Addressing Causes of Environmental Degradation through Regime-Building and International Cooperation: A Comparative Case Study of Lake Victoria and the Aral Sea

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Abstract

Large scale environmental degradation is a problem that plagues individuals, communities, nations, and the international community. In a search for solutions, this essay asks the question: *How are the causes of environmental degradation addressed by nations?* Some perspectives on the topic are rooted in the problems which stem from environmental degradation, can be economic, social, political, and scientific in nature. The literature within economics tries to establish a link between development and the state of the environment. Development can also refer to social and political debates that try to establish a link between governing and freedom and the environment. Further still, scientific debates address social issues like health linked to pollution and environmental problems to human population and the environment. The literature in these fields offers solutions albeit inadequate ones to environmental problems. While each perspective offers solutions on how to address environmental degradation, the most holistic approach is through the study of international regime-building and cooperation within the international relations literature. Through a comparative case study, this essay examines two cases of large-scale environmental degradation to freshwater resources; Lake Victoria in East Africa and the Aral Sea in Central Asia. The results support hypotheses in international relations that regime building and international cooperation are how nations address the causes of environmental degradation. These findings not only reveal that regime-building and international cooperation are being used but that through these instruments, improvement of once degraded resources is possible.

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Introduction

Environmental degradation is a problem that plagues most countries in the world. Environmental degradation encompasses a range of problems including but not limited to extraction, pollution, erosion, depletion, and desiccation. Global warming and climate change are issues of the largest scale that affect all nations and are not easily controlled. Environmental degradation has been more adequately addressed on a global scale since the 1980's. During this time, a surge of information was made available and publicized on the subject.[1] Growing interest in a "greener" or more sustainable world has taken root in small communities, and on a global scale. Worldwide this involves the cooperation of governments and formation of non-governmental organizations (NGO's).

This general increase in awareness and concern does not show the difference in environmental degradation that is naturally occurring, as well as more specific man made events. Issues of environmental degradation like these lie closer within the reach of being controlled. Many environmental problems can even be traced to a direct man made cause and their correction is in much closer human control. Some of the problems countries face today are legacies of previous regimes and the solutions to these more specific issues will also be addressed here.

Disasters of environmental degradation have occurred throughout the world on numerous occasions.[2] Two disasters that have garnered global attention are that of the degradation of Lake Victoria in East Africa and the Aral Sea disaster in Central Asia. While attention has been paid to

[1] Lowe, Laura, Krosnick, Jon A., Holbrook, Allyson L., and Penny S. Visser. "The Origins and Consequences of Democratic Citizens' Policy Agendas: A Study of Popular Concern About Global Warming." *Climate Change* 77 (2006): 7-44. Accessed May 11, 2012, doi: 10.1007/s10584-006-9068-8

[2] Melillo, Jerry M., Mooney, Harold A., and Peter M. Vitousek. "Human Domination of Earth's Ecosystems." *Science* 277 (1997): 494-499. Accessed 9/04/2012.

both it warrants discussion to analyze the origins of each issue and how they were and continue to be addressed. The environmental problems associated with each resource were created decades ago and continue to be issues of contention into the present.

This essay focuses on answering the following question: *How are the causes of environmental degradation addressed by nations?* Asking this question allows competing voices from different fields (for example, biology and international relations), to be heard and to filter out which information best contributes to the ongoing debate addressing global environmental problems. A comparative case study among Lake Victoria and the Aral Sea, two of the world's largest bodies of freshwater, was conducted to answer this question. Environmental degradation of these two natural resources began before the current countries surrounding them even existed. The causes of environmental degradation of these lakes can be attributed to British colonial rule of former East Africa and the Soviet Union, respectively. The purpose of looking at these cases is to examine what actions have since been taken or how these causes are addressed and whether they are similar, different, and can be explained by theories in international relations scholarship. Other cases that could have been chosen include cases of deforestation, species population collapse, soil degradation, air pollution and toxic dumping. Such cases were not chosen for reasons explored further in chapter two.

Environmental degradation is discussed in many fields in both the natural and social sciences. The conclusions drawn from the literature however, address only the links established between certain factors and environmental problems. It does not discuss how or what nations are doing to stop or improve the problems. In international relations literature, regime building and international cooperation are often brought up as a way nations *could* or are thought to handle

environmental problems and how this process might work. It falls short of actually testing this theory in depth on internationally recognized cases.

Voices that contribute to the debate of how the causes of environmental degradation are addressed come from many areas of academia. This essay looks at contributions from the fields of biology, economics and development, and international relations. Awareness among all fields is essential to come to coherent solutions when faced with such large-scale problems as those examined in this essay. Authors in biology do not dismiss that environmental issues are politicized. They also choose to focus on and examine the effects of a growing world population when it comes to these issues. Others in economics and development argue that their own observed patterns can show us how countries address environmental degradation. Democracy is even argued to be linked to the likelihood of addressing the causes of environmental degradation.[3] Furthermore, theory in international relations argues that regime building and cooperation are responsible for how causes of environmental degradation are addressed. It takes into consideration all aspects of the debate from the scientific and biological concerns, to social, political, and economic agendas. International regimes and institutions have shown that they build a platform from which international actors and countries can formulate a discussion and adequately solve problems including those facing the environment.

The following case studies trace the historical origins of each environmental problem and compare several variables to address the magnitude and common beliefs associated with the problems relating to environmental degradation for both Lake Victoria and the Aral Sea. While this essay focuses specifically on how nations are addressing environmental problems, it is part

[3] Payne, Rodger A. "Freedom and the Environment," *Journal of Democracy,* 6.3 (1995): 41-55. Accessed 8/09/2012. http://muse.jhu.edu/journals/journal_of_democracy/v006/6.3payne.html

of the larger debate on global warming.[4] Scientists readily produce information and statistics on the temperature of the earth and rate of disappearance of the polar ice caps. International organizations like the United Nations are also vital players in this debate. How nations address the causes of environmental degradation must be further examined to provide information which can be evaluated to determine if it is improving, not affecting, or negatively affecting the goal of reducing global warming. The specific problems that plague resources and other parts of the environment may vary in type and magnitude, but as this essay shows, regime-building and international cooperation are tools through which countries can confront these problems no matter their origin, scope, or magnitude.

[4] Chittibabu, P., Khandekar, M.L., and T.S. Murty. "The Global Warming Debate: A Review of the State of Science." *Pure and Applied Geophysics* 162 (2005): 1557-1586. Accessed 10/04/2012. doi: 10.1007/s00024-005-2683-x

CHAPTER 1: RESEARCH DESIGN

The objective of this essay is to highlight the competing voices in the fields of international relations and biology by asking: *How are the causes of environmental degradation addressed by nations?* This question is addressed within the context of the debate on global environmental issues. The selected variables for the case studies (Lake Victoria and the Aral Sea) operate under the assumption that conditions for each case will be different, but despite their difference, problems of environmental degradation are addressed similarly by nations. Natural scientists, namely biologists, are not naïve to the reality that politics on all levels (local, national, and international) has the ability to influence the natural state of the environment, however their research is far more empirical as a result. International relations could be especially appealing to these scientists researching problems of environmental degradation on an international scale.

Two examples of this type of large scale degradation which will be compared in this essay are the degradation of Lake Victoria (in East Africa) and the Aral Sea disaster (in Central Asia). Unlike many issues of environmental degradation, each of these problems has warranted considerable attention by natural scientists as well as the international community. This makes these cases ideal for a comparison which will demonstrate and evaluate how nations address the causes of environmental degradation. This essay builds on liberal international relations theory and contributes to the literature by demonstrating how international regimes and institutions have the impact on the natural world many scholars in international relations declare that they have.

1.1 METHODOLOGY

To highlight the differences in the conditions of each case and prove how nations approach environmental problems in similar ways, five carefully selected variables were chosen:

1) water level, 2) water pollution, 3) GDP per capita of countries contiguous to the water resource, 4) freedom rating[5] of countries contiguous to the water resource and; 5) the total population dependent on the water resource. The data for each of the five variables will be presented for both Lake Victoria and the Aral Sea, and the author will conduct a comparative case study before giving an in-depth analysis of the findings.

Each of the variables was chosen based on the specificity of the resource and to test common beliefs in the literature about the link between the causes of environmental degradation and international relations. Variables 1 & 2; water level and water pollution, are variables most interesting to natural scientists, but that have an impact on the decisions of countries and their role internationally when addressing the problem. Water level and water pollution are physical, or as Thomas Homer-Dixon would call them "technical", indicators which can be measured using scientific approaches. They show proof of changing physical characteristics to the environmental freshwater resources. While other physical variables exist, water level is of special interest when relating to the two selected cases as it is the one of foremost issues of environmental degradation to the resources. The water levels of Lake Victoria and the Aral Sea have been measured and monitored over the years because they greatly affect the ecology of the lakes. In contrast, pollution is too general to pin point, and cannot be separated from a number of environmental factors. As previously mentioned, Variables 1 & 2 are representative of "technical" problems that can be solved using ingenuity by Thomas Homer-Dixon. While the purpose of comparing these two variables for each case is not to prove Homer-Dixon's proposed solution of ingenuity but to test "technical" problems using scientific data. Variables 3, 4, & 5;

[5] Freedom rating is a statistic compiled from polling by the organization Freedom House. Standard, reputable reports have been issued since 1972 and have with stood criticisms making is a reliable source for statistics by scholars.

GDP per capita of countries contiguous to the water resource, freedom rating of countries directly bordering the water resource and, the total population dependent on the water resource, are present in this essay to test common beliefs in the literature about the link between the causes of environmental degradation and other factors.

Variable 3, GDP per capita, is an indicator used to measure development and the economic well-being of a nation. As discussed in the literature review, Simon Kuznets believed there to be a link or pattern among economics and development. This concept was later applied to the environment in what is known as the environmental Kuznets curve. The environmental Kuznets curve is a mathematical translation of the link between development and environmental degradation. While the environmental Kuznets curve finds an emergent pattern, a link between development and environmental degradation is not an indicator of how nations address environmental problems. It takes a step within the debate on global environmental issues but falls short of providing a solution or pattern of solving the problem.

Freedom Rating, Variable 4, is representative of Rodger A. Payne's assumption that there is a link between environmental degradation and democracy. How nation's address environmental problems might then depend on the level of democracy they have obtained. Comparing the Freedom Rating of the countries bordering the two freshwater resources in this study and then looking at how the problems inflicted on the resources are being addressed test's Payne's assumption. The total population dependent on the water resource, Variable 5, and its relationship to environmental degradation of the resource will also test for the accuracy of the belief that overpopulation negatively affects natural resources.[6] This belief is put forth by Paul

[6] Ehrlich, Anne and Paul R., "Population, Growthism, and National Security," in *The Population Explosion*, pp. New York: Simon and Schuster, 1990.

Ehrlich that ecologically, natural resources and the use thereof are not equipped to handle larger or increases in population.

Each of the five variables is quantified and compared between Lake Victoria and the Aral Sea. It is assumed that for variables 1 and 2, a difference will be found between Lake Victoria and the Aral Sea. It is further assumed that for variables 3, 4, and 5, the outcome of the comparison will differ from common beliefs and assumptions made in the literature about the topics these variables represent. Although the assumption is to see a difference between the cases, when explored further the prediction is that international relations theory relating to regime building and international cooperation, can answer how nations address the causes of environmental degradation.

1.2 CASE SELECTION

The two cases selected have been two of the most significant instances of environmental degradation faced in recent environmental history.[7] Both Lake Victoria and the Aral Sea have had significant attention paid to them by both the scientific and international political community. The territory surrounding each water resource was also previously under the control of a different national and political regime; Lake Victoria formerly surrounded by British East Africa (now Kenya, Uganda, and Tanzania) and the Aral Sea formerly surrounded by the Soviet Union (now wedged between Kazakhstan and Uzbekistan).

Each of these cases is a representation of manmade environmental degradation to a natural, freshwater resource. Other cases that could have been studied include several instances

[7] United Nations Television, "Aral Sea/Environmental Disaster," *United Nations News and Media*, Accessed July 15, 2012. http://www.unmultimedia.org/tv/unifeed/d/10681.html

of deforestation throughout the world, species population collapse due to over fishing, hunting, or harvesting, soil degradation, air pollution, and toxic dumping.

One of the most famous cases of deforestation has been and continues to occur in the Amazon Rainforest. Other cases can be found historically in the United States, colonial Africa, China, and northern India among many other areas. Deforestation is not an ideal example for this research question because, in a majority of cases, an indigenous or local population lives within the forest. Therefore when researching such instances of environmental degradation, it would be impossible to completely separate the social and ethical aspects that come with a population living *within* a territory that is considered to have suffered or is suffering from an environmental disaster. A less accurate assessment of how countries address these issues would, however, be possible.

The collapse or extinction of a species population is another type of case that could have been studied. In these cases, because the main element is not human or seen to have a direct impact on human life outside of food and profit, it does not carry the same weight of importance as environmental problems that share a direct link with human well-being.

Soil degradation is another type of environmental degradation with cases like the expanding Gobi desert being one of the most prominent. Cases like these are heavily intertwined with global warming and changing rain patterns making it difficult to assess where the problem began and where it's future lies. Instead of the countries being affected by these instances being responsible for the source of the problem, the source may often lie elsewhere. Soil degradation is also often an indicator of other environmental problems and itself is not the root cause.

Cases of air pollution were not chosen because of the nature of the resources. Air molecules travel and can spread over borders, and even globally, making it impossible to track the origins. Isolated bodies of freshwater in comparison, are a segregated resource whose location and biological indices can be sampled with more accuracy and relate to the nation or nation's directly bordering the resource.

Finally, toxic dumping is also responsible for many cases of environmental degradation. In these cases, many types of natural resources in the environment can be affected including all of those previously listed. This however is an *action* not an *outcome* like the cases being addressed in this essay. The degradation of freshwater resources being examined is looking at how causes, which have led to negative outcomes, are being addressed.

This essay examines two cases of freshwater degradation: Lake Victoria and the Aral Sea. The dimensions along which theses cases can be defined, other than being bodies of freshwater, are that they are, or were previously among the world's four *largest* bodies of freshwater, leading to the fact that they became two of the greatest and most devastating instances of environmental degradation, the causes of each instance can be traced back to specific actions taken on behalf of a previously ruling government over the territory where each body of water is located. These cases were chosen because they are two of the most significant and best documented cases in the developing world. Freshwater resources are also a shared resource, but one that human beings do not live on; like territory.

1.3 DATA GATHERING

Sources for the study have been drawn from a variety of mediums, including: books, magazine and newspaper articles, journal articles, research institutes, International Organizations (IO's) and government publications. Academic studies and papers found in journals account for

the majority of secondary sources. Primary sources are taken from data and statistics officially published by the United Nations[8], World Bank[9], International Monetary Fund[10], CIA World Fact Book[11], and Freedom House[12]. To understand the background of the degradation affecting each of the water resources, the author historically traces the degradation of both Lake Victoria and the Aral Sea using sources from online academic journals.

1.4 ORIGINALITY AND LIMITATIONS

A comprehensive comparison of the two instances of water degradation for Lake Victoria and the Aral Sea shows how nations use regime building and international cooperation to address problems of environmental degradation. Furthermore, the causes of each of these disasters can be traced back to a manmade source and cannot be entirely blamed on global warming and climate change.[1314] The change in political rule for the territory surrounding each resource allows a baseline from which we can study. How nations address the causes of environmental degradation would be a question constituting a drastically different answer if these areas were still part of a larger colonial empire or vast union. This study is limited by the information available by print and online sources, as funding for first hand data gathering through scientific testing or from on site research institutes was unavailable at the time of writing. Other methods could have also included personal interviews and observation of current working programs on site at Lake Victoria and the Aral Sea, and again a lack of funding and time made this approach impractical.

[8] United Nations Environment Programme. http://www.unep.org/
[9] The World Bank. http://data.worldbank.org/
[10] International Monetary Fund. http://www.imf.org/external/data.htm/
[11] The World Fact Book. https://www.cia.gov/library/publications/the-world-factbook/
[12] Freedom House. www.freedomhouse.org
[13] Pringle, Robert M. "The Origins of the Nile Perch in Lake Victoria" *BioScience,* 55 (2005): 780-789. Accessed May 13, 2012.

[14] Micklin, P.P. (1988, September 2). Desiccation of the Aral Sea: A Water Management Disaster in the Soviet Union. *Science*, 241, pp. 1170-1176.

CHAPTER 2: LITERATURE REVIEW

Issues relating to the environment are arguably global or international issues.[15] The vantage point from which authors Thomas Homer-Dixon, Paul Ehrlich, Lawrence Goulder, Barry Commoner, Oran Young, Peter Haas, Robert Keohane, Marc Levy, and Kate O'Neill argue however, imply that degradation can create larger problems on an international basis. Some argue that a lack of natural resources, many times caused by manmade degradation oftentimes leads to conflict. This conflict can occur within a single country but more likely it will occur among countries. Other authors take the opposite view and takes on the voice that environmental problems are addressed with cooperation and institution-building. Democracy and income have even been linked to environmental problems with the politico-economic-democratic power structure claiming this form of governance is good for the environment. The third, most prevalent opinion is that common beliefs, values, rules and norms within a society are how individuals form a bond internationally to confront environmental degradation.

2.1 ENVIRONMENTAL DEGRADATION, SECURITY, AND DEMOCRACY

The environment and its woes have been linked to both conflict and cooperation. Some, like Thomas Homer-Dixon argues that environmental problems are addressed with violence and conflict. He furthermore explains that the ability to correct violence and conflict as a result of environmental problems is through ingenuity. This author proposes therefore, that ingenuity is the defining force responsible for addressing and solving environmental problems that he claims usually lead to conflict and violence when left by the wayside. Ingenuity is defined as a set of, "ideas that can be applied to solve practical technical and social problems, such as the problems

[15] Emissions for example come from individual countries to escape into the atmosphere but the problem they create is global in nature as air pollutants know no bounds. Hoel, Michael. "Global environmental problems: The effects of unilateral actions taken by one country." *Journal of Environmental Economics and Management* 20 (1991): 55-70. Accessed 8/28/2012. http://dx.doi.org/10.1016/0095-0696(91)90023-C

that arise from water pollution, cropland erosion, and the like."[16] From this perspective, environment issues are not addressed directly but the problems they create are. Ingenuity is further differentiated as being either 'technical' or 'social'[17]. Ingenuity is seen as a means to both create new technology responsible for the conservation of resources and reforming of institutions and social arrangements. In this sense, a state's economic and political capacity is stretched in the face of environmental problems and environmental problems are addressed by taking security measures.

Others have proposed that it is not "ingenuity" but the system of governance, namely democracy that has a definitive impact on the environment.[18] While some believe democracy produces positive effects on the environment, others argue the opposite and find negative evidence toward the environment to support their claims. Authors like Rodger A. Payne argue that democracy is conducive to positive effects on the environment.[19] His argument is based around the state of the environment and the regime type, not the quantitative data. Most famously, he references the environmental travesties of the Soviet Union and China, in comparison to the more ecologically sound (in his opintion) United States. Just a few years later Manus I. Midlarsky conducted a study using the kind of empirical statistical analysis that had been missing from the dominant dialogue on the issue, to definitively prove the relationship between democracy and the environment, whether positive or negative.[20] Midlarsky looks at the

[16] Homer-Dixon, *The Ingenuity Gap*, 21.
[17] Ibid, 22.
[18] Payne, Rodger A. *Freedom and the Environment,* "Journal of Democracy," 6.3 (1995): 41-55. Accessed 8/09/2012. http://muse.jhu.edu/journals/journal_of_democracy/v006/6.3payne.html
[19] Payne's five points arguing democracy is good for the environment are: 1) individual rights and the open marketplace of ideas, 2) regime responsiveness, 3) political learning, 4) internationalism, and 5) open markets. Payne, Rodger A. *Freedom and the Environment,* "Journal of Democracy," 6.3 (1995): 41-55. Accessed 8/09/2012. http://muse.jhu.edu/journals/journal_of_democracy/v006/6.3payne.html
[20] Midlarsky, Manus I. *Democracy and the Environment: An Empirical Assessment,* "Journal of Peace Research," 35 (1998): 341. Accessed 8/09/2012. DOI 10.1177/0022343398035003005

effects of democracy on five variables[21] and concludes that there is no set or distinctive pattern between democracy and its impact on the environment. With this evidence, one cannot take in the argument that democracy is the best way to address environmental degradation without some skepticism.

Arguments relating to democracy and the environment are also intertwined with other arguments relating to population, economics, and development. In the following, more views and authors are discussed to show these relationships.

2.2 BIOLOGISTS ON POPULATION, POLITICS, AND ENVIRONMENTAL DEGRADATION

Authors in biology and ecology can offer a different perspective. While it is not complete (nor can any single discipline provide a complete picture of an issue) and does not take into accord international relations theory and institutional cooperation or conflict, it offers a different lens from which we can view issues of environmental degradation and how countries address such problems. Paul Ehrlich is one author who points out a misconception in the "West", which he believes is endangering the global environment. Ehrlich addresses growth. Previously in the West population growth was viewed as essential to economic growth, Ehrilich notes.[22] Ehrlich argues that the opposite is true: larger populations cannot be sustained economically or by the environment. He blames economic beliefs for the failure of people to recognize what he calls the "population crisis"[23]. From this view, addressing problems of environmental degradation would mean addressing the "population crisis." Ehrlich's voice is a strong one amidst a well-known debate between ecologists and economists, more popularly discussed as a Malthusian crisis. The

[21] 1) deforestation, 2) air quality, 3) soil erosion by water, 4) protected land area, 5) freshwater availability, and 6) soil erosion by chemicals. Ibid
[22] Ehrlich, "Population, Growthism, and National Security," 158.
[23] Ibid, 162.

idea, made popular by Thomas Malthus in 1798 in his work, *An Essay on the Principle of Population*, posits whether or not an environment can support an indefinitely large population.[24] In the modern economic context, we ask: *What can we spend to maximize efficiency of resource use while not destabilizing natural balance and also making a profit?* Proponents of the environmental economics approach apply economic theories while taking the environment into account to do so. Some, like Lawrence Goulder an environmental economist at Stanford, argue in favor of this approach applying formulas and outcomes. The biggest problem with this approach is that even the most advanced econometric model cannot predict all of the variables present in the natural world. In fact, these models have proven futile in the prediction of purely economic events, such as the 2009 global financial crisis.[25] The method of addressing environmental problems through population and economics is therefore at a loss from the start.

Biologist Barry Commoner, in straightforward manner tells us that environmental problems are political problems and that corporations lay behind the lack of progress for a country to address them; his focus being on the United States.[26] Commoner describes a "hard path" and "soft path". The "hard path" being the political (and only path in Commoner's view that can accomplish actual environmental change) and the "soft path" accepts corporations governing and decision making.[27] In his view, causes of environmental problems are politicized and appear to be controlled by the economy and big business. They are essentially political and economic problems, and not entirely ecological. Commoner also gives weight to grass roots movements that he believes are making a difference in addressing environmental problems.

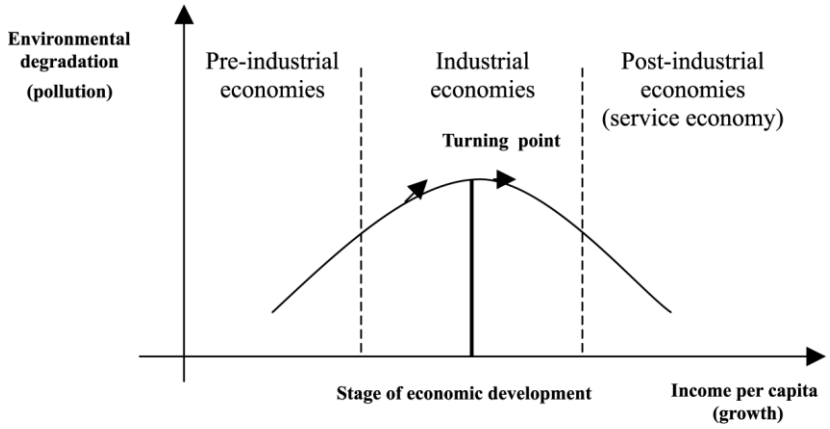
[24] Malthus, Thomas. *An Essay on the Principle of Population,* 1798.
[25] Colander, David, Goldberg, Michael, Haas, Armin, Juselius, Katarina, Kirman, Alan, Lux, Thomas, and Brigitte Sloth. "The Financial Crisis and the Systemic Failure of the Economics Profession." *Critical Review: A Journal of Politics and Society* 21 (2009): Special Issue: Causes of the Financial Crisis. Accessed 8/09/2012. doi: 10.1080/08913810902934109
[26] Commoner, "Environmental Action," 173.
[27] Ibid, 174.

When governments or countries fail to act or take inadequate action, citizens groups and individuals take the lead.

2.3 ECONOMICS AND DEVELOPMENT; HOW THEY FOUND THEIR WAY INTO THE ENVIRONMENTAL DEBATE

The economics and development literature also offers two important and interrelated perspectives to the causes of environmental degradation and how they are addressed. Simon Kuznets was the first to present the idea that inequality and wealth, or economic development of a country, were interrelated.[28] The Kuznets curve is mathematically-based and shows that economic inequality is low when a country has not developed, increases as a country develops, and again decreases as economic growth and development lead to improvement for everyone. Later this concept was used to explain the relationship between environmental degradation and economics. The environmental Kuznets curve (pictured below) exhibits the same U-shape as the original showing the relationship between economic inequality and development.[29]

Figure 1: Environmental Kuznets Curve



Source: Panayotou (1993)

[28] Kuznets, Simon. "Economic Growth and Income Inequality," *The American Economic Review,* 45 (1995): 1-28. Accessed July 15, 2012.
[29] International Trade and Environment. http://environmentaleconomics.wordpress.com/2010/05/02/international-trade-and-environment/

Again, the rate of environmental degradation low before a country develops, increases during development, and again decreases as higher levels of economic growth are reached.[30] While patterns like this have been identified, they may fall short in some cases.

2.4 INTERNATIONAL REGIME-BUILDING AND COOPERATION

All of the previously mentioned authors and literature identify one part or factor that is then deemed responsible for not only the causes of environmental degradation, but then how countries address the problem. When looking at problems of environmental degradation from the view of international relations theories, we can develop a wider and more fruitful approach to understanding the behavior of the relationship between problems of environmental degradation and how countries act to address them. International regime-building and cooperation does not look to only one factor to explain this relationship, but many. To approach the subject of environmental degradation saying that regime building and cooperation are responsible for how countries address these issues is to take into account not only social conditions like conflict and population, but also the biological data and statistics necessary to fully understand the problem, the government types that are involved, the economic status of each country involved, and the related international community capable of providing the infrastructure, funding, and other support necessary to address manmade environmental problems.

In his book *International Regimes in Practice,* Oran Young contributes a chapter comparing models of regime building in the cases of marine fisheries and deep-seabed mining. The examination of international regimes in the first place is justified by Young earlier in the

[30] Stern, David I. "The Environmental Kuznets Curve," *International Society for Ecological Economics.* Accessed July 15, 2012. http://www.ecoeco.org/pdf/stern.pdf

book. He argues that the assumption in international relations that interaction and cooperation among the worlds' states is a given or a natural condition, is too simplified an approach[31]. Furthermore, he claims that by expanding the study of regimes beyond trade and monetary relations, we can further develop our understanding of them. In chapter five he addresses the problem of regulating natural resources that cut across state boundaries or lie entirely out of reach by nations' jurisdiction[32]. He identifies two other approaches to the problem for which he thinks are ineffective: unilateral state control on an issue by issue basis and global governance by institutions which will lack the ability of effective implementation. Instead he argues that supranational arrangements at the international level are most desirable to manage natural resources or, in other words, he examines conditions under which such arrangements are the preferred strategy for natural resource management. He applies each of the three scenarios to marine fisheries and deep-seabed mining.

Although Young details each of these examples, the approach is sparse and theoretical; especially in the second example. Young is proposing what 'should' happen and is doing so based on his own opinion and a counterfactual argument. He does not show enough evidence other than a few lines from the FCMA to uphold his objections. Furthermore, the second example is entirely theoretical and although it allows us to peer into what a world using supranational regimes to address resource issues would look like, it is not beneficial in making an accurate assessment of problems surrounding natural resources at the international level.

Peter Haas builds on regime theory and identifies a specific factor that he claims is transformative in nature and goes beyond looking at only the political and economic aspects

[31] Young, "Comparative Statics: Regimes for the Marine Fisheries and Deep-Seabed Mining," 1.
[32] Ibid, 109.

regimes may or may not produce. He believes that communities of shared knowledge or epistemic communities have the ability to alter power structures through the use of regimes[33].

Using the Mediterranean Sea as the premier example in his book, Peter Haas conducts an extended analysis by telling the story of the polluted Mediterranean Sea and how it ceased to become "a biological time bomb"[34]. Chapter three details the beginning of awareness by surrounding countries and how a plan was developed to confront the causes of environmental degradation to the Sea. According to Haas, sixteen Mediterranean countries began working together in 1975 to negotiate what became known as the Mediterranean Action Plan. These countries recruited the United Nations Environmental Programme (UNEP) to address the causes of degradation to the Mediterranean. Haas argues that an epistemic community arose out of continued efforts led by UNEP and was comprised of both politicians and scientists. Individuals dedicated to preserving the environment included UNEP leadership, members of governments, scientists, UNESCO bureaucrats, and FAO lawyers. Haas continues with his argument by identifying alliances formed because of UNEP with marine scientists who then communicated to their government the importance of stopping degradation. Haas then gives two examples detailing the interactions of UNEP with a Yugoslav scientist and the French Foreign Affairs Ministry. Haas tells the compelling story of how UNEP took a holistic and interconnected approach to the issue similar to that of an ecological approach. This included working at both the international and national level and keeping talks and negotiations alive by building alliances to develop political compromise. Furthermore, the development of the epistemic community, Haas argues, provided a platform through which experts had access to policy makers, which led to

[33] Haas, "The Origins of Awareness of Mediterranean Pollution and Early Negotiations for the Mediterranean Action Plan," 377.
[34] Ibid, 66.

informed, convergent, and broad successful policies[35]. UNEP was able to bring together the right balance of the wants and needs of politicians along with the desires of scientists. Therefore, how countries address the causes are answered with an epistemic community led by UNEP and joined forces of scientists and politicians. The combination of UNEP, government officials, research scientists, regional efforts, and the development of monitoring and research projects are what formed this epistemic community.

Haas' approach is a documentation of the process that took place and actors involved that were responsible for addressing the degradation of the Mediterranean Sea. His main argument that epistemic communities play a large role in the success of a regime is criticized by some as being ambiguous. One author notes that Haas does not draw the distinction of whether this community is a necessary condition or a sufficient one[36].

Other proponents of international regime building and cooperation among countries to solve environmental problems include Robert Keohane and Marc Levy who co-authored Peter Haas in *The Effectiveness of International Environmental Institutions.* In this chapter taken from a book on environmental institutions, the authors very strongly argue that the future of the earth and its preservation for future generations is entirely dependent on the cooperation of states through institutions[37]. Institutions are defined as, "persistent and connected sets of rules and practices that prescribe behavioral roles, constrain activity, and shape expectations.", and include bureaucratic organizations, regimes and conventions. Institutions are the broad umbrella that encompasses several examples of cooperation as a means to addressing transboudary issues especially those concerning environmental degradation. Successful attempts at employing

[35] Ibid, 79.
[3636] Weale, "Saving the Mediterranean: The Politics of International Cooperation by Peter M. Haas: Review", 441.
[37] Haas, Levy, and Keohane "The Effectiveness of International Environmental Institutions," 5.

institutions to solve problems are mentioned with the United Nations Conference on Environment and Development or UNCED, as the most admired example. This chapter clearly outlines how environmental institutions are effective, listing three main reasons: the contribution and consensus over appropriate agendas, more specific policies obtained through intergovernmental bargaining and, their contribution to national policy responses directly linked to the environment[38].

More recently, author Kate O'Neill looks at how international actors including national governments, international organizations (IO's), experts, everyday people, and private corporations address the world's environmental issues in her book, *The Environment and International Relations*. O'Neill builds on the same framework as Young, Haas, Levy, and Keohane. Her approach however, is all-encompassing because she does not limit the discussion of environmental issues to only the institutionalist interpretation. Part of her approach is to identify "sites" or "arenas of governance within the broader structure of global governance in which actors interact and make decisions" and "modes" or, "ways of crafting and implementing environmental regulations and initiatives."[39] This is a clear example of institutionalism at work. O'Neill looks at the platforms created or provided in the international or global arena and how actors (mostly non-state actors) utilize them as a tool; specifically to be applied to global environmental issues. This does not appropriately confront the role of national governments. It assumes that "sites" and "arenas" are capable of carrying out actions. As we have seen from the five countries evaluated in this paper, action to correct the environmental degradation of Lake Victoria and the Aral Sea has taken place through national governments, local officials, and citizens.

[38] Ibid, 8.
[39] O'Neill, Kate. *The Environment and International Relations*, 2009

More specifically, when talking about national governments as actors, O'Neill is again looking at them *in relation to* non-state actors. She observes that governments take the lead while non-state actors fill the supporting roles when addressing global environmental governance or how international and global environmental issues are being handled.[40] In relation to the state, she is looking at what the states goals or interests are and where they come from.[41] Her argument stays true to institutionalism saying that states or national governments are increasingly determining global environmental governance through the use of multilateral institutions and predicts that how environmental problems are addressed depends on a) crises and awareness, b) leadership and leverage, c) the rules of the game, and d) domestic politics.

What one can see from the institutional perspective is that the studies are based primarily on how countries cooperate and not how environmental issues are being addressed. International relations are of course a discipline of interactions exchanged between countries. In the case of environmental issues and problems, however we must not only be concerned with the structure of the organizations, why they started, and who comprises them, but also whether they are actually working to create a physical change in environmental problems. From the point of conflict, Homer-Dixon does go to the source of the problem and say that ingenuity is needed to solve the root cause of conflict, however, ingenuity despite its given definition by the author, is a broad and vague concept that cannot be quantified, put into practice or show if any environmental issues are being improved. An improvement may be based solely on the priority and economic capacity of a country to publicly address a problem but again remains a theoretical perspective.

[40] Ibid
[41] Ibid

2.5 CONCLUSION

While many authors from several different disciplines have written about environmental problems, the ones mentioned above are the most prominent voices in the field from both international relations and biology. Each discipline contributes substantially to the debate on how countries address environmental problems however none is flawless in its approach to all cases. In some cases, authors argue that conflict and violence inspire action to cease environmental degradation. Financial incentives have been seen to be another motivating factor with authors from the fields of economics, development and biology recognizing the impact. Unsustainable populations have also been linked to how countries address problems of environmental degradation. Ultimately however, international regime building and cooperation allow for the most holistic analysis of the relationship between environmental problems and nations. It is therefore worthwhile to analyze two of the world's most studied, large scale, manmade environmental problems using this frame. In the following pages, a comparative case study of two freshwater resources show how other assumptions do not always hold true and how regime building and international cooperation may be the only way to turn issues of environmental degradation around.

CHAPTER 3: HISTORICAL BACKGROUND

Both Lake Victoria and the Aral Sea are bordered by countries that did not exist when the environmental degradation of these water resources began. Kenya, Uganda, and Tanzania that border Lake Victoria were all previously under British colonial rule while Kazakhstan and Uzbekistan, bordering the Aral Sea, were part of the former Soviet Union during the time that environmental degradation began. The story of each of these water resources therefore begins with an historical account of the actions of previous regimes and how they led to the environmental degradation countries may or may not address today.

3.1 DEGRADATION OF LAKE VICTORIA

Lake Victoria, located in East Africa, is the world's second largest freshwater lake spanning 250 kilometers at its widest point with a total surface area of 68,000 kilometers square; approximately the size of Ireland. This vast freshwater body is also the origin of the Nile River. Prior to British colonial rule in the area, the lake was home to more than 100 different species of fish.[42] The majority of the species were African cichlids; small fish that could be easily caught using basic fishing techniques and minimal materials. Therefore, the lake served as a resource for the surrounding populations in what are today's Kenya, Uganda, and Tanzania. British colonial rule began in the 1800's over the territories that are now Kenya and Uganda whereas Tanganyika and Zanzibar (later to unite as Tanzania) were originally under German authority and later transferred to the British after WWI. An era referred to as "the second colonial occupation"[43] marked a shift in the how the British approached the relationship between Great Britain and the colonies. It became one with characteristics of development rather than indirect rule and extraction of resources and labor. The harvesting of fish from Lake Victoria by the British had

[42] Kaufman, Les. "Catastrophic Change in Species-Rich Freshwater Ecosystems." *Bioscience,* 42 (1992): 847-858. Accessed May 8, 2012.
[43] Low and Lonsdale, 1976.

already started during the inception of colonial rule, and more drastic changes in fishing practices resulted over time. Initial changes were fishing methods. Modern fishing techniques and equipment such as gill nets were used to catch greater amounts of fish than could previously be achieved by the native inhabitants. Demand for fish increased as the infrastructure, like railways, expanded.[44] This increased the pressure to increase fish stock of the lake. Fish native to the lake, the majority African cichlids, were small and undesirable to the British and in many instances even referred to as "trash fish".[45] Cichlids were easily being caught by the British but were not large enough to be a desirable catch. They were fish that the British thought should only be used as bait and often got in the way of catching larger, more desirable fish. To remedy this problem, the introduction of a larger, more desirable fish was made unofficially in the 1950's and publicly in the early 1960's just before East African independence.[46] What was meant to be a social and economic solution soon turned into one of the greatest instances of environmental degradation in history.

The introduction of the Nile Perch signaled the beginning of large scale environmental issues to come. While there is some debate over when exactly the fish was introduced, there is no doubt it was an act committed by the British.[47] Other fish species[48] had also been introduced to the lake in the 1950's to replace depleted fish[49] but none became as destructive as the Nile Perch. Although a reliable food source for many years since its introduction, this large fish[50] presented a multitude of other problems. Even early ecologists were vehemently opposed to the species

[44] Pringle, Robert M. "The Origins of the Nile Perch in Lake Victoria."
[45] Pringle, Robert M.
[46] Kaufman and Pringle
[47] Pringle
[48] The African Fisheries Research organization (EAFRO) a British colonial institution, introduced four non-indigenous Tilapia species to the lake in 1953
[49] Kaufman
[50] Nile Perch can grow up to six feet long and weigh up to 500 pounds.

introduction to the lake but were unable to voice these opinions in the political climate in place at the time.[51] Early problems included: the destruction of locals' fishing nets, quickly rotting carcasses without refrigeration (which was not available in the region at the time), and inability to be sun-dried (a local technique developed for cichlids) by locals.[52] Furthermore, Nile Perch preyed on the native fish species, those easier for locals to harvest, in the lake, making them less and less available for consumption. These early problems only became exacerbated as time went on.

While the problem began in the 1950's when the British first began making ecological decisions about the lake, all issues became exacerbated in the 1980's. This was due to the enormous increase in population of the Nile Perch. An introduction made by the British to increase fish stocks, food, exports and profit, later became and is now the problem for three African nations. [53] The population explosion of the Nile Perch led to further extinction of endemic or native fish species; the species most desirable to local inhabitants. Other problems that grew since introduction included soil erosion and overall water degradation. Soil erosion was a product of the decrease in trees of the surrounding landscape. Before modern refrigeration was introduced the fish had to be smoked using wood planks. This differed from the traditional sun drying method used on native fish species that were small enough for this.

The large Nile Perch required lots of wood for smoking which was acquired by chopping down trees. This deforestation allowed the soil surrounding the lake to erode into the water creating *turbidity* or lack of water clarity. This in turn affected the amount of sunlight that could

[51] Pringle
[52] Kaufman
[53] Geheb, Kim, Kalloch, Sarah, Kyangwa, Mercy, Lwenya, Carolyne, Medard, Modesta and Anne-Theresa Nyapendi. ''Nile perch and the hungry of Lake Victoria: Gender, status and food in an East African fishery." *Food Policy,* 33 (2008): 85-98. http://ars.els-cdn.com/content/image/1-s2.0-S030691920700036X-gr1.jpg

penetrate the surface of the water, which, in turn, determined which plant species could and could not grow in the lake. Water clarity was not the only overall water degradation. Increasing Nile Perch population also led to *deoxygenation* or lower levels of oxygen in the water. Lack of oxygen inevitably leads to the death of fish both native and non-native. Nile Perch became so overpopulated at one point they even began eating their own young as a means of survival. This situation became counter to the original intention of supplying a greater food source that could be harvested, sold, eaten, and exported. Poorly thought out decisions made by the colonial British government led to a domino effect of degradation of one of the world's largest freshwater resources and changed fishing practices forever.

While environmental problems began in East Africa with the actions of the British toward Lake Victoria, they were unfortunately continued for some time, instead of being immediately dismantled by the newly independent countries of Kenya, Uganda and Tanzania. Each country established independence in the early 1960's. Especially until the large increase in Nile Perch population in the 1980's, it was difficult to understand the real impact the invasive species was having on the lake. A scientific study published in 1994 showed that there was an increasing *lack* of oxygen in the water when comparing measurements from 1960-1961 to 1990-1991.[54] The study concluded that the responsible factors were an increase in the growth of algae, climate change, and "food-web changes"[55] or the change in the presence of fish species the Nile Perch and the impact its predation has had on native fish species to the lake. Other problems like the disappearance of native fish species were also taking place but went uncorrected.

[54] Bugenyi, F.W.B., Gophen, M., Hecky, R.E., Kaufman, L., Ochumba, P. and J.F. Talling. "Deoxygenation of the Deep Water of Lake Victoria, East Africa." *Limnology and Oceanography,* 39 (1994): 1476-1481. Accessed May 23, 2012. http://www.jstor.org/stable/2838147

[55] Bulenyi *et al* 1476

It wasn't until the late 1970's when it could more easily be observed that there was a change in the composition of fish species in the lake,[56] inevitably the result of introducing the Nile Perch. Fishing practices until then were conducive to sustainability. Small boats with small nets operated by numerous local fishermen were the preferred method of harvesting fish from the lake. Further degradation of the lake ensued when a more industrialized approach to fishing took place. Fisheries became modern, industrial and factories were needed to clean and gut the larger quantity of fish being caught. Large amounts of exports were being sent to the 'West'; the countries of the European Union. One author tells us, "The foreign exchange thereby saved or earned may have enabled the purchase of essential capital goods, but as natural resources were rapidly depleted, Third World states faced a growing environmental crisis within their borders which was partly of their own making."[57] With the demand only increasing, exporting Nile Perch was a means to be part of the global economy and experience economic benefits while simultaneously disregarding the impact on the environment.

3.2 THE ARAL SEA DISASTER

Located across the border of Kazakhstan and Uzbekistan is what was once the fourth largest lake in the world. The Aral Sea is now a mostly salinized plain and has suffered a severe loss of water since the 1960's. Despite its name as a sea, two rivers, the Syrdarya and Amudarya, are the sources of inflow to what is really a lake. While the Sea itself only directly borders two countries, the rivers that flow into it include all of Central Asia. The two rivers originate in the Kunlun Mountains and spatially affect all Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan, Afghanistan, and Kazakhstan before entering into the Aral Sea. Before severe degradation, the Aral Sea acted as a freshwater resource, supported large populations of fish species, regulated the

[56] FAO Corporate Document Repository. "Lake Victoria fisheries industrialization: recent developments in Uganda." *Fisheries and Aquaculture Department.* http://www.fao.org/docrep/006/AD136E/AD136E01.htm
[57] Bryant, Raymond L. and Sinead Bailey. *Third World Political Ecology.* New York: Routledge, 1997.

climate in the surrounding area, and its surrounding shores were haven for both animals and people. Today, the same area produces a drastically different picture. Under the control of the Soviet Union the Sea was used not only for fishing but the supporting force for agricultural yields; mainly cotton. Changes began in the 1930's and the most significant of projects was underway by the 1960's. These changes included diverting water from the sources of the Aral Sea, the Syrdarya and Amudarya rivers, by digging canals. The purpose of these projects was mostly to irrigate cotton fields. However, the greater social structure of the area was also being changed at the expense of the environment. What was previously a nomadic culture became an agriculturally based community. By way of the Soviet's agricultural and industrial expansion, land in Central Asia was converted to harvest crops and feed livestock changing the society to an organized political structure over which the Soviet leaders in Moscow could exert greater control. The conversion from nomadic to agricultural society was made possible largely because of the Aral Sea and its degradation. An agricultural society was formed and profits were yielded as the Soviet's intended however it became unsustainable and the disaster that ensued is one that has been left for the younger nations of Central Asia to deal with and not the Soviet regime that created the problem.

Irrigation projects headed by the Soviet Union were responsible for the demise of the Aral Sea. Irrigation and water diversion began as early as the late 1800's but the digging of canals to produce areas that could be converted for agricultural use under Soviet rule were more purposely developed starting in the 1930's.[58] From the 1930's to 1970's there was a vast

[58] Saiko, Tatyana A. and Igor S. Zonn, "Irrigation expansion and dynamics of desertification in the Circum-Aral region of Central Asia," *Applied Geography* 20 (2000):349-367. Accessed July 12, 2012.

expansion in the surface area of land that was irrigated.[59] The expansion of irrigated land by way of digging canals drastically decreased the volume of water inflow to the Sea and eventually ceased all together. Although degradation began in the early 1900's, policies made in 1960 by Soviet planning authorities were ultimately responsible for the increased severity and total destruction of the water resource. The Aral Sea Project was set in place with the goal of expanding and increasing cotton production.

The Aral Sea Project was essentially responsible for irrigating a desert and fulfilled its goal of economic gain by way of increased cotton production. A decade later, officials began to realize that problems once considered trivial, were devastating. However, this did not stop water diversion. Project construction was done quickly and as a result many canals were improperly constructed leading to an inefficient use of water. Water that was meant for crops not only left the river source but was lost in sand and soil on its way to hydrate them. This only increased the amount of water diversion necessary to keep up yields and the rate at which water levels of the Sea dropped, increased. A decrease in fish catch was one of the first signals that brought attention to the environmental problems wrought on the Sea. The dropping water levels and increased salinity resulted in the death of entire species of fish. While there was no stopping of water diversion, the inability of any water to flow into the Sea continued leaving it to gradually evaporate.

Eventually, the Aral Sea split into two parts; the northern or Small Aral Sea, and southern or Large Aral Sea. Furthermore, the southern portion was halved as land became visible with only little connection of water flow at the southernmost part. In 1960 the water level of the Aral

[59] From 1930-1965 expansion in irrigated land was only 0.5%-1% per year but by 1970 the total surface area had exceeded one-third of the original land irrigated in 1950. Ibid, 351

Sea was estimated at 53 m above sea level whereas in 2006, water level estimates were at 30 m above sea level.[60] The exposure of land due to this split, and the surrounding soil in the area is also completely degraded. Sometimes referred to as the "white desert", toxic salts encrust the soil that was once fertile. Moreover, wind carries the dust of these toxic soils spreading chemicals responsible for human health complications and disease (costs which, although difficult to quantify, are important to consider). These devastating consequences have been at their worst since the end of Soviet rule and newly formed Central Asian republics. Their origin though, was the creation of unsustainable Soviet policy. While it was evident by the 1990's that devastating environmental problems were in existence, the newly formed countries did not have the ability to halt or correct a large scale environmental problem such as the draining of what was once the world's fourth largest body of freshwater.

In 1991 the five Central Asian republics affected by the Aral Sea, Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan, and Tajikistan, had declared independence; one year after the United Nations Environmental Programme had declared it the worst ecological disaster of the twentieth century. Swift action was taken by the five republics in the few years immediately following independence but only in the form of signing agreements. The scale of the disaster was too great to be addressed otherwise by these countries. In 2006 it was even predicted that the Sea would disappear completely by 2015.

Both Lake Victoria and the Aral Sea exhibit a history of environmental degradation that can be linked to policies of political regimes no longer in existence. While environmental

[60] Glantz, Michael H., "Aral Sea Basin: A Sea Dies, a Sea Also Rises," *Ambio* 36 (2007): 323-327. Accessed July 12, 2012.

problems began to be recognized during the previously ruling regimes, they were not considered substantial or paid enough attention until after newly independent nations had formed.

CHAPTER 4: ANALYSIS

COMPARING LAKE VICTORIA AND THE ARAL SEA; HOW INTERNATIONAL REGIME BUILDING AND COOPERATION OCURRED DESPITE DIFFERING CIRCUMSTANCES

To answer the question of how the causes of environmental degradation are addressed by countries, it is necessary to compare specific variables for both Lake Victoria and the Aral Sea. These cases were chosen because they are two of the most significant and best documented cases in the developing world. Furthermore, each case experienced the causes of its degradation during a period when a different government was in place than the one that is currently in power. Freshwater resources are also a shared resource, but one that human beings do not live on like territory. In the following paragraphs, the author pursues a comparative case study and analyzes 1) water level; 2) water pollution; 3) GDP per capita of countries contiguous to the water resource; 4) freedom rating of countries directly bordering the water resource and; 5) the total population dependent on the water resource. Each variable was selected based on assumptions from the literature mentioned at the beginning of this essay. Variables 1 & 2 relate to Thomas Homer-Dixon's theory on ingenuity and "technical" problems. Variable 3 questions the link between democracy and the environment. Variable 4 is a quantitative way to test the Rodger A. Payne's assumption that democracy is related to a positive environmental outcome and Variable 5 tests Paul Ehrlich's assumption that larger populations are to blame for environmental woes. The purpose of testing these variables is to show the differences between the lakes and the countries that surround them. It is despite these differences, that the same approach is taken to address the causes of environmental degradation: regime building and international cooperation. Each case exhibits manmade degradation to a freshwater resource but do not share other similar characteristics except how countries address their degradation.

By looking first at biological variables, water level and water pollution, it is possible to evaluate the impact manmade stressors have had on each body of freshwater. Comparing GDP per capita shows that the state of the economy does not have a significant impact on whether nations choose to cooperate to address environmental issues. Freedom rating, given by Freedom House, is a way to gauge the degree of democracy, political, and civil rights. Nations choose to cooperate when addressing the causes of the environmental problems surrounding each body of freshwater, regardless of the presence of democracy. Finally, the effects of population have been popularly believed to *be* the root causes of environmental degradation and therefore the answer, which has been proven incorrect by the literature. Several organizations, both regional and supranational, have taken part in addressing the causes of environmental degradation to Lake Victoria and the Aral Sea with the cooperation of not only the countries contiguous to each resource, but others in the region and abroad.

4.1 WATER LEVEL

Water level is an important physical characteristic for bodies of water. Dropping water levels can be considered a "technical" problem in Thomas Homer-Dixon's theoretical framework. Water level is also a measure taken by scientists in the field of biology and remains an important physical indicator of the degree of degradation of freshwater resources. It is natural for large bodies of freshwater to fluctuate in level depending on natural circumstances like rainfall and seasonal temperature. Some of the world's largest bodies of freshwater, including the Great Lakes in the United States, show changes of water level within both short term and long term periods.[61] However, in the cases of Lake Victoria and the Aral Sea, changing water levels have been dependent on more than just natural forces. The Aral Sea is more obvious with extensive projects having been built to divert water from the lake at its source, but Lake Victoria

[61] U.S. Environmental Protection Agency. "Large Lakes and Rivers Forecasting Research Branch," www.epa.gov

too has seen changes in water level that are due not only to natural causes. Dropping water levels have extensive effects not only on the human population dependent on the resource, but also the ecology within and surrounding each body of water.

Lake Victoria, unlike the Aral Sea, is more dependent on rainfall and less dependent on water inflow from rivers.[62] Despite this fact, water inflow from the river Nile is significant enough a source that when tampered with by man, a decrease in water levels can be seen. The Owens Fall Dam, a project constructed in 1954 controls part of the source of water reaching Lake Victoria. Government policies had protected water levels for some time but during a routine monitoring project, the United States National Aeronautics and Space Administration (NASA) reported that water levels dropped drastically in 2005 with rainfall and weather only partially accountable. Mainly, the dangerous drop was attributed to manmade causes; the expansion of the Owen Falls Dam. The next page contains a chart that displays data from NASA's Jason-1 satellite revealing both historic levels and the recent period of observation from approximately 1993 to 2005. The far right of the chart where the data ends, 2005, shows a drastic drop of the water level due to manmade interference. The report states that since the period in the 1960's when the water level was observed to be much higher than average, in comparison to 2005, the water dropped an estimated one full meter.[63]

[62] Riebeek, Holli. "Lake Victoria's Falling Waters," *Earth Observatory: NASA,* http://earthobservatory.nasa.gov/Features/Victoria/
[63] Ibid

Figure 2: Lake Victoria's Falling Water Levels; image taken from NASA's Earth Observatory[64]

Since the NASA report released in 2006, water levels continue to drop and in some area have even seen a full two meter drop since the 1990's.[65] Biologically, a drop in water level means a receding shoreline which eliminates shallow water habitats for particular species that breed there including fish which are most important to humans for consumption. This also means a decrease in overall water volume which shrinks the size of the habitat for other fish species and further concentrates sediment and pollutants. Another obvious repercussion is that less water means that fewer people can be supported by the resource. Lake Victoria is a water supply in the surrounding area for drinking and household use.[66] Furthermore, ships for fishing and transportation are having to dock farther from shore increasing time and monetary costs. The drop in water level is a concern that could not go ignored but is not as disastrous as the drop seen in the Aral Sea.

The Aral Sea has experienced a drastic drop in water level since the construction of water diversion projects during the Soviet era. As previously mentioned, the main sources of inflow to the Aral Sea are the Syrdarya and Amudarya rivers (pictured on the following page).

[64] Riebeek, Holly. "Lake Victoria's Falling Waters." *National Aeronautics and Space Administration (NASA),* http://earthobservatory.nasa.gov/Features/Victoria/
[65] Issa, Mohamed. "Lake Victoria's ports grapple with sinking water levels," *Alert Net,* January 10, 2012. http://www.trust.org/alertnet/news/lake-victorias-ports-grapple-with-sinking-water-levels/
[66] United Nations University. "Usoma Village Kenya," http://www.inweh.unu.edu/Health/Usoma_Kenya.htm

Figure 3: The Syr Darya and Amu Darya rivers as a source of inflow to the Aral Sea[67]

Therefore with the construction of diversion projects in the 1950's meant for agricultural use, water inflow to the Sea was cut off at the source. From the 1950's until 1988 it had been reported that the Sea experienced a 20 meter drop.[68] More recently, figures 4 and 5 on the next page show the drastic decrease in water level from the year 2000 in comparison to 2011. Even in the last decade (2002-2012) the Sea has continued to shrink with water levels decreasing at alarming rates. Figure 5 pictures the Aral Sea from 1957 leading up to NASA's more recent images in 2000 and 2011. In this figure it is easy to see how the dropping water levels are responsible for splitting the Sea into different parts, when it once existed all as a single contiguous body of water. The decrease in water has been so drastic that not only have new land formations emerged but the more recent NASA satellite images show a drying up of the Sea all together.

[67] Picture taken from www.japanfocus.org

[68] Micklin, P.P. "Desiccation of the Aral Sea: A Water Management Disaster in the Soviet Union," *Science,* 241 (1988): 1170-1176.

Figure 4: The Aral Sea in years 2000 and 2011; images taken from NASA's Earth Observatory[69]

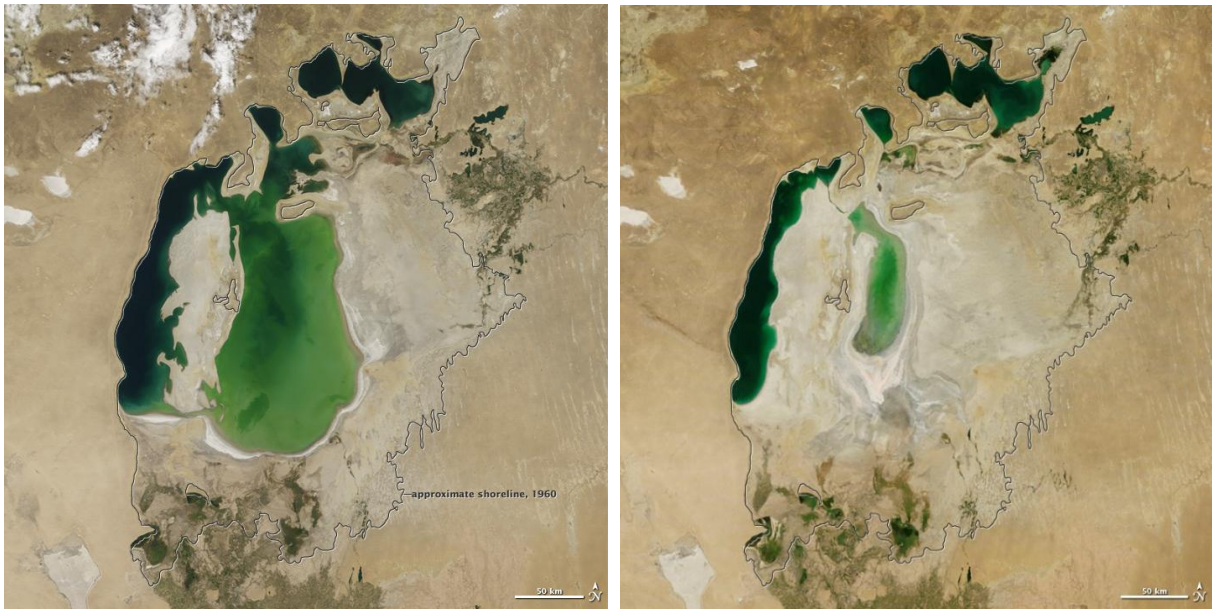
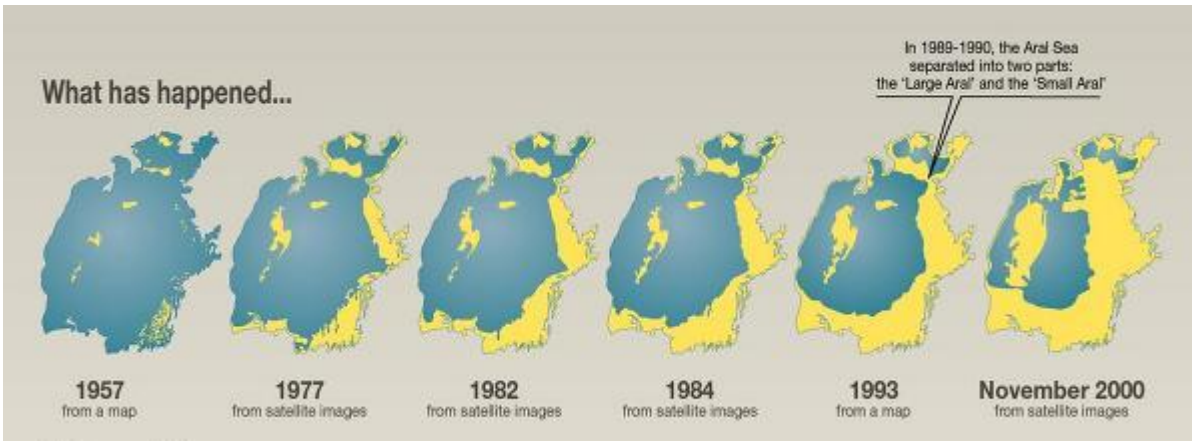


Figure 5: The Aral Sea from 1957 to 2000; image taken from The United Nations Environmental Programme[70]



[69] Aral Sea 2011. *NASA Earth Observatory.* http://earthobservatory.nasa.gov/IOTD/view.php?id=52002
[70] "The Disappearance of the Aral Sea." *United Nations Environmental Programme (UNEP).* http://www.unep.org/dewa/vitalwater/article115.html

Dropping water levels can be seen in both Lake Victoria and the Aral Sea and are dependent on manmade actions of dam building and water diversion. While both bodies of water experience repercussions within their natural ecology as well as the human population dependent on the resource, the decrease in water level has been and remains more significant for the Aral Sea than for Lake Victoria.

4.2 WATER POLLUTION

Water pollution is another variable that is extremely pertinent to all of the populations that rely on a water resource. It is also of use to scholars from both international relations and biology. In international relations, scholars rely on data produced by scientists to accurately address the severity of international environmental issues such as those stemming from Lake Victoria and the Aral Sea. This variable is similar to water level in that it can be considered a "technical" problem by Homer-Dixon while being measured by and remaining an important physical indicator to biologists to assess the degree of degradation to a freshwater resource.

Pollution data for freshwater resources in developing countries is not widely available due to the lack of formal record keeping by their governments or funding and allowance of scientific research centers. Scientific reports do however, compile what data are available. The World Health Organization (WHO) also provides some data that can show water pollution more generally. The data in Table 1 on the following page are taken from the WHO's website and shows the total population using improved drinking water sources in Kazakhstan, Uzbekistan, Kenya, and Uganda.[71] The higher the percentage of improved drinking water can indicate a lower rate of pollution to the freshwater resources utilized by these countries. The overall trend is that although the two Central Asian countries bordering the Aral Sea report higher percentages of

[71] WHO. "Water, sanitation and hygiene, Exposure," *The World Health Organization Data Repository.* Accessed July 27, 2012. http://apps.who.int/ghodata/

improved drinking water overall, they continue to decline as time goes on whereas the two African countries bordering Lake Victoria report an overall increase in water quality.

Table 1: Percent of population using improved drinking water sources[72]

Year	Kazakhstan	Uzbekistan	Kenya	Uganda
1990	96	90	44	43
1995	96	90	48	50
2000	96	89	52	58
2005	96	88	55	65
2010	95	87	59	72

The table above is useful to show an inferred difference in the rate of water pollution at the general level. To compare the degradation of the freshwater resources at hand further; it is necessary and possible to look at scientific reports that compile the scattered and varied data on these resources. A study published in 2000 gives a comprehensive report of the pollution to Lake Victoria. The report shows the Biological Oxygen Demand (BOD) for several different industries as an indicator for pollution as well as pollution intensities for domestic liquid waste generation.[73] The BOD figure tells a scientist or observer how much oxygen is required for the breakdown of a particular waste or material. The more oxygen required to be used, the less

[72] Original data were taken from the World Health Organization (WHO) and formatted in excel by author. "Data and Statistics." *World Health Organization (WHO).* http://www.who.int/research/en/

[73] Lemmens, A.C., Scheren, P.M., and H.A. Zanting. "Estimation of water pollution sources in Lake Victoria, East Africa: Application and elaboration of the rapid assessment methodology," *Journal of Environmental Management* 58 (2000): 235-248.

oxygen that remains available in the water. Oxygen is important in a freshwater resource as it is breathed by fish that live in the water; a desirable species. As oxygen levels decline due to an increase in waste requiring higher and higher BOD levels, desirable species begin to die. Overall this leads to an ecologically less satisfying and less stable resource for human use and consumption purposes. In the report being discussed, the total industrial BOD load measured in kilograms over time was reported equal to 531.81 kg/t. The total "most likely" amounts of sewered and unsewered pollution were reported to be 24 kilograms per person per year again measure in BOD. Nitrogen levels were reported equal to 6.6 kilograms per person per year and phosphorous levels 0.8 kilograms per person per year. Phosphorous and nitrogen are common chemical compounds to measure when looking at sewage and fertilizer pollution to water. While this type of pollution is of most concern for Lake Victoria, the Aral Sea shows other pollution problems.

Many essays written about the Aral Sea tell us that pollution is a problem but few give detailed scientific analysis of exactly the magnitude of this problem. One study however looks at early development of children being born in the areas immediately surrounding the Aral Sea.[74] Toxins and chemicals were measured through blood samples or pregnant women, newborns, and non-pregnant women. The most significant information reported in the study were the levels of a certain toxin found in breast milk. 2,3,7,8-TCDD or Tetrachlorodibenzo-p-dioxin is a pesticide that was commonly used in the agricultural areas surrounding the Aral Sea. The runoff into the sea is exposed to people in the area through drinking water and particles in the air as the dropping water levels have allowed for the crystallization of the settled compounds on the

[74] Ataniyazova, OA, Baumann, RA, Boersma, ER, Liem, AKD, Mukhopadhyay, UA, and EF Vogelaar. "Levels of certain metals, organochlorine pesticides and dioxins in cord blood, maternal blood, human milk and some commonly used nutrients in the surroundings of the Aral Sea (Karalkalpakstan, Republic of Uzbekistan)," *Acta Paediatrica,* 90 (2000): 801-808. Accessed July 31, 2012.

ground where water used to be present. The study in focus tells us that the measured toxic equivalent's or TEQ's are among the highest in the world in this area and account for 66-82% of total TEQ's. Other results of the study found toxic concentrations in the blood of both pregnant and non-pregnant women and that the toxins found in breast milk are passed on to the newborn children.

The way pollution is measured for each freshwater resource is very different and unfortunately, no uniform study has been compiled to compare pollution of the world's freshwater resources. The data produced by the WHO are uniform but cannot show us exact levels of pollution, only a change in percent of potential pollutants. For Lake Victoria pollution problems are found mainly in sewage issues whereas the Aral Sea suffers from chemical and pesticide pollution. Pollution into each resource is different but a problem faced by each body of water none the less.

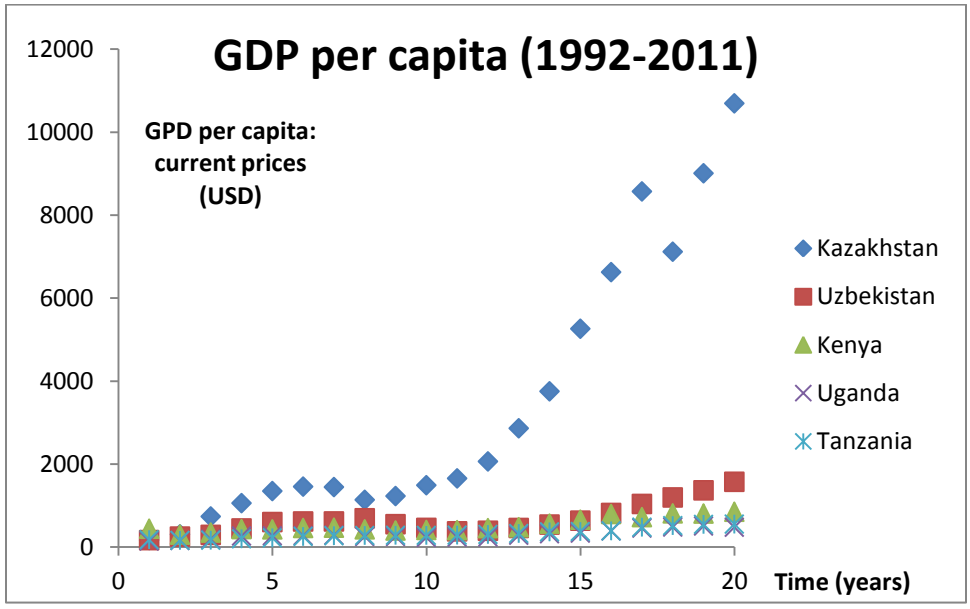
4.3 GDP PER CAPITA

GDP per capita is a way to compare countries bordering both Lake Victoria and the Aral Sea. By comparing such figures it is possible to determine whether the countries surrounding each of the manmade environmental problems are more similar or more different economically. GDP per capita is an indicator of economic development. The pattern established by the Kuznets has since been used to find a pattern in development and the environment. This pattern or assumption however, has not provided an answer for how nations are addressing the causes of environmental degradation. Information gathered from the comparison of the two cases of Lake Victoria and the Aral Sea can then be used when assessing *how* these countries, and other countries around the world, have addressed environmental problems. Figure 6 below shows a time series plot comparing the GDP per capita of countries surrounding Lake Victoria and the

Aral Sea. Data were generated through the International Monetary Fund website for data and statistics. The data were coded for time with the number one equal to the year 1992 through year twenty or 2011.

Figure 6: GDP per capita for Kazakhstan, Uzbekistan, Kenya, Uganda and Tanzania for years 1992-2011[75]

***Current prices, Units measure in USD**



From the above time series plot it is easy to see that Kazakhstan is an outlier. This is mostly likely due to oil revenue that the other four countries do not have. There is a trend from year two or 1993 until approximately years eight to ten for Kazakhstan and Uzbekistan with a slight rise and fall in GDP per capita, most likely due to gaining independence in 1991. The three African countries show very little change with only a slight increase for all three countries beginning in 2005 (year 14). Uzbekistan also shows an increase in GDP per capita, beginning in

[75] Original data were taken from the International Monetary Fund and formatted in excel by the author. "Data and Statistics." *International Monetary Fund (IMF).* http://www.imf.org/external/data.htm

2005 as well and it is slightly greater than that of the three African countries. Based on assumptions of the environmental Kuznets' curve, one would expect that as the rate of economic indicators increases (GDP per capita is used as an economic indicator in this case) environmental problems first become worse and then get better as development furthers. For Kazakhstan especially, we should see such a trend taking place from 1991-2011. Later this paper discusses why this assumption is not true for manmade environmental problems surrounding Lake Victoria and the Aral Sea and how regimes and institutions can better explain how these problems have been addressed.

4.4 FREEDOM RATING

Freedom House[76] offers data from 2002 to 2011 for each of the five countries being examined in this essay. While extensive data are gathered in many categories, this essay will look at the Freedom Rating for each of the five countries; Kenya, Kazakhstan, Tanzania, Uganda, and Uzbekistan. A Freedom Rating of 'Free', 'Partly Free' or, 'Not Free' is assigned to countries based on a scale from 1 to 7 with 1 being the most free and 7 the least free.[77] Comparing the freedom ratings for the countries surrounding Lake Victoria versus the countries surrounding the Aral Sea will not only allow one to see how similar or different these countries are in their governing structure but it also tells whether a heavy influence of democracy is necessary for environmental problems to be addressed. As previously mentioned, some authors believe that democracy can only have a positive impact on the environment citing and comparing regimes like that in the former Soviet Union and China with the United States.[78] Others have

[76] www.freedomhouse.org

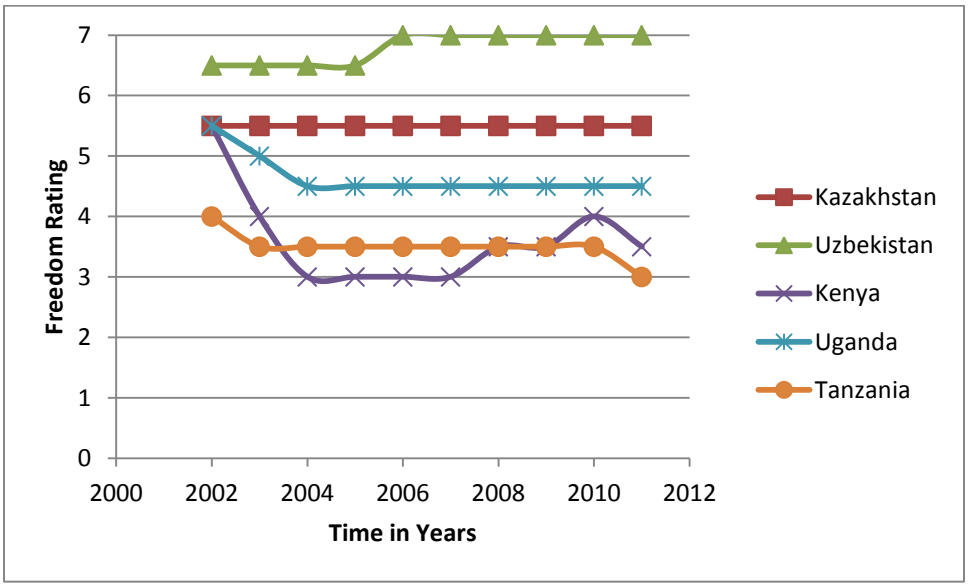
[77] Freedom Rating is based on two categories; political rights and civil liberties. Initial ratings in these categories are designated with raw points from 0 to 4 by the surveyor or observer. The category of political rights consists of an 8 question survey worth 4 points each and civil liberties consist of a 14 question survey worth 4 points each.

[78] Payne, Rodger A., "Freedom and the Environment," *Journal of Democracy,* 6.3 (1995) 41-55. Accessed 8/09/2012. http://muse.jhu.edu/journals/journal_of_democracy/v006/6.3payne.html

disputed this point and it is the goal of this essay to show that regardless of government type or the degree of democracy, regime building and international cooperation is how nations address the causes of environmental degradation.

On the following page, Figure 7 displays the freedom rating for Kazakhstan, Uzbekistan, Kenya, Uganda, and Tanzania over time from 2002 to 2011. Overall, Uzbekistan shows a trend towards being the least free of the five countries and Kenya the most with the other three countries in between. However, according to Freedom House the countries can be grouped into two categories assorted by regions. Kenya, Uganda, and Tanzania, all bordering Lake Victoria, are given "Partly Free" status. Kazakhstan and Uzbekistan, directly bordering the Aral Sea, are given the status of "Not Free". The points per country vary slightly and the status of "Partly Free" and "Not Free" are neighboring categories.

Figure 7: Freedom Rating for Kazakhstan, Uzbekistan, Kenya, Uganda and Tanzania for years 2002-2011[79]



[79] Original data were taken from Freedom House's Freedom Ratings and formatted in excel by the author. Freedom House. www.freedomhouse.org

The African countries are slightly freer than the Central Asian countries. Based on this information, each group of countries differs in their freedom rating which is based on democratic principles; political rights and civil liberties. According to Freedom House, "Political rights enable people to participate freely in the political process, including the right to vote freely for distinct alternatives in legitimate elections, compete for public office, join political parties and organizations, and elect representatives who have a decisive impact on public policies and are accountable to the electorate." Furthermore, "Civil liberties allow for the freedoms of expression and belief, association and organized rights, rule of law, and personal autonomy without interference from the state." Each group of countries based on which environmental problem they are aligned with differs in their categorization of freedom and neither set of countries satisfies a "Free" status that is enjoyed by other countries like those in Western Europe that are not only declared democracies but demonstrate through action that they are. In the following section, the problems with Lake Victoria and the Aral Sea have been and are being addressed with degradation improving and not worsening. This shows that for countries to address and improve the causes of environmental degradation, they do not necessarily have to be democratic.

4.5 POPULATION

It has been argued by many that a growing population and increases in populations surrounding natural resources has had a negative impact on the environment. The main voice in this debate is Paul Ehrlich who assumes that ecologically, natural resources cannot be sustained in any way if the population or growth of the population exceeds natural limitations. It would be wise then, for countries to limit the total number of individuals that have access to the resource or, regulate the amount of the resource people are able to use. As has previously been discussed,

Lake Victoria and the Aral Sea have both suffered from immense problems due to manmade interference. In the following section, this paper shows that despite the fact that both freshwater bodies have had immense environmental problems, the number of individuals or population dependent on the resources differ greatly. Table 2 below shows data collected from the CIA World Fact Book[80].

Table 2: Population dependent on water resources

Country	Population	Resource	Total
Kazakhstan	17,522,010	Aral Sea	--
Uzbekistan	28,394,180	Aral Sea	45,916,190
Kenya	43,013,341	Lake Victoria	--
Uganda	35,873,253	Lake Victoria	--
Tanzania	43,601,796	Lake Victoria	122,488,390

From the above table, the total population dependent on the Aral Sea is equal to 45,916,190 people. Kenya and Tanzania's population alone are close to this number. The total population dependent on Lake Victoria stands at 122,488,390; more than double the population dependent on the Aral Sea. This nullifies the assumption that the greater the population dependent on the resource, the more taxed it becomes. With the earlier analysis of water level

[80] Kazakhstan, https://www.cia.gov/library/publications/the-world-factbook/geos/kz.html; Uzbekistan, https://www.cia.gov/library/publications/the-world-factbook/geos/uz.html; Kenya, https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html; Uganda, https://www.cia.gov/library/publications/the-world-factbook/geos/ug.html; Tanzania, https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html

and pollution, the Aral Sea has suffered worse damage due to manmade events than Lake Victoria and has a significantly smaller population dependent upon it. This does not however change how countries have addressed these environmental problems as this paper shows in the next section.

CHAPTER 5: DISCUSSION

INTERNATIONAL REGIME BUILDING AND COOPERATION

The previous section demonstrated the magnitude of each environmental problem, Lake Victoria and the Aral Sea, and tested some common beliefs about environmental problems, development, democracy, and population. Many of these variables showed different outcomes for the countries bordering Lake Victoria than for the Aral Sea. Yet all countries, as well as others not directly bordering or affected by the freshwater resources being examined, cooperated to address problems of environmental degradation. Kenya, Uganda, Tanzania, Kazakhstan, and Uzbekistan among great powers and international institutions, have cooperated to address the problems of environmental degradation relevant to Lake Victoria and the Aral Sea.

5.1 INTERNATIONAL REGIME BUILDING AND COOPERATION SURROUNDING LAKE VICTORIA

Kenya, Uganda, and Tanzania, the countries that were once part of British East Africa, all gained independence before 1964. Regional cooperation began almost immediately with the 1967 establishment of the first East Africa Community (EAC) to which all three countries were parties. The original community was dismantled by 1977 but began to be re-established in 1993 and the three countries began full cooperation in 1996. Eventually the Treaty for the Establishment of the East African Community was signed in late 1999 and came into force in 2000. Not long thereafter, the East African Community established the Lake Victoria Basin Commission (LVBC) in 2001. Both the EAC and LVBC have focused on the economic benefits that can be reaped through cooperation but are in no way ignorant to the fact that economic prosperity can only proceed when environmental problems are addressed. Environmental law, management, conservation, and development are the main priorities of both the EAC and LVBC

for Lake Victoria and its surrounding areas.[81] Other nearby countries also affected by Lake Victoria and the decisions of Kenya, Uganda, and Tanzania include Rwanda and Burundi whom became members of the EAC in 2007 and continue to cooperate and participate in the community and decisions that affect Lake Victoria.

Since its inception, the EAC has delegated a number of projects to the LVBC which have involved the cooperation, participation, and funding of countries and organizations outside of Africa. The United Nations (UN) and World Bank are two international institutions that work with the African countries involved in the EAC; those most affected by the environmental problems and solutions of Lake Victoria. The UN through United Nations Habitat launched the Lake Victoria Region Water and Sanitation Initiative (LVWATSAN) in 2004. The project is partnered with the EAC through the LVBC and its aims include assessing and reducing the negative impacts on the environment of the lake.[82] Thus far the implemented parts of the project have provided increased water production, sanitation, rehabilitation of sewer systems, "unaccounted-for-water", and construction of water supply systems in all Kenya, Uganda, and Tanzania.[83] These initiatives positively impact the environment. With improved sanitation and water delivery systems, pollution from sewage decreases and less water is wasted from the

[81] "The commission envisages a broad partnership of the local communities around the Lake, the East African Community and its Partner States as well as the developed partners. The commission's activities are focusing on the; Harmonization of policies and laws on the management of the environment in the Lake and its catchment area; Continuation of the environmental management of the Lake, including control and eradication of the water hyacinth; Management and conservation of aquatic resources, including fishers;" Lake Victoria Basin Commission (LVBC). "About LVBC: Overview," *Lake Victoria Basin Commission.* http://www.lvbcom.org/index.php?option=com_content&view=article&id=46&Itemid=64

[82] Lake Victoria Basin Commission (LVBC). "Lake Victoria Water and Sanitation (LVWATSAN) Initiatives Project, *Lake Victoria Basin Commission.* http://www.lvbcom.org/index.php?option=com_content&view=article&id=72&Itemid=82

[83] UN Habitat. "Lake Victoria Region Water and Sanitation Initiative (LVWATSAN): Implementation Status," *UN Habitat.* http://www.unhabitat.org/content.asp?typeid=19&catid=462&cid=5936

lake.[84] Besides this initiative, the United Nations Environmental Programme (UNEP) issues a published report on Lake Victoria; the Lake Victoria Basin Environmental Outlook (LVBEO).[85] The report gives a general background of the environmental issues with the lake including sewage pollution, overgrowth of invasive species, the state of the fisheries, and energy that is created through dam building.

The World Bank Group, made up of five international institutions, in partnership with Kenya, Uganda, and Tanzania, has launched two phases of the Lake Victoria Environmental Management Project (LVEMP). The first project was instituted in 1997 and funded by the International Development Association (IDA) and the Global Environmental Facility (GEF). The goals[86] clearly outline that improving and reversing environmental degradation is a priority. The first project took place from 1997 to 2003 and currently Phase II of the project is underway.

Phase II which shares similar environmental goals[87] of the first project, furthers regime building and international cooperation. This is made clear by the statements made by the World Bank about the project, which tell us that the first component of the project is to strengthen

[84] Osanjo, Tom. "Lake Victoria Region Water and Sanitation Initiative Brochure," *UN Habitat,* 2010. http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3006

[85] United Nations Environmental Programme. "Lake Victoria Basin Environment Outlook," http://www.unep.org/dewa/africa/docs/en/lvicbasin_brochure.pdf

[86] "The main objectives of the LVMEP are (a) to provide the three governments with the necessary skills, information, technical and financial resources and the necessary institutional and legal framework for the Project, (b) to reverse the deterioration of the Aquatic resources and the environmental conditions of the Lake's ecosystem, (c) to maximize the sustainable benefits to the riparian communities by using the basin's resources to generate food, income, potable water and disease-free environment, (d) to conserve the Lake's biodiversity and genetic resources, and (e) to harmonize national management programs in order to reverse the increasing environmental degradation." Lake Victoria Environmental Management Project. "The Inspection Panel Investigation Report," December 15, 2000. http://siteresources.worldbank.org/EXTINSPECTIONPANEL/Resources/KenyaInvestigationReport.pdf

[87] (i) improve collaborative management of the transboundary natural resources of Lake Victoria Basin (LVB) for the shared benefits of the East African Community (EAC) partner states; and (ii) reduce environmental stress in targeted pollution hotspots and selected degraded sub catchments to improve the livelihoods of communities, who depend on the natural resourced of LVB. The World Bank. "Lake Victoria Environmental Management Project Phase II," http://www.worldbank.org/projects/P100406/lake-victoria-environmental-management-project-phase-ii?lang=en

"institutional capacity," by "building the capacity of existing regional and national institutions to harmonize policies, legislation, and regulatory standards, and develop basin-wide management frameworks, to improve cooperative management of the shared transboundary water and fisheries resources of the LVB."[88] The projects therefore, not only involve countries directly affected by the state of the environment of the Lake, but also international institutions which have the capacity to help fund, organize and establish a regime capable of addressing environmental issues of great magnitude like the degradation of Lake Victoria.

5.2 INTERNATIONAL REGIME-BUILDING AND COOPERATION SURROUNDING THE ARAL SEA

Soon after the five Central Asian republics became independent of the Soviet Union, they came together in 1993 to form the International Fund for saving the Aral Sea (IFAS)[89]. Since 1993 the IFAS has launched three Aral Sea Basin Programs (ASBP) with the third currently underway. Each program has goals that seek to stop or reverse environmental degradation to the Aral Sea. These programs were not limited to the cooperation of the five Central Asian republics, but were executed with the help of countries outside the region and other international institutions. The purpose of ASBP-1 was to not only develop international cooperation but also outlined four clear goals[90] to address environmental degradation. While there is little information available for ASBP-1, a full report on ASBP-2 was issued by the IFAS in 2003; the beginning of the program's implementation. Within the ASBP are numerous country specific initiatives. In 2003 when the report was issued, it mentions at least forty programs which are listed below in

[88] The World Bank. "Lake Victoria Environmental Management Project Phase II," http://www.worldbank.org/projects/P100406/lake-victoria-environmental-management-project-phase-ii?lang=en

[89] "an international organization supported by the Central Asian governments." IFAS, *Who We Are.* http://www.ec-ifas.org/about/

[90] (i) stabilizing the environment in the Aral Sea basin, (ii) restoring the disaster zone around the sea, (iii) improving management of transboundary waters in the basin, (iv) developing the capacity of the regional organizations to plan and implement the program. "History of ASBP-1," *International Fund for saving the Aral Sea,* http://www.ec-ifas.org/pbam/pbam-1/

the table. Of these forty programs, seventeen or nearly fifty percent are titled in a way that specifically mention the word "environment," in reference to the ecological environment of the lake or target specific issues of environmental degradation such as the impact on biodiversity and desertification. These programs are highlighted in the table below which continues on the next page.

Table 3: Country Specific Programs under ASBP-2[91]

Country	**Programs**
Kazakhstan	Strategic Plan of Development, The State Programme on Decline of Poverty Level, National Plan of Actions on Hygiene of Environment (NPAHT), State Programmes: Population Health, Portable Water, Education, Science, Healthy Lifestyle
Kyrgyzstan	National Strategy of Poverty Decline, Conception on Transfer of Kyrgyz Republic to Sustainable Development, Manas State Programs: health protection, education, environmental protection
Tajikistan	The Medium-term Programme of Overcoming Crisis in the Agroindustrial Complex in the Republic of Tajikistan, State Programme on Environmental Protection, National Programme of Actions against Desertification, Strategy of the Republic of Tajikistan on Health Protection of the Population, National Programme: Pure Water and sanitation in Tajikistan, State Environmental Protection Programme, National Programme on Decrease of Risk of Natural Disasters and Emergency Situations, Tajikistan Youth, The Programme of Development of Cotton-growing, EBRD Strategy for Tajikistan, National Plan of Actions for the Republic of Tajikistan on Decline of Effect of Consequences of Climate Change

[91] History of ASBP-2. http://www.ec-ifas.org/pbam/pbam-2/

Turkmenistan	The Strategy on Social and Economic Reformation, National Program on Environmental Protection, National Program on Improvement of Social and Economic Situation on the Close-to Aral Sea Territory, National Plan of Actions on Environmental Protection, The Program of Actions Against Desertification, The Strategy and Plan of Actions on Biodiversity Protection, Health
Uzbekistan	National Programme of Sustainable Development, The State Program of Tourism Development, The National Plan of Actions on Hygiene of Environment (NPAGE), The Programme on Aral Sea, The National Strategy and Plan of Actions on Preservation of Biodiversity, The Sub-regional Plan of Actions Against Desertification in the Aral Sea Basin (SRAPCD), The Programme of UNDP and the Government of Uzbekistan on Environmental Protection, the National Programme on Specialist Training

Several other programs are listed in the report for other specific issues of environmental degradation such as: water resources, land degradation, and biodiversity conservation. The report goes on to address and detail the "environmental situation" of which, mountain ecosystems, water resource pollution, regional natural eco-systems, loss of biodiversity, air pollution, hydropower, and environment monitoring are topics of discussion. While the report also addresses social issues like poverty and health, it is clear that the environment of the Aral Sea and surrounding area are of great importance. Problems of poverty, poor health, water and economic issues arise only out of the demise of the environment of the Aral Sea and its surrounding area.

According to the IFAS, the ASBP-2 was not only funded the equivalent of over 1 billion US dollars by the five Central Asian republics, but also received financial support from the

United Nations Development Programme (UNDP), World Bank, Asian Development Bank, United States Agency for International Development (USAID), and the governments of Switzerland, Japan, and Finland among others. The disaster of the Aral Sea has warranted international attention not only in the region but from all around the world.

The third program began implementation only one year ago in 2011 but a report had been issued in 2009 by the IFAS to again outline the upcoming goals of the institution. Phase three of the program outlines new goals, albeit similar to those of the first.[92] The fourth goal however, "Improving institutional and legal instruments," is proof that what may have started as a just cooperative agreement and funding instrument has been built into a regime or international institution. Funding for this part of the program entitled, "Improving the Institutional and Legal Instruments," is estimated in the report at over 13 million USD.

The three programs have compounded cooperative efforts over time. From an economic standpoint, the amount of increase in funding is one sign that cooperative efforts to address environmental degradation of the Aral Sea are present. The first program began with funding of around $400 million USD, the second over $1 billion USD and the third expecting over $2 billion USD. Projected costs per project within the entirety of ASBP-3 are given in the 2009 ASBP-3 program guide issued by the Executive Committee for saving the Aral Sea.

[92] Phase three goals are outlined as: Integrated use of water resources, Environmental protection, Socio-economic development, and Improving institutional and legal instruments. "Joint Statement of the Heads of States-Founders of the International Fund for saving the Aral Sea."

CONCLUSION

Environmental degradation is problem that not only stretches across disciplines but across the globe. While many voices are active in the debate of how nations address the causes of these problems, international relations theory in regime-building and international cooperation offers the most holistic approach to providing solutions.

The two cases compared in this essay are a representation of manmade environmental degradation that occurs throughout the globe which is always within or between nations. When we ask how the causes of environmental degradation are addressed by nations, these cases show that despite the different factors within the nations surrounding Lake Victoria and the Aral Sea, these nations cooperated and with the help of other nations (some in the area and some geographically distant) built regimes. These regimes or international institutions are now responsible for and making progress in addressing the causes of environmental degradation to both bodies of freshwater. When assessing the differences between the cases of Lake Victoria and the Aral Sea and addressing assumptions made in the literature, the five variables chosen, water level, water pollution, GDP per capita of nations contiguous to the water resource, freedom rating, and population, displayed these differences and questioned standing beliefs. Water level and water pollution showed the physical state of difference between the freshwater resources. The Aral Sea has experienced a much more significant drop in water level than had Lake Victoria. The overall trend in water pollution also differed between the two cases. The trend in pollution for the Aral Sea was one of increasing pollution while Lake Victoria shows a trend of decreasing water pollution. When looking at GDP per capita to test the assumptions put forth through the use of the environmental Kuznets curve, it was found that although the countries surrounding each freshwater body were in the stages of development, action to improve

environmental degradation is being taken. This was assessed in the discussion through the examination of international organizations, regime building and cooperation and demonstrated through signing of treaties. Assumptions regarding democracy, population and the environment were also questioned with regime building and international cooperation to once again remain accountable for a differing outcome. While none of the countries surrounding each of the two freshwater resources can be considered "free" based on Freedom House Ratings environmental degradation to Lake Victoria and the Aral Sea shows an overall trend towards improvement. Finally, a greater population for each resource to support does not hold true the assumption that environmental conditions can only worsen. When comparing population for countries surrounding Lake Victoria versus the Aral Sea it was found that the populations greatly differ yet all countries are moving towards international regime building and cooperation to improve environmental degradation to the resources. This essay has shown that previous assumptions and beliefs about the environment, why it is degraded and what can be done to address or reverse these effects are untrue and that international relations scholarship is the most effective to encompass issues that span across disciplines. International regime building and cooperation have been shown to be effective in addressing problems of environmental degradation and making attempts to reverse it, despite previous assumptions that it was not possible based on conditions within the nations surrounding the resources.

It is not enough to stop at recognizing the role of international institutions and regimes. At least one issue or area of further research is to examine how or if these institutions continue to grow and cooperate. Documentation of meetings, signed agreements, and most importantly, the implementation of action, is necessary to continue to assess the impact and effectiveness of these efforts. Another area of further research is to examine the cooperative agreements being signed

to address other environmental problems and follow their progression. Lake Victoria and the Aral Sea are two well documented examples and examining many others would provide fruitful information to the debate regarding global environmental problems and global warming.

Many voices, from many disciplines, debate how nations should address issues of environmental degradation. Some rely on the progression and development of capitalism; while others believe that limiting the population that has access to natural resources is the answer. Politically, some say democracy is the panacea to these problems. However, it has been shown that while these beliefs factor into the role of cooperation for the purpose of improving environmental resources, combined with regime-building that are responsible for how real manmade environmental degradation is addressed.

BIBLIOGRAPHY

Aral Sea 2011. *NASA Earth Observatory.* http://earthobservatory.nasa.gov/IOTD/view.php?id=52002

Ataniyazova, OA, Baumann, RA, Boersma, ER, Liem, AKD, Mukhopadhyay, UA, and EF Vogelaar. "Levels of certain metals, organochlorine pesticides and dioxins in cord blood, maternal blood, human milk and some commonly used nutrients in the surroundings of the Aral Sea (Karalkalpakstan, Republic of Uzbekistan)," *Acta Paediatrica,* 90 (2000): 801-808. Accessed July 31, 2012.

Bryant, Raymond L. and Sinead Bailey. *Third World Political Ecology.* New York: Routledge, 1997.

Bugenyi, F.W.B., Gophen, M., Hecky, R.E., Kaufman, L., Ochumba, P. and J.F. Talling. "Deoxygenation of the Deep Water of Lake Victoria, East Africa." *Limnology and Oceanography,* 39 (1994): 1476-1481. Accessed May 23, 2012. http://www.jstor.org/stable/2838147

Bulayi, Magese Emmanuel. "Community Based Cooperative Fisheries Management for Lake Victoria Fisheries in Tanzania." *The United Nations University,* (Final Project 2001).

Chittibabu, P., Khandekar, M.L., and T.S. Murty. "The Global Warming Debate: A Review of the State of Science." *Pure and Applied Geophysics* 162 (2005): 1557-1586. Accessed 10/04/2012. doi: 10.1007/s00024-005-2683-x

Colander, David, Goldberg, Michael, Haas, Armin, Juselius, Katarina, Kirman, Alan, Lux, Thomas, and Brigitte Sloth. "The Financial Crisis and the Systemic Failure of the Economics Profession." *Critical Review: A Journal of Politics and Society* 21 (2009): Special Issue: Causes of the Financial Crisis. Accessed 8/09/2012. doi: 10.1080/08913810902934109

Commoner, Barry. "Environmental Action," in *Making Peace With the Planet,* pp. New York: Pantheon Books, 1990.

"Data and Statistics." *International Monetary Fund (IMF).* http://www.imf.org/external/data.htm

"Data and Statistics." *World Health Organization (WHO).* http://www.who.int/research/en/

Ehrlich, Anne and Paul R., "Population, Growthism, and National Security," in *The Population Explosion,* pp. New York: Simon and Schuster, 1990.

FAO Corporate Document Repository. "Lake Victoria fisheries industrialization: recent developments in Uganda." *Fisheries and Aquaculture Department.* http://www.fao.org/docrep/006/AD136E/AD136E01.htm

Freedom House. www.freedomhouse.org
Geheb, Kim, Kalloch, Sarah, Kyangwa, Mercy, Lwenya, Carolyne, Medard, Modesta and Anne-Theresa Nyapendi. ''Nile perch and the hungry of Lake Victoria: Gender, status and food in an East African fishery." *Food Policy,* 33 (2008): 85-98.
http://ars.els-cdn.com/content/image/1-s2.0-S030691920700036X-gr1.jpg

Glantz, Michael H., "Aral Sea Basin: A Sea Dies, a Sea Also Rises," *Ambio* 36 (2007): 323-327. Accessed July 12, 2012.

Haas, Peter M., "The Origins of Awareness of Mediterranean Pollution and Early Negotiations for the Mediterranean Action Plan," in *Saving the Mediterranean: The Politics of International Environmental Cooperation,* pp. New York: Columbia University Press, 1990.

Hoel, Michael. "Global environmental problems: The effects of unilateral actions taken by one country." *Journal of Environmental Economics and Management* 20 (1991): 55-70. Accessed 8/28/2012. http://dx.doi.org/10.1016/0095-0696(91)90023-C

Homer-Dixon, Thomas. *The Ingenuity Gap.* New York: Alfred A. Knopf, 2000.

International Fund for saving the Aral Sea. "History of ASBP-1," http://www.ec-ifas.org/pbam/pbam-1/

International Monetary Fund. "Report For Selected Countries and Subjects," *World Economic Outlook Database,* Report Produced July 23, 2012.

Issa, Mohamed. "Lake Victoria's ports grapple with sinking water levels," *Alert Net,* January 10, 2012. http://www.trust.org/alertnet/news/lake-victorias-ports-grapple-with-sinking-water-levels/

Kaufman L. "Catastrophic Change in Species-Rich Freshwater Ecosystems" *Bioscience,* 42 (1992): 847-858. Accessed May 8, 2012. http://www.jstor.org/stable/1312084

Kumar, R.S. (2002, September 14). Aral Sea: Environmental Tragedy in Central Asia. *Economic and Political Weekly*, 37, pp. 3797-3802.

Kuznets, Simon. "Economic Growth and Income Inequality," *The American Economic Review,* 45 (1995): 1-28. Accessed July 15, 2012.

Lake Victoria Basin Commission (LVBC). "About LVBC: Overview," *Lake Victoria Basin Commission.*
http://www.lvbcom.org/index.php?option=com_content&view=article&id=46&Itemid=64

Lake Victoria Basin Commission (LVBC). "Lake Victoria Water and Sanitation (LVWATSAN) Initiatives Project, *Lake Victoria Basin Commission.* http://www.lvbcom.org/index.php?option=com_content&view=article&id=72&Itemid=82

Lemmens, A.C., Scheren, P.M., and H.A. Zanting. "Estimation of water pollution sources in Lake Victoria, East Africa: Application and elaboration of the rapid assessment methodology," *Journal of Environmental Management* 58 (2000): 235-248.

Levy, Marc A., Haas, Peter M., and Robert O. Keohane, "The Effectiveness of International Environmental Institutions," in *Institutions for the Earth: Sources of Effective Environmental Protection (Global Environmental Accord: Strategies for Sustainability and Institutional Innovation),* pp. Cambridge: Massachusetts Institute of Technology, 1993.

Lowe, Laura, Krosnick, Jon A., Holbrook, Allyson L., and Penny S. Visser. "The Origins and Consequences of Democratic Citizens' Policy Agendas: A Study of Popular Concern About Global Warming." *Climate Change* 77 (2006): 7-44. Accessed May 11, 2012, doi: 10.1007/s10584-006-9068-8

Low DA, and JM Lonsdale. "Introduction: Towards the new order, 1945-1963" In *The Oxford History of East Africa*, 1-63. Oxford: Clarendon Press, 1976.

Malthus, Thomas. *An Essay on the Principle of Population,* 1798.

Melillo, Jerry M., Mooney, Harold A., and Peter M. Vitousek. "Human Domination of Earth's Ecosystems." *Science* 277 (1997): 494-499. Accessed 9/04/2012.

Micklin, P.P. "Desiccation of the Aral Sea: A Water Management Disaster in the Soviet Union," *Science*, 241 (1988):1170-1176.

Midlarsky, Manus I. *Democracy and the Environment: An Empirical Assessment,* "Journal of Peace Research," 35 (1998): 341. Accessed 8/09/2012. DOI 10.1177/0022343398035003005

National Aeronautics and Space Administration. "Aral Sea." http://landsat.gsfc.nasa.gov/images/archive/f0012.html

O'Neill, Kate. *The Environment and International Relations.* Cambridge: Cambridge University Press, 2009.

Osanjo, Tom. "Lake Victoria Region Water and Sanitation Initiative Brochure," *UN Habitat,* 2010. http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3006

Payne, Rodger A. "Freedom and the Environment*," Journal of Democracy,* 6.3 (1995): 41-55. Accessed 8/09/2012. http://muse.jhu.edu/journals/journal_of_democracy/v006/6.3payne.html

Peneva, E.L., Stanev E.V., Stanychni S.V., Salokhiddinov A., and G. Stulina. "The recent evolution of the Aral Sea level and water properties: analysis of satellite, gauge and hydrometerological data." *Journal of Marine Systems*, 47 (2004): 11-24. Accessed July 23, 2012.

Pringle, Robert M. "The Nile Perch in Lake Victoria: Local Responses and Adaptations." *Journal of International African Institute*, 75 (2005): 510-538. Accessed May 16, 2012. http://www.jstor.org/stable/3556959

Pringle, Robert M. "The Origins of the Nile Perch in Lake Victoria" *BioScience*, 55 (2005): 780-789. Accessed May 13, 2012.

Riebeek, Holli. "Lake Victoria's Falling Waters," *Earth Observatory: NASA,* http://earthobservatory.nasa.gov/Features/Victoria/

United Nations Environmental Programme. "Lake Victoria Basin Environment Outlook," http://www.unep.org/dewa/africa/docs/en/lvicbasin_brochure.pdf

United Nations University. "Usoma Village Kenya," http://www.inweh.unu.edu/Health/Usoma_Kenya.htm

UN Habitat. "Lake Victoria Region Water and Sanitation Initiative (LVWATSAN): Implementation Status," *UN Habitat.* http://www.unhabitat.org/content.asp?typeid=19&catid=462&cid=5936

Saiko, Tatyana A. and Igor S. Zonn. „Irrigation expansion and dynamics of desertification in the Circum-Aral region of Central Asia." *Applied Geography* 20 (2000): 349-367. Accessed July 12, 2012.

Stern, David I. "The Environmental Kuznets Curve," *International Society for Ecological Economics.* Accessed July 15, 2012. http://www.ecoeco.org/pdf/stern.pdf

U.S. Environmental Protection Agency. "Large Lakes and Rivers Forecasting Research Branch," www.epa.gov

Weale, Albert. Saving the Mediterranean: The Politics of International Cooperation by Peter M. Haas: Reviewt. *Journal of Public Policy*, Vol. 11, No. 4 pp. 439-441

"The Disappearance of the Aral Sea." *United Nations Environmental Programme (UNEP).* http://www.unep.org/dewa/vitalwater/article115.html

The World Bank. "Lake Victoria Environmental Management Project Phase II," http://www.worldbank.org/projects/P100406/lake-victoria-environmental-management-project-phase-ii?lang=en

WHO. “Water, sanitation and hygiene, Exposure,” *The World Health Organization Data Repository.* Accessed July 27, 2012. http://apps.who.int/ghodata/

“World of Change: Shrinking Aral Sea,” *NASA Earth Observatory*, earthobservatory.nasa.gov/Features/WorldOfChange/**aral_sea**.php

Young, Oran R. “Comparative Statics: Regimes for the Marine Fisheries and Deep-Seabed Mining,” in *International Cooperation: Building Regimes for Natural Resources and the Environment*. Ithaca: Cornell University Press, 1989.

APPENDIX I

Year	Kazakhstan	Uzbekistan	Kenya	Uganda	Tanzania
1992	168.657	167.182	442.291	145.000	178.708
1993	304.872	251.774	299.167	157.729	160.392
1994	737.296	292.667	349.385	188.465	164.913
1995	1058.59	448.122	432.808	266.269	199.942
1996	1349.64	601.908	426.702	272.156	223.149
1997	1456.99	616.106	460.052	274.684	255.969
1998	1445.84	616.901	467.092	286.109	273.514
1999	1137.83	693.220	427.300	253.489	279.667
2000	1229.35	550.720	399.150	253.586	284.220
2001	1490.43	461.374	412.726	231.620	282.180
2002	1654.65	378.367	408.274	238.706	287.810
2003	2063.27	392.544	456.013	245.672	304.489
2004	2862.50	459.544	478.435	285.417	327.656
2005	3753.44	541.894	564.868	321.376	365.973
2006	5261.81	636.291	659.869	335.810	375.175
2007	6626.29	821.095	796.185	389.389	389.724
2008	8570.61	1038.18	721.924	456.151	478.782
2009	7118.53	1195.02	812.413	481.877	516.955
2010	9008.69	1367.12	808.077	506.142	547.048
2011	10693.9	1572.47	850.555	477.545	553.231

APPENDIX II

Year	Kazakhstan	Uzbekistan	Kenya	Uganda	Tanzania
2002	5.5	6.5	5.5	5.5	4.0
2003	5.5	6.5	4.0	5.0	3.5
2004	5.5	6.5	3.0	4.5	3.5
2005	5.5	6.5	3.0	4.5	3.5
2006	5.5	7.0	3.0	4.5	3.5
2007	5.5	7.0	3.0	4.5	3.5
2008	5.5	7.0	3.5	4.5	3.5
2009	5.5	7.0	3.5	4.5	3.5
2010	5.5	7.0	4.0	4.5	3.5
2011	5.5	7.0	3.5	4.5	3.0