Scavia, D., Rabalais, N., & Turner, R. (2003). Predicting the response of Gulf of Mexico hypoxia to variations in Mississippi River nitrogen load. *Limnology and Oceanography*, *48*(3), 951- 956.

Smith, S., Swaney, D., Talaue, L., Bartley, J., Sandhei, P., McLaughlin, C., et al. (2003). Humans, hydrology, and the distribution of inorganic nutrient loading to the ocean. *BioScience*, *53*(3), 235-244.

Stow, C., Qian, S., & Craig, J. (2005). Declining threshold for hypoxia in the Gulf of Mexico. *Environmental Science and Technology*, *39*, 716-723.

Tilman, D., Fargione, J., Wolff, B., Antonio, C., Dobson, A., Howarth, R., et al. (2001). Forecasting agriculturally driven global environmental change. *Science*, *92*, 281-284.

United States Commission on Ocean Policy. (2005). Clear waters ahead: Coastal and ocean water quality. Retrieved June 10, 2009, from http://oceancommission.gov/documents/prelimreport/05_clear_waters.pdf.

Warner, K.D., & DeCosse, D. (2009). Who, when, where and how: The distinctiveness of environmental ethics. Retrieved May 13, 2009, from http://www.scu.edu/ethics/practicing/focusareas/environmental_ethics/lesson2.html.

White, L., (1967). The historical roots of our ecological crisis, *Science*, 55, 1203-1207.

ABOUT THE AUTHORS
Mary Martinasek (mmartina@health.usf.edu) is a PhD student in the Department of Community and Family Health, University of South Florida College of Public Health, Tampa, FL. Christian Watamaleo (stillshinen@inbox.com) is an MPH student in the Public Health Practice program, University of South Florida College of Public Health, Tampa, FL. Claudia X. Aguado Loi (cloi@fmhi.usf.edu) is a PhD student in the Department of Community and Family Health, University of South Florida College of Public Health, Tampa, FL. Cynthia Pace (cpace@health.usf.edu) is an MPH student in the Department of Community and Family Health, University of South Florida College of Public Health, Tampa, FL. Selina Radlein (sradlein@health.usf.edu) is an MPH student in the Department of Epidemiology and Biostatistics, University of South Florida College of Public Health, Tampa, FL. An earlier version of this paper was presented at the 11th Health Education and Injury Prevention Partnership Course and Field Conference, Cologne Germany, May 16-22, 2009.