

Issue categorization acts as a means in which to constrain the ways in which environmental issues are framed; the ways in which the news media frame a given subject depend upon how it is categorized according to preconceived ideas and divisions of labor within the news organization (Anderson, 1997). Because it is too simplistic to solely characterize articles based on broad categories, each article was analyzed by content according to multiple, specific categories to better gain an understanding of the overall message intended by the author. Each category must be explicitly defined to set parameters to perform a detailed analysis; the following section each summarize a particular category by subject and list the associated attributes of the study. APPENDIX C and APPENDIX D provide examples of articles coded by the content analysis model.

4.5 CONTENT ANALYSIS FOR ARTICLES INVOLVING ACID RAIN

ACID RAIN CATEGORY 1: NORMATIVE, POSITIVE, AND NEUTRAL STATEMENTS (AR 1)

Economic analysis commonly refers to statements as being normative or positive; positive statements are factual and attempt to convey a reality (what is) while normative statements are idealistic and convey a more subjective viewpoint (what should be). For the purpose of this research, the term “nature” refers to articles written with a more environmental and ecological aspect, “industry” focuses on the economical aspects of the issue at hand, and “neutral” are articles in which both environmental and economical aspects are evenly distributed or articles that focus on conveying events in the manner in which they occur. Each article was listed under one of the following classes: (1) Normative Nature; (2) Positive Nature; (3) Neutral; (4) Normative Industry; (5) Positive Industry. Articles classified as “Normative Nature” contain characteristics in which normative

statements were found in favor of protecting the environment from acid rain through management, legislation, or action of the reader. “Positive Nature” articles focus more on the scientific attributes and findings of acid rain. “Neutral/News-based” are articles in which no normative statements are found, a balance between environmental and economical topics are discussed, or news involving acid rain unrelated to ecological or business events is conveyed. “Normative Industry” articles contain normative viewpoints in which statements are made that focus on what should, or should not happen, to protect businesses from the economic costs of acid rain, specifically legislation that would require industries to add scrubbers, switching from high to low-sulfur coal, etc. “Positive Industry” is descriptive of articles stating realities and actualities of the problems concerning the management of acid rain from a business standpoint.

ACID RAIN CATEGORY 2: ECONOMIC, ECOLOGICAL AND HEALTH PREDICTIONS (AR 2)

Due to the economic, political, social and ecological implications of environmental decisions, many stakeholders are interested in scientifically based and mathematical models predictions assessing the future of the environment. Because the environment is highly variable in time and space, risk and uncertainty are commonly used terms when predicting the future of the environment due to unforeseen disturbances, shocks, and surprises (Grafton, 2004; White & Hooke). Risk controversies represented by the news media are understood to have a major structuring effect upon public opinion (Wilkinson, 1999). Predictions provided by the academic community, policy makers, economists, and other invested stakeholders are a common tool in which the media presents the risks, or consequences of a decision, to the public. This study evaluates three forms of predictions found in the popular press: (1) Economical Predictions; (2) Ecological Predictions; (3)

Health Predictions. Any article inclusive of one or more of the previously listed predictions was recorded.

ACID RAIN CATEGORY 3: SOURCES OF ACID RAIN (AR 3)

Acid rain originates from the emissions of variety of pollutants that are subsequently converted into sulfur dioxide (SO₂) and nitrogen oxides (NO_x) that form acid rain. Primary sources of SO₂ emissions include: fossil fuel power plants, ore smelters, industrial burners, refineries, and paper and pulp mills. Automobiles and other vehicles are the primary sources of NO_x emissions. Natural processes such as: volcanic eruptions, forest fires, and the bacterial decomposition of organic matter also produce both sulfur and nitric compounds found in the atmosphere. Due to differing opinions of the causes and sources of acid rain found in the media, each article was further classified by statements indicating the causes of acid rain as being: (1) Human Induced; (2) Natural; (3) Combination of Manmade and Natural Sources; or (4) Not Enough Information Known.

ACID RAIN CATEGORY 4: CONSEQUENCES OF ACID RAIN (AR 4)

The National Acid Rain Precipitation Program began an extensive long-term study in 1980 to identify the consequences of acid rain, along with the Commission of the European Communities and the World Conservation Union. The following consequences of acid rain have been identified by these programs (1) increased acidity of lakes; (2) increased acidity of soils which reduces the number of flora that may be grown; (3) forest destruction; (4) adverse human health effects (5) building and infrastructure erosion (Perman, 2003). However, this is a limited listing; articles indicated one, if not multiple, general consequences that could occur from acid rain. Due to the numerous specific examples that were found in articles citing the consequences of acid rain, these seven classifications were

developed as more broad generalizations to better organize and classify the consequences of acid rain: (1) Ecological Consequences; (2) Economic Consequences; (3) Health Problems; (4) International Problems; (5) Structural Damage; (6) Problems Unforeseen at the Time; (7) Acid Rain Poses No Problems. Any article including specific examples of any of the listed classifications was identified and recorded. The following section better describes the analysis used to determine if an article included the standards to meet the requirements of each classification.

(1) Ecological Consequences

Decades of research has shown that the ecological consequences of acid rain are significant due to the deposition of acidifying compounds delivered to the Earth's surface, creating adverse effects on many ecological ecosystems. Due to the interdependence of the natural environment and the biological organisms, disruptions can create multiple, adverse ecological effects on ecosystems. Ecological ecosystems that acid rain can affect include but are not limited to: forest soils and vegetation, surface waters including lakes and streams, coastal waters, aquatic organisms, and terrestrial ecosystems. All popular press articles inclusive of a possible or proven ecological consequence from acid rain were listed under this classification.

(2) Economic Consequences

The economic implications of addressing acid rain were commonly found in popular press articles. Costs imposed on utility companies, the mining community, and households by the possible means to reduce SO₂ in the atmosphere were commonly associated with the acid rain debate. Economic costs associated with crop damage such as declines in timber and agricultural production were substantially discussed as well. Legislative implications,

unemployment, and structural damage estimates were included under economic consequences of acid rain. Any article inclusive of possible or proven economic costs was listed under this classification.

(3) Health Problems

The pollutants that cause acid rain, SO₂ and NO_x, have been proven to damage human health. When these two pollutants interact in the atmosphere, fine sulfate and nitrate particles are formed that can be transported long distances and inhaled by human lungs. Many scientific studies have identified a relationship between increased levels of fine particles and premature death from lung and heart disorders such as asthma and bronchitis; ozone impacts on human health from NO_x include a number of morbidity and mortality risks associated with lung inflammation, including asthma and emphysema ("Effects of Acid Rain - Human Health,"). In the 1980's, uncertainties remained about the health effects of acid rain, however many authors recognized the possibility of adverse effects that could be inflicted. Any article stating the possibility of health consequences of acid rain was included in this classification.

(4) International Problems

Acid rain is an environmental problem in which the adverse effects cross regional, state, and international boundaries. In the late 1960's, Scandinavia first identified acid rain as a significant, environmental issue with transboundary implications due to the acquisition of downwind acid-producing emissions from Europe, particularly from the United Kingdom and Germany. In the 1970's and 1980's, northeastern United States electric-generating facilities were producing excessive amounts of SO₂ and NO_x, which were reaching and severely damaging eastern Canadian forests; this caused strained diplomatic relations

between the two countries in which the United States struggled to find a bilateral agreement with Canada (Visgilio, 2007). In the 1980's, differences of opinion and a lack of trust between Canadian and American scientists were consistently relayed to the public (Alm, 1997). It was not until 1990 that the United States began to forcefully take action to curb acid rain; newly elected President George Bush signed the 1990 Clean Air Act Amendments, with Title IV specifically detailing acid rain requirements. Two months later, President Bush and Prime Minister Brian Mulroney signed the Air Quality Accord in May 1991, which was found to be as extremely successful in reducing transboundary pollution from the United States to Canada. The regions that most notably dealt with acid rain implications include the heavily industrialized regions of Europe, North America, eastern Asia (more specifically China and Japan), and the former Soviet Union. This research analyzes the number of articles in which international implications of acid rain were acknowledged.

(5) Structural Damage

Acid rain and the dry deposition of acidic compounds have been observed and accurately attributed to cause considerable damage to buildings and materials, primarily in urban areas, as a consequence of relatively high concentrations of SO_2 . Acid rain is known to contribute to the corrosion of metals, such as bronze, and the deterioration of paint and stone, such as limestone and marble. These effects significantly reduce the societal value of buildings, bridges, cars, and cultural objects such as statues, monuments, and tombstones

("Effects of Acid Rain - Materials; Newbery, Siebert, & Vickers, 1990). Any article citing structural damage was included in this category.³

(6) Problems Unforeseen at the Time

While it is possible to observe whether an ecosystem is resilient after a disturbance has taken place, ex ante we cannot know whether a system will be resilient to future shocks and disturbances that it will be subject to (Perman, 2003). While mathematical models and global observations are useful tools in forming predictions, unforeseen variables can alter outcomes, which accounts for uncertainty and risks affecting environmental decision-making. Authors which recognized the uncertainty of unforeseen futuristic problems that could possibly arise from acid rain were noted under this classification.

(7) Acid Rain Causes No Problems

With any field involving social, political, economic and environmental interests, conflicting views are certain to exist due to differing personal values. Significant differences exist in individual perceptions about the seriousness of environmental threats, their origins, relative importance, and the action needed to address the respective issue; in many instances, extremely different conclusions can be drawn based on the same basic scientific evidence (Goldfarb, 1997). In the 1980's, the scientific community was not entirely convinced that acid rain was to blame in causing adverse ecological consequences. In a widely controversial 1983 article in *Science*, soil scientist Edward Krug, who helped conduct a ten-year federal study on acid rain, argued that while acid rain was popularly believed to be responsible for acidifying soil and water sources in eastern North America

³ The estimated costs of acid rain on structural objects are high, therefore any article citing costs on structural objects was also included in the listed category: (2) Economic costs.

and eastern Europe, in actuality it was natural processes causing ecosystems susceptible to increased acidification (Krug & Frink, 1983). Krug later spoke at seminar on acid rain during 1983 and told the audience that acid rain was an “environmental nuisance, not a catastrophe.” Due to the complexity and divisive political nature of the issue, political differences arose, the coal industry was divided, and different regions of the United States were sided against each other (Yanarella & Ihara, 1985). Industry stakeholders and politicians commonly conveyed that acid rain was not an issue of significance as claimed by scientists and researchers. Based on the differences in opinion during the time period, any article citing that acid rain did not pose any problems was included in this classification.

ACID RAIN CATEGORY 5: LEGISLATIVE ATTITUDE (AR 5)

The 1980’s involved a decade of political debate involving the legislation surrounding acid rain, especially the Clean Air Act. In 1970, the passage of the Clean Air Act marked the first substantial control programs that established a system of local air quality standards, and granted powers to the states to enforce emissions quantity regulations. However the program was considered a disappointment and consequently contributed to the transboundary issues of acid rain. The legislation led to taller emissions stacks intended to disperse pollutants further from the point source, which was successful in achieving local air quality standards, but subsequently increased the inflow of acidic deposition to nearby regions. It was not until 1990 when the Clean Air Act would be amended to affectively address acid rain, specifically through the requirements mandated by Title IV. The 1980’s included a time period of misreading of public opinion, unrealistic expectations on Congress to be receptive of proposals for comprehensive change, and difficulty in developing and presenting proposals for legislative change (N. J. Vig & Kraft, 1984).

Numerous bills and proposals went before Congress to amend the Clean Air Act, however the lack of success of such legislative acts is due to the complexity of the acid rain debate among the many stakeholders involved. Over the decade, significant scientific evidence had mounted in favor of action against acid rain while environmental groups continuously pressed for a stronger Clean Air Act (Visgilio, 2007). From the early 1980's to the end of the decade, debates in Congress shifted from whether or not acid rain was a problem to how to manage acid rain and allocate the costs of doing so. Proponents of regulatory action, primarily representatives from northeastern states as well as many environmental groups, argued that the volume of scientific evidence clearly identifies acid rain as a significant problem in need of increased regulation through legislative means, as well as benefits of regulatory action outweighing costs. Opponents of regulatory action, primarily representatives of the industrial Midwestern and Appalachian states as well as electric companies, coal companies and coal miners, argued that restrictions on such industrial companies posed unreasonable costs and burdens which outweighed the benefits of cleaning up acid rain. This research analyzes articles in which the authors' legislative attitude surrounding regulatory action was observable; any article involving legislative attitude was further divided noting the following observations: 1) Author believes costs imposed on industry due to stricter regulations will be unreasonable; 2) Author believes additional regulation might possibly be beneficial but that the costs of doing so will be substantial; 3) Author believes that benefits outweigh any costs associated with legislative action.

ACID RAIN CATEGORY 6: TONE OF ARTICLE (AR 6)

A study by Sandman et al. (1986) designated magazine articles as “environmental” based on characteristics fitting into certain categories as defined by the researcher, this study takes the same approach in order to categorize each article under the following classes: (1) Highly Environmental; (2) Somewhat Environmental; (3) Neutral; (4) Somewhat Industrial; (5) Highly Industrial. Articles under each listed class contained characteristics associated with the following descriptions in order to designate the specific category: (1) Highly Environmental: Articles focusing on the ecological, economical, international, structural, and/or health consequences of acid rain. When discussing legislation, author clearly asserts that legislative action is crucial in abating problem. (2) Somewhat Environmental: Articles focusing on the consequences of acid rain, however, the author is more apt to acknowledge problems also facing the industrial sector. When discussing legislation, author asserts that legislative action will produce benefits, but acknowledges costs as well. (3) Neutral: Articles focusing on portraying current events surrounding the acid rain debate, or author poses both sides of the debate with no preference observably stated. (4) Somewhat Industrial: Articles focusing mainly on economical implications of stricter regulations involving acid rain legislation on the industrial sector, however author more apt to acknowledge the adverse implications of acid rain on the environment, economy, structures, transboundary issues, etc. (5) Highly Industrial: Articles focusing on the economical implications of acid rain legislation on the industrial sector. When discussing legislation, author firmly asserts that legislation will result in numerous problems for industry, policy, and households.

4.6 CONTENT ANALYSIS OF ARTICLES INVOLVING CFCs

CFCs CATEGORY 1: NORMATIVE, POSITIVE, AND NEUTRAL STATEMENTS (CFC 1)

Applying the parameters previously used in categorical design from ACID RAIN CATEGORY I: NORMATIVE, POSITIVE, AND NEUTRAL STATEMENTS, each CFC article was listed under one of the following classes: (1) Normative Nature; (2) Positive Nature; (3) Neutral/News-based; (4) Normative Industry; (5) Positive Industry. Articles classified as “Normative Nature” contain characteristics in which normative statements were found in favor of actively preventing the depletion of the ozone layer by restricting the use of CFCs through management, legislation, or action of the reader. “Positive Nature” articles focus more on the scientific nature and findings of CFCs and the ozone layer. “Neutral/News-based” are articles in which no normative statements are found, a balance between environmental and economical topics is discussed, or news involving CFCs unrelated to ecological or business events is conveyed. “Normative Industry” articles contain normative viewpoints in which statements are made that focus on what should, or should not happen, to protect businesses from the economical costs of restricting the use of CFCs in products or costs to find substitutes. “Positive Industry” is descriptive of articles stating realities and actualities of the problems concerning the restriction, bans, and substitutes involving CFCs from an industrial standpoint.

CFCs CATEGORY 2: ECONOMIC, ECOLOGICAL AND HEALTH PREDICTIONS (CFC 2)

Applying the parameters used in categorical design ACID RAIN CATEGORY II: ECONOMIC, ECOLOGICAL AND HEALTH PREDICTIONS, each CFC article inclusive of one or more of the following predictions was classified according to: (1) Ecological Predictions (2) Economical Predictions and (3) Health Predictions.

CFCs CATEGORY 3: SOURCES ATTRIBUTED TO THE DEPLETION OF THE OZONE LAYER (CFC

3)

The scientific community launched a major research campaign following the 1974 theories to learn more about the role of CFCs and their potential to deplete the ozone layer, including the National Academy of Sciences as well as prominent chemists, meteorologists, physicists and space scientists from NASA, the National Oceanic and Atmospheric Administration, and universities. The scientific, political, and industrial community vigorously disputed the connectivity of CFCs and the ozone layer; even though laboratory and modeling research confirmed the validity of the chlorine-ozone linkage, they could not prove definitively what was occurring in the atmosphere. Because ozone particles are dynamic variables of the atmosphere, natural variations and fluctuations involving complex natural forces, including solar radiation and interactions, occur on a daily, seasonal, and solar cyclical basis. The detection of manmade influence on ozone is difficult because of large, natural variations in the amount of total ozone (Cumberland, Hibbs, & Hoch, 1982). Industrialists continuously denied any connection between the depletion of the ozone layer and CFCs as well as launching their own research and public relations efforts to place doubt on the theory (Benedick, et al., 1998). Due to differing opinions of the correlation of CFCs and the ozone layer found in the media, each article was further classified by statements indicating the depletion of the ozone correlated to: (1) Human Induced Sources, specifically CFCs; (2) Natural Sources; (3) Combination of Manmade and Natural Sources; (4) Not Enough Information Known.

CFCs CATEGORY IV: CONSEQUENCES OF OZONE DEPLETION (CFC 4)

Because the ozone layer protects the Earth from harmful UV-B radiation, a decrease in ozone particles results in more radiation reaching the Earth's surface and could have damaging effects in several areas including: human health, crops and natural terrestrial

ecosystems, aquatic plants and ecosystems, and materials—effects expected on a global level, with latitudinal variations (Brunnée, 1988). Due to the numerous specific examples that were found in articles citing the consequences of ozone depletion, these seven classifications were developed as broad generalizations to better organize and classify the consequences of ozone depletion: (1) Ecological Consequences; (2) Economic Consequences (3) Health Problems; (4) International Consequences; (5) Agricultural Damage; (6) Atmospheric Disturbances; (7) Problems Unforeseen at the Time; (8) CFCs Cause No Problems. Any article including specific examples of any of the classifications, or lack of, was identified and recorded. The following section better describes the analysis used to determine if an article included the standards to meet the requirements of each classification.

(1) Ecological Consequences

Anthropogenic destruction of the ozone layer was first linked with potential negative impacts upon non-human nature in 1977; by the 1980's, research was indicating that enhanced UV-B could reduce leaf area on certain plant species by up to 50%, as well as causing difficulties in cell growth and biosynthesis difficulties in other plant species (Gillespie, 2006). Despite mechanisms to reduce or repair effects and a limited ability to adapt to increased levels of UVB, physiological and developmental processes of plants are adversely affected by enhanced UV-B radiation, as well as generating implications for plant competitive balance, herbivory, plant diseases, and biogeochemical cycles (EPA).

Enhanced UV-B has been demonstrated as having potential lethal and sub-lethal effects on a number of species of non-human animals, such as frogs, especially when at

embryonic stages. Studies indicated observed cases of cancer, cataracts, and other diseases from enhanced UV-B in species such as cattle and sheep.

It has long been realized that enhanced UV could have a negative effect on a number of aquatic species (Gillespie, 2006). Phytoplankton is the foundation of aquatic ecosystems; exposure to UV-B radiation has been shown to affect both orientation mechanisms and motility in phytoplankton, resulting in reduced survival rates for these organisms (Newton and EPA). Scientists have demonstrated a direct reduction in phytoplankton production due to ozone depletion-related increases in UVB; these findings are troublesome due to aquatic organisms' dependence on phytoplankton in a complex food chain (EPA and Newton). UV-B radiation can also directly affect aquatic organisms by damaging developmental stages in species that include: larval crabs, shrimps, fish and amphibians.

(2) Economic Consequences

Economic costs of addressing industrial decisions involving CFCs, as well as costs associated with consequences of ozone depletion were vigorously discussed in the ozone debate. Industrialists cited costs imposed on implementing new technologies and substitutes, as well as job losses, which would be associated with legislative action. In 1973, industry sources calculated that aerosols alone were a \$300 billion per year industry, with CFC related employment between 200,000 and one million (Taubes, 1987). Other economic costs associated with CFCs and ozone depletion included crop damage, structural damage to plastics and other materials, and health costs. Any article inclusive of potential or proven economic costs due to CFCs and ozone depletion was included in this category.

(3) Health Problems

Depletion of the ozone layer results in excess ultraviolet (UV) radiation reaching the Earth's surface, UV-B in particular; a link between UV-B radiation and skin cancer has been established over the years (Benedick, et al., 1998). Laboratory and epidemiological studies demonstrate that UV-B causes non-melanoma skin cancer and contributes to malignant melanoma development. In addition to skin cancer, UV-B has been linked to cataracts as well as suppressing the human immune system, resulting in human susceptibility to infectious diseases. Ozone depletion increases the amount of UV-B that reaches the Earth's surface, which will then increase the risk of health effects. However, uncertainties remained about the health effects of ozone depletion during the 1970's and 1980's, especially since such cancers take decades to develop. However many authors acknowledged the potential of ozone depletion resulting in damaging health effects, therefore any article stating the possibility of health consequences of ozone depletion was included in this classification.

(4) International Consequences

In the 1980's, the wintertime hole over Antarctica gave the world an insight to the effects of human activity on the atmosphere on a global scale. Since then research has shown that ozone depletion occurs over latitudes that include North America, Europe, Asia, Africa, Australia and South America. Because of the international implications resulting from the use of CFCs, ozone depletion gained recognition in the media as a global issue, not just a concern subjected to the Antarctic region. Any article acknowledging that ozone depletion is of international concern, affecting regions and nations other than Antarctica, was included in this classification.

In addition to the atmospheric consequences possible at an international level, many nations were capitalizing on the production of CFCs at the time; U.S decisions involving CFCs would affect economic and industrial aspects of other countries. Articles inclusive of possible effects on non-U.S. countries were also included in this classification.

(5) Agricultural Damage

Damage to crops intensifies with increased UV-B radiation; numerous experiments indicated that UV-B radiation adversely affects two thirds of the 200 plant species tested including: peas, cabbage, melons and cotton (Benedick, et al., 1998; Brunnée, 1988). Any article inclusive of agricultural and crop damage was included in this classification.

(6) Atmospheric Disturbances

The depletion of the ozone layer is highly interconnected with another global environmental concern, climate change, due to the redistribution of ozone at different altitudes and to the result of CFCs as heat absorbing gases. At the time of the ozone debate in the media, there was an increasing scientific consensus that CFCs in the atmosphere could create implications for increasing global temperatures, sea level rise, and alterations in weather patterns. Any article inclusive of atmospheric disturbances due to CFCs and the ozone layer was included in this classification.

(7) Problems Unforeseen at the Time

Brunnée (1988) acknowledges that at the time, the future growth rates and concentration of CFC emissions were critical areas of uncertainty, as was the difficulty in predicting to what degree and how quickly the depletion of the ozone layer would occur. Because loss of stratospheric ozone takes place in distant parts of the atmosphere at a relatively slow rate, any health or environmental problems it produces may not show up for years or decades

(Newton, 1995). Authors that recognized the uncertainty of unforeseen futuristic problems that could possibly arise from ozone depletion were noted under this classification.

(8) CFCs Not Proven to Cause Harm

Differences of opinion involving ozone depletion emerged as scientific research intensified to determine if a correlation between CFCs and the hole in the ozone layer existed.

Industrial representatives continually expressed doubts about the reality of problems with the ozone layer as well as claiming that sufficient scientific data could not prove that CFCs were contributing to ozone depletion. A direct relationship between causes and effects is not immediately obvious when studying ozone scenarios; human knowledge stems from a laboratory hypothesis, or some co-variation, and no physical, causal link is demonstrated (Leroux, 2005). (Newton, 1995) outlines industrialists' motivation in raising doubts

involving the interconnectivity of CFCs and ozone depletion:

The opposition of industries to policies such as those outlined in the Montreal Protocol and the Clean Air Act Amendments of 1990, are, therefore, easy to understand. Companies can point to specific dollar and job losses that will occur if and when they are required to abandon the use of commercially vital compounds like the CFCs.

Any article that acknowledges that CFCs had yet to be proven to cause harm was included in this category.

CFCs CATEGORY 5: LEGISLATIVE ATTITUDE (CFC 5)

This research analyzes articles in which the authors' legislative attitude surrounding regulatory action was observable; any article involving legislative attitude was further divided noting the following observations: 1) Author believes costs imposed on industry due to stricter regulations will be unreasonable; 2) Author believes additional regulation might possibly be beneficial but that the costs of doing so will be substantial; 3) Author believes that benefits outweigh any costs associated with legislative action.

CFCs CATEGORY 6: TONE OF ARTICLE (CFC 6)

The approach follows that under AR: CATEGORY 6 to categorize each article under the following classes: (1) Highly Environmental; (2) Somewhat Environmental; (3) Neutral (4) Somewhat Industrial; (5) Highly Industrial.

4.7 CLASSIFYING MAGAZINES INTO GENRES

After compiling articles according to the parameters as stated, 76 acid rain articles and 38 CFC articles were collected. From the combined total of these 114 articles, 26 magazine titles were identified as contributing magazine sources. The initial phase of creating genres to classify magazine titles involved referencing the detailed Subject Index of *Magazines for Libraries*, a source of magazine information from 1965-1992 that annotatively summarizes information of over 6,600 periodicals (Katz, 1992).⁴ All but two magazines (*Popular Science* and *Science Direct*) in this study were included in the subject heading listings found in *Magazines for Libraries*. The magazines from this research yielded the following 12 subject headings: "Alternatives", "Business", "Environment, Conservation, and Outdoor Recreation", "Fishing, Hunting, and Guns", "Gardening", "General Editorial", "Home", "News and Opinion", "Recreational Projects", "Science", "Sports", and "Women". To create broader categories, these 12 given subject headings were reclassified into 5 genres: Business and Industry, Editorials, News, Science and Sports and Recreation. Table 4.1 lists the genre given by the researcher in the first column, the subject listing as given by *Magazines for*

⁴ The 7th edition of this book was chosen for this study opposed to the most current edition due to the time span of this study.

Libraries in the second column, with the respective magazine titles listed in the third column.

Table 4.1: Magazine Genres

| Genre as given by researcher | <i>Magazine for Libraries</i> <u>Subject Listing</u> | Magazine Title |
|------------------------------|---|---|
| Sports and Recreation | Environment, Conservation, and Outdoor Recreation | <i>Audubon</i> |
| | Fishing, Hunting, and Guns | <i>Field and Stream</i> <i>Outdoor Life</i> |
| | Recreational Projects | <i>Popular Mechanics</i> |
| | Sports | <i>Sports Illustrated</i> |
| Business and Industry | Business | <i>Business Week</i> <i>Forbes</i> <i>Fortune</i> |
| General Editorial | General Editorial | <i>Esquire</i> <i>Life</i> <i>National Geographic</i> <i>Reader's Digest</i> <i>Smithsonian</i> |
| | Alternatives | <i>Mother Earth News</i> |
| | Women | <i>Good Housekeeping</i> <i>Glamour</i> |
| | Home | <i>Home and Garden</i> |
| | Gardening | <i>Organic Gardening</i> |
| News | News and Opinion | <i>Newsweek</i> <i>Time</i> <i>U.S. News & World Report</i> |
| Science | Science | <i>Discover</i> <i>Scientific American</i> <i>Popular Science*</i> <i>Science Direct*</i> |

*Note: The magazines *Popular Science* and *Science Direct* are not listed in *Magazines for Libraries*; these magazines were placed in the Science genre according to the discretion of the researcher.

CHAPTER 5

RESULTS

This chapter presents the results from the content analysis model and addresses the research questions of this study. Sections 5.1 and 5.2 report the percentages of each classification according to magazine genre by subject matter of acid rain and CFCs.

5.1 ACID RAIN FREQUENCIES

AR 1: NORMATIVE, POSITIVE AND NEUTRAL STATEMENTS

Of the 76 articles analyzed according to AR 1, 28.9% were classified as containing environmental normative characteristics, 34.2% contain environmental positive characteristics, 21.1% were classified as neutral, 6.6% contain normative characteristics from an industrial standpoint, and 9.2% contain positive characteristics from an industrial standpoint. Table 5.1 presents the percent of each AR 1 classification by magazine genre.

Table 5.1: Percentage of Articles Analyzed According to AR 1: Normative, Positive and Neutral Statements

| | Classification | | | | |
|------------------------------------|------------------|-----------------|---------|-------------------|--------------------|
| | Normative Nature | Positive Nature | Neutral | Positive Industry | Normative Industry |
| Genre Sports and Recreation (n=20) | 45.0 | 45.0 | 5.0 | 5.0 | 0.0 |
| Business and Industry (n=13) | 7.7 | 0.0 | 15.4 | 38.5 | 38.5 |
| General Editorial (n=11) | 45.5 | 45.5 | 9.1 | 0.0 | 0.0 |
| News (n=24) | 16.7 | 29.2 | 50.0 | 4.2 | 0.0 |
| Science (n=8) | 37.5 | 62.5 | 0.0 | 0.0 | 0.0 |
| All Genres (n=76) | 28.9 | 34.2 | 21.1 | 9.2 | 6.6 |

AR 2: ECONOMIC, ECOLOGICAL AND HEALTH PREDICTIONS

The content analysis indicates that 40.8% of the 76 acid rain articles included economic predictions, 18.4% included ecological predictions, and 3.9% included health predictions. It is important to note that articles could be inclusive of one or more types of predictions, and that this is not a cumulative percent (in comparison with Table 5.1). Table 5.2 presents the percentages by magazine genre.

Table 5.2: Percentage of Articles Analyzed According to AR 2: Economic, Ecological and Health Predictions

| | | Classification | | |
|-------|------------------------------|----------------------|------------------------|--------------------|
| | | Economic Predictions | Ecological Predictions | Health Predictions |
| Genre | Sports and Recreation (n=20) | 25.5 | 15.0 | 5.0 |
| | Business (n=13) | 61.5 | 15.4 | 0.0 |
| | Editorial (n=11) | 54.5 | 45.5 | 9.1 |
| | News (n=24) | 45.8 | 12.5 | 4.2 |
| | Science (n=8) | 12.5 | 12.5 | 0.0 |
| | All Genres (n=76) | 40.8 | 18.4 | 3.9 |

Note: Articles in the study could be inclusive of multiple predictions; therefore, it is important to acknowledge that the rows do not sum to 100% (as compared to Table 5.1).

AR 3: SOURCES OF ACID RAIN

Of the 76 articles analyzed according to AR 3, 32.9% of articles asserted that the precursors of acid rain were human induced, 1.3% asserted that the precursors formed from natural origins, 19.7% attributed the precursors to a combination of manmade and natural sources, 3.9% claimed that not enough information was known at the time, while 42.2% did not include information on the sources of acid rain. Table 5.3 presents the percentages by magazine genre.

Table 5.3: Percentage of Articles Analyzed According to AR 3: Sources of Acid Rain

| | Classification | | | | |
|------------------------------------|----------------|---------|-------------|------------------------------|---------------|
| | Human Induced | Natural | Combination | Not Enough Information Known | Not Inclusive |
| Genre Sports and Recreation (n=20) | 45.0 | 0.0 | 20.0 | 0.0 | 35.0 |
| Business and Industry (n=13) | 7.7 | 7.7 | 7.7 | 7.7 | 69.2 |
| General Editorial (n=11) | 63.6 | 0.0 | 18.2 | 0.0 | 18.2 |
| News (n=24) | 25.0 | 0.0 | 20.8 | 4.2 | 50.0 |
| Science (n=8) | 25.0 | 0.0 | 37.5 | 12.5 | 25.0 |
| All Genres (n=76) | 32.9 | 1.3 | 19.7 | 3.9 | 42.1 |

AR 4: CONSEQUENCES OF ACID RAIN

Of the 76 articles analyzed according to AR 4, 82.9% of the articles included ecological consequences, 32.9% economic consequences, 25.0% health problems, 51.3% international consequences, 21.1 % structural damage, 14.5% unforeseen problems, while 2.6% of articles claimed that acid rain causes no problems. Articles could be inclusive of multiple classifications, as this is not a cumulative percent. Table 5.4 presents the percentages by magazine genre.

Table 5.4: Percentage of Articles Analyzed According to AR 4: Consequences of Acid Rain

| | | Classification | | | | | | |
|-------|---------------------------------------|---------------------------------|-------------------------------|--------------------|--------------------------------|----------------------|-----------------------------|----------------|
| | | Ecological Conse- quences | Economic Conse- quences | Health Problems | Inter- national Problems | Structural Damage | Unfore- seen Problems | No Problems |
| Genre | Sports and Recreation (n=20) | 90.0 | 50.0 | 25.0 | 50.0 | 10.0 | 5.0 | 0.0 |
| | Business and Industry (n=13) | 30.8 | 7.7 | 0.0 | 23.1 | 0.0 | 46.2 | 15.4 |
| | Editorial (n=11) | 100.0 | 45.5 | 54.5 | 63.6 | 63.6 | 18.2 | 0 |
| | News (n=24) | 91.7 | 29.2 | 29.2 | 62.5 | 16.7 | 4.2 | 0 |
| | Science (n=8) | 100.0 | 25.0 | 12.5 | 50.0 | 37.5 | 12.5 | 0 |
| | All Genres (n=76) | 82.9 | 32.9 | 25.0 | 51.3 | 21.1 | 14.5 | 2.6 |

Note: Articles in the study could be inclusive of multiple consequences of acid rain; therefore, it is important to acknowledge that the rows do not sum to 100%.

AR 5: LEGISLATIVE ATTITUDE

Of the 76 articles analyzed by AR5, 19.7% percent of authors suggested that costs imposed on the industry due to stricter regulations will be unreasonable, 9.2% suggest that additional regulation might be beneficial, but acknowledges the substantial cost of implementing regulation, while 17.1% of authors asserted that the benefits of legislative action would outweigh any costs associated with legislative action. Table 5.5 presents the percentages by magazine genre.

Table 5.5: Percentage of Articles Analyzed According to AR 5: Legislative Attitude

| | | Classification | | |
|-------|------------------------------|---|---|---|
| | | Unreasonable costs resulting from regulations | Costs resulting from legislation will be substantial but provide benefits | Benefits outweigh any costs associated with legislation |
| Genre | Sports and Recreation (n=20) | 5.0 | 5.0 | 30.0 |
| | Business (n=13) | 38.5 | 7.7 | 0.0 |
| | Editorial (n=11) | 27.3 | 18.2 | 45.5 |
| | News (n=24) | 25.0 | 12.5 | 8.3 |
| | Science (n=8) | 0.0 | 0.0 | 0.0 |
| | All Genres (n=76) | 19.7 | 9.2 | 17.1 |

Note: Articles in the study could be inclusive of statements illustrating opposing views of the issue; therefore, it is important to acknowledge that the rows do not sum to 100%.

AR 6: TONE

Of the 76 articles analyzed by Acid Rain Category VI, 35.5% of articles were classified as highly environmental, 28.9% were classified as somewhat environmental, 23.7% classified as neutral/news-oriented, 6.6% classified as somewhat industrial, and 5.3% classified as highly industrial. Table 5.6 presents the percentages by magazine genre.

Table 5.6: Percentage of Articles Analyzed According to AR 6: Tone

| | | Classification | | | | |
|-------|------------------------------|----------------------|------------------------|---------|---------------------|-------------------|
| | | Highly environmental | Somewhat environmental | Neutral | Somewhat industrial | Highly industrial |
| Genre | Sports and Recreation (n=20) | 65.0 | 25.0 | 5.0 | 5.0 | 0.0 |
| | Business and Industry (n=13) | 7.7 | 7.7 | 23.1 | 30.8 | 30.8 |
| | General Editorial (n=24) | 54.5 | 36.4 | 9.1 | 0.0 | 0.0 |
| | News (n=11) | 16.7 | 33.3 | 50.0 | 0.0 | 0.0 |
| | Science (n=8) | 37.5 | 50.0 | 12.5 | 0.0 | 0.0 |
| | All Genres (n=76) | 35.5 | 28.9 | 23.7 | 6.6 | 5.3 |

5.2 CFCs FREQUENCIES

CFC 1: NORMATIVE, POSITIVE AND NEUTRAL STATEMENTS

Of the 38 articles analyzed, 26.3% were classified as containing environmental normative characteristics, 47.4% contain environmental positive characteristics, 18.4% were classified as neutral or were news-based, 7.9% contain normative characteristics from an industrial standpoint, and none contain positive characteristics from an industrial standpoint. Table 5.7 presents the percentages by magazine genre.

Table 5.7: Percentage of Articles Analyzed According to CFC 1: Normative, Positive and Neutral Statements

| | Classification | | | | |
|-----------------------------------|------------------|-----------------|---------|-------------------|--------------------|
| | Normative Nature | Positive Nature | Neutral | Positive Industry | Normative Industry |
| Genre Sports and Recreation (n=1) | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Business and Industry (n=4) | 25.0 | 50.0 | 0.0 | 0.0 | 25.0 |
| General Editorial (n=3) | 66.7 | 0.0 | 33.3 | 0.0 | 0.0 |
| News (n=20) | 30.0 | 45.0 | 20.0 | 0.0 | 5.0 |
| Science (n=10) | 0.0 | 20.0 | 10.0 | 0.0 | 2.6 |
| All Genres (n=38) | 26.3 | 47.4 | 18.4 | 7.9 | 100.0 |

CFC 2: ECONOMIC, ECOLOGICAL AND HEALTH PREDICTIONS

The research indicates that 18.4% of the articles included economic predictions, 10.5% included ecological predictions, and 34.2% included health predictions. It is important to note that articles could be inclusive of one or more types of predictions, and that this is not a cumulative percent. Table 5.8 presents the frequency statistics from the articles organized by magazine genre according to CFC 2: Economic, Ecological and Health Predictions.

Table 5.8: Percentages of Articles Analyzed According to CFC 2: Economic, Ecological and Health Predictions

| | | Classification | | |
|-------|-----------------------------|----------------------|------------------------|--------------------|
| | | Economic Predictions | Ecological Predictions | Health Predictions |
| Genre | Sports and Recreation (n=1) | 100.0 | 100.0 | 100.0 |
| | Business (n=4) | 50.0 | 25.0 | 50.0 |
| | Editorial (n=3) | 0.0 | 0.0 | 66.7 |
| | News (n=20) | 20.0 | 10.0 | 40.0 |
| | Science (n=10) | 0.0 | 0.0 | 0.0 |
| | All Genres (n=38) | 18.4 | 10.5 | 34.2 |

Note: Articles in the study could be inclusive of multiple predictions; therefore, it is important to acknowledge that the rows do not sum to 100%.

CFC 3: SOURCES ATTRIBUTED TO THE DEPLETION OF THE OZONE LAYER

Of the 38 articles analyzed according to CFC 3, 57.9% of articles asserted that the depletion of the ozone layer correlated with human induced sources (specifically CFCs), 7.9% attributed ozone depletion to natural sources, 18.4% attributed ozone depletion to a combination of manmade and natural sources, while 7.9% stated that not enough information was known at the time. Table 5.9 presents the percentages by magazine genre.

Table 5.9: Percentage of Articles Analyzed According to CFC 3: Sources Attributed to the Depletion of the Ozone Layer

| | Classification | | | | |
|-----------------------------------|-----------------------|---------|-------------|------------------------------|--------------|
| | Human Induced Sources | Natural | Combination | Not Enough Information Known | Not Included |
| Genre Sports and Recreation (n=1) | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| Business and Industry (n=4) | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| General Editorial (n=3) | 66.7 | 0.0 | 33.3 | 0.0 | 0.0 |
| News (n=20) | 60.0 | 10.0 | 15.0 | 10.0 | 5.0 |
| Science (n=10) | 40.0 | 10.0 | 20.0 | 10.0 | 20.0 |
| All Genres(n=38) | 57.9 | 7.9 | 18.4 | 7.9 | 7.9 |

CFC 4: CONSEQUENCES OF OZONE DEPLETION

The results indicate that of the 38 articles analyzed according to CFC 4, 36.8% of the articles included ecological consequences, 5.2% economic consequences, 78.9% health problems, 55.3% international consequences, 21.1 % agricultural damage, 94.7% atmospheric disturbances, 15.8% unforeseen problems, while 18.4% of articles claimed that CFCs had not been proven to cause harm. Articles could be inclusive of multiple classifications, as this is not a cumulative percent. Table 5.10 presents the percentages by magazine genre.

Table 5.10: Percentage of Articles Analyzed According to CFC 4: Consequences of Ozone Depletion

| | Classification | | | | | | | |
|-----------------------------------|--------------------------|------------------------|-----------------|-------------------------|----------------------|---------------------------|----------------------|-------------|
| | Eco-logical Consequences | Eco-nomic Consequences | Health Problems | Inter-national Problems | Agri-cultural Damage | Atmo-spheric Disturbances | Unfore-seen Problems | No Problems |
| Genre Sports and Recreation (n=1) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 0.0 |
| Business and Industry (n=4) | 25.0 | 0.0 | 75.0 | 75.0 | 75.0 | 100.0 | 0.0 | 25.0 |
| Editorial (n=3) | 33.3 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| News (n=20) | 30.0 | 5.0 | 80.0 | 55.0 | 20.0 | 100.0 | 20.0 | 15.0 |
| Science (n=10) | 50.0 | 0.0 | 70.0 | 60.0 | 0.0 | 80.0 | 10.0 | 30.0 |
| All Genres(n=38) | 36.8 | 5.3 | 78.9 | 55.3 | 21.1 | 94.7 | 15.8 | 18.4 |

Note: Articles in the study could be inclusive of multiple consequences of ozone depletion; therefore, it is important to acknowledge that the rows do not sum to 100%.

CFC 5: LEGISLATIVE ATTITUDE

The results indicate that of the 38 articles analyzed by CFC 5, 28.9% of authors suggested that costs imposed on industry due to stricter regulations will be unreasonable, 26.3% suggest that additional regulation might be beneficial, but acknowledges the substantial cost of implementing regulation, while 13.2% of authors asserted that the benefits of legislative action would outweigh any costs associated with legislative action. Table 5.11

presents the percentages by magazine genre.

Table 5.11: Percentages of Articles Analyzed According to CFC 5: Legislative Attitude

| | | Classification | | |
|-------|-----------------------------|---|---|---|
| | | Unreasonable costs resulting from regulations | Costs resulting from legislation will be substantial but provide benefits | Benefits outweigh any costs associated with legislation |
| Genre | Sports and Recreation (n=1) | 0.0 | 0.0 | 0.0 |
| | Business (n=4) | 75.0 | 100.0 | 25.0 |
| | Editorial (n=3) | 0.0 | 0.0 | 33.3 |
| | News (n=20) | 25.0 | 25.0 | 15.0 |
| | Science (n=10) | 30.0 | 10.0 | 0.0 |
| | All Genres (n=38) | 28.9 | 26.3 | 13.2 |

Note: Articles in the study could be inclusive of statements illustrating opposing views of the issue; therefore, it is important to acknowledge that the rows do not sum to 100%.

CFC 6: TONE

The results indicate that of the 38 articles analyzed by CFC 6, 36.8% of articles were classified as pro-environmental/pro-action, 42.1% were classified as somewhat environmental, 13.2% classified as neutral/news-oriented, 0.0% classified as pro-industry/anti-action, and 5.3% classified as somewhat industrial. Table 5.12 presents the percentages by magazine genre.

Table 5.12: Percentage of Articles Analyzed According to CFC 6: Tone

| | | Tone | | | | |
|-------|-----------------------------|----------------------|------------------------|---------|---------------------|-------------------|
| | | Highly Environmental | Somewhat Environmental | Neutral | Somewhat Industrial | Highly Industrial |
| Genre | Sports and Recreation (n=1) | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Business and Industry (n=4) | 25.0 | 50.0 | 0.0 | 25.0 | 0.0 |
| | General Editorial (n=3) | 66.7 | 0.0 | 33.3 | 0.0 | 0.0 |
| | News (n=20) | 40.0 | 40.0 | 15.0 | 5.0 | 0.0 |
| | Science (n=10) | 20.0 | 60.0 | 10.0 | 10.0 | 0.0 |
| | All Genres (n=38) | 36.8 | 42.1 | 13.2 | 7.9 | 0.0 |

5.3 EVALUATING THE QUALITATIVE TRENDS OF MASS MEDIA COVERAGE

I hypothesized that journalists will frame information with an environmental or industrial tone based upon magazine genre. From the information provided by the content analysis, articles classified by tone as “Highly Environmental”, “Somewhat Environmental”, “Neutral”, “Somewhat Industrial”, and “Highly Industrial” were given values of 2, 1, 0, -1, and -2, respectively, for both acid rain and CFC articles. A genre with a mean closer to 2 will be highly environmental leaning, while a mean closer to 0 is considered neutral, and a mean of -2 will be highly industrially leaning. The test procedure for evaluating the research hypothesis that the media frames issues in a certain tone is as follows:

$$H_0 : \mu = 0 \text{ (that is, the tone of magazine genres will be neutral)}$$

$$H_1 : \mu \neq 0 \text{ (that is, the tone of magazine genres will not be neutral)}$$

ANALYSIS OF TONE BY GENRE FOR ACID RAIN

For the Sports and Recreation, General Editorial, and News genre, we reject the null hypothesis and conclude that the tones of these genres are environmentally leaning. For the Business and Industry genre, we reject the null hypothesis and conclude that the tone is industrially leaning. The t-test results are shown in Table 5.13.

Table 5.13: T-Test Results for AR 6: Tone

| Genre | N | Mean | Standard Deviation |
|------------------------|----------|-------------|---------------------------|
| Sports and Recreation* | 20 | 1.50 | 0.83 |
| Business and Industry* | 13 | -0.69 | 1.25 |
| General Editorial* | 11 | 1.45 | 0.69 |
| News* | 24 | 0.67 | 0.76 |
| Science* | 8 | 1.25 | 0.71 |

Note: Genres denoted by: (*) indicate significance from 0 at the 0.1 level.

ANALYSIS OF TONE BY GENRE FOR CFCs

For the News and Science genre, we reject the null hypothesis and conclude that the tone of these genres is environmentally leaning. For the Business and Industry and General Editorial genre, we cannot reject the null hypothesis, indicating these genres present a more neutral tone. The Sports and Recreation genre was not included in this test based on the quantity of one article found in the study. The t-test results are shown in Table 5.14.

Table 5.14: T-Test Results for CFC 6: Tone

| Genre | N | Mean | Standard Deviation |
|-----------------------|----------|-------------|---------------------------|
| Business and Industry | 4 | 0.75 | 1.26 |
| General Editorial | 3 | 1.33 | 1.16 |
| News* | 20 | 1.15 | 1.56 |
| Science* | 10 | 0.90 | 0.876 |

Note: Genres denoted by: (*) indicate significance from 0 at the 0.1 level.

ANALYSIS OF NORMATIVE, POSTIVE AND NEUTRAL STATEMENTS FOR ACID AND CFCs

I hypothesized that the diction used by journalists will not depend on magazine genre.

Similarly to the analysis of tone by genre, articles classified as using terminology described as “Normative Nature”, “Positive Nature”, “Neutral”, “Positive Industry”, and “Normative Industry” were assigned values of 2, 1, 0, -1, and -2, respectively. A genre with a mean closer to 2 will use diction with a more persuasive tone in favor of the environment, a mean closer to 1 will use diction more objectively stated that is more environmentally based, a mean closer to 0 is considered more neutral, a mean closer to -1 will use diction more objectively that is more industry-based, and a mean of -2 will use diction with a more persuasive tone in favor of industrial standpoints. Acid rain articles and CFCs articles were combined to evaluate this issue collectively. The test procedure for evaluating the research hypothesis that the diction used by the media is not neutral is as follows:

$$H_0 : \mu = 0 \text{ (that is, the diction of magazine genres will be neutral)}$$

$$H_1 : \mu \neq 0 \text{ (that is, the diction of magazine genres will not be neutral)}$$

For the Sports and Recreation and General Editorial genre, we reject the null hypothesis and conclude that the diction falls between “Normative Nature” and “Positive Nature” with mean values of 1.55 and 1.35, respectively. For the News and Science genre, we reject the null

hypothesis and conclude that the diction can be classified as “Positive Nature” with mean values of 0.75 and 0.89, respectively. It is important to note that these results are affected by the sample size. For the Business and Industry genre, we reject the null hypothesis and conclude that the diction can be classified as more “Positive Industry”. No genres resulted in diction described as “Normative Industry”. The t-test results are shown in Table 5.15.

Table 5.15: T-Test Results for Diction

| Genre | N | Mean | Standard Deviation |
|------------------------|----------|-------------|---------------------------|
| Sports and Recreation* | 21 | 1.33 | 0.80 |
| Business and Industry* | 17 | -0.65 | 1.41 |
| General Editorial* | 14 | 1.36 | 0.75 |
| News* | 44 | 0.75 | 0.92 |
| Science* | 18 | 0.89 | 0.90 |

Note: Genres denoted by: (*) indicate significance from 0 at the 0.1 level.

CHAPTER 6

DISCUSSION

6.1 EVALUATING JOURNALISTIC NORMS: OVERALL OBSERVATIONS

This section addresses the general conclusions from the results presented in sections 5.1 and 5.2. The purpose of the section is to address the most telling observations from the research results. These findings can be combined with the analysis of the tone and diction further discussed to observe parallels in the frames found in environmental coverage.

By looking at the results from AR 2 and CFC 2, there is some evidence that journalists use predictions to engage their readership; these scientific predictions exhibit the ability of the media to turn a general audience member into a potential stakeholder. With regard to acid rain, the general public showed concern over the ecological outcomes, as reflected by their acceptance of bearing regulatory costs in order to protect a region's ecological heritage (Visgilio, 2007). The AR 2 results indicate that 40.8% of all genres include economic predictions and 18.4% include ecological predictions. Comparatively the public's concern revolved around the health threats involving CFCs' role in ozone depletion, specifically that of skin cancer (Mazur, 2006). The CFC 2 results indicate that 34.2% of all genres include health predictions, while only 18.4% and 10.5% include economic and ecological predictions, respectively. While environmental risks presented by the news media do not possess actual news value, risks are an abstraction about the possibility of damage that will occur from environmental threats (Allan, et al., 2000).

This research seeks to determine how journalists convey accusations of environmental threats whether as human induced or attributed to natural factors. This is particularly relevant currently as the debate about the definitive causes of global warming is currently being played out in the media. Overall, uncertainties are evident in the more divisive issue of acid rain as 32.9% of all genres contributed the sources of acid rain as human induced, while a larger majority of 57.9% of articles cited human induced sources, specifically CFCs, to the destruction of the ozone layer. However only 1.3 and 7.9% contributed environmental consequences occurring from natural sources for acid rain and ozone depletion, respectively. While a large majority of magazines did not take an obvious stance on the source of acid rain and ozone depletion, it is evident that journalists were more likely to attribute sources as human induced as opposed to natural causes.

Similarities can be identified in the means in which journalists convey the consequences of acid rain and CFCs. The AR 4 and CFC 4 results indicate that a high percentages of journalists addressed ecological, health, and international consequences that could emerge from the respective issue. Specifically, articles on acid rain included threats of structural damage while articles on CFCs concentrated on agricultural damage and atmospheric disturbances. By focusing on the threats of environmental issues in the media, journalists are able to raise apprehension among audiences. While additional research, with more diversity on subject matter, is needed to support any broad inferences, the findings of this study suggest a form of journalistic writing in which consumers are presented with information with the ability to turn audiences into invested stakeholders.

6.2 EVALUATING JOURNALISTIC NORMS: TONE

Our results indicate that the articles on acid rain in most magazine genres were environmentally leaning in tone. The Sports and Recreation genre was the most environmentally leaning with a mean of 1.50, followed by General Editorial (1.45), Science (1.25), and News (0.67). Business and Industry had a mean of -0.69, indicating an industrial leaning tone. For articles involving CFCs, all articles were environmentally leaning in the following ascending order: General Editorial (1.33), News (1.15) and Science (0.90). Unlike for acid rain, Business and Industry magazines exhibited an environmental tone of CFC coverage.

It is not surprising that the Sports and Recreation mean tone value fell between highly and somewhat environmental; articles in this category emphasized the threats of acid rain to recreational activities, especially fishing with some inferences to hiking and camping. With headlines and stories describing the apparent “doom” arising to fishing as a recreational activity, readers were left with an overall impression that the ecological effects of acid rain would devastate their recreational livelihoods (Boyle, 1984). For this genre, we conclude that readers were provided with information that would raise apprehension about acid rain, affecting their position as a stakeholder. Because the risks of CFCs and ozone depletion were not associated with recreational activities, only one article was found under the Sports and Recreational genre involving CFCs.

The General Editorial genre resulted in similar means of 1.45 and 1.33 for acid rain and CFCs, respectively. This genre was inclusive of magazines that have a broad audience base, as well as magazines in which no other category was deemed appropriate. Our results imply that the news media will frame issues in a manner that favors the environment when presenting messages to a more general audience. The mass media is a key source of

information involving environmental issues to the general public; the media acts as a translator between the scientist and the reader (Boykoff & Boykoff, 2007). The overall message was environmentally leaning to audience members that might not be as observably invested as other specific stakeholder groups. Our research raises the question of whether journalists intentionally frame information in an environmentally favoring tone, or does it occur consequently because journalists receive information from scientists that study the environment and thus already an underlying bias favorable to the environmental view?

Our research indicates that the Science genre was environmentally leaning with a mean value of 1.25 for acid rain, which is not surprising given the research from the scientific community at the time indicated that acid rain adversely affected the environment. Consensus among ecological scientists at the time was largely due to high quality of time series analysis of both rainfall pH and surface water acidity, which was of high value for demonstrating the trends in acid deposition and surface water pH (Visgilio, 2007). My research reflects the consensus of the scientific community, as well as the results from the research at the time, to the high mean value for the Science genre involving acid rain. The Science genre, as applied to articles for CFCs, was noticeably lower, which is surprising in the context of this research. The conflict involving CFCs was far less controversial than acid rain; we would have expected this genre to have a higher mean value. Ozone depletion generated less policy conflict, and policies to control CFCs were implemented with far less objections compared to acid rain. Because acid rain was a more controversial issue at the time, we suggest that scientific journalists were more compelled

to advocate with a stronger environmental tone compared to CFCs, which would account for the differences within the mean values.

For the magazines that were included in the News genre, we find that journalists framed information that was slightly more leaning in favor of the environment than neutral. While it would be expected for this middle-ground genre of media sources to report on issues with a more objective and neutral tone, again we find that more general audiences were provided with messages that were environmentally leaning.

The Business and Industry genre was the only genre to frame information in an industrial leaning tone and only in the case of acid rain. This tendency is indicative of the industry's opposition to legislation that would create technological costs to the clean up problem caused by acid rain. Contrary to acid rain, the Business and Industry genre was more environmentally leaning for articles involving CFCs with a mean value of 0.75. Interestingly, not one article fell under the classification of "Highly Industrial". We attribute these findings to the less divisive nature of the industry's standing involving CFCs and ozone depletion; industry producers were presented with the opportunity to find technological innovations to gain competitive advantages in response to the challenge of phasing out CFCs (World Resources Institute., et al., 1996).

My research seeks to determine what we can be inferred about the means in which the media provides information to its readers. From studying the tone in which environmental issues are framed, I posit that general audiences are provided with more environmentally leaning messages, as opposed to being given a more general, objective point of view, when it comes to environmental messages in the news media. These findings complement the studies by Boykoff & Boykoff (2007), which concludes that the explicit

principles of journalism such as: objectivity, fairness, balance, and comprehensiveness have proven to be more of an ideal than an actual practice. They further iterate that media coverage involving anthropogenic climate change has been biased due to journalistic norms such as: dramatization, personalization, novelty, balance and authority-order.

Whether or not journalists intentionally frame issues in favor of a certain position, some competing viewpoints are emphasized in the media while others are excluded; members of these competing stakeholder groups become claims-makers when they articulate their perspective (Allan, et al., 2000). Therefore, information is presented to the public about how to view certain issues, rather than being presented with the facts of news-oriented events, which we associate with media coverage. The question is then raised if the media is a more environmentally leaning entity, or are journalist simply influenced by the scientists providing the evidence, which results in scientific matters in the media being framed in a more environmentally leaning tone? Further research is needed in this area to address these topics. Regardless of journalists' intentions, I posit that the majority of journalism involving magazine publications will provide generalized audiences with information that favors the environment when studying environmental issues with policy processes.

Additionally, my study finds that more targeted audiences are provided with information in which explicit framing occurs that further enhances their position as invested stakeholders, as seen in the Science genre for acid rain and CFCs, as well in the Sports and Recreation and Business and Industry genres for acid rain. While these results suggest that journalists do in fact tailor information to its readers based upon assumed stakeholder positions, it is also important to consider how the public gathers information

surrounding environmental issues. Psychological literature asserts that individuals seek information that confirms pre-existing beliefs, ideals, and expectations, termed confirmation bias (Klayman, Jerome Busemeyer, & Douglas, 1995; Nickerson, 1998). Recent research illustrates this phenomenon by showing that consumers want to read and watch news that is consistent with their prior beliefs and tastes (Xiang & Sarvary, 2007). My study contributes to the discussion involving confirmation bias in the means that information sources such as the media present information in a limited, specifically framed manner, so that the reader is consistently provided with reaffirming information rather than given multiple viewpoints.

Combining my study with confirmation bias research, I suggest that a cycle exists in which audiences seek information sources, such as magazines, that are best tailored to their invested interests; these information sources then provide information in such a manner that continually reaffirms initial values. Therefore, for a reader to acquire a different argument on a subject matter, he or she must actively pursue another source as a means to obtain new ideologies. Future research is needed to study the relationship between media messages and reader's tendencies and preferences concerning reaffirming ideologies to fully understand the media's role in confirmation bias.

6.3 EVALUATING JOURNALISTIC NORMS: NORMATIVE, POSITIVE AND NEUTRAL STATEMENTS

My research aimed to study framing in an additional manner by evaluating the diction used by journalists to convey environmental messages. My study shows that the media phrase environmental issues in a more normative and positive manner that is environmentally

leaning for certain consumers, rather than using neutral terminology or diction that illustrates industrial viewpoints. The Sports and Recreation and General Editorial genres contained normative writing that was environmentally leaning, while the News and Science genres' diction fell between positive and neutral writing in favor of the environment. No articles resulted in diction described as writing in a normative or positive manner in favor of industry arguments.

Comparing my analysis of diction with the analysis of tone within the study, I can see parallels in framing used by journalists to convey environmental messages. The Sports and Recreation and General Editorial genres were the most environmentally leaning in tone; it reasons that these two genres employed the most subjective form of writing. As for the News and Science genres, the writing was more indicative of positive statements that were environmental in nature, however this still does not signify a more objective form of journalism due to the exclusion of industrial arguments. According to the source used to classify the genres, the News genre can be considered a more impartial source in which news events are duly reported while the Science genre is source of information for the scientific community in which research results are generally provided (Katz, 1992). While the Science and News genres refrained from using a subjective form of writing and reported information in a positive manner, again it is representative of framing used in an environmentally leaning manner.

Both the tone and diction emphasized by the journalists can be defined as "frames of communication," a form of conveying information from what the writer sees as relevant to the topic at hand (Cappella, 1997; Druckman, 2001). Implications of frames of communication are that they influence "frames of thought" upon the reader; this process is

referred to as the “framing effect” (Druckman, 2001). Again we see that the journalism frames evaluated in this study provides consumers with the means of how to view the environmental issue at hand. Journalists using normative terminology assert a powerful ideology of what “should be”; in the context of my study this translates into “what should be done” to prevent harm from the threats of acid rain and CFCs. Journalists using positive terminology focused on “what is” involving the events surrounding acid rain and CFCs; while this is a more objective form of writing, again only the environmental side of the dispute was portrayed. While my study can assess frames of communication provided by the media, additional research in this field is necessary to determine how frames of thought evolve surrounding environmental issues to understand the overall framing effect.

6.4 CONCLUSION

This study confirms the importance of studying journalistic norms found in mass media outlets such as magazines. By critically reviewing qualitative information found in the media using content analysis, this research illustrates how the dynamics of journalistic framing can be an influential tool in public perception and policy formation. By studying the frames found in environmental media coverage, my study concludes that general audiences are provided with more environmentally leaning messages, while more specific audiences are provided with messages that affirm their positions as stakeholders.

Additionally I find that journalists consistently use normative and positive diction in a manner exclusive of environmental viewpoints. These findings can aid policy makers understand the types of messages that are being conveyed to the public, and what structure the messages take relative to the issue at hand. Overall, it appears that the media provides

consumers with the values of how to view respective issues rather than providing more objective messages, which can have serious implications for policy formation and implementation.

In conclusion, while there is an existing need for further research to study the qualitative and quantitative trends of environmental media coverage, this research provides a methodology for doing so. My content analysis model can be expanded and modified to evaluate other environmental issues, as well as social and political sciences in the media. Further analyses of media coverage, environmental issues, policy processes and public perception will give us a better overall understanding of the interconnectivity and implications of these matters at hand.

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APPENDIX A

ACID RAIN ARTICLES INCLUDED IN STUDY

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APPENDIX B

CFC ARTICLES INCLUDED IN STUDY

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- Aerosol link (1981, August 24). *Time*, 118, 41.
- Beardsley, T. (1987). Ozone watch. *Scientific American*, 257, 18.
- Beardsley, T. (1988). Ultraviolet verdict. *Scientific American*, 258, 26.
- Beck, M. (1988). More bad news for the planet. *Newsweek*, 111, 63+.
- Begley, S. (1986). The silent summer. *Newsweek*, 107, 64-66.
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- Can we keep the sunshine safe? (1988). *Glamour*, 86, 148.
- Citron, M. (1988). The hole truth. *Discover*, 9, 72-73.
- Cook, W. J. (1989). Cooling out in your car. *U.S. News & World Report*, 107, 82.
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- Du Pont does good (1988). *U.S. News & World Report*, 104, 13.
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- Evans, H. (1987a). A lethal filibuster. *U.S. News & World Report*, 102, 72.
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How refrigerators work [freon] (1982, November). *Science Digest*, 90, 96.

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Lemonick, M. D. (1987a). Culprits of the stratosphere. *Time*, 130, 57.

Lemonick, M. D. (1987b). The heat is on. *Time*, 130, 58+.

Lemonick, M. D. (1989a). Deadly danger in a spray can. *Time*, 133, 42.

Lemonick, M. D. (1989b). First aid for the ozone layer. *Time*, 133, 50.

Lethal leaks in the roof of the world (1988). *U.S. News & World Report*, 104, 10.

Much of the damage is already done (1988). *U.S. News & World Report*, 105, 63.

Ozone defense (1989). *Time*, 133, 63.

Shell, E. R. (1988). Solo flights into the ozone hole reveal its causes. *Smithsonian*, 18, 142+.

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Taubes, G. (1987). Made in the shade? No way. *Discover*, 8, 62-71.

The hole in the ozone: can it have been the cans? (1986). *Discover*, 7, 8+.

The search for ozone-friendly refrigerants (1988). *Discover*, 9, 24+.

Try convertibles (1989). *Time*, 133, 92.

Wellborn, S. N. (1986). Putting a freeze on Freon. *U.S. News & World Report*, 101, 72.

APPENDIX C

EXAMPLES OF ACID RAIN ARTICLE CODING

Article: Boyle, R. H. (1982). When it rains. [Feature]. *Sports Illustrated*, 56 part Sp Issue, 72.

Genre: Sports and Recreation

| | |
|------|--|
| AR 1 | <ul style="list-style-type: none"> • Normative, Positive and Neutral Statements: Positive Nature |
| AR 2 | <ul style="list-style-type: none"> • Economic Predictions: Not inclusive • Ecological Predictions: Not inclusive • Health Predictions: Not inclusive |
| AR 3 | <ul style="list-style-type: none"> • Source of Acid Rain: Not Inclusive |
| AR 4 | <ul style="list-style-type: none"> • Ecological Consequences: Inclusive • Economic Consequences: Not inclusive • Health Problems: Not inclusive • International Problems: Not inclusive • Structural Damage: Not inclusive • Problems Unforeseen at the Time: Not inclusive • Acid Rain Causes No Problems: Not inclusive |
| AR 5 | <ul style="list-style-type: none"> • Unreasonable Costs Resulting from Legislation: Not inclusive • Costs Resulting from Legislation will be Substantial but Provide Benefits: Not inclusive • Benefits Outweigh Any Costs Associated with Legislation: Not inclusive |
| AR 6 | <ul style="list-style-type: none"> • Tone: Somewhat Environmental |

Article: Michelmore, P. (1984). Our trees are dying. *Reader's Digest*, 125, 157-161.

Genre: General Editorial

| | |
|------|--|
| AR 1 | <ul style="list-style-type: none">• Normative, Positive and Neutral Statements: Normative Nature |
| AR 2 | <ul style="list-style-type: none">• Economic Predictions: Not inclusive• Ecological Predictions: Not inclusive• Health Predictions: Not inclusive |
| AR 3 | <ul style="list-style-type: none">• Source of Acid Rain: Not Inclusive |
| AR 4 | <ul style="list-style-type: none">• Ecological Consequences: Inclusive• Economic Consequences: Inclusive• Health Problems: Not inclusive• International Problems: Not inclusive• Structural Damage: Not inclusive• Problems Unforeseen at the Time: Not inclusive• Acid Rain Causes No Problems: Not inclusive |
| AR 5 | <ul style="list-style-type: none">• Unreasonable Costs Resulting from Legislation: Not inclusive• Costs Resulting from Legislation will be Substantial but Provide Benefits: Inclusive• Benefits Outweigh Any Costs Associated with Legislation: Not inclusive |
| AR 6 | <ul style="list-style-type: none">• Tone: Highly Environmental |

Article: Brown, W. M. (1986). Hysteria about acid rain. *Fortune*, 113, 125-126.

Genre: Business and Industry

| | |
|------|--|
| AR 1 | <ul style="list-style-type: none"> • Normative, Positive and Neutral Statements: Normative Industry |
| AR 2 | <ul style="list-style-type: none"> • Economic Predictions: Not inclusive • Ecological Predictions: Not inclusive • Health Predictions: Not inclusive |
| AR 3 | <ul style="list-style-type: none"> • Source of Acid Rain: Not Inclusive |
| AR 4 | <ul style="list-style-type: none"> • Ecological Consequences: Not inclusive • Economic Consequences: Not inclusive • Health Problems: Not inclusive • International Problems: Not inclusive • Structural Damage: Not inclusive • Problems Unforeseen at the Time: Not inclusive • Acid Rain Causes No Problems: Inclusive |
| AR 5 | <ul style="list-style-type: none"> • Unreasonable Costs Resulting from Legislation: Inclusive • Costs Resulting from Legislation will be Substantial but Provide Benefits: Not inclusive • Benefits Outweigh Any Costs Associated with Legislation: Not inclusive |
| AR 6 | <ul style="list-style-type: none"> • Tone: Highly Industrial |

APPENDIX D

EXAMPLES OF CFC ARTICLE CODING

Article: Beck, M. (1988). More bad news for the planet. *Newsweek*, 111, 63+.

Genre: News

| | |
|-------|--|
| CFC 1 | <ul style="list-style-type: none"> • Normative, Positive and Neutral Statements: Positive Nature |
| CFC 2 | <ul style="list-style-type: none"> • Economic Predictions: Not inclusive • Ecological Predictions: Not inclusive • Health Predictions: Inclusive |
| CFC 3 | <ul style="list-style-type: none"> • Sources Attributed to Ozone Depletion: Human Induced |
| CFC 4 | <ul style="list-style-type: none"> • Ecological Consequences: Inclusive • Economic Consequences: Not inclusive • Health Problems: Inclusive • International Problems: Inclusive • Agricultural Damage: Inclusive • Atmospheric Disturbances: Not inclusive • Problems Unforeseen at the Time: Not inclusive • CFCs Causes No Problems: Not inclusive |
| CFC 5 | <ul style="list-style-type: none"> • Unreasonable Costs Resulting from Legislation: Not inclusive • Costs Resulting from Legislation will be Substantial but Provide Benefits: Not inclusive • Benefits Outweigh Any Costs Associated with Legislation: Not |

| | |
|-------|--|
| | inclusive |
| CFC 6 | <ul style="list-style-type: none">• Tone: Highly Environmental |

Article: Citron, M. (1988). The hole truth. *Discover*, 9, 72-73.

Genre: Science

| | |
|-------|--|
| CFC 1 | <ul style="list-style-type: none"> • Normative, Positive and Neutral Statements: Positive Nature |
| CFC 2 | <ul style="list-style-type: none"> • Economic Predictions: Not inclusive • Ecological Predictions: Not inclusive • Health Predictions: Not inclusive |
| CFC 3 | <ul style="list-style-type: none"> • Sources Attributed to Ozone Depletion: Human Induced |
| CFC 4 | <ul style="list-style-type: none"> • Ecological Consequences: Not inclusive • Economic Consequences: Not inclusive • Health Problems: Inclusive • International Problems: Inclusive • Agricultural Damage: Not inclusive • Atmospheric Disturbances: Not inclusive • Problems Unforeseen at the Time: Not inclusive • CFCs Causes No Problems: Not inclusive |
| CFC 5 | <ul style="list-style-type: none"> • Unreasonable Costs Resulting from Legislation: Not inclusive • Costs Resulting from Legislation will be Substantial but Provide Benefits: Not inclusive • Benefits Outweigh Any Costs Associated with Legislation: Not inclusive |
| CFC 6 | <ul style="list-style-type: none"> • Tone: Somewhat Environmental |