CONSTRUCTING SCARCITY:
A RHETORICAL ANALYSIS OF NATURAL RESOURCE JOURNALISM

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by
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CONSTRUCTING SCARCITY:
A RHETROICAL ANALYSIS OF NATURAL RESOURCE JOURNALISM

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a candidate for the degree of master of arts,

and hereby certify that, in their opinion, it is worthy of acceptance.

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Professor Mary Kay Blakely

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Professor Tim P. Vos

For my mom and dad,

for Emily,

and in memory of Karen Unglesbee.

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ABSTRACT

The subject of natural resource scarcity has occupied the minds of social scientists since the 17th century. Scarcity is a difficult concept to define and yet more difficult to predict. It is partly subjective, partly physical and generally relative to people's incomes and expectations. This research examined how resource scarcity is communicated through magazine journalism. To do this, I looked to Kenneth Burke's "master tropes" as tools for analyzing how writers use language to construct the concept of scarcity as it applies to two resources in particular: oil and water. Several recurring tropes emerged from this analysis. These took the form of common metaphors and synecdochic substitutions. The meanings of these tropes were fluid and sometimes contested, but commonalities do appear. The tropes writers used, especially those regarding oil, show a fixation on the supply of a resource as opposed to an examination of consumption and use. We also see in the common tropes a wide range of social effects attributed to scarcity, perhaps at the cost of scrutiny of scarcity's causes, as well as a consideration of social phenomenon other than scarcity that might be at play.

Introduction

To overstate humankind's dependence on natural resources would take some imagination. The ability to systematically exploit land, water, ecosystems and minerals for human ends largely defines what civilization is. Industrialization drastically magnified the scale and scope of resource use, yet the fundamental role that naturally created materials play in human life remains constant. As John F. Kennedy told an audience in 1961: "Our society rests upon—and is dependent on—our water, our land, our forests and our minerals. How we use these resources influences our health, security, economy and well-being" (qtd. in Barnett and Morse, 1963). Technology, globalization, climate change and population growth have altered the context, but Kennedy's point is no less relevant today.

The concept of scarcity as it relates to natural resources is nearly as old as industrial society. Near the beginning of the 19th century, Thomas Malthus formulated scarcity as a natural boundary on human population and economic growth. Malthus predicted a point where population would outstrip the environment's ability to provide sustenance. Charles Darwin was among those influenced by Malthus' grim mathematical logic. Scarcity plays a major role in Darwin's theory of evolution, with the competition for limited resources directing the survival and evolution of species over time (Walter and Nicholson, 2007; Barnett and Morse, 1963).

The general aim of this research is to investigate how journalistic publications constitute resource scarcity for their audiences. Journalism about natural resource scarcity reports on economic forces and social outcomes; it concerns itself with competition for

resources—among communities, nations, businesses and other uses. Because scarcity is partly subjective and largely relative, media play a role not only in informing people about scarcity issues but also helping them understand scarcity and perceive its occurrence. By exploring how writers construct scarcity, I have tried to delineate some major rhetorical issues around a subject that will continue to gain importance as a growing and prospering human population demands ever-more natural resources.

Defining Scarcity

If defining scarcity were straightforward and conclusive, this research probably wouldn't be necessary. But scarcity is a slippery concept that seesaws between supply and demand, the objective and subjective, and it mingles with the environmental, political, physical and social. In economic thought, scarcity is one of the primary drivers of social activity, as people and entities compete for limited resources. In fact, the terms "scarcity" and "resources" both help to define the field of economics, which Nicholson and Snyder (2007) describe as "the study of the allocation of scarce resources among alternative uses" (p. 4). One way to think of scarcity is to consider its opposite. Some economists have defined scarcity as the inverse of abundance (Zinam, 1982). Doing this, we can create a spectrum—with scarcity on one end and abundance on the other—on which all economic goods can fall.

If we define scarcity of resources in terms of supply, we can say that essentially all natural resources are scarce because space on the planet is finite and many key resources are exhaustible (Nicholson and Snyder, 2007). However, the finite quality of a material such as oil was of no social importance until humans found commonplace uses for it and came to rely on it. For that reason, defining scarcity relative to demand has more social use, though is a

trickier task. Considered in terms of demand, scarcity is a prevailing economic condition, as it is when defined in terms of supply. Resources are scarce because "we simply cannot have all of everything we might want" (Nicholson and Snyder, 2007, p. 5). Scarcity, in this sense, becomes a relative condition rather than an absolute fact.

Scarcity expressed in terms of social "want" is to some degree perceptual; it is in the eye of the beholder. If we accept that premise, we can describe scarcity as the cost of a resource relative to the income of people whose "sense of well being depend[s] on it." And so when the cost of a good goes up, it creates "perceptions of increased hardship*"* (Gurr, 1985, pp. 55-56). Going further, in wealthy industrial societies scarcity might be thought of as the perceived lack of a resource as compared to people's "image of the good life" (Welch and Miewald, 1983, p. 10). Following from this observation is a definition of scarcity that relates perceptions to costs, with scarcity described as "a perception that the continued use of a certain resource, at a given place and time, carries too high a cost, either tangible or intangible" (Welch and Miewald, 1983, p.10). Regardless of the reason behind rising prices, changes in cost can create a sense of scarcity.

Looking at scarcity as it is defined for practical applications—that is by those tasked with addressing the problem—yields the tidiest definition yet. A United Nations (2012) report defines one form of scarcity, water scarcity, as a condition where "demand for freshwater exceeds a supply in a specific domain" (ix). The U.S. Geological Survey uses a similarly functional and concise definition of scarcity: "Scarcity is the lack of adequate supply to meet demand" (Wagner, 2002, p. 14). These definitions are clean and applicable. They include both supply and demand. They also keep scarcity relative, fluid, and in the here and now. One thing they lack, though, is a perceptual, subjective dimension.

Because my analysis concerns references to scarcity in journalistic texts, I wanted a definition of scarcity capable of identifying those subjective references and could also evaluate them against a scientifically established understanding of scarcity. Defining scarcity as existing relative to social demand is useful, and perhaps the only meaningful way to describe scarcity, but leaving out a subjective element to scarcity is overly exclusive for my purposes. With this in mind, I defined scarcity as *a shortage, physical or perceived, of a resource relative to society's desire for it, and that is often felt through rising costs*. This definition includes both supply and demand aspects of scarcity, but expresses it as a relative state, a social quality, and with a subjective component. It also casts a large enough net to capture allusions to scarcity communicated by journalists, but can also help measure those allusions against formulations of scarcity accepted by social scientists.

Natural Resources and Industrial Society: Studies in Scarcity

Thinkers from a wide array of fields—including political science, economics, ecology, sociology, geography and public health—have studied the impact that physical limits on natural resources could have on consumption and industrial activity. Industrial society requires constant access to a resource base that can supply materials for goods and assimilate wastes from the production process (Pelletier, 2009). As new mineral resources decrease, many scholars predict that the collision of resource constraints with ever-expanding human activity could eventually lead to diminishing economic returns (Randers and Behrens, 1979, p.23). One modest projection estimates that by 2050 resource scarcity might reduce real economic growth rates by 0.3 percent (Nicholson and Snyder, 2007, p. 506). A more pessimistic view suggests that industrialized society might prove unsustainable in the future

from the physical limits imposed by the "bottlenecks" of finite arable land, energy and environmental constraints, and population growth (Dobkowski and Wallimann, 2002).

As far back as Thomas Malthus, economic and ecological thinkers have worried over the environment's ability to provide for humankind's well-being and economic activity. Writing in the late 18th and early 19th centuries, Malthus predicted an imminent upper limit to economic activity imposed by the finite bounds of natural resources (Barnett and Morse, 1963). More specifically, because population grows exponentially and food production (at the time) grew linearly, Malthus assumed a point where population would outgrow the Earth's ability to produce enough food. The term "carrying capacity" captures this implied limit to resources by describing the level of human activity that an environmental system can support (Randers and Behren, 1979). The extent of this limit, and whether it exists at all, has been debated over the last two centuries as subsequent technological developments have increased the world's carrying capacity beyond pessimistic estimates such as Malthus'. But by the turn of the 21st century, population growth had begun to strain the environment's ability to provide food and water for much of the world. As Homer-Dixon (1999) writes, "Aquifers are being overdrawn and salinized, coastal fisheries are disappearing, and steep uplands have been stripped of their forests leaving their thin soil to erode into the sea" (p. 13).

Natural resources can be broken into two general categories: renewable and nonrenewable, or depletable, resources. Renewable resources are those that can be regenerated over time. They include arable land, freshwater, forests and animal populations, such as fish. Nonrenewable resources, which are composed primarily of geological minerals,

cannot be replenished within human life spans and so are essentially finite in nature (Tietenberg, 2000). Although many scarcity concerns center on nonrenewable resources because of their physically finite nature, it is largely renewable resources that currently face scarcity limits, in the form of rapid deforestation, overworked soil and exhausted fisheries (Tietenberg, 2000). Still, future scarcity of nonrenewable resources such as fossil fuels and metals already pose significant economic risks for industries, manufacturers and supply chains (Bell, Autry, Mollenkopf and Thornton, 2012; Duclos et al., 2010).

To think of resource availability and scarcity as being purely physical in nature would be a mistake. Availability of a resource is determined both by supply and social demand (Homer-Dixon, 1999; Smith, 2012). Moreover, supplies of natural resources are determined by both physical and social factors. Supplies are not constant but rather "depleted through use, destroyed by careless or unnecessary action, and otherwise extinguished" (Barnett and Morse 1963, p.4). A close look at the resource abundance of the U.S., which helped drive its emergence as an industrial giant, shows that resource supplies were not merely a matter of physical terrain but also a socially constructed phenomenon. Several social mechanisms made the U.S. unique even among countries with similar resource endowments. These mechanisms include: the introduction of applied mining education to American universities; government funding of mineral exploration surveys; a legal framework that gave mining rights to private entities rather than governments; and a public determination to continue searching for minerals even in areas where scientific studies found few (David and Wright, 1997).

Optimists and Pessimists

Being an issue of great sociological, political, economic and environmental significance, the concept of resource scarcity is fervently debated. A wide, complex spectrum of views exists, but we very often see a recurring dialectic tension between optimistic and pessimistic outlooks. In the field of resource economics, those outlooks have translated into working conceptual models tasked with predicting the fate of industrial economies. The pessimistic model, an updated and more complex version of Malthus' ideas, predicts that society will run out of nonrenewable resources within 100 years. The inevitable result is that humanity overshoots. When resources are spent, economies and societies collapse: food production declines, unemployment skyrockets and people die off en masse (Tietenberg, 2000). It is a grim, sudden and unavoidable outcome of our economic order.

The optimistic model takes into account adaptability in economic and political systems, which allows societies to respond to scarcity. Optimists, looking at history and theory, point to factors that can mitigate resource scarcity. These include: technological progress, resource substitution and discovery of new resource stocks (Tietenberg, 2000). Some economists have argued that no absolute limit to resources exists because prices and other market forces will continually drive technological advances and efficient allocation, thus indefinitely increasing natural resource availability. As arch-optimist Julian Simon (1994) puts it:

> When you develop new technology, build new goods, and expand the scope of our creative activities, you are on the side of angels—you are promoting human improvement, and the quality of life.... Productive people and organizations should

> walk tall with pride and get on with their jobs, rather than skulk around with a guilty conscience at befouling our environment (p. xv).

(It's perhaps worth noting here that in 1994 Simon also wrote, "My guess is that global warming will simply be another transient concern, barely worthy of consideration ten years from now" (p. 55).)

Representatives of the two camps went so far as to wager on their respective views. Simon and neo-Malthusian Paul Ehrlich famously made a bet in 1980 on the future prices of five industrial metals. Simon bet that the real prices of those resources would decline over a ten-year period as efficiency, technology and new discoveries made them more abundant; meanwhile Ehrlich bet that prices would rise as the commodities became more scarce. In 1990 Simon won the bet, with prices of all five commodities having declined (Homer-Dixon, 1999). However, if the bet had been extended through the 2000s, Ehrlich, the pessimist, would have won 4-1, and won even bigger if the bet had covered the prices of other important commodities (Rotella, 2011).

The main threat to optimists' philosophical position is that technological progress itself might have limits. Homer-Dixon (1999) catalogs some factors that can constrain the ability for human ingenuity to overcome scarcity, including: market failures (where prices don't reflect actual levels of scarcity); social friction nurtured by competition for resources; capital availability to build new technology; and scientific constraints imposed by restrictions to human cognition and the costs of research. Population expansion might also pose limits to technology's ability to overcome scarcity. Geoffrey West (2012), a theoretical physicist-turned-mathematical demographer, said in an interview with *Discover* that, as human

populations grow at exponential rates, to avoid population collapse caused by resource limits we must develop technology at an ever-faster rate.

As I noted above, the discussion around resources and scarcity is certainly not limited to pessimists and optimists. Another prominent group of researchers and critics focus on the distribution of resources. Like optimists, they emphasize the underlying flexibility of human institutions and discount limitations imposed by nature, but they do not share optimists' faith in markets in addressing scarcity. Rather, they argue that scarcity is symptomatic of structural inequalities within capitalist societies and advocate for a more equitable distribution of resources (Homer-Dixon, 1999). Mehta (2011) notes that emphasis on physical scarcity can even obscure important social issues. As she writes, "Scarcity is not seen as the result of powerful actors getting away with resource appropriation" (p. 373). This view is shared by many critical geographers and adds another layer of complexity in trying to understand scarcity.

Winners and Losers: The Social Consequences of Scarcity

Observers point to a host of negative social outcomes can potentially result from resource scarcity. To begin with, scarcity can exacerbate the inequality of resource distribution (Finsterbusch, 2002; Homer-Dixon, 1999; Gurr, 1985; Orr and Soroos, 1979). In times of resource scarcity, richer groups seek to protect their interests while inflation and economic downturns make it harder for society to provide for the needy (Finsterbusch, 2002). Scarcity can also lead to constraints on agricultural and economic activity; the mass migration of people affected by lack of resource availability; greater segmentation of society

along class and ethnic lines; and the disruption of important social institutions (Homer-Dixon, 1999).

Social problems associated with scarcity go beyond access to resources. Resource riches can create problems of their own. The rush to sell resources such as oil to the global market can bring about political instability in countries with large resource stocks (Ross, 2012; Reyna and Behrends, 2008; Ross, 2004; Klare, 2001; Karl, 1997). Oil states are 50% more likely to be ruled by autocrats than non-oil states and twice as likely to undergo civil wars (Ross, 2012). Oil states are also more secretive, more financially volatile and allow women less political and economic equality (Ross, 2012). These outcomes are largely the result of the scale, instability and secrecy of oil revenues in countries with nationalized oil industries. Resource wealth, particularly from oil and minerals, has also been linked to civil conflict, fueling both insurgencies and violent, repressive governments by providing revenue mechanisms for governments and rebel groups (Ross, 2004). For instance, during Sierra Leone's civil war the government was able to stave off defeat (and thus prolong the conflict) by selling in advance the rights to exploit diamond fields—then held by rebels—to a South African energy company.

Along with political instability and violence, resource-rich countries can also suffer from economic ills. One symptom of the "resource curse," which applies primarily to nonrenewable resources such as oil, is stagnating or even declining national incomes (Ross, 2012). Much of this can be attributed to political instability, civil conflict and the volatility of commodity prices for resources. Another problem for countries with large stocks of oil and other minerals is "Dutch Disease" (Ross, 2012; Karl, 1997; Auty 1993). The term refers to the decline in a country's manufacturing and agricultural sectors that follows a boom in a

natural resource sector (Ross, 2012). It results from the shift in labor and capital to resource exploitation, as well as from the increase in a country's currency exchange rate that happens when an economy is flooded with money from the resource sector. The increased exchange rate makes imported agricultural and manufactured goods cheaper relative to those produced domestically, creating little incentive to make those goods at home. The end effect of Dutch Disease is that non-resource industries become smaller and dependent on government help (Ross, 2012).

Two Cases: Oil and Water

So far I have discussed natural resource scarcity broadly, but we experience scarcity specifically. Among nonrenewable resources, oil is perhaps most deeply integrated into daily life for advanced countries. Oil—because of its energy density and ease of extraction and transport—is a critical fuel for industrialized societies. As one scholar writes, "The sheer ubiquity of oil means that it is a commodity like no other: oil's applications are more numerous, more intimate and more transformative of social life than those associated with coal, steel or uranium" (Bridge, 2011, p. 313).

Of the primary fossil fuels—oil, coal and natural gas—the world's reserves of oil are predicted to run out the soonest (Gordon, 2012). Starting at the turn of the 21st century, crude oil prices began a steady ascent. From 2000 to 2007, the cost per barrel increased 142 percent. In 2008 prices spiked sharply, hitting $100 per barrel, and then slumped in 2009 with the global recession. In 2011, amid the Arab Spring, prices again broke the $100 mark (EIA, 2013). As with all resources, supply and demand play a role in oil scarcity (and, by extension, prices). Much of the price increase over the last decade can be attributed to

growing demand for oil in China and India. In 2012 global demand came to about 90 million barrels per day, while the world was able to supply about 91.6 million barrels per day (IEA, 2012). The U.S. remains the world's largest oil consumer—by leaps and bounds. At nearly 19 million barrels per day, the U.S. represents about 20 percent of the world's oil consumption. It uses nearly twice as much oil as the world's next largest customer, China, though the U.S. has about one-third of China's population.

Because industrial economies are so dependent on oil, they are highly vulnerable to disruptions in the supply (Heinberg, 2003). The world could see oil resources start to deplete within two or three generations if current consumption rates continue; therefore, oil-dependent societies are not ultimately sustainable (Bartlett, 2000). In the short term, sudden oil shortages could have a concrete impact on public health by disrupting infrastructure for energy generation, transportation, food production and healthcare (Frumkin and Hess, 2009). Perhaps for this reason, "peak oil"—a term expressing the maximum point of oil production (as plotted along a bell-shaped curve) past which production inevitably declines with time as costs of extraction rise—has become for many an indicator of general resource scarcity (Smith, 2012). Peak oil's possible imminence has also given rise to a "shadow literature" of peaks in other resources, including "peak everything" (Bridge and Wood, 2009). In other words, oil scarcity has raised more general resource scarcity concerns.

Peak oil as a concept is fraught with debate. Optimistic analysts argue that higher prices will continue promoting new discoveries and technology well into the future, in plenty of time to develop substitute energy sources. Pessimists disagree. Those who believe in peak oil's imminence, many of whom are current or former petroleum geologists, tend to make three related claims: The oil extraction rate is nearing its maximum; once the world reaches

the maximum rate, it will experience permanent shortages relative to demand; those permanent shortage conditions will take the form of price shocks (Bridge and Wood, 2009). In this way the peak oil concept is in some sense inherently pessimistic, as well as deterministic. It points to geology as a physical constraint on oil supplies and the ultimate source of oil scarcity.

Oil pessimists and optimists look at the same world, and sometimes even the same data, through vastly different perspectives. One commentator branded peak oil believers as a "catastrophic apocalyptic cult," arguing that fuel efficiency will rise along with oil prices while new technologies and natural gas will eventually replace oil: "As a result, there is nothing inevitable about any particular date of peak of global oil extraction. More fundamentally, there is no reason to see an eventual decline of oil's share in the global energy supply as a marker of civilizational demise" (Smil, 2006, p. 24). That view, though, doesn't seem a fair characterization of what peak oil believers say and write about the issue. Many, rather than conceiving of peak oil as some sort of Armageddon event, see it as a transitional period and advocate for advanced preparation. For instance, Aleklett (2006) voices concern over the slowing rate of oil discovery: "Fifty years ago the world was consuming 4 billion barrels of oil per year and the average discovery rate was 30 billion barrels per year. Today we consume 30 billion barrels per year and the discovery rate is dropping toward 4 billion per year." Aleklett does not prophesize doom, but rather advocates a conscious, collective search for "solutions" to manage the transition away from oil.

Water, a partially renewable resource, plays an even more fundamental role in human life. Water is both a required ingredient to biological survival and a vital resource in agriculture and industry. Only about three percent of the world's total water is freshwater.

That can be broken up into surface water (such as rivers and lakes), which is renewable through a hydrological cycle that continually replenishes supplies through precipitation and ice melt, and groundwater, which is largely depletable (Tietenberg, 2000). Water scarcity is not merely a matter of access and availability; it can also be a function of pollution and other quality issues (Homer-Dixon, 1999; Tietenbeg, 2000).

Growing population and ever-increasing competition for water use is expected to be one of the primary scarcity issues in the 21st century. As of the turn of the century, many areas of the world were already confronted with water scarcity (Homer-Dixon, 1999; Klare, 2001;Tietenberg, 2000). By 2025, an estimated 2.7 billion people will face water scarcity (U.N., 2003). As with other resource scarcity, water scarcity is a relative phenomenon, and both supply and demand of freshwater play a role. This is important to note because, historically, much attention has been given to supply issues created by nature rather than human-induced scarcity caused by water and land practices (Mehta, 2011). During the twentieth century, water management primarily focused on the availability of supply to growing populations, largely without considering eventual economic and resource constraints or environmental consequences. That focus largely took the form of heavily engineered infrastructure projects (Gleick, 1998).

The U.N. (2012) points to three dimensions of water scarcity: a physical lack of water, inadequate infrastructure for storage and distribution, and insufficient institutional capacity to provide water services. Two of these three dimensions are manmade. Going yet further, the organization defines water scarcity as primarily a "social construct": "Its causes are all related to human interference with the water cycle" (ix). And its human causes are many: growing water use across the world, demographic growth, economic development,

urbanization, pollution, climate change, bio-energy crops, uncoordinated planning, underdeveloped infrastructure and overdeveloped infrastructure.

Water scarcity creates another scarcity issue, one just as primal: food insecurity. Around the world, agriculture consumes more water than any other use. It accounts for 70 percent of freshwater withdrawals and 90 percent all of consumptive use. With world population expected to reach 9 billion by 2050, and an estimated 60 percent increase in food production needed to meet global needs, organizations like the U.N. are evaluating agriculture's impact on water scarcity and vice versa. "The net result is that agricultural water use is increasing the severity of water scarcity in some areas, and causing water scarcity in areas that are relatively well endowed with water resources." Put another way: "Agriculture is both a cause and a victim of water scarcity" (U.N., 2012, p. 2).

Although the potential for armed conflict over water receives much media attention, Homer-Dixon (1999) argues water scarcity rarely sparks interstate wars. Rather, water scarcity "constrains economic development and contributes to a host of corrosive social processes that can, in turn, produce violence within societies" (Homer-Dixon, 1999, p. 69). However, history has seen water play a role in violence between countries, as well as within them. Gleick (1998) points to four primary ways that water factors into violent conflict, those being: as a military tool (e.g., when in 1990 pro-apartheid forces cut off water to a primarily black township in retribution for anti-apartheid protests); as a target of war (e.g., the U.S. bombing of North Vietnamese irrigation systems); as a military or political goal (e.g., a 1995 armed skirmish between Ecuador and Peru over control of the Cenepa River headwaters); and as a source of inequity and social tension that can fuel conflict (e.g., 1991's violent protests in the Karnataka region of India over irrigation rights).

Despite the occurrence of these conflicts, some observers point to the conceptual danger in assigning scarcity as the cause of conflict over water and other resources. For one, conflicts that erupt around resources such as water may result not just from scarcity, but rather from unequal access to resources (Mehta, 2011). Also of importance is the *lack* of conflict in disputes over water. As Gleick himself writes, "Not all water-resources disputes will lead to violent conflict; indeed, most lead to negotiations, discussions, and nonviolent resolutions" (p. 124). But he maintains that projected water scarcity could pose a greater risk of conflict in the future as population grows and supplies diminish.

Literature Review

Natural Resources and the Media: Parallels with Environmental Coverage

As we have seen, natural resource scarcity is not a decided or clear-cut subject of study. For centuries, very smart people, armed with data and statistical models, have disputed resource scarcity's nature, prevalence and fate. This is where journalism becomes relevant. Journalists report on natural resources in one way or another every day, whether it's working the environment beat, reporting on commodity prices or covering resource-related industries and economic issues. How journalists treat the subject of resource scarcity, how they make sense of this contested and complex phenomenon, is of great importance given scarcity's subjective qualities, which in turn can have political and economic consequences.

Media studies have given the subject little direct attention. At the same time, media researchers have focused much on how the press covers the environment, a closely related subject given that natural resources are—up to the point of extraction—part of the environment, and wastes from consuming resources have environmental impact. From these studies we can hopefully glean something about the role media plays in shaping public consciousness of resource issues.

Research and scholarship shows that the media have a pronounced impact on the public's relationship to environmental issues. Ader (1995) defined the environment as an unobtrusive issue, meaning the public has little direct contact with it. Consequently, citizens rely heavily on the media to learn about the environment. We can draw a parallel between the unobtrusive nature of environmental issues and natural resource-related subjects such as

mining, commodity markets, supply stocks, peak resources and civil conflicts in foreign countries. Because few citizens have direct experience with them, these issues would seem to be unobtrusive for most U.S. readers and viewers in the same way that pollution and other aspects of the environment are. The main distinction is that that once natural resources are refined into consumer goods, they become a more familiar feature of people's lives.

Digging deeper in into the press's agenda-setting role, Sachsman, Simon and Valenti (2010) note that the media has "the power to define an environmental story in ways that either place it before the public or keep it off the public agenda" (p. 27). Soroka (2002) found quantitative evidence showing the press has a "significant impact" on the agendas of both the public and policy-makers when it comes to environmental issues (p. 279). But the findings also demonstrate that the influence is not one-way. The public and policy-makers influence the media's agenda as well (p. 279).

The media also helps build community consciousness of the environment and shapes how citizens relate to it. According to Boykoff (2009), media coverage of the environment has "proven to be a key contributor—among a number of factors—that has stitched spaces of environmental science, governance, and daily life together" (p. 434). Hansen (2011) asserts, "Much, if not most, of what we learn and know about 'the environment,' we know from the media" (p. 8). This extends to "the ways in which we—as individuals, cultures and societies—view, perceive, value and relate to our environment" (p. 8).

Natural Resources and the Media Part 2: Bias, Fickleness and Failure

What observations we do see of natural resource coverage, specifically, tend to be unfavorable. One notable critique is that coverage tends to be friendly toward industrial

interests. Homer-Dixon (1995) writes that business-oriented publications play a role in propagating the neoclassical view of natural resources, which values markets and recognizes no firm limits to economic growth, thanks in large part to human ingenuity.

One example of bias toward industry that has been quantified is found in coverage of logging disputes in the Pacific Northwest. In their analysis of the debate over logging old-growth forests, Liebler and Bendix (1996) found network television coverage tended toward a "procut" frame. This frame viewed environmental restrictions as a threat to jobs and industry, though historical evidence shows that resource scarcity—in the form of overcut forests—posed a larger threat to the industry. The media bias might be the result of the procut frame's simplicity, which created a narrative "more readily amenable to encapsulation in news stories" (Liebler and Bendix, 1996, p. 62). The authors also suggested that a lack of journalistic enterprise prevented media outlets from exploring complex ecological and economic issues that contradicted industry arguments. Businesses can also wield influence directly over media coverage. For instance, Mobil Oil's aggressive public relations campaign in the 1970s sought to create a "benevolent, authoritative image" of the company through "advertorials" and by contacting journalists directly in an attempt to disseminate their message (Murphree and Aucoin, 2010). As a result of the PR blitz, Mobil enjoyed an unprecedented level of success in bypassing media gatekeepers to promote its interests and point of view, even during times of spiking prices for consumers.

Prices can drive coverage of resource industries in the mainstream media. Erfle and McMillan (1989) found a link between media coverage of the oil industry and price fluctuations in oil-based consumer products. As prices went through large changes in either direction, coverage of the oil industry increased. So if press coverage of the oil industry

increases when prices rise or fall, we might expect that it stagnates when prices are stable. And indeed, Heinberg (2003) argues that the low prices of oil in the 1990s made the media complacent, and what scant coverage existed was superficial. He points out that the *New York Times* covered oil industry happenings such as corporate mergers, but "provided little analysis of the state of the industry or of the geological resources on which it depended" (p. 86). Heinberg also chided the science-oriented consumer magazines *Discover* and *Popular Science* for "buried paragraphs or sidebars" that "blandly noted" stark facts about shrinking oil supplies, yet the magazines made "no attempt to inform readers of the monumental implications of these statements" (p. 86-87). The mainstream media's limited coverage of the global oil supply, and the consequences of its decline, continued into the first decade of the 21st century. From 2005 to 2010, agenda-setting news outlets, which include the *New York Times, Businessweek,* the *Economist* and the *Washington Post*, published only 16 articles about peak oil. None of these articles addressed the potential public health consequences of peak oil (Nisbet and Leiserowitz, 2011).

At the same time, other observers have chastised the press' obsession with scarcity and global conflict over resources. Le Billon and Cervantes (2009) accuse the press of contributing to the "banalization" of geopolitics around oil in assuming a simple relationship between scarcity and violence. In their view, the press is part of a discourse that has come to expect violence in oil-producing countries. While the media obsess about wars that disrupt oil supplies, they underreport other forms of violence such as state repression, communal conflicts and poverty. Moreover, these critics argue Western media fixate on "strategic" oil supplies while ignoring the continuing failure among governments and consumers to reduce demand for oil. Ultimately this discourse converts scarcity fears into financial profiteering, as

anxiety over scarcity and war raises the price of oil on commodity and futures markets. As they write, "scarcity is in part a narrative constructed for and through prices" (Le Billon and Cervantes, 2009, p. 842). Ultimately, the media's participation in this discourse can have problematic social consequences: "Attributing conflict to scarcity rather than the host of factors ... reinforces a counterproductive vision of energy security dismissive of other concerns such as human rights" (p. 842).

Scarcity Discourse and Rhetoric

Looking to political ecology, a subfield of geography, we find more examples of scarcity discourse and its consequences. In her case study of water issues in India, Mehta (2011) argues that excessive focus on physical shortages of water can obscure inequality and other social dynamics of water issues. Scarcity discourse can thus be used as a political tool. Invoking scarcity, as a physical quality, often supports arguments for privatization of common resources such as water, converting them to commodities and property. Scarcity discourse can also simplify reality and circumvent cultural and communal will. As Mehta writes, "Scarcity is a concept that can provide meta-level explanations for a wide range of phenomena over which humans ostensibly have no control, and science and technology are evoked as the panaceas" (p. 373). Resource shortages, then, are not merely material, but often result from "uneven social measures that manufacture scarcity all over the world for economic and political gain of powerful interests" (p. 383).

Energy scarcity, like water scarcity, comes packed with social and political meaning. Bridge (2011) writes that energy is "one of the principal components of modernity in both a statistical and an ideological sense." Therefore, the specter of an "energy crisis," such as the

oil supply shock of the 1970s, "strikes at the heart of modernist transformation: it suggests the moment when the grand arc of human progress stalls, and the lights of prosperity flicker and dim" (p. 308). For his part, Bridge holds little truck with the notion of an "energy crisis." He sees these crises not as a temporary supply squeeze but a pervasive state of our social world and physical environment: "The inequities and developmental and environmental distortions of high-energy, fossil-fuel dependent societies constitute an on-going 'crisis' even in the absence of supply disruptions, so that 'crisis' is a normal state of affairs" (p. 309).

The recent attention to the concept of peak oil represents for Bridge a rebirth of the language of the energy crisis. Peak oil's entrance into political parlance has shifted scarcity discourse away from "above-ground" concerns such geopolitics and the decisions of OPEC to "below-ground" or geological factors (Bridge and Wood, 2009). For others, peak oil is "a particular form of 'energy crisis' that is global in scope, geological in origin, and which takes the form of a permanent reduction in the rate at which conventional oil can be extracted" (Gavin, 2011, p.311). More broadly, peak oil has become "rhetorical shorthand for a specific set of claims about socio-natural relations" (Bridge and Wood, 2009, p.566). This "rhetorical shorthand" can have a simplifying effect:

> As with other discursive couplets, such as 'population pressure,' 'carrying capacity,' or 'global warming,' peak oil's popularisation carries with it a risk that the specificity of claims becomes lost. At the extreme, it becomes possible for widely divergent phenomena—high commodity prices, volatile oil markets, proposals for Arctic drilling, subsidies for agricultural producers, appeals for re-localisation of production and exchange relations—to be linked uncritically to peak oil and for the phrase itself

> to become a rhetorically potent yet surprisingly empty signifier: the proverbial hollow drum (Bridge and Wood, 2009, p. 566).

As with Mehta's admonitions about water scarcity discourse, the greater fear here is that scarcity rhetoric allows for an environmental determinism that attributes social outcomes physical supplies of resources while ignoring social inequities and other distortions in resource use. Focusing on scarcity when discussing oil, in Bridge's view, misses the point:

> Peak oil's concern with an impending slow-down in the rate of oil extraction is curiously irrelevant: the primary challenge for the twenty-first century when it comes to oil (and other fossil fuels) is to slow the rate at which fossil carbon is mobilized and released into the atmosphere. Contra the claims of peak oil, the problem is not one of trying to get more oil (or coal or gas) out of the ground, but of finding ways to keep it shut in (p. 320).

Rhetorical studies can give us even more targeted insight into how natural resource issues are constructed for the public. Mark P. Moore has studied instances where synecdoche—a rhetorical trope that substitutes part for whole, whole for part, cause for effect and so on—was used to constitute environmental and resource issues, often with polarizing effects. In the debate over logging old-growth forests in the Pacific Northwest, the spotted owl took on a synecdochic role for both sides of the rhetorical conflict (Moore, 1993). In this case, environmentalists used the owl as a symbolic stand-in for the forest ecosystem and indicators of environmental health. Meanwhile, logging company owners and employees came to see the owls as representing a threat to their livelihoods by being the objects of regulation and restrictions. The end result was the construction of two apparently irreconcilable, us-vs.-them worldviews hinging on a single rhetorical fulcrum in the owl.

Although sometimes polarizing, synecdoche can also be an important tool in illustrating environmental hazards, as well as the environmental hazards of rhetoric. Specifically, Moore (2009) looks at a report from the Union of Concerned Scientists criticizing the Bush administration's ironic use of "uncertainty" to delay policy action on climate change. In countering the administration's rhetoric, the organization sought to rhetorically link the public to environmental issues and link the Bush administration's policies to a cycle of evasion:

> This does not mean government and big business are innocent, but that we critically examine how their constructions of uncertainty serve and feed us. If addiction to oil is cooking the planet, then the oil pushers, like those of tobacco, are junkies as well, and should be treated as such. Addicts are serving addicts with uncertainty to perpetuate for all and thus join together in a weak representative form of synecdoche ... (Moore, 2009, pp. 202- 203).

Rather than displacing administration and industry officials as outsiders (an us-vs.-them relationship) the Union of Concerned Scientists tried to place everybody—themselves, their audience, their ideological opponents—in the same boat, as victims of their own decisions.

These rhetorical tropes need not always be tools of combat or used to subvert a philosophical opponent. Writing about the salmon crisis in the Pacific Northwest, Moore (2003) notes:

> Environmental discourse can agitate, divide and polarize, but it can also connect people to problems and issues by establishing integral relationships between the parts that contribute to the whole of a resource crisis. This sense of "connectedness" is expressed with synecdoche, an essential rhetorical trope in environmental discourse

that establishes part for the whole, whole for the part, and part for part relationships (p. 75).

In the case of Northwest salmon, they became a synecdochic form representing resource abundance and humans' relationship to the environment. But as the salmon became scarce because of human activity, they came to represent economic and environmental decline. From this transition we can see that the worldly power we invest in our language is subject to change as the world changes.

Moore's studies demonstrate how the symbolic use of language shapes understanding of and debates over resources and the environment. The special properties of scarcity and its social consequences are likely to manifest rhetorically in ways that have not yet been explored by communications researchers. To help encourage and begin this exploration, this study sought answers to the following questions:

RQ1 – How do journalists use rhetorical tropes to construct the concept of natural resource scarcity?

RQ2 – What is the relationship of publication and topic to the construction of natural resource scarcity?

RQ3 – What do representations of scarcity suggest about the relationship between writers and their audiences?

By analyzing how journalists use rhetorical tropes when writing about natural resource scarcity, I have tried to gain insight into how journalists construct, or constitute, a feature of our social reality that is significant to our economies, well-being and government policy.

Methodology

The Master Tropes

From the preceding review of the literature comes a guiding assumption to this study: Scarcity should have distinct rhetorical features in media accounts of natural resource issues. Complicated as the concept of scarcity is, communicating it would seem just as complicated and fraught with ideological tension and social and political consequences. This, coupled with the media's role in helping citizens make sense of unobtrusive issues such as the environment and natural resources, highlights the importance of studying what sort of rhetorical constructions media use when handling the subject of scarcity.

Rhetoric, here, has meaning beyond the persuasive use of language. When applied to a subject such as the environment, which is complex and extends beyond our everyday experience, rhetoric is a "constitutive" element, as described by Cox (2010). This means that "our language and other symbolic action also have the capacity to affect or constitute our perceptions of nature itself" (Cox, 2010, p.62). In doing so, the language used to describe the world can have profound effects on our relationship it. As Cox writes, "Rhetoric's constitutive force comes into play in this ability to characterize a set of facts or a condition in the world one way rather than another and therefore name it as a problem or not" (p. 63).

Kenneth Burke (1966) approached rhetoric this way, describing humankind as "the symbol-using animal" (p. 3). In Burke's treatment of rhetoric, both our understanding of reality and reality itself are constructed for human beings through the symbolic use of language. As we saw from Moore's work, Burke's "master tropes" offer a powerful and

nimble tool to describe constitutive rhetoric around natural resources. These four master tropes—metaphor, synecdoche, metonymy and irony—describe the general ways in which this construction of reality takes place. Burke notes in his description of the tropes that his concern is "not with their figurative usage, but with their role in the discovery of 'the truth'" (p. 503).

Among the tropes, metaphor is perhaps the most familiar. In Burke's formulation, metaphor explores one thing through the perspective of another or "*in terms* of something else" (Burke's emphasis) (Burke, 1962, p. 503). Metaphor is for Burke a crucial tool used to construct reality for our intellects. As Burke writes:

> It is customary to think that objective reality is dissolved by such relativity of terms as we get through shifting perspectives (the perception of one character in terms of many diverse characters). But on the contrary, it is by this approach through a variety of perspectives that we establish a character's reality. If we are in doubt as to what an object is, for instance, we deliberately try to consider it in as many different terms as its nature permits: lifting, smelling, tasting, tapping, holding in different lights, subject to different pressures, dividing, matching, contrasting, etc. (p. 504).

As Foss (1989) describes the process of making metaphor, it is all but unavoidable in use of language: "Whatever vocabulary or language we use to describe reality is a metaphor because it enables us to see reality *as* something. Phenomena in the world become objects of reality or knowledge only because of the symbols/metaphors that make them accessible to us" (pp.188).

Synecdoche, another of Burke's master tropes, represents a feature of reality by substituting "part for the whole, whole for the part, container for the contained, sign for the

thing signified, material for the thing made... cause for the effect, effect for the cause, genus for the species, species for the genus, etc." (Burke, 1962, pp. 507-508). Through these substitutions objects and concepts take on expansive social meanings. At best, they can boil a widespread phenomenon down to an understandable scale. At the societal level, all these synecdochic representations are as contested as they are inevitable:

> And though there are many disagreements within a society as to what part should represent the whole and how this representation should be accomplished, in a complex civilization any act of representation automatically implies a synecdochic relationship (insofar as the act is, or is held to be, "truly representative) (p.508).

Related to both metaphor and synecdoche, is metonymy. Metonymy reduces the intangible in terms of the tangible. If metaphor and synecdoche are unavoidable and inevitable in language use, metonymy is necessary. It peppers our languages, reducing emotions to body parts and spiritual conditions to bodily fluids. "Language develops by metaphorical extension," Burke writes, "in borrowing words from the realm of the corporeal, visible, tangible and applying them by analogy to the realm of the incorporeal, invisible, and intangible" (p. 506). Burke treats metonymy as a special case of synecdoche, often used in the sciences, wherein the speaker substitutes the concrete for the abstract, such as in using a quantity to represent a quality.

The final "master trope" in Burke's list is maybe the most difficult: irony. Irony, for Burke, occurs amid competing ideas and perspectives. He writes, "Irony arises when one tries, by the interaction of terms upon one another, to produce a *development* which uses all the terms" (Burke's emphasis) (p. 512). As these terms—or perspectives, or ideas, or characters—interact, irony comes about as a "certainty," or the "perspective of perspectives."

In some cases this ironic "certainty" might seem "superior" to competitor terms, but Burke writes that "true irony" is not superior: "True irony, humble irony, is based upon a sense of fundamental kinship with the enemy, as one *needs* him, *is indebted* to him, is not merely outside him as an observer but contains him *within*, being consubstantial with him" (Burke's emphasis) (p. 514). Burkian irony, then, becomes a play between similarities and contrasts. That which was different we see suddenly as similar, or as depending on its opposite unexpectedly.

Partly because of irony's complexity, I have left it out of this study and chosen to focus on the more straight forwardly descriptive tropes: metaphor, synecdoche and metonymy (and of those I've focused primarily on metaphor and synecdoche). Including irony would have expanded the analysis beyond what is doable in the time I had to perform research. I have, however, noted in the "Discussion" section some areas where a study of Burkian irony in texts involving resource scarcity could bear theoretical fruit.

Data Collection

My goal in this research was one of discovery. Media and communications researchers have largely left the subject of scarcity rhetoric in media unstudied. To compensate for this, I wanted to do a broad study. Although resource scarcity is relative and to some degree subjective, I have assumed that disparate texts about natural resources can be linked by the concept of scarcity. Whether the focus and impetus of an article is the price of gasoline, the quest to drill for crude in the Arctic Sea, or the political power of autocrats afforded by oil revenues, scarcity can cause and shape the social issues at play or be perceived as doing so. Given the different news topics and publications that might involve

resource scarcity, I wanted to study the similarities and differences among texts and then investigate the meaning of those similarities and differences.

In looking broadly at the rhetoric of scarcity, I have, to a degree, traded depth for breadth. Ultimately I wanted to make theoretical propositions that require a broader survey of the terrain than a single case would allow for. Any number of cases exist that could yield useful insights about how journalists cover natural resources. But looking across multiple news topics in multiple publications offers a way to tease out how writers shape scarcity, as a concept and experience, at a more general level.

My specific aim was to map out key patterns in how resource scarcity is formulated through language over the periodic flow of magazine journalism. To help accomplish this task, I opened data collection to include articles about more than one natural resource (two resources, to be exact). I placed no numerical limits on the number of news topics relating to those resources. The only stipulations were that the articles must deal with scarcity in some way and have been published since 2007. The latter was meant to keep the scope of the study fairly contemporary.

The two resources I included in this study were oil and water. Both resources loom large in the public consciousness. Oil is fundamental to modern industrial society; water is fundamental to life itself, in addition to being vital to industrial society. Oil represents a nonrenewable resource, one whose price fluctuations are seen and felt by much of the public in the U.S. and other developed countries. Water is a (largely) renewable resource that is thoroughly integrated into daily life and used among households, industries and agriculture. As noted earlier, oil is expected to run out first among fossil fuels and already has seen a

sharp rise in prices since the turn of the century. Water remains nearly free for consumers in wealthy nations, though costs in the U.S. have been on the rise as utilities update their infrastructure and users compete for supplies. In some localities prices have risen by more than 200 percent (McCoy, 2012). On top of this, climate change brings with it projections of drought and water shortages for some regions, raising concerns about a new era of water scarcity. In short, oil and water are two prominent and widely used natural resources representing the two main classifications of resources, both of which, because of their importance to industry and societies, have strong scarcity concerns attached to them.

Although many journalistic texts could yield data relevant data, I've chosen to focus on magazine journalism primarily because of the role magazines play in helping the public understand the world. As the 2011 "State of the News Media Report" notes, "Magazines, by their nature, are more contemplative than other kinds of journalism. They do not so much report events as help people think about the news after it has happened, to analyze it and explain it" (Matsa, Rosenstiel and Moore, 2011). For that reason, magazines are an excellent source to examine how journalists "help people think" about scarcity through language.

To help me draw theoretically significant comparisons and contrasts, I collected articles from three different publication types: science, business and general interest magazines. Given the divisions between scientists and economists over resource scarcity, magazines that target science- and economic-minded audiences could potentially help determine if these divisions play out in the ways writers use tropes to construct scarcity. The third publication type, general interest, we could think of as the qualitative equivalent of a "control." My reasons were more basic than that, though. With the large number of readers that follow general interest magazines, I felt they should be included in the analysis because

of their potential influence.

For a sample of general interest publications, I included the *New York Times Magazine* and *Time*. The size and scope of these publications could, I felt, shed some light on how journalists conceptualize scarcity for a large, non-specialized audience. Both magazines reach a large, middle-class, well-educated audience (though *Time's* audience is significantly larger, with 17.4 million people to *New York Times Magazine*'s 3.7 million; both magazines report that more than 70 percent of their respective audiences are college graduates). Both magazines also report on a wide range of issues and present themselves as conversation-starting publications. For instance, *New York Times* Magazine boasts that it "sets the tone for the country's conversation, captivating readers with the practiced art of conveying stories—about politics, global issues, finance and the economy, culture, design, the sciences and more. It sparks national discussions, while bringing illuminating depth to the events it covers" (New York Times Co., 2013).

My interest in opening my analysis to business magazines stems partly from their regular coverage of natural resources—as industries, commodities, investments and current events relevant to a business-minded audience. By including business-oriented publications, I hoped also to investigate Homer-Dixon's claim that the business media help propagate a neo-classical worldview in their reporting on natural resources. For business magazines I chose *Businessweek* (*Bloomberg Businessweek*, as of late 2009) and the *Economist*. *Businessweek* reaches an audience of nearly 100,000 people, most of them male, most of them in managerial and professional positions, and most of them well off, with a median income among them of almost $150,000 (Bloomberg LP, 2013). Bloomberg's marketing page also claims that *Businessweek* is the "magazine for the global financial elite" and that it reaches

"more C-level executives than any other business magazine" (Bloomberg LP, 2013). Not to be outdone, the *Economist* states that it reaches a similar contingent of the elite and powerful, which its media package calls "The Ideas People." Demographically, these 1.5 million readers are, like *Businessweek*'s, mostly male (87 percent), rich (an average net worth of $1.7 million) and professional.

Finally, I included the articles from two science magazines: *Science* and *Nature*. Both journals reach the scientific research community while publishing news stories and commentary on scientific topics written by journalists and scientists. I pulled articles exclusively from the current events sections of the journals; I excluded all peer-reviewed research articles on resource topics from the journals. These journals are fundamentally different from the other magazines included in here. Both are peer-reviewed, general science research journals, rather than consumer magazines. *Science* is published through the American Association for the Advancement of Science and *Nature* through the Nature Publishing Group. Both organizations are devoted to advancing scientific knowledge, and both are highly influential. *Science* reaches more than one million readers worldwide (though circulation of the journal itself is more modest at 130,000 readers). *Nature* has a similarly large online following and is the most cited scientific journal in publication (Nature Publishing Group, 2013). The readers for these magazines are *highly* educated. More than 60 percent of *Science*'s readers have PhDs (AAAS, 2013).

In short, all six of the publications I included here enjoy relatively large audiences, and all publications are considerably influential in their respective fields. The differences among their audiences—of researchers, of businesspeople, of educated non-specialists—provided a range relevant to studying the potential reasons for and implications of how

resource scarcity might be constructed differently for different audiences.

To gather data, I accessed the electronic databases ProQuest and EBSCO available through the University of Missouri library system. (*Businessweek* proved more elusive, requiring a publication-specific search through Google News.) The many contexts and uses of natural resources guided my search terms in retrieving relevant articles. Simple searches for "petroleum," "oil" and "crude oil" more often than not yielded enough articles from each magazine. Searches for "water" often turned many more articles, so to narrow the search I tried terms such as "water scarcity," "water shortages," "water supply," "water demand," etc.

Altogether I collected four to five articles about both oil and water from each publication listed above. I chose that range mainly to keep a detailed, meaningful analysis manageable within the allotted time frame for doing it, though I was prepared to add more articles to the collection if my first read through the data proved it necessary to adequately address the research questions. The grand total came to of 57 articles, 31 about oil and 26 about water. In many cases, four articles were the maximum I could find on a resource topic in a given magazine through the databases I used. Ultimately, my goal was not to be comprehensive but to read enough, and read deeply enough, so that I could make meaningful theoretical propositions about the conceptualization of scarcity through the master tropes. To that end, I found those 57 articles sufficient. Hopefully the reader will agree.

Obviously, much weeding out had to be done when running searches. For example, a simple search for "oil" in *New York Times Magazine* (via the ProQuest Newsstand database) turns up 156 items. Many of these were published more than five years ago, so those could be dispensed with easily by arranging the search results by date (instead of relevance). Additionally, many articles that appear in a search for "oil" have nothing to do with

petroleum. Many are about cooking (with references to cooking oil) and, in one case, a spa review that included references to massage oils. More difficult to weed out are those articles that deal with oil but do not reference scarcity. These include several articles about the 2010 BP Oil spill off the Gulf Coast. Certainly the BP oil spill is an important story concerning natural resources, but for my study I would classify it as a pollution story rather than a scarcity story, and thus not relevant to my analysis. To pick out references to scarcity, I referred to the definition of scarcity outlined in the "Introduction" section. Because scarcity can be partly defined in terms of relative costs, I took references to rising prices as references to scarcity. Likewise, since we can define scarcity in terms of either supply or demand, or both, I also looked for references to growing demand or constrained supplies. By this logic, many stories about the market for a resource such as oil deal with scarcity. Additionally, I identified relevant data based on social issues associated with scarcity (see "Winners and losers").

Magazines, by their nature, house a wide range of content. A magazine's editorial brand is ultimately accountable for all the content it publishes. For this reason, I included all types of relevant content available through database searches, with the exception of peer-reviewed research articles in the science-oriented publications. This means that my analysis includes news article and features as well as opinion pieces. Where relevant, I have noted the content type in the "Findings" section.

Data Analysis

Foss (1989) provides a useful framework for doing metaphorical criticism that I have adapted to my own analysis of rhetorical tropes. She boils the process down to four basic,

sequential steps: 1) *examination* of texts to garner their dimensions and context; 2) *isolation* of the metaphors within the text; 3) *sorting* the metaphors into groups; and 4) *assessment* of the metaphors used.

Assessment is the most essential step in the analysis; it is where deep analysis takes place. Here again Foss provides useful guidance. She describes several rhetorical aspects of metaphors to examine when assessing them. These include: Mixed metaphors and their effect, the use of archetypal metaphors (those metaphors suggesting basic patterns of experience unchanged over time), attitudes and values underpinning metaphors, what metaphors suggest about the speaker, the organization of metaphors, the effect of the presentation of metaphors, any relevant metaphors that are absent from the artifact, and whether the speaker's metaphors reinforce other rhetorical cues. All of these things I took into account when reviewing the data.

On the first read through the data I used a list, based in part on Foss' suggestions for analysis, to code data as it related to my research questions. For each article, I took notes detailing: article information, trope description, role of a trope in the article, rhetorical effects, and author's attitude. Here, article information refers to the article's publication, date, author, title and general topic (oil or water). In describing the trope, I determined if the author used a form of metaphor, synecdoche or metonymy and then briefly summarized the device's relationship to scarcity. The role and effect of a trope partly depended on its trope type. As noted above, metaphor involves a transference of perspective, a casting of reality as something else. Synecdoche substitutes part for the whole, cause for the effect, vice versa and etc., while metonymy reduces the intangible to the tangible. In describing effects I also considered how these symbolic uses of language might influence a reader's understanding of

scarcity and its consequences. This, as well as assessing a writer's attitude, required some interpretive effort in considering not only what is in the text but also what might be missing or underemphasized.

This list helped organize my notes and my thinking on the first run through the articles I had collected. In some cases I would repeat the process for multiple tropes in a single article (these were typically longer articles). Once finished with this process, I reviewed my notes to search for broader patterns by which I could reorganize the data into groups based on recurring tropes. Once in groups, I could tease out issues for deeper analysis, looking closely at comparisons, contrasts and relationships among articles and publications in the way that they approached a common metaphor or form of synecdoche, etc.. This allowed me to analyze the different iterations of a theme and by extension the theoretical implications of any similarities and differences among publications, topic and writers.

What emerged from this process was a handful of broadly used metaphors that described scarcity for each resource. The articles under these categories may or may not contain the same metaphor to the letter, but rather shared common rhetorical perspectives that related scarcity. Further, I found that these overarching metaphors had corresponding synecdochic forms that closely associated scarcity with another concept, expressing scarcity in terms of its effects, causes, parts and so forth. (As Burke notes, the master tropes "shade into one another" (p. 503)—a fact that allows fluidity in my analysis, but also much challenge.)

Some examples are probably in order. Consider one such metaphor, the "water project." The name itself, the "water project," I took from an article in *Science* titled "A New Great Lake—Or Dead Sea?" The article describes Turkmenistan's plan to build a giant

reservoir to collect agricultural runoff as a "grandiose water project." But as I looked through my initial set of notes, I found that many articles contained references to similar engineering projects, and that these references shared some rhetorical features: They connoted human action and efforts to control scarcity. They conceived of scarcity as a problem that can be solved through technology. The emphasis on scarcity as a solvable problem amounts to a synecdoche that replaces scarcity (a cause) with a water problem (effect), which can be (or some think can be) solved through technology. That technology takes on a metaphorical role in the articles, representing human efforts to mitigate scarcity. Both the metaphor of the water project and the corresponding synecdoche reveal efforts, aspirations and assumptions of humans in dealing with water scarcity.

Another example is that of the oil "rush." Broadly, the oil rush metaphor describes the pursuit of oil resources in the context of relative scarcity. Writers might use the "rush" metaphor to either highlight what they view as a haphazard and dangerous pace of oil extraction, or, alternately, they might show the rush for oil resources as a treasure-seeking adventure. While some articles use the term "rush" or a synonym such as "race," not all do. Yet those articles that don't use the "rush" metaphor by that name still describe a similar pursuit of oil and share many of the same rhetorical qualities with those that do. Moreover, all the articles grouped together under the "rush" metaphor share a synecdochic form that substitutes cause for effect. In this case, writers substitute scarcity's wealth-generating properties (an effect) in place of exploring the causes of scarcity or all the many other physical and social effects of scarcity. By synecdochically tying scarcity to wealth, writers can make these associations appear normal, natural. In another setting we might call this the "focus" of the article, but here I want to explore the rhetorical implications of the choice to

zoom in on a single aspect of scarcity at the cost of others, and Burke's master tropes provide a unique tool of doing so.

When I found such patterns in the data, I classified them as a common trope. After organizing my initial notes by shared tropes, I began my second read through the data, this time simplifying the note-taking process. Entries for each article in the second set of notes contained two parts: a "description" of the article's content, composed largely of direct quotes with key words, phrases and sentences bolded for reference and emphasis, and a "discussion" section that described my interpretations of the role, authorial attitudes and rhetorical effects demonstrated in use of the trope. This allowed me to tropes themselves and to make comparisons and contrasts among different articles that deployed them.

Validity

Yin (2011) defines validity in qualitative research as collecting and interpreting data so that conclusions accurately represent the area of reality that is being studied. I have tried to establish validity in this study by examining as many interpretations as possible before making propositions. I also took pains in the "Findings" and "Discussion" sections to account for the interpretations I made (a process in qualitative research often referred to as "thick description"). This form of transparency will allow external readers to compare my conclusions to data and to judge the extent to which my interpretations of the data answer my research questions.

Seele (1999) holds that peer auditing and a researcher's own reflexivity can increase the validity of qualitative research. To this end, I have worked closely with my committee advisor and methods expert in devising the analysis process. They, plus the other members of

my research committee, have reviewed my analysis for interpretive errors and biases. To help account for any biases, the "Discussion" provides an assessment of the limits to this study; suggestions for further work that could strengthen or add to the findings; and a disclosure of my personal, intellectual and ideological beliefs concerning the subject of this study.

Findings

As noted in the "Methods" section, I have isolated some key metaphors that recurred in the data. These metaphors are broadly defined, meaning they don't occur in precisely the same form in each article, nor do the writers approach them with the same attitudes. The phrases used as organizational markers in this section are the most vivid or most used wording of the common metaphors. With each metaphor I've also indicated a corresponding synecdochic form. These associate scarcity with another concept or phenomenon to the point where these associations become synecdochic substitutions that conflate cause with an effect, part for whole, etc. In doing so, they reveal many of the concerns and assumptions that underlie the rhetoric of scarcity.

Metonymy, in the form of quantitative descriptors of scarcity, is so pervasive in the data that a deep analysis of specific instances could have easily doubled the length of this study. To address metonymy, I have included a brief discussion at the end of this section dealing with some of the general trends concerning the metonymic use of numerical indicators to illustrate scarcity.

Oil

The conversation about oil and oil scarcity has taken many twists and turns over the last decade. Prices have climbed steadily since the turn of the century, with sharp spikes in 2008 and 2011 and a dip during the recession of 2009—all years that are within the purview of this analysis. Moreover, hydraulic fracturing technology has led to a spike in U.S. oil

production stemming largely from North Dakota's Bakken shale formation. In late 2012 the IEA projected the U.S. could become a net exporter of oil by 2030, thanks in large part to new recoveries, but also because of new auto efficiency standards set to go into effect (IEA, 2012). Even with U.S. production at a 20-year high, prices of gasoline for U.S. consumers have not lowered significantly. As we'll see, the conversation about global oil supplies remains disputed.

For oil, I have isolated four primary tropes that recur throughout the data and can serve to organize my findings: peak oil, the oil panic, the oil rush and the petrocracy.

Peak Oil: Geology-as-Scarcity

Peak oil, as with most metaphors we'll see in this study, is a borrowed metaphor. Here it is a metaphor borrowed by journalism from petroleum geologists. As noted earlier, the term peak oil describes the maximum production rate of oil—from an oil field, a country, or the world as a whole—as plotted along a bell curve. The "peak" of oil production occurs at the high point of the curve. More than a half century after Marion King Hubbert conceived of the oil supply this way, "peak oil" has gone from a statistical term to a rhetorically packed metaphor expressing for some the finite limits to natural resources and for others an ill-conceived form of environmental determinism spread by conspiracy-theorizing doomsayers. A vice president of oil exploration at BP once described the concept of peak oil as "a metaphor for a deeper anxiety about energy security in the western world, rooted in politics and concern about climate change, not the fundamental limits of geology or resources" (qtd. in Bridge and Wood, 2010, p. 569).

Before a journalist uses the phrase "peak oil" (or its related concepts) in a story, it is already laden with meaning. In the articles I examined I found ambivalence about peak oil and those who take its propositions to heart. In the journalistic telling, ideological camps form around projections of oil production. Geologists and other observers who believe the peak will come sooner than later take on playful, if charged, labels such as "peakists," "peakers" and "Hubbertists" (after M. King Hubbert). Regardless of a writer's attitude toward peak oil prophecies, both the "peak" itself and the "peakist" label usually convey an anxiety about oil scarcity.

Of the magazines from which I pulled data, one of them accounts for more than half of the references to peak oil, and one writer in particular accounts for most of those references. Richard Kerr, writing for *Science*, seems to be on the peak oil beat, covering contested projections of the world's oil supplies for a research-minded audience. In March 2011 Kerr wrote an article titled "Peak Oil Production May Already Be Here." Around the peak metaphor Kerr builds a rhetorical drama with tension rising between optimists and pessimists, abundance and scarcity, activity and decline. He writes:

> Non-OPEC oil production would peak, no matter the effort applied. All the high technology, exploration and drilling, all the frontier-pushing bravado of the oil industry would no longer stave off the inevitable as OPEC gains an even stronger hand among the world's oil producers... Five years on, it appears those experts may have been unduly optimistic—non-OPEC oil production may have been peaking as they spoke (p. 1510).

The potentialities of the best-case scenario take on a language of vigor and action with its "high technology," "effort," and "frontier-pushing bravado." But Kerr sets this robust

vocabulary against a backdrop of decline, for that "effort" does not matter in a "peak" scenario. In fact, Kerr muses, the "peak" may have been happening in the midst of all that bravado. The contrast is ironic in the dramatic sense, with buoyant oil producers and other boosters obliviously busying themselves to squeeze oil from a world already in decline.

Kerr draws a similar contrast elsewhere. In an August 2012 article—amid the Dakota shale boom—he sets up dueling metaphorical worlds, one of hearty activity, and an alternate world in decline:

> Lately the buzz in the oil patch has been all about growing abundance. New, more capable technology is coming on line: mining the oil sands of Alberta, wringing oil from beneath North Dakota by fracking, drilling down to the superdeep deposits beneath the Gulf of Mexico (p. 633).

The "buzz" among over abundance—the other end of the scarcity spectrum—centers on the activity of producers. Oil companies are "mining" and "wringing" and "fracking" and "drilling" for oil all over the world. But, as Kerr points out, all that activity might be in vain if supplies are peaking:

> The ultimate arbiter will be the drill. If decline rates are indeed low, new technology—from the Canadian sands to the Brazilian offshore and beyond—should boost the crude oil output of countries outside the Organization of the Petroleum Exporting Countries (OPEC). But so far, that hasn't happened. Despite encouragement from high prices, non-OPEC crude production has been flat since 2003 (p. 633).

Although Kerr does not mention the "peak" by name here, he invokes "decline rates," a statistical relative of the peak concept, and a metonymic cousin of the peak metaphor that

captures the quality of the peak through a concrete quantity. Kerr tempers enthusiasm over new technologies that have opened up new oil stocks by calling them "incrementally improving," which "inch out" oil. When Kerr does invoke the peak metaphor by name, he offers an even gloomier vision of the world:

> For drillers outside of OPEC, cheap, easy oil is now a thing of the past. Fields that gushed oil on their discovery in the 1930s, '40s, and '50s are well on their way to a dribble. And discoveries of truly huge oil fields capable of easily delivering a half-billion barrels or more are now few and far between. That suggests to some that world production is about to peak (522).

A striking disparity arises here. For Kerr, it seems that the peak is a threat to the buoyant expectations of oil optimists. It brings with it a slump, a decline, a dampening of expectations. The "easy oil" becomes "a thing of the past." Fields that used to "gush" now "dribble." In Kerr's world scarcity does not come with an apocalyptic bang. It is just a bummer. This sense of buoyant ascent and depressing decline is built into the topographical imagery of the peak metaphor. Where a cliff would describe a sudden end to the oil supply, a peak implies an exciting trip up followed by an anticlimactic descent.

Another writer for *Science,* David Lloyd Greene, depicts peak oil as an era of transition, marked by declining extraction rates and rising prices:

> A plateau in non-OPEC production implies increasing dependence on OPEC, a massive transition to high-carbon unconventional fossil resources, higher and more volatile oil prices.... The timing, extent, and intensity of oil peaking will probably strongly influence whether transitions are relatively easy or painful (p. 828).

Along with a "transition," Greene refers to a "turning point" at which the rates of oil pumped out of the ground stop increasing and start decreasing. As with Kerr, this is no apocalyptic revelation. The peak is not the end of the world, but rather the beginning of a new world, one potentially "painful" to travel to. This "turning point" is, like the peak, an image molded in topography, but it takes us to ground level. At a turning point, we go around a corner without knowing what is on the other side. The anxiety lies not in the certain decline of stumbling down a peak, but rather the uncertainty of not knowing what is around the bend ahead.

Writing for *Nature*, Alexandra Witze adopts the language of the "slump" as well. She writes, "Others point out that predictions of an unavoidable slump are almost as old as the oil business" (p. 15). She uses this slump imagery again when noting M. King Hubbert's prediction that "oil production would peak quite suddenly—and that when it did, it would slump sharply thereafter" (p. 15). Witze connects this predicted slump in oil production to economic woes. Then, taking another turn, Witze connects the peak to environmental concerns. The discursive jump from geology to the economy, and then again to the environment, has the effect of making peak oil a function of human volition:

> Thinking along those lines raises a parallel question: can we afford, in environmental terms, to put the peak off, and to keep turning oil into atmospheric carbon dioxide at an ever-increasing rate? From an environmental point of view, a peak might almost be welcome. If the subsequent rapid drop in production crashed the world economy, though—in the way that peak-oil supporters fear—those benefits might be hard to appreciate. What's more, the resources needed to develop the alternatives of which economic recovery would depend might not be available (p.17).

By asking "can we afford... to put the peak off...?" Witze presents peak oil as a choice humans can make. She is unique among writers in this. Witze notes earlier in the article that optimists—or peak oil skeptics—view the peak concept as "simplistic geologic determinism." Witze turns that notion—as well as any actual determinism implicit in the peak concept—on its head. She adopts the language of the peak, but repositions it as determined by human action and choice instead of geology. Until now, the peak oil trope has conceptualized oil scarcity (an effect) in terms of geology (a cause), linking the two in a synecdoche that substitutes cause for effect. But Witze wrenches this substitution apart. In this rewrite of the peak oil trope, humans are now culpable for both the environment and scarcity. For Witze, we should fear abundance more than scarcity, and the fate of the peak is in human hands, not in the ground.

The *Economist*, perhaps not surprisingly, expands on the economic implications of peak oil production. In an article irreverently titled "Feeling Peaky," the anonymous authors hone in on a quantity, the energy return on energy invested (EROI):

> Even if the world can find more oil—in the Arctic or tar sands, say—the longer-term question is whether the era of "cheap energy" is over and how the world can adjust if it is.... Persistently high oil prices would clearly lead to substitution (electric cars, natural-gas-powered trucks) but the transition costs could be significant. Furthermore some potential substitutes for, or new sources of, oil (such as biofuels and tar sands) are a lot less efficient, in the sense that they require significant amounts of energy simply to produce. To the extent that this equation (energy return on energy invested, or EROI) is deteriorating, that must surely have an effect on economic growth.

Here again is a sober vision of the near-future, of a world in "transition," in decline. EROI is a metonymic form in the same way that oil production decline rates are, but instead of relating scarcity to geologic production through a quantity, it relates geologic scarcity to the economy. In looking at net energy, EROI symbolizes the ultimate economic *value* to society of the energy produced.

As with *Nature'*s Witze, Bryan Walsh (2012) of *Time* draws a positive relationship between oil scarcity—imagined as a peak—and environmental benefits. Unfortunately for his readers, he mismanages the technical concept behind the peak metaphor:

> The one clear benefit of reaching peak oil—when the world was expected to run out of easily accessible crude—was that it would force the world to find alternatives fast. But if we can count on cheap oil for years and even decades to come, it's going to be that much tougher to break our addiction to crude.

Walsh's definition of peak oil is simply wrong. A peak does not represent the point at which we "run out" of anything. Quite the opposite, actually. The peak represents *maximum* production. (Walsh at least partially qualifies with "easily accessible crude." Still, even that description is technically wrong.) Aside from that mix-up, the primary distinction between Witze and Walsh, both of whom connect peak oil to the environment, is in how they approach human social volition. Witze puts both scarcity and environmental conditions in human hands; Walsh makes note of an "anxiety" about new oil resources and in doing so implies that humans have little control over oil use or the environment. For Walsh's oil-addicted society, if the oil is cheap and in the ground we will use it and continue to put off environmental concerns. And he may well be right about this outcome, but this attitude is deterministic, though not geologic.

Spawning from the peak metaphor is a litany of names for those who accept its logic and predict its imminence. For example, Kerr writes, "Peakists—along with other analysts who would decline the label—are far less sanguine than those who think tight oil and offshore oil will hold off production decline until 2035" (p. 523). As with the "peak" itself, "peakist" is a borrowed metaphor. Kerr takes it from oil expert and historian Daniel Yergin, whose work Kerr references. But from there Kerr continues to use "peakist" independent of his sources. In doing so he stigmatizes peak oil believers by using a label that implies an ideological bent (the same way that marx*ist* and femin*ist* signify ideological stances). At the same time, Kerr lends credibility to the "peakist" position by offering evidence to support their more pessimistic view of the world's oil supplies.

Greene uses a similar label to describe peak oil believers. Of the "oil peakers," he writes:

> The oil peakers' contribution to understanding the world oil situation can be summed up as follows: rates matter as much or more than quantities, and geology matters as much or more than economics and technology. It is easy to caricature the oil peakers' assessment as a mechanistic calculation about using up a fixed resource. It is also easy to caricature their opponents view as blind faith that markets and technology will overcome all problems (p. 828).

At another point Greene calls peakers "proponents of peak oil" and notes that they are typically geologists (as opposed to economists) and pessimists (as opposed to optimists).Where the "-ists" in peakists makes peak oil believers sound ideological, the "-ers" in "peakers" makes them sound a little like loons—a fringe group of true-believers. Witze also invokes such a term, only here it is "Hubbertist," connoting the same group of

(relatively) pessimistic analysts working off the concept developed by M. King Hubbert. Witze, like Greene and Kerr, uses the term without any apparent derision, but the terms still carry some implicit derision. She, too, lends credibility to the Hubbertists' position by carefully considering their position and its implications, but this effect goes to balance that which the labels bring with them.

Bill Saporito of *Time* gives "peakists" none of the nuanced explanation of their position that Kerr, Greene and Witze afford the group. In fact, Saporito is not shy at all about stigmatizing them. He writes, "Oil's alarmists, called peakists, think the supply will diminish in a couple of years." Saporito takes as given the most simplistic and derisive of all possible meanings of the "peakist" metaphor, which sees peak oil believers as morbid doomsayers. And though he calls them "alarmists," implying an undue fear, he invokes peakists as evidence that investors should put their money in oil, precisely because they say the oil supply will "diminish in a couple of years." (This, too, might be an oversimplification of the peakist position, depending on how one defines "diminish.")

Regardless of the writer's sympathies or lack of, in each case—peakist, peaker, Hubbertist—the label connotes pessimism and anxiety about the oil supply. The labels also imply a person is dedicated to a certain (gloomy) prediction of scarcity. As such, the group takes on the stigma of ideologues through these labels. Writers for science-oriented publications *Science* and *Nature* seem to afford this group more deference by explaining their position in detail and offering evidence that supports it. Still, the labels come with some negative meaning attached regardless of how they are qualified.

As for the peak itself, its imagery is typographic: It alludes to the landscape humans traverse. We travel up and down the production curve, and only one writer—Alexandra

Witze of *Nature*—considers the volition involved in the footprints we leave along that path, and the environmental footsteps we leave behind us. Overall, some evidence exists here to support the BP executive's suggestion that peak oil is a "metaphor" for anxieties over energy security. The "peak" in the oil supply heralds a deflating slump in activity, be it oil production or economic activity. That said, there is nothing here to support the assertion (made by the same BP executive) that the metaphor of peak oil is rooted in politics and concerns about climate change. At least in these articles, the trope revolves around geology, perhaps at the expense of broader environmental considerations and scrutiny of oil use in the industrial world.

The Oil Panic: Scarcity-as-Fear, Fear-as-Scarcity

The "oil panic" trope conflates oil scarcity (cause) with fear (effect), as well as the reverse, with fear substituting for scarcity. In the panic metaphor, fear—over oil supplies, prices and the environment—takes on a prominent rhetorical presence in these articles. Panic itself becomes an actor on the world stage, guiding markets, economies and current events.

Rana Foroohar (2011) of *Time* explores fear's role in oil markets, describing in evocative terms how emotion plays into our sense of scarcity:

> Oil is primal. Like food, it's necessary to our survival, and when we fear that our ability to heat our homes and fuel our cars might somehow be in danger, we panic. That's a key reason petroleum prices have jumped so wildly off the back of the turmoil in the Middle East in recent weeks.

Instead of linking prices to scarcity, Foroohar links prices to fear. “Panic” takes over the markets as the world watches “turmoil” unfold in the Middle East. But panic itself then creates scarcity through the convoluted mechanisms of the market:

> That's another reason the fear factor in oil may continue to rise. More speculation in energy markets means more uncertainty. And there's going to be plenty of that in the energy business. Fear has increased the volatility of oil prices, and that has created a snowball effect, in which the industry has grown wary of investing in new facilities and expensive exploration.

The oil panic, as with any panic, is both understandable and destructive. Here Forohoor traces fear of future price volatility to underinvestment in oil, which can then in turn lead to an undersupply in the future. In her exposition of the “fear factor,” Foroohar takes the fear (effect) for scarcity (cause) substitution, reverses it, and creates a new one, this on between scarcity (effect) and fear (cause). Prices—specifically, prices for oil futures—become both a reflection and a symbol of fear about scarcity, which then drive actual scarcity. The emotional underpinnings of the “primal” fear of scarcity are vivid and put oil scarcity in Darwinian terms.

In a climate of scarcity marked by high prices, fear can also be seen as an effect. Moira Herbst (2008) of *Businessweek* explores scarcity’s risk by treating it as a drag on the economy:

> The question now: whether the faltering U.S. economy can avoid a recession in an environment of $100 oil. That's because the price of crude oil has knock-on effects throughout the economy from the price of gasoline to the stock market. The worry is

> that consumer spending, which accounts for two-thirds of the U.S. economy, will suffer as prices rise, tipping the economy into a further slowdown or recession.

Although less dramatic than Forohoor's "panic," this transformation of scarcity (cause) into a "worry" (effect) is not without emotional underpinnings. Consider how Herbst dramatizes the advance of oil prices in the market:

> After flirting with $100 in the final months of 2007, crude oil prices wasted little time crossing that threshold in the new year. Light, sweet crude for February delivery breached the historic milestone of $100 a barrel on the New York Mercantile Exchange (NMX), just after noon on January 2. After retreating to close at $99.62, prices again hit $100 Jan. 3.

Herbst starts romantic and turns toward the violent. Prices at first court the $100 mark—a weighty (and metonymic) if arbitrary milestone—"flirting" with it before "crossing that threshold." From here these personified prices take on the language of war, "breaching" the $100 per barrel milestone, then "retreating," before another "hit" at it. The many turns of phrase create a sense of awe and relish at the steep climb oil prices, mixed with fear as Herbst ponders its effects. Prices here are a sort of cavalier brigade wowing and attacking a besieged economy. One important effect of this personification is that it puts humans in a spectator's box. All they can do is watch oil prices do what they will, highlighting and adding anxiety to the inflexibility of oil supply and demand in the short run.

Peter Coy (2008), also of *Businessweek*, explains this inflexibility in similarly dramatic, if less violent, terms:

> What makes good information so important in the oil market is that both the supply and the demand for oil are extremely inflexible, especially in the short term. That

> means even a small, unanticipated shortfall in output—from, say, strife in Nigeria—or a bigger-than-expected rise in consumption can send prices through the roof..... In other words, there's a big slab of unknown built into the price of oil. Truth is, the world is almost as starved for information as it is thirsty for oil.

Fear seems less primal in Coy's telling. Rather, oil scarcity is a financial game with little room for error. His focus is so sharply honed on economic outcomes that he summarizes a potential humanitarian crisis in three dull words: "strife in Nigeria." All actual bloodshed and human suffering disappear in this phrase; violence becomes merely a factor in the oil economy, an "unanticipated shortfall in output." Both *Businessweek* articles conflate oil scarcity and fear, but they do so by relating scarcity—a broad phenomenon with many qualitative effects—to a variable in the financial markets. It makes scarcity less deeply felt than in Forohoor's use of the panic trope. Moreover, in this focus on economic variables we are left without insight into environmental outcomes, scrutiny of the production and uses of oil, or the social disruption in oil-producing countries caused by price volatility. Coy so drains oil of its qualitative life that he is able to equate the need for information with the need for oil. His world is "starving for information" with "a big slab of unknown built into the price of oil" because of the "scarcity of global data" around oil production. These dramatic terms apply not to citizens' fear of mechanized society grinding to a halt, but fear among investors and economic planners of slowing growth.

Writing about the effects of oil prices on scientific research, Quirin Schiermeier (2008) of *Nature* characterizes oil scarcity through a language of danger and violence to show how oil prices could slow down marine research in the Arctic and Antarctic:

> Hundreds of Arctic and Antarctic scientists face uncertainty as polar science programmes worldwide are curtailed, postponed or cancelled.... More than 100 Polarstern scientists could be hit by cutbacks. Arctic projects at risk include a wide variety of geophysical, oceanographic and biological research.... Rising fuel costs threaten researchers from all countries involved in polar research (p. 372).

Against a backdrop of doubling prices for marine diesel fuel, Schiermeier points to "uncertainty," "risk," "threat" and projects that could be "hit" by cutbacks. Research slows in *Nature* as a result of fuel costs the same way the economy does in *Businessweek*. While not spelling out fear of oil scarcity in "primal" terms as Forohoor does, Schiermeier, like Coy and Herbst, conveys scarcity as a danger through this association of violence.

So far we've seen writers substituting scarcity for fear; others invert this synedoche, presenting fear as scarcity through a causal substitution. For example, the *Economist* (2010) looks at how the environmental and financial risks associated with drilling Brazilian offshore oil could hamper production. In order to produce oil, Brazil's national oil company must procure foreign private investment. But drilling the oil presents environmental hazards. "Deep-water drilling is risky," the authors write, alluding to the BP oil spill of 2010. Investors also see financial risks in the terms and prices Brazil wants for oil rights. As with *Businessweek,* the *Economist* adopts the point of view of investors. They write, "Analysts worry the firm [i.e., the Brazilian national oil company Petrobras] might be spreading itself too thin" by demanding to operate new wells. After noting Petrobras could favor Brazilian firms in contracting support work for wells, the authors write, "Investors hate that." So here, scarcity does not create danger or fear. Rather, investors' worries result in a lack of funds for Petrobras, which could then result in a supply shortfall. The effect of this coupling of fear

and scarcity, told from the perspective of investors, is that the Brazilian government looks like an antagonistic and self-defeating boor.

Another article from the *Economist* (2010) takes fear over environmental risks and transforms it into scarcity. The issue here is over drilling in the Arctic:

> The retreat of the polar ice cap is making the region easier to work in, and there is thought to bet lots of oil and gas to tap. But Canada is not the only country now thinking twice: America, Norway and even Russia are all contemplating tighter rules for drilling. Canada's stay on drilling, like a similar one imposed in America, is temporary. But environmental groups and some indigenous people advocate more lasting restrictions, on the ground that the Arctic is particularly ecologically fragile, far from clean-up crews and blanketed for much of the year in oil-trapping ice.

The area being "ecologically fragile" communicates a sense of vulnerability in the same way as Forohoor's "primal" oil fear. A panic ensues not over scarcity, but over the environment, which then could lead to policies that constrain supplies. Though they acknowledge this environmental vulnerability, the authors' underlying assumption shows most clearly in the following: "After all, if the Arctic does not provide new supplies of oil, they will have to be obtained somewhere else." This reveals a sense of inevitability about oil use and production. It amounts to economic determinism, similar to what we saw with Walsh's take on peak oil, where humans are ruled not by their environment but by the forces of supply and demand.

Adam Davidson (2012) in *New York Times Magazine* provides a counterpoint this trope. He deliberately sets about debunking the notion of an oil panic by arguing Americans, in terms of their economic behavior, don't actually panic when oil prices rise. He describes attention to high prices as "mania" and political "fury." Yet actual gasoline consumption in

times of high prices shows "indifference." People, Davidson notes, spend less income on gasoline than they do on restaurants and entertainment, and they fail to carpool or take public transport in times of rising prices. Davidson also provides his own version of the "panic" metaphor in the "gas-phobic society," which he argues the U.S. is *not*. Davidson finally surmises, "If gas prices truly damage the quality of our lives, we have done a remarkable job of hiding it*"* (p. 13). His cause for invoking the panic metaphor is solely to dispense with it as a descriptor of American society.

The "panic" metaphor brings human emotion to bear on scarcity discourse. Rhetorically, fear can take on the spectral form of scarcity itself. This suggests that in a disparate global production system, our own fear of oil scarcity might be all we can truly know of it. This could explain the violent and dramatic language that a topic as mundane as crude oil prices takes on in these articles. Risk of scarcity drives these fears and can drive scarcity itself. Likewise, fears over environmental and other risks are seen as creating scarcity by hampering the world's ability to produce oil. These associations are taken for granted to the extent that they become synecdochic substitutions, wherein scarcity (cause) can replace fear (effect) and vice versa.

Oil Rushes and Oil Bets: Scarcity-as-Wealth

The world's first oil rush came to Pennsylvania in 1860, with drillers swooping in to get a cut of the kerosene market and thus beginning more than 150 years of oil's boom-bust cycle (Yergin, 1991). More recently, as oil prices rose in the 2000s, its renewed profitability sparked exploration offshore from coastlines, in the Arctic, under shale rock and in other hard-to-get places. At the same time, expectations for oil to keep rising in value have fueled

investments in oil futures and other forms of financial speculation. Following these historical developments are rhetorical patterns that capture a pot-of-gold mentality of oil exploration and speculation in the context of relative scarcity.

David Schindler (2012), an ecologist writing an essay for *Nature*, describes in lively terms how rising prices push new production in Canada's Alberta oil sands:

> Industrial development of Alberta's oil sands began in 1967. The cost of producing usable oil from the bituminous sands was high, and companies struggled for the next 30 years. As the price of conventional oil edged upwards at the turn of the millennium, development in the oil sands increased at a frantic pace. Production rocketed from 760,000 barrels of oil a day in 2005 to 1.3 million barrels a day in 2006, and is projected to reach 3.3 million barrels or more a day by 2020 (pp. 499-500).

Schindler's language here draws attention to the speed of development. In recent years it has moved at a "frantic pace," a phrase that attributes a measure of irrationality to development. As a result, production has "rocketed," which gives a sense of unworldly quickness. Elsewhere Schindler invokes the "rush" metaphor by name: "Meanwhile, the rush for expansion in the oil sands is resuming, after a months-long lull caused by the global recession" (p. 501). In Schindler's hands the rush metaphor paints Alberta's oil exploration as reckless and haphazard. The "rush" in this case emphasizes the speed of development and highlights how far oil production has moved ahead of scientific studies of environmental impact.

Quirin Schiermeier (2012) of *Nature* similarly uses the rush metaphor to describe the pace of Arctic oil exploration amid environmental concerns. Schiermeier refers to a "starting-gun" fired by a Norwegian oil executive who called Arctic oil exploration a "race." The title of the article adopts this "race" metaphor and Schiermeier later summons the "rush" by name. As with "peak oil," the "rush" gives attention to the oil supply (as opposed to demand). For example, Schiermeier hones in on Norway's production capacity, writing that the country is "looking to offset a one-third decline in production" in its southern oil fields. Norway's plans for the Arctic Schiermeier describes as "bold," which carries a far less negative connotation than the "frantic" development described by Schindler. Still, Schiermeier devotes much space to environmental concerns. Schiermeier writes, "The resource rush is alarming critics," who argue more research is needed on the potential impact on Arctic ecosystems. By tying environmental concerns directly to the rush metaphor, Schiermeier echoes Schindler in positioning the rush as an environmental danger.

In its take on the global oil rush, the *Economist* (2009) inverts this perspective, looking through the point of view of oil producers. The authors write:

> Oilmen are worried because they believe that many of the factors behind the record-breaking ascent last year remain in place. Much of the world's "easy" oil has already been extracted, or is in the hands of nationalist governments that will not allow foreigners to exploit it. That leaves firms to hunt for new reserves in ever more inhospitable and inaccessible places, such as the deep waters off Africa or the frozen oceans of the Arctic. Such fields take a long time and a lot of expensive technology to develop.

The authors opt for the word "hunt" to describe the pursuit of new oil resources. This choice changes the ultimate effect of the metaphor. The "rush," as we've seen it treated by science writers, paints exploration as reckless and haphazard, where "hunt" is more adventuresome, more goal-minded. And by adopting the frame of reference of "oilmen," the *Economist* presents issues of access to oil as obstacles that these protagonists face in pursuit of treasure. The list of frustrations for these "oilmen" is long: American sanctions against Iran, national oil companies hoarding supply and profits for themselves, insurgents in Nigeria, environmental concerns in the Arctic region. All these impediments conspire to keep supplies low and prices high.

In another *Economist* (2012) article, the rush metaphor takes on the same aura of treasure-seeking adventure. In the context of higher commodity prices, new oil finds become a coveted bounty. Here the authors look at oil fields in the Arctic region. They refer to oil as "hidden treasure," "a prospect," a "whopper," a "wildcat energy frontier" and " a lot," the latter describing an economic windfall shared among countries rich in potential oil. The romantic language of treasure hunts and 1800s prospecting mythos suggests none of the tension found in Schiermeier's treatment of Arctic exploration, where the "rush" metaphor highlights the speed and environmental risk of such exploration, not a swashbuckling, wildcatting adventure.

This adventuresome strain of the "rush" metaphor shows up elsewhere. Writing for *New York Times* Magazine, Benjamin Wallace-Wells (2011) delves deeply into the notion of the "prospect" as a dedicated pursuit of oil in the context of scarcity and risk. As with other uses of the rush metaphor, the article is set against a backdrop of rising oil prices and decreasing supply of "easy oil," which Wallace-Wells defines neatly as "easier to find, less

complicated to drill." He describes the optimistic outlooks within the oil industry as "prospective," meaning bright, and describes in romantic terms the relationship between "oilmen" and the probabilities involved in oil exploration:

> Oil exploration has an unexpected quality of whimsy. The artistry lies in acts of narrative imagination, the ability to take disparate wisps of data and insist that oil must exist in a particular spot and then to entice a company with your enthusiasm.... Yet if no one ever got caught up in the enthusiasm, nothing would ever be drilled (p. 40).

Elsewhere Wallace-Wells writes of offshore oil finds in Angola's waters that have given the oil industry "license to dream." This is another nod to wildcatter optimism, which Wallace-Wells later summarizes as a "hopeful feeling of infinite possibility" (p. 43). This all goes to cast oil drillers as bright-eyed dreamers chasing treasure in remote areas—sometimes with disastrous results, as Wallace-Wells notes, pointing to the BP oil spill off the Gulf Coast. Wallace-Wells calls this the "frontier ethos": "blunt, optimistic, aggressive." Again we see the rush metaphor conjuring the Old West. Wallace-Wells offers perhaps the most pronounced, most detailed telling of "the rush" as a metaphor of adventure and exploration, though he tempers this by adding context about the environmental and financial risks of "hard oil" drilling.

While lacking the excitement or abandon of a "rush" or a "prospect," a *Businessweek* article by Stanley Reed (2008) captures this same theme of extraordinary effort in the context of scarcity in an article about a Saudi Arabian "monster oil field." As a response to higher prices and international worries about the oil supply, Saudi Arabia retooled its Al Khurais field as a "showcase" to "show the world that it should not underestimate [Saudi Arabia's]

capacity to produce oil." In place of the frontier imagery of "the prospect," this "monster field" is described as an otherworldly, awe-inspiring curiosity bustling with activity:

> The guts of the infrastructure, known as the central processing facility, stretch for nearly a mile. The workers—there are already 28,000 of them and the number is likely to rise—are covered with protective garb from head to foot and wear hoods that stick out from under their hard hats to shield them from the scorching Arabian sun. They look like aliens, moving about under the girders or hammering together wooden forms for pouring concrete.

This variation of the rush is tied up with the diplomatic aspirations of a nation. Still, the "monster" or "mega" field metaphor emphasizes a response to scarcity and prices, one that translates into broader macroeconomic power rather than mere wealth creation. Its awesomeness as a piece of drilling infrastructure matches the underlying tenor of the rush metaphor as it is employed by the *Economist* and Wallace-Wells. In times of scarcity, grand efforts to produce a resource are seen through this romantic version of the trope as heroic.

Finding and drilling crude is not the only way to profit from oil's commoditization. Through futures markets and various financial instruments investors can make plenty money from the oil trade without drilling or hauling a drop of actual oil. For writers, oil trading and speculating often takes the form of "the oil bet," a metaphor that describes trading on the volatile and uncertain price of crude oil. *Time's* Saporito (2011) comments on oil's virtues as an investment, comparing and contrasting it with gold. As with gold, an indelible part of oil's allure as a financial instrument is its scarcity:

> The case for oil is more compelling. It's critical to running Planet Earth—an ingredient in everything from soda bottles to sweaters. Demand for oil must expand.

> It will increase by 32% to 40% over the next 20 years, says oil expert Daniel Yergin, chairman of IHS Cambridge Energy Research Associates. Political chaos in the Middle East threatens to disrupt supplies, which would boost prices.

In looking at oil's demand, Saporito points to oil's practical use as its defining virtue. But he also points to the many potential disruptions to supply, as well as to "peakists'" concerns about supply decline. Saporito is flip about social ills that cause and unfold from scarcity. He refers to Hugo Chavez as a "quasi-socialist screwball" and the diverse social and political revolutions taking place in northern Africa as "political chaos in the Middle East." To defend the morality of profiting from scarcity, Saporito turns back to gold. "You don't have to be a doomsayer; it's simple diversification." He never fully explains the moral turn he took here. We can see clearly enough, though, that whether you are investing in oil or investing in gold, what matters for Saporito is rationality, which appears to be measured by one's ability to make money.

We see the same emphasis on rationality in a 2012 Saporito column. Only in this instance the "rational actors" are playing the part of oil refiners. To rationalize the behavior of oil refiners who have "responded to weak demand by limiting the supply of gasoline," Saporito turns to the "6-3-2-1 crack spread." This is a term grounded in the language of gambling, which can explain the decision making of refiners:

> The 3-2-1 means that out of one barrel of oil you get three barrels of gasoline, perhaps two of diesel and one of a by-product. The 6 is a cost multiplier: take the price of oil, multiply it by 6, then back out the production costs of the 3-2-1. What's left over is the crack spread. For most refiners, that spread was negative last year.

The "6-3-2-1 crack spread," in Saporito's hands, becomes another iteration of the "oil bet," a metaphor explaining the profits made from oil's relative scarcity. One thing Saporito's metaphor does is help readers see the scarcity of an oil product as an outcome of human decision making. However, Saporito's brisk writing can obfuscate, or at least confuse. He writes that refiners are "limiting supply," as though by intent or conspiracy, when they are, by his own account, responding to market variables.

Businessweek's Matthew Phillips (2012) captures most completely the logic of the oil bet as a metaphor and as a financial practice. For, Phillips, "oil bets" are inevitable, impossible to stop:

> Making it harder to speculate would do nothing to reduce the huge demand for oil as an investment. In fact, it may cause some of the biggest investors to leave the futures market and start buying actual oil, rather than its financial proxy... But in a world of sluggish equities, low-yielding bonds, and falling currency values, it seems hard to overestimate the demand for oil as an investment—and the lengths to which big investors will go to capture exposure to it.

This sense of inevitability lends legitimacy to oil speculation as a means to livelihood. The article's underlying logic is that oil speculation can't be stopped and so probably shouldn't be. That logic is demonstrated in Phillips' parody of speculation's critics: "Those pesky oil speculators. If only we could rein them in by making it more expensive to bet on oil prices." In addition to satirizing critics of speculation, he defends oil speculation by alluding to a positive role it plays in markets: "For all their shortcomings, speculators help markets process information sooner rather than later." Much like the drillers who combat scarcity by producing oil in unlikely places, speculators become heroes through the "oil bet" metaphor

by processing reams of information in times of uncertainty and pointing others (other investors, that is) to important trends.

Both the "oil rush" and "oil bet" metaphors attempt to explain the actions of those who try to profit from the oil trade. We see the "rush" used in both positive and negative lights—either as a romantic quest after a hard-to-get treasure, or a hasty pursuit of riches at the expense of the environment. Both show human responses to scarcity, driven by the rational, adventuresome or reckless pursuit of wealth. The emphasis on wealth takes the place of scarcity itself. We can describe this with a synecdochic form that substitutes effect (wealth) for cause (scarcity). One implication of this synecdoche is that other consequences and aspects of scarcity can be overshadowed by the focus on wealth. Also missing from the trope is some reflection of how oil resources and oil wealth are distributed among and within societies.

The Petrocracy: Scarcity-as-Political Power

For those countries with nationalized oil industries, revenues from oil resources can make up a large portion of a government's income and play a strong role in the country's political organization. As described in the preceding literature review, those countries can be vulnerable to a host of political, social and economic maladies. These stem largely from the fact that oil revenues allow governments to act with less accountability to their citizens than governments funded mainly by taxes.

Those writers who report on the role of oil revenues in political economy often discuss political power in terms of scarcity—usually shown in terms of rising prices—so that the distinction between the two gets lost. Scarcity and power become a synecdochic

coupling, with effect (political power) subbing for cause (oil scarcity). Metaphorically, power and scarcity are also related through the "petrocracy," wherein the relationship scarcity and power create hopelessly corrupt and autocratic governments.

Fareed Zakaria (2012) makes a substitution of power for scarcity quite explicit in a column for *Time* that explains Vladimir Putin's position in Russia in terms of rising oil prices:

> The real hero of Russia's rescue was oil. The dramatic rise in the average Russian's income has been a consequence not of Putin's policies but of oil prices. Russia's future—and Putin's—will likely depend on this factor and not on Putin's skills, the opposition's strengths or the power of Facebook.... The price of oil when Putin came to office was $27 a barrel. From that point it began an almost unbroken rise and is now $116. And oil is the lifeblood of Russia's economy, providing two-thirds of its exports and half of federal revenue.

Several metaphors here deepen the synecdochic relationship between oil prices and Putin's political standing in Russia. Oil (or, really, oil scarcity, signaled in terms of steeply rising prices) is Russia's "real hero," saving it from economic decline. The choice of "hero" seems quite deliberate as a means of preempting any credit that might be given Putin in managing the Russian economy. Oil is likewise the "lifeblood" of the Russian economy, a visceral (if not fully explained) description of oil's economic importance to the Russian government. After vesting oil with all this power, Zakaria goes on to minimize other factors that could explain Russia's political present and future. Along with an effect-for-cause substitution, we also have here a part-for-whole synecdoche, where all outcomes in Russia's national life are

told in terms of oil's relative scarcity. Obviously this allows for many pieces of historical context to get lost.

A running theme we will find with the petrocracy metaphor and the scarcity-as-power synecdoche is the indelible tie between power—and, by synecdochic extension, scarcity—and corruption. Zakaria sums up the mechanism behind this relationship by noting:

> The Russian state has used the revenue to dole out largesse across the country. It is widely believed in the West that Putin stays in power through repression. In fact, he does so in larger measure through patronage and bribery.... Bribery works. Look around the world and you will notice that the Arab Spring has not disturbed the region's oil-rich dictatorships and monarchies.

Scarcity earns states money through higher prices for resources, and that money can then be used to generate "largesse" to keeps autocrats in power. This is the basic logic we see used in other instances of the "petrocracy." The tension playing out within Zakaria's commentary specifically is between political determinism and social will. In the end he argues the solution to autocratic entrenchment will come from political restructuring within Russia, yet his explanation of Putin's rise and reign seems to make all political happenings within Russia fated. They are wholly a function of oil prices.

Peter Maass (2007), writing for *New York Times Magazine*, draws an even sharper and stronger relationship between scarcity, autocratic governments and corruption. He offers readers a stark choice: access to oil or a clean conscience. He writes:

> In an era of scarce oil, can America afford to punish anyone who cuts corners to win deals for American firms? In 2003, when oil sold for less than $30 a barrel, it was possible to believe we could have our anticorruption statutes and our cheap gasoline.

> Four years later, with oil going for $95 a barrel, it's not so clear... As an instrument of resource control, bribery has been the recourse of corporate executives and government officials the world over.... Desperate buyers—and this category now includes the United States—must compete against one another as they try to fulfill the wishes and needs of the autocratic sellers of petroleum... (p. 26).

This is not really meant to be a Sophie's choice scenario. From the way Maass poses it, the choice between "(making) painful but necessary changes to reduce our addiction to oil, or sink deeper into our moral sludge" should be an easy one. An "addiction" to oil sounds bad, and so reducing it would seem good. Likewise, sinking "deeper into our moral sludge" seems *very* bad. So it should be no choice at all. What is interesting—and unique—about these separate turns of phrase is that they *directly* link the corruption implicit in the petrocracy metaphor with U.S. oil "addiction," a powerful metaphor describing oil consumption in the U.S.. This rhetorical tie makes U.S. oil consumers morally complicit in a way that never enters into Zakaria's take on Putin. When Zakaria writes of high oil prices "propping up" Putin and funding bribery, he never asks *who* is buying all that oil or *why*.

In *New York Times Magazine* Tina Rosenberg (2007) rigorously details the mechanisms that create power and corruption in Venezuela. In outlining Venezuelan petrocracy, Rosenberg adds a considerable amount of context and nuance to the trope. As she writes:

> [The] percentage of oil controlled by state-owned companies is likely to continue rising, mainly because of the demographics of oil. Deposits are being exhausted in wealthy countries—the ones that exploited their oil first and generally have the most private oil—and are being found largely in developing countries, where oil tends to

> belong to the state... Oil concentrates a country's wealth in the state, creating a culture where money is made by soliciting politicians and bureaucrats rather than by making things and selling them. Oil states also ask their citizens for little in taxes, and where citizens pay little in taxes, they demand little accountability. Those in power distribute oil money to stay in power. Thus oil states tend to be highly corrupt (p. 44)

Scarcity provides the financial skeleton of the petrocracy. Although this idea remains in the background for much of the article, it provides the explanatory thrust at the outset. From there, Rosenberg treats oil money as a natural, almost fated corruptor, as Zakaria does, but goes into much more depth in explaining the process. In the end we come away with the same essential picture of a corrupt oil state that can dole out oil money to keep itself going, but Rosenberg gives us all the many turns of history and decisions by leadership that led to the current state of affairs. The relationship is not nearly as automatic, as synecdochic, as scarcity and power are in Zakaria's piece.

A 2011 *Businessweek* article by DiPaola et al. translates scarcity profits into something beyond internal political power: international influence. This version of the petrocracy shows Saudi Arabia as the center of an international drama, wielding its capacity to produce oil as a diplomatic weapon and buffering itself against tensions with other OPEC companies. The authors write:

> When an unsympathetic group of OPEC members including Libya, Iran, Algeria, and Venezuela shot down the idea of increasing supply, the Saudis vowed they would go their own way. Saudi Aramco, the kingdom's national oil company, quickly contacted refiners in India, China, South Korea, Taiwan, and Europe, asking whether they wanted more oil. Suddenly the Saudis' desire for a modest increase in output was

transformed into a determination to show rival oil suppliers that it was still calling the shots in the global energy market.

We could perhaps consider this a form of an oil "rush," with countries racing to produce oil, except for one thing: Only one country wants to race. As *Businessweek*'s authors tell it, Saudi Arabia converts oil scarcity into regional and global political muscle. As the drama progresses, the article's language of intrigue deepens. The authors describe the "main factions in the [OPEC] cartel," the "schism" between Saudi Arabia and other OPEC countries, as well as how "the Sunni Saudis have accused the Iranians of fomenting dissent in Shiite-majority Bahrain." The relationship between oil and power is summed up perhaps most succinctly in these two lines: "Oil and the army are two of the Saudis' major weapons. The other is cash." Of course that cash also comes largely from selling oil. Scarcity for Saudi Arabia amounts to heavy-duty international leverage.

International tension and intrigue are a byproduct of the petrocracy in the same way as corruption is elsewhere. But the stories are essentially the same: Where scarcity creates power, trouble follows. The metaphor of the petrocracy depicts a world where scarcity, by its ability to buffer political power, corrodes the integrity of institutions and relationships within and among societies. For the writers who deploy the metaphor, the bounty that oil scarcity yields wreaks havoc on the political will of those living in oil-states. They live off the largesse their autocratic leaders afford them—helpless, manipulated, perhaps themselves corrupt (as Zakaria implies in calling government largesse "bribes"). As for those autocrats, they enjoy none of the plucky heroism given private actors who supply the world with oil through the "rush" metaphor. And if consumers of oil in the U.S. and other Western

democracies share any responsibility for the corruption resulting from the petrocracy, none of these writers—with the notable exception of Peter Mass—recognize it.

Water

While no one expects water to "run out" in the same sense that oil ultimately will, climate change models do predict that drought will reduce supplies in many regions. At the same time, projections for global population and wealth growth will add pressure on water supplies and infrastructure. As noted previously, oil is critical to the everyday functions of industrial civilization as we know it. Water is that, too, but also critical to *any* civilization. Water is essential to manufacturing, energy production, agriculture and sanitation infrastructure, not to mention a requisite for life itself. This sharply sets water apart from oil, and all other resources for that matter.

As I did with oil, I've isolated common metaphors and synecdochic forms that writers use to describe water scarcity. These are: the thirsty world, the water project, the creeping disaster, blue gold and the water war.

Thirsty Crops, Thirsty Lawns, Thirsty World: Demand-as-Scarcity

With oil, very few writers used rhetorical tropes to describe or draw attention to scarcity in terms of oil demand and use. Up popped the occasional "addiction" to oil or "energy pigs" to describe U.S. oil consumption, but these were isolated instances, not recurring patterns in the data. We do, however, see some common tropes dealing one way or another with water use and water demand. The most prominent metaphor of these is the

"thirsty" trope. It is a metaphor that sometimes describes the very real need of water among humans, but can also emphasize distortions and inefficiencies in water use.

One example of the latter comes from a 2009 *Science* article by Robert Service. Looking at the large amounts of water needed to cultivate corn for biofuels, Service calls ethanol corn a "thirstier" crop than others. He uses the thirsty metaphor to illustrate the downside of using corn for industrial fuels: "A widespread shift toward biofuels could pinch water supplies and worsen water pollution. In short, an increased reliance on biofuel trades an oil problem for a water problem" (p. 516). The thirsty metaphors adds a personifying element to corn, one that highlights the incongruity of use between corn and other, perhaps more necessary, uses. The metaphor also serves as an ironic transposition of human need onto something artificial. The choice to divert water to a "thirsty" crop seems a touch absurd in this light, especially given that there are thirsty *people* in the world. As Service goes on to detail the projected increase of water use attributable to ethanol, he places the risk of water scarcity on ethanol production and explicitly questions the social choices involved.

Another *Science* article looks at water use on the other side of the planet, in China. Li Jiao (2010) uses the "thirsty" metaphor to describe rice, which Jiao calls "one of the thirstiest crops on the planet" (p. 1462). This in itself does not pose a problem. But Chinese farmers' attempts to grow rice on "desiccated" riverbeds "stunned" an American ecologist. Jiao writes that pumping water from aquifers to cultivate rice in areas unsuited for the crop is contributing to "looming water shortages." And growing a "thirsty" crop like rice somewhere where farmers must pump groundwater to cultivate it is one reason why Jiao writes that "China has largely brought its water problem on itself" (p. 1462).

When applied to people, the "thirsty" metaphor lacks the sharp ironic contrast it takes on when applied to a plant. The subhead to an article by Anita Hamilton (2011) of *Time* reads: "The world is getting thirstier." The phrase refers to growing populations and shrinking supplies, and it carries none of the implicit condemnation of "thirsty" that Jiao applied to rice and Service applied to corn. Holding to that trend, though, Hamilton does apply the "thirsty" metaphor to a plant at one point: "Albuquerque's water authority has been paying residents 75¢ per square foot (7¢/sq m) to rip out their thirsty lawns and replace them with native plants that need little water to thrive.*"* Hamilton uses "thirsty" to indicate grass' relatively high water requirements and to highlight the decision to water lawns in a dry area. As Service did with corn and Jiao did with rice, Hamilton is able to draw attention to collective water decisions with a single word.

An article by Nanette rnes (2007) in *Businessweek* represents another interesting case. rnes applies the "thirsty" metaphor to the "Southeast." This allows for multiple messages to get through rnes' writing, for though we recognize the human need for water, which is built into the common use of the word "thirst," rnes also leaves room to criticize the collective human decision making in water use:

> Most of the blame at the moment is falling squarely on historically low rainfall. But an equally important culprit has been the unbridled growth of the Southeast in the past 50 years. The region's abundance of cheap water has long fueled development.... The diminishing water supply in the Southeast has come at a time of soaring demand. Population growth and water use in the region have both outstripped the national average in recent years.

By branding the "unbridled" population and economic growth of the region as a "culprit," rnes points to humans institutions as a driver of scarcity, but does so by treating the "Southeast" as a political and economy entity, rather than a population. She notes several large manufacturing companies that have moved into a water-short area of the state, where they add stress to water supplies. She also points to "irrigated" lawns and low utility prices for water that have "created a false sense of the resource as being low in value." By their wants and needs, humans become an indelible component of scarcity, not mere victims.

Writing for *Time*, Walsh (2008) sets the metaphor of a "thirsty" world against that of a "dry" world. The literal meaning behind them is that the world's population is growing, and thus making the world "thirstier" at the same time that climate change is warming many areas and disrupting precipitation patterns, making the world "drier." He writes:

> About 1.1 billion people have no access to clean water, and half the planet lacks the same of quality of water that the ancient Romans enjoyed. And while the amount of water on the planet remains fixed, the number of people drawing on it does not. The world's population could grow from 6.7 billion to more than 9 billion by 2050, according to U.N. projections. Much of that growth will be in countries that are already water poor.... What's more, none of that includes a new X factor: global warming. Some areas of the world will grow a result of climate change, but others will grow dryer, and so far the drying is winning.

The clashing metaphors set up what is essentially a crisis moment for humanity. Applied to the whole population, the "thirsty" metaphor does not carry the sting of criticism. And yet humans are not completely off the hook in Walsh's article. We have the ability to change by reducing greenhouse emissions and changing water use. The solution, in Walsh's eyes, does

not come from nature, nor does it come from engineering new supplies for water. He writes, "The only way to thrive in a warmer, thirstier world will be to learn to get more out of less."

Frederick Kaufman (2012), writing for *Nature*, shows a departure from other uses of "thirsty," but one that is noteworthy. His article is titled "Future's market: Wall Street's thirst for water." "Thirst" here refers to various attempts to profit from the trading of water and water futures. The metaphor here does not represent a literal need for water or even want for water, but for *profit*. Kaufman uses "thirst" ironically here, to portray the greed of financial speculators at the same time as they create physical "thirst"—i.e., water shortages—elsewhere: "This is much is clear: a water betting game will leave crops thirsting and push the global price of food far beyond the peaks of the past five years." So, we see thirsty used twice, once ironically to illustrate the will to profit from scarcity and once to represent problematic water shortages. These are sharp distinctions, but in keeping with the pattern seen throughout the data, where "thirsty," when applied to nonhuman objects or political entities can emphasize distortions in use.

At its most basic, the metaphorical use of "thirsty" points to the demand and uses of water. Because of the fluid meaning of the word "thirst"—it can connote both want and need—it can also indicate the more general and valid need for water among the population. When applied to the human population as a whole, the metaphor remains fairly neutral. It simply describes the increasing water needs of a growing population. As discussed earlier in this study, defining resource scarcity relative to demand is perhaps the only meaningful way to do so. "Thirsty," when used ironically, can point to disproportionate uses of water relative to alternatives and thus serve as a vehicle for criticizing decisions about water. And yet, even

when used as a critique, it does not come with a stinging rebuke. (We could easily think of harsher metaphors than "thirsty" to indicate poor decision making or greed.)

The Water Project: Scarcity-as-a (Solvable) Problem

The "water project" represents a concerted effort through technology to deal with water scarcity. Where there is a "water project" there is a "water problem" that needs solving. Two different classifications of this metaphor show up in the data. The first water project, what we might call the "big water project"—or perhaps the "doomed" water project—signifies a large, obtrusive engineering project that significantly alters a water system, often exacerbating the problem it was intended to solve. The other, the small water project, shows smaller scale efforts, often aimed at capturing water as it precipitates or curbing water use. These small water projects are more modest, unobtrusive and, almost without fail, viewed with admiration and hope by the writers describing them.

One example of the big water project comes from Richard Stone (2008), writing for *Science*. Stone writes that Turkmenistan's plan to build a massive lake to catch agricultural run-off is "one of the most grandiose water projects ever undertaken" (p. 1002). As Stone describes it, the "Golden Age Lake" is perhaps the prototypical big water project: grand in design, poorly conceived, super-expensive, and a symbol of misplaced political will that creates as many problems as it solves. Even its name, Golden Age Lake, is over-the-top and deeply hubristic. Like a breached levee or an overwhelmed dam, the project has "unleashed a torrent of criticism." Some fear that to dilute all this tainted water the Turkmen government would divert water from the Amu Darya river, which it shares with Uzbekistan, and create water shortages and international tension as a result.

Grandiose as the project might be, it is a simplistic (and probably ineffective) solution to complex problem, but, as Stone notes:

> That hasn't stopped Turkmen authorities from forging ahead with a solution: the resurrection of a 1970s idea to divert Turkmenistan's irrigation runoff into Karashor, near the border with Uzbekistan. Niyazov dusted off a Soviet rough blueprint for an artificial lake, Glantz and others assert, as a strongman's way of showing dominion over nature (p. 1003).

A water project does not need to be of Soviet design to represent "a strongman's way of showing dominion over nature," though it certainly helps. Soviet or otherwise, this attempt to control nature is a fundamental element of the big water project metaphor and carries an implicit critique of human and governmental hubris.

Another typical case of the big water project comes from Jiao (2010), who explains how the Chinese government's big water projects have run their course, failing to accomplish their stated goal and even contributing to the country's current water shortages:

> Until recently, the [Chinese] government was banking on a massive engineering solution. The $75 billion South-to-North Water Diversion Project, now under construction, would bring water from the Yangtze basin to the parched north. But that remedy is no longer deemed sufficient (p. 1462).

The money, heavy engineering and the lack of effectiveness are key traits of the big, doomed water project. Jiao, for his part, offers a humble antidote to the heavy, water-controlling project. He describes a new project by the Chinese government, focused not on controlling water, but on monitoring it:

> A comprehensive solution may depend on better information..... For a half-century, the government has relied heavily on data from nonstandardized farmers' wells. To address this shortcoming, the land and water ministries have devised a project, now in final review and expected to start this year, in which more than 20,000 monitoring wells would be drilled across the country, with a focus on northern regions. Each well would track water level, temperature, and water quality, and more than half would also test for pollutants and other contaminants (p. 1463).

The description of the monitoring program is closely related to the water project metaphor. It describes a concerted effort to address scarcity, but this one Jiao shows in a more positive light, a true "solution" that seeks to *understand* water, not control it.

In a 2010 essay for *Nature*, Margaret Palmer writes about these large infrastructure projects in the aggregate, enumerating their flaws and the residual problems they create:

> In the developed world, responses to natural disasters such as floods and droughts often involve taming or vexing nature instead of moving people out of harm's way or rethinking water-use policies. Dams are built, levees erected, and various infrastructure project redirect flows to nourish water-stressed regions. Ironically, such actions affect the very ecological processes and natural systems that purify, store and ensure long-term delivery of the abundant fresh water that supports ecosystems and people (p. 534).

Palmer casts a sharp eye on the distortions of natural water systems created by infrastructure projects. These projects represent attempts to "tame" and "vex" nature—a less neutral, more negative characterization than simple "control" of nature. But Palmer shows awareness of and sensitivity to the water project as a "response" or solution to water scarcity. This might

be why she is careful to point out the "irony" of water projects' failure to solve problems they were created to solve. This irony sets beneficiaries of water projects as victims of their failure but also complicit in the destruction of biodiversity that such projects cause. I should note also that Palmer is exceptional among writers analyzed here in giving *non*humans a stake in water scarcity and efforts to mitigate it. And she is unique in noting this negative statistical relationship between water security in developed nations and threats to biodiversity, and in turn tying this relationship to the water project metaphor. Palmer ultimately offers her own solution to water scarcity, a different kind of water project. Instead of manipulating water systems, Palmer calls for studying them. This information-gathering project, similar to that described by Jiao, is a humble antidote to the water project, an appeal to study more deeply "the relationship between biodiversity and ecological processes to social factors that influence the delivery of ecosystem goods and services to humans" (p. 535).

One instance of the small, unobtrusive water project deals with the genome of plants, a project aimed at keeping the food supply secure in coming times of water scarcity. Elizabeth Pennisi (2008), writing for *Science*, describes this as a "blue revolution" in plant genomics:

> With Earth's water resources under strain, population growth booming, and desertification increasing, the need to wring more crops out of dry land is becoming urgent, Annan said in his April 2000 Millennium Address. It was a call to arms for plant genomicists. But they are fighting a battle on many fronts... Researchers armed with the latest sequencing and gene-expression technologies are making progress in

> rounding up the genes that can help plants stand up to dry conditions, both in the greenhouse and in the field (p. 171).

The warlike imagery here seems more arbitrary than meaningful. It matches the content of the article to Kofi Annan's words, but we see no human conflict to really justify the martial diction above. However, it does capture the sense of human effort implicit in the water project metaphor, if a bit overdramatically. (And perhaps we can give Pennisi a pass here since making plant science exciting to readers is no easy task.) An argument could be made that tampering with plant genetics represents an attempt to control nature beyond even the most ambition water infrastructure projects. But in Pennisi's treatment, this is still a modest solution to the world's water problem, an attempt to adapt and make do with less, which is the hallmark of the small water project trope.

Other small water projects embody ways of gathering water in new, creative and harmless ways. Gaia Vince (2010) writes in *Science* about Lima communities that are experimenting with nets to "harvest" fog. Vince describes a neighborhood that has "given up waiting for the city's help" to help it deal with water shortages. Instead, with technology developed and funded by western nonprofits and based on known indigenous practices, this community is trying to "capture precious drops" of moisture in fog so as to irrigate saplings that will "themselves trap the fog, creating a microclimate that should yield a self-sustaining runoff" (p. 751). Here we have victims of water scarcity bypassing governments, skipping infrastructure solutions, and taking matters into their own hands in one of the most modest ways we can imagine: eking water from ground-level clouds.

From *New York Times Magazine* comes a similar water project, which uses simple and locally controlled technology, holds the same underlying hope. The project Sara Corbett

(2011) describes is labeled explicitly in the title a "solution" to the water quality problems of developing countries. Here the solution is clay water filters that can be mass produced by locals using a clay press and a tire jack. This is a simple, cheap redress tied to a global freshwater scarcity problem that Corbett describes:

> According to the United Nations, more than five million people die each year from diseases related to unclean drinking water. Most live in developing counties and, overwhelmingly, they are children under the age of 5.[Ron] Rivera [developer of the manufacturing system] liked to say he wouldn't rest until he 'put a dent' in the problem, which by his calculation meant setting up 100 water-filter factories, creating enough pottery to provide safe drinking water to at least four million people" (p. 38)

These small-time actors, with their western scientist benefactors, are heroes in a scarcity drama, as is the entire country of Singapore, as described in an article by Neel Chowdhury (2009) in *Time*. Singapore, rather than diverting rivers or pumping groundwater, has addressed water scarcity by harvesting rainwater and conserving water resource. As Chowdhurry writes, "Hot, equatorial, but with limited groundwater, Singapore has made itself a global paragon of water conservation by harvesting—and reusing—the aqueous bounty of its skies and, to a lesser extent, its surrounding seas." Chowdhury calls Singapore's water projects a "success story" that began "in struggle" as the country tried to gather its own water resources rather than depend on other countries. Chowdhury is quite generous to Singapore, showing the whole nation as a hero among large nations by "making itself into a vast catchment area for the thundershowers that regularly soak." This creative solution represents a positive antidote to the brute control shown in a large infrastructure project.

Along with gathering and cleaning water, efforts and technology that save water can also take on the heroic qualities of the small water project. The *Economist* (2010) rolls out a lengthy laundry list of water-saving devices and systems that private companies have pursued. Among other projects, these include: Unilever's "Medusa" project which shaved eight percent from its water use; SABMiller's efforts to reduce by 25 percent the water needed to produce a liter of beer; Nestle's goal of being the world's most water-efficient food manufacturing company; Cisco's installation of low-flow plumbing in its buildings. The title, "Business Begins to Stir," suggests collective mobilization among private companies. A sense of action accompanies this, similar to the "Blue Revolution" that pushes plant geneticists to create drought-resistant plants. The irony we see in big water projects goes missing in all of these variations of the trope. Writers dealing in the small water project metaphor hold out hope for success of these unobtrusive solutions to scarcity.

A singular but interesting take on the small water project comes from Elizabeth Royte (2008) in *New York Times Magazine*. Royte investigates a physically feasible but psychologically repellent solution to water scarcity: recycled waste water. The project in this case includes not only Orange County's engineering project that cleans and filters water that once contained sewage, but it has as a component the public relations effort to convince users the water is safe to drink:

> Opening in January, the Orange County Groundwater Replenishment System is the largest of its type in the world. It cost $480 million to build, will cost $29 million a year to run and took more than a decade to get off the ground. The stumbling block was psychological, not architectural. An aversion to feces is nearly universal, and as

> critics of the process are keen to point out, getting sewage out of drinking water was one of the most important health advances of the last 150 years (p. 31).

Royte writes that Orange County "forged ahead" through this psychological barrier—a note of action common among uses of the water project metaphor. Facing an impending water problem, "[Orange County] didn't appear to have a choice" but to build a water recycling plant. Royte eventually brings scarcity and the metaphorical water project together within a larger context of natural resource scarcity:

> As we deplete the earth's nonrenewable resources, like oil and metals, the one-way trip from raw material to disposed and forgotten waste makes less and less sense. Already we recycle aluminum to avoid mining, compost organic material to avoid generating methane in landfills and turn plastic into lumber. As it becomes more valuable, water will be no different" (p. 32)

The recycling project thus becomes an inevitable, necessary response to scarcity. But Royte turns the water project metaphor on its head and exposes a flaw in the approach of searching for "solutions" to scarcity. She writes, "The (purification) technology, far from making us aware of the consequences of our behavior, may give us license to continue with doing what we've always done" (p. 33). As Royte presents it, the Orange County water recycling system straddles the line between a big and small project. On the one hand, it is an adaptation to scarcity, an unobtrusive project that that does not divert river flows and does not try to impose human will on nature as a dam or massive reservoir would. But Orange County's answer to scarcity, as with the big, doomed water projects such as the Golden Age Lake, comes with a downside. And just as the challenge of this water project is psychological, its negative side effects are psychological: Orange County's water project allows consumers and

polluters of water to continue their behavior without awareness of the consequences. Instead of diverting water from river systems, it diverts *attention* from how we use water.

And so as Royte shows, even the small water project asks for little sacrifice among water users. Indeed, technological innovations such as those in private industry described by the *Economist* represent ways of maintaining a consistent level of industrial activity and don't raise questions about, for example, whether water should be used to make junk food and other consumer products in the first place. Moreover, the heroic aura of the small water project might deflect attention from inequities in the current distribution of water resources within those countries.

The water project metaphor, big and small, presents scarcity as a problem for humans to solve. Through the synecdochic transformation of scarcity into a problem in need of a solution, the water project invites thinking about control and technology, not inequity, not reconsiderations of our behavior and ways of doing business. The big water project remains perhaps the more pointed metaphor, for it illuminates the hubris of control by ironically pointing out failures in our attempts to increase water supply by rearranging nature. It emphasizes the problems inherent in thinking of water scarcity as purely a supply problem. And yet the small water project—seemingly the antithesis of the big water project—asks little from societies and powerful actors, and as a rhetorical tool offers no means of criticism.

The Creeping Disaster: Scarcity-as-a "Natural" Disaster

In simplest terms, the "creeping disaster" references scarcity caused by drought. Like most other metaphors here, it is borrowed by journalists from a technical field. Specifically it hails from meteorologists. Whereas the "thirsty" world describes water scarcity in terms of

human population and human actions, the "creeping disaster" describes it in terms of "natural" causes. I put quotation marks around "natural" because, as we'll see, human-caused climate change is expected to exacerbate drought patterns around the world.

Conceiving of water scarcity as a weather-induced "disaster" often puts it out of reach of human control and thus positions humans as victims of scarcity. Even so, we see many writers look to changes of behavior to endure these water shortages. One example comes from a 2011 issue of *Time*. Bryan Walsh opens by grouping droughts with other weather disasters and at the same time showing their sharp distinctions:

> Hurricanes announce themselves on radar screens before slamming into an unlucky coast. Tornadoes strike with little warning, but no one can doubt what's going on the moment a black funnel cloud touches down. If we're lucky, a tsunami offers a brief tip-off—the unnatural sight of the ocean swiftly retreating from the beach—before it cuts a swath of death and destruction... But a drought is different. It begins with a few dry weeks strung end to end, cloudless skies and hot weather. Lawns brown as if toasted, and river and lake levels drop, like puddles drying after the rain. Farmers worry over wilting crops as soil turns to useless dust. But for most of us, life goes on as normal, the dry days in the background—until one moment we wake up and realize we're living through a natural crisis.

Perhaps the most telling notion in Walsh's description of these disasters can be found in the word "luck." A coast that a hurricane collides with Walsh calls "unlucky."Alternately, if a tsunami comes with a physical warning, victims are "lucky." The idea of luck here gives a sense of randomness to events and downplays human choice and control. (Is it really a matter of bad "luck" if real estate developers build beachside properties along coastlines prone to

hurricanes?) Although Walsh distinguishes drought from these other disasters in terms of warning signs, this same randomness, this same "luck" element is still very much associated with the "creeping disaster."

Later in the article Walsh does invoke human choice, pointing to remedies to drought that involve reducing water consumption and waste, promoting water reuse, fixing leaky irrigation and reducing greenhouse gases to mitigate the effects of climate change. But the impression of the creeping disaster Walsh leaves us with is one of human powerlessness in the face of drought: "But for all that, we still can't make it rain. Drought may be the creeping disaster, but there's a characteristic it shares with all natural catastrophes: they remind us of our essential vulnerability to the whims of the planet."

A 2012 article from the *Economist* also describes drought as an unannounced, almost inconspicuous disaster. The authors write:

> The drought of 2012 started innocently enough, with a little less snow in the winter and a pleasantly early start to spring. But as the summer has rolled on a string of heat records have been set across America. Both lack of rain and extreme heat have conspired to create the worst drought for 55 years—with more dry weather forecast in the weeks to come.... Across America farmland is parched, corn is wilting, reservoirs are low, rivers running dry and wildfires have broken out in Utah and Colorado.

In this passage, drought is almost entirely out of human hands. Humans are the victims of the "conspiring" forces of heat and lack of rainfall. This, along with how "innocently" the drought started out, depicts drought as a duplicitous menace. The drought's main attack is against the agricultural industry, as it wilts crops and rangeland and raises prices for

consumers. Humans and commerce are the victims of a disastrous onslaught of scarcity. No mention of climate change, here, nor do the authors make any reference to the disproportionately large water needs of all that corn wilting in the U.S.

New York Times Magazine's Jon Gertner (2007) puts the effects of prolonged drought in the American West in terms of "chaos," "catastrophe" and "apocalypse." The term "apocalypse" is perhaps not so sensational given the quickly growing gap between the supply and demand for water along the Colorado River system, with water levels slumping because of diminished snowpack at the same time as populations of Western cities boom. As Gertner describes the situation:

> In the Southwest this past summer, the outlook was equally sobering. A catastrophic reduction in the flow of the Colorado River—which mostly consists of snowmelt from the Rocky Mountains—has always served as a kind of thought experiment for water engineers, a risk situation from the outer edge of their practical imaginations. Some 30 million people depend on that water. A greatly reduced river would wreak chaos in seven states (p. 70).

Here again, climate change is the driving force behind current and future droughts. The article is written largely from the point of view of water managers, those tasked at the municipal level with finding water supplies to meet demand. With Gertner's focus on climate change, the disaster of drought floats somewhere in a realm between natural and human-made. Gertner, like Walsh, gives space to solutions to drought that include reducing consumption and demand of water as well as cutting greenhouse gases. These additions allow for some measure of human will in a trope that otherwise emphasizes human helplessness.

Quirin Schiermeier (2008), writing for *Nature*, downplays the notion of "disaster" when looking at drought and, partly through this, actively attributes more of a role to human decisions in both causing drought and enduring it. Schiermeier zeroes in closely on the relationship between drought, climate change, and soil dryness:

> Climate scientists believe that in the second half of this century, extreme summer heat and drought could become the rule rather than the exception as global temperatures rise. In any case, rapid loss of soil moisture early in the year now seems to be a signal for subsequent summer heatwaves in Europe. A feedback loop appears to be at work: as heat dries up the soil, the dry soil amplifies the heat (p. 270.)

Perhaps to leave no doubt as to the role of humans in drought, Schiermeier writes that "the degree of human interference with climate and water" has prompted experts to "declare dead the idea that water planners need only consider natural variability (and not human influence) when managing water supplies" (p. 271). Humans are then left to "adapt" to the problem of drought that they largely created.

Drought, in the form of a "disaster," represents unexpected scarcity. It most often places humans in the role of victims, even when writers point to anthropogenic climate change as a factor and explain human actions that can be taken to remedy scarcity. Climate change presents some rhetorical tension for these writers. Historically, drought was purely a natural disaster, something to be feared and lamented. Those writers who reference climate change—Walsh, Gertner, and Schiermeier—try to balance this sense of vulnerability and victimhood against a growing sense of human responsibility. And while writers might suggest water efficiency or conservation, patterns of human development in dry regions such as the American West aren't explicitly or metaphorically challenged. Positioning humans as

victims of unexpected scarcity from the skies, to some extent, preempts the possibility of doing so.

Blue Gold: Scarcity-as-Wealth (Redux)

The "blue gold" metaphor, like the oil "rush" and "bet," captures efforts to profit from water in a context of relative scarcity. Water, though, doesn't share the same history of commodification that oil does. Around the world advocates have criticized and protested the commodification of water by private actors. These critics maintain water should be treated legally as a commons, not a commodity (Barlow and Clarke, 2002). Meanwhile, some economists and environmentalists argue that pricing water more closely in line with supply and demand would assure a more efficient distribution and use of water as well as conservation. As with other metaphors we've seen, writers can deploy the notion of blue gold to underline it in a positive or negative light. Writers also constitute scarcity in a synecdochic form, where water scarcity (cause) is substituted with wealth-creation (effect).

In his essay for *Nature*, Kaufman (2012) levels a pointed, unequivocal critique against the trading of water on financial markets. To examine the consequences of trading derivatives and futures based on water, Kaufman outlines the financial mechanisms that would allow water to be converted into wealth. In doing so, he allows for a synecdoche that conflates water scarcity with wealth:

> So this summer, as cornfields from Ukraine to Kansas withered, as bacon shortages made headlines and dairymen fed candy to their cows, a new message congealed: the world's next great commodity will not be gold or grain or oil. It will be water. Useable water. Although collecting stakes in indices of publicly traded companies is

> nice, and water certainly generates predictable profits, wouldn't it be more efficient if it could be translated into a cash equivalent? Perhaps, plotted the hedgers and speculators, there should be a commodity market in water, as there is for gold and grain—a futures exchange in which assurances to deliver or accept water on some specified future date can be traded like cash.

Kauffman tries to capitalize on the synecdochic form of scarcity-as-wealth. He shows the cruel physical manifestation of water scarcity next to the abstract world of commodities and futures markets. The contrast seems meant to unsettle and even repulse readers. Kaufman alludes to water shortages to show the important stakes of the water supply, and he then splices it with the commodification of water, where water increases in value because of its scarcity. Elsewhere, Kaufman approaches this contrast more directly, openly deriding those who would profit from water's scarcity and turn a physical resource into an abstruse financial product:

> Investors of all stripes adore the apocalyptic vibe. Within the interstices of violence and chaos there will be money to be made. These days, the biggest profits do not come from buying or selling actual things (such as houses or wheat or cars), but from the manipulation of ethereal concepts like risk and collateralized debt. Wealth flows from financial instruments that are one step away from reality.

The reference to violence here (which also comprises an instance of the "water war" metaphor—more on that later) represents yet one more moral strike against those seeking to profit from water's scarcity. We saw earlier how oil is transformed rhetorically into wealth, but nowhere in the oil scarcity-as-wealth trope did we see such moral ferocity brought to bear. In fact, no writer directly questioned the practice of oil's commodification, even though

oil shortages could lead to significant public health issues, and the oil market creates plenty of its own social, political and environmental distortions.

Of course, not all writers come to the water scarcity-as-wealth trope with Kaufman's evident moral outrage. Exploring the distinction between value and pricing, the *Economist* (2010) explores the difference between water and other commodities:

> But the world's most expensive commodities are worth nothing in the absence of water. Fresh water is essential for life, with no substitute. Although mostly unpriced, it is the most valuable stuff in the world. Nature has decreed that the supply of water is fixed. Meanwhile demand rises inexorably as the world's population increases and enriches itself.

This lack of substitutability is perhaps what endows water with its preciousness. Metals can be traded for other materials, oil is not the only fuel that exists, but there is nothing like water and nothing that can replace its role in biology. "The most valuable stuff in the world" seems to describe water's value to both life and commerce. And these two areas are related, of course. Because water is scarce, supply and demand forces apply. And in this, the *Economist* presents a very different view from Kaufman:

> As for the market, when it approaches water it meets all sorts of obstacles: water is difficult to move, difficult to measure, difficult to price and often difficult to charge for, since many people think it should be free. Even in arid market economies where every drop is precious, the price of water seldom reflects scarcity. Trading in water rights may one day bring order to the 20 million well-users in India, but not in time to feed the 1.4 billion Indian mouths expected by 2025.

That price doesn't follow scarcity is a problem for the *Economist*'s authors, as is the fact that "some people" think it should be free. These people stand in the way of efficient allocation. The authors argue that trading water rights could bring "order" to well users in India—a view that veers opposite from Kaufman's indictment of market traders that would profit from scarcity that could lead to social chaos. This notion of "order" is significant. It is the chief quality that the *Economist* attributes to the financial trading of water. And the authors note that it can eventually lead to more investment in water infrastructure and movement, which can ultimately alleviate scarcity and human suffering.

Another parallel between oil and water: When scarcity of a resource becomes more widespread, areas that have the resource in abundance can become rich. And water booty, like oil booty, can create social problems of its own. A 2010 *Economist* article uses the metaphor "liquid gold"—akin to "blue gold"—to describe the potential wealth from the water of the Great Lakes. Here the authors describe this relationship between scarcity in one location and the potential for profit in another:

> But the lakes themselves remain; and while much of America is regularly afflicted by drought, they hold enough water to submerge the entire country. Now the Great Lakes states are reconsidering their main asset. Water, the boosters say, will bring prosperity once more. The first task is to protect the water itself. Environmentalists raise the spectre of Central Asia's Aral Sea, all but drained by Soviet irrigation projects. Nightmares have been fed by radical plans such as a scheme in the 1990s to ship water to Asia.

Instead of trading in water rights or water futures, the subject here is the trading of water itself. Great Lakes water is a resource, a product, a tourist attraction and an industrial input.

As with "liquid gold," water as an "asset" is a metaphor connoting water's financial value. Here, the *Economist* struggles down the middle of the road regarding the issue. On one hand we see "boosters" lauding the possibility of selling Great Lakes water to water-poor regions. On the other we see environmentalists invoking the "spectre" of past disasters and "nightmare" scenarios—scaremongering, in other words. In the end, the authors seem to support efforts to profit from Great Lakes water. We see that "Milwaukee itself exemplifies the hope that water may not only support growth, but catalyse it." The term "growth" here is a softer term than "wealth" or "profit"—it's tied to social aspirations rather than individual greed, not to mention it is also attached to the word "hope," that most benevolent of words. Meanwhile, the authors describe critics as "squabbling" over the plans, a term that minimizes the content of their arguments. So while the authors here cautiously distance themselves from water "boosters," they ultimately land on the side of the commodification of Great Lakes water.

Another variation on this notion of water as an asset or investment comes from a 2012 *Businessweek* article. In the remote woodlands of Japan, foreigners are—somewhat mysteriously—buying up rights to the groundwater as scarcity looms in the background:

> The UN has warned that two-thirds of the globe may be "water-stressed" by 2015, while locales such as India's Rajasthan region have already banned new bottling plants and breweries to conserve aquifers.... Chinese investors have been eyeing the water assets in Japan with the idea of exporting bottled water back to China, says Hokuto Okudera, head of M&A Support, a Tokyo-based broker focusing on mergers and acquisitions for small and mid-sized companies. The safety of drinking water is a big issue in China. The Chinese investors may also want to cultivate crops for export

> to their home country, or even set up factories, such as steel and paper mills, that require lots of water.

We see no "squabbling" in this case. Japan's legal environment allows for this. Nor do we see a challenge to this practice from the article's authors. Water's status as an "asset" in one area is explained, simply, through scarcity in another area. The authors don't sound any alarms about this development, they simply explain the phenomenon in terms of supply and demand: Japan is experiencing a real estate slump, which has lowered the prices of land, and China has ever-growing demand for freshwater. This may seem a neutral position, but explaining water scarcity this way makes the foreign purchasing of water rights seem like a natural social outcome.

Perhaps the most vivid example of the "blue gold" metaphor is a 2008 *Businessweek* article by Susan Berfield. In it, Berfield profiles oil magnate T. Boone Pickens' quest to sell groundwater from the high plains of Texas. Along with "blue gold," Berfield uses another metaphor illustrating water's commodification: "the new oil." Both metaphors liken water to other commodities whose prices rise in times of relative scarcity. Here is Berfield as she describes the relationship between scarcity, water's financial value and the opportunism of T. Boone Pickens:

> In the coming decades, as growing numbers of people live in urban areas and climate change makes some regions much more prone to drought, water—or what many are calling "blue gold"—will become an increasingly scarce resource. By 2030 nearly half of the world's population will inhabit areas with severe water stress, according to the Organization for Economic Cooperation & Development. Pickens understands

> that. And while Texas is unusually lax in its laws about pumping groundwater, the rush to control water resources is gathering speed around the planet.

As with oil, we have a "rush" to buy and sell water. And as with the rush metaphor when used to describe the pursuit of scarce oil, it can carry an aura of romance and Old West adventurism. T. Boone Pickens is a water wildcatter who cuts a cavalier figure in Berfield's telling:

> There's a saying in Texas: "Whiskey's for drinking. Water's for fighting." Pickens decided to fight. In 1999 he created a company called Mesa Water and began to water rights so he could strike a deal with another city altogether. The hell with Amarillo. Pickens was confident he could sell his water....

Although Berfield gives voice to Pickens' critics, she levels none of the sharp condemnation on him that Kaufman does on Wall Street traders who want to invest in water futures and derivatives. Berfield uses the "blue gold" metaphor to explain Pickens' actions, but, intentionally or not, adds a measure of awe and romance to the pursuit of water for profit by painting Pickens as a shrewd, enterprising and adventuresome profiteer.

A final variation on the scarcity-as-wealth form inverts one side, where now scarcity is not a wealth-generator but a risk to wealth. Moira Herbst (2009) of *Businessweek* examines the many threats to businesses from rising demand and shrinking supplies:

> If there weren't enough for businesses to worry about these days, here is another threat: water scarcity. Companies in industries from technology to agriculture to apparel are vulnerable to the risks posed by a falling supply of available water... Decreasing water availability, declining water quality, and increasing water demand

are creating major new challenges for businesses and investors who have historically taken clean cheap water for granted, says the report.

Instead of an investment, an asset or commodity, water here is an industrial input—crucial to generating profit, though not itself a profit-generator. Scarcity negates profits rather than creates them. The rhetorical effect, though, is not different. The language here is still financial; the world is spelled out in terms of supply and demand, dollars and cents. There is one notable distinction, though: As an industrial input, profit can be made without buying or selling water. Herbst points to efficiency and water reduction as a means for businesses to buffer their bottom line against water scarcity.

The water scarcity-as-wealth form has many parallels with its oil counterpart. It can provoke criticism or invoke adventure. Through the "blue gold" metaphor we see writers struggling to wrestle down the value of water, which hovers somewhere between economic and the existential. If those writers that treat water as a wealth-maker without questioning its status as such legitimize it, then we could say the vast majority of writers here accept water scarcity's status as an object of wealth-creation. The *Economist* goes so far as to attribute the power of creating social order to tradable water rights. Only Kauffman criticizes this notion outright and uses water's rhetorical transformation into investment/commodity as a means of subverting the synecdoche's moral logic. The other writers seem to accept it as inevitable, if not normal or even desirable.

The Water War: Scarcity-as-Conflict

In the "Introduction" I noted Peter Gleick's list of past conflicts over water. Many commentators have alluded to the potential for "water wars" between nations as climate

change exacerbates water shortages and creates tensions among countries sharing water resources. The "water war" makes several appearances in the data. Often writers debunk the idea or refine it, but writers also use the water war trope to drive home some point about scarcity. Along with the metaphor is a synecdochic form that substitutes social conflict for water scarcity. The "water war" becomes much more than a reference to violence. Underpinning it is an anxiety about social disruption from scarcity.

In Kaufman's rebuke of financial profiteering from water scarcity, he alludes briefly to the water war. Describing the social consequences of declining water tables and increasing demand for water, he writes:

> The implications are dire: the destruction of aquatic ecosystems, the extinction of innumerable species and the risk of regional and international conflicts—the much-dreaded "water wars" of the twenty first-century. What will Egypt do when Ethiopia dams the Blue Nile? What will happen when Yemen becomes the first country to run out of water? The short answer: nothing good.

The quotation marks around "water wars" are telling. They indicate that by the time Kaufman gets to it in his 2012 article, the term "water wars" has been bandied about and misused. Kaufman employs the punctuation, one would think, to show he's savvy to this; and yet he still tries to capitalize on the rhetorical capital of the water war trope. He stops short of predicting violence and instead uses the metaphor as a shorthand for "nothing good" that might follow from national tensions caused by water scarcity.

Another writer for *Nature,* Wendy Barnaby (2009), invokes the "water wars" metaphor for the specific purpose of debunking its logic and critiquing its rhetorical currency. She writes:

> The United Nations warned as recently as last week that climate change harbours the potential for serious conflicts over water. In its World Water Development Report of March 2009, it quotes UN Secretary-General Ban Ki-moon noting the risk of water scarcity "transforming peaceful competition into violence". It is statements such as this that gave birth to popular notions of 'water wars'. It is time we dispelled this myth. Countries do not go to war over water, they solve their water shortages through trade and international agreements. Cooperation, in fact, is the dominant response to shared water resources (p. 282).

By calling it a "notion" and a "myth," Barnaby draws attention to the metaphorical quality of the "water war," and from there deliberately sets about trying to reduce its rhetorical potency. She argues why war seldom results from scarcity. In doing so she argues against environmental determinism in the same way that peak oil critics do—i.e., by arguing ways people are able to mitigate scarcity through economic changes. (In this instance, Barnaby argues that nations can alleviate water scarcity through importing agricultural products that require large amounts of water to cultivate.) The end effect is to subvert the water war metaphor and to upend the scarcity-as-conflict synecdoche. Scarcity, in Barnaby's view, scarcity is more linked to social cooperation. And so the real social threat is fear of scarcity created by the water war trope. As Barnaby explains, scarcity rhetoric distracts from and obfuscates other social ills:

> [It] is still important that the popular myth of water wars somehow be dispelled once and for all. This will not only stop unsettling and incorrect predictions of international conflict over water. It will also discourage a certain public resignation that climate change will bring war, and focus attention instead on what politicians can do to avoid

> it: most importantly, improve the conditions of trade for developing countries to strengthen their economies. And it would help to convince water engineers and managers, who still tend to see water shortages in terms of local supply and demand, that the solutions to water scarcity and security lie outside the water sector in the water/food/trade/economic development nexus (p. 283).

And yet the water wars "notion" persists. An *Economist* (2010) article goes all in on the water wars metaphor, giving us not just "water wars" but every other imaginable bad social outcome stemming from water scarcity. In the future, when "population grows, climates change and water becomes ever scarcer," all sorts of disruptive outcomes might result: water "wars," water "clashes," water "rows," water "competition," water "disagreements," water "worries," water "alarm," water "disputes," water "antagonists," water "disgruntlement" and water "protests." At the same time, the authors bring up the specific term "water war" with some derision of those who use it. Specifically, they write of "pundits" who "delight in predicting the outbreak of water wars." They don't dispel the "myth" of water wars, as Barnaby does, but they do distance themselves from it and stick to synonyms that represent conflict. And so "water war" as a broader concept for social conflict over scarcity gets much traction here. But the article is not entirely doomful, for the authors also offer an alternative metaphor to the water war: the water "arrangement" or water "agreement." At its best, water agreements "look for benefits and then try to share them." If that is done, water can "bring competitors together." The water agreement is a resolution of social tension; scarcity seems to disappear in its glow. If we look again at the water conflict in this light, it seems to represent a failure of interested parties to manage scarcity.

The "water war" is so synonymous with general social conflict—so metaphorical, in other words—that one can easily use it without any implication of physical violence. In her profile of T. Boone Pickens, Berfield writes: "That Roberts County would become the stomping ground for the Panhandle water wars was perhaps inevitable. Underneath it lies one of the world's largest repositories of water, moving slowly among layers of gravel, sand, and silt." There is nothing here that suggests Berfield thinks that armed conflict will actually break out over water in the Texas Panhandle. "Water wars" here seems like no more than a typical civic squabble, to be played out in courts and county commission meetings. The "water war," then, might be so diluted as to be easily substituted with "disagreement." However, another writer, Carlo Rotella (2011) for *New York Times Magazine,* performs the opposite trick. Instead of using the "water wars" without any hint of violence, he juxtaposes the violence of wars with a far more tame and domestic word, "irritation." He writes, "Agriculture is more worrisome. Local water shortages will cause 'persistent irritation'—wars, famines" (p. 36). By likening water wars to "persistent irritation," it is as if Rotella would rather not predict such violence, but can't seem to avoid it.

Also consider the water "apocalypse" and "chaos" in Gertner's article for *New York Times Magazine*. Gertner, like Berfield, seems to assume his audience expects no actual violence to break out over the Colorado River system. Instead the conflict would take the form of "an almost unfathomable legal morass" among the states and stakeholders that depend on the river. Or, more elaborately, if water volumes were reduced it could ultimately "ravage the fragile relationship among states and almost certainly lead to a scrum of lawsuits" as states and parties sued each other for rights to the river (Gertner, 2007, p. 77). While the language is strong, Gertner seems reluctant in sounding the alarm. He starts this

laundry list of catastrophe with considerably milder language, calling the outlook of the region's water in climate change projections "sobering."

The writers in this study seem wary in their use of the "water war" metaphor. And yet, most persist in substituting social conflict for water scarcity and either invoke the water war by name or find other ways of alluding to them. Because ambivalence prevails among writers, pinning down any common meaning of the water war is difficult. Barnaby calls it a "myth," while others toss it out almost compulsively while distancing themselves from it. Although its rhetorical currency is reduced from presumed overuse, most writers still try to spend that currency when they can. In short, the metaphor is fraught. Perhaps more telling than the actual use of the "water war" is the use of its rhetorical antithesis: water cooperation and water agreements. These counter-metaphors show the "water war" not as an inevitable state but a failure among interested parties to negotiate. What we don't see, though, are these counter metaphors used independently of the water war. Cooperation, in the rhetoric of scarcity, follows only alongside conflict.

A Note on Metonymy

Metonymy, which Burke describes as a special case of synecdoche wherein a tangible object takes the place of an intangible, often takes the form of a quantity substituting for a quality. The data I've described here is packed with instances of a quantity operating as a description of scarcity or its effects. The data is so full of these quantities that to comprehensively discuss and dissect them could easily fill another study. In place of that, I will point to some noteworthy trends I observed.

The metonymic forms in the data often corresponded with the primary tropes. To take the "peak oil" trope as an example, we can think of it as having three components: one metaphorical, one synecdochic and one metonymic. The metonymic form of the peak oil trope can be found in statistics writers use to explain, support or reject peak oil projections. Kerr invokes production decline rates in the world's oil fields. In a 2011 article discussed above, Kerr writes: "In the past decade, analysts have realized that rather than the 2% to 3% per year decline once assumed, production from existing fields is declining 4% to 5% per year. Some believe the depletion is even faster" (p. 1510). The decline rates not only provide quantitative evidence to Kerr's suggestion that the "peak" might be imminent, but serve also to rhetorically illustrate the peak itself. "Decline" rates fit neatly with the peak's language of slump and, topographically, they allude to the downward momentum of the peak's down slope. The *Economist* (2012) also uses a quantitative measure that adds something tangible, something countable, to a vision of a world in slump. "To the extent that this equation [energy return on energy invested, or EROI] is deteriorating, that must surely have an effect on economic growth." "Deteriorating" energy returns on investment is a signal of scarcity and an effect of the peak. It retells the peak in economic terms, but uses the same essential narrative of ascent and slump. Along with decline rates and energy returns, we see production rates, supply and demand figures in number per barrels, and so forth. As concrete indicators of the oil supply, these metonymies have the somewhat ironic effect of making oil itself an abstraction. We aren't introduced to the black, tarry muck coming out of the ground, but instead the aggregate flow of barrels through the world economy.

Perhaps the most pervasive metonymic form oil scarcity takes is references to prices. These are everywhere, accompanying each of the other tropes. Herbst (2008) goes so far as

to personify prices and their "flirting" with a (once) high water mark of $100 per barrel and then "breaching" it. Zakaria (2012) attributes $100-plus oil to Vladimir Putin's political entrenchment. In both cases, and similar ones throughout the data, prices illustrate scarcity in countable terms and work in tandem with the primary trope (e.g., Herbst uses the specter of rising prices to sound a note of danger; Zakaria uses it to explain Putin's political power).

Numbers that count people figure heavily into articles dealing with water scarcity. Walsh (2008) of *Time* notes the 1.1 billion people without access to clean water and the 9 billion people expected to live on the planet by 2050. *Nature's* Kaufman (2012) invokes the world's 3 billion water-stressed people expected by 2035. Gertner (2007) of *New York Times Magazine* mentions the 30 million people in the American West that depend on the Colorado River's water. Jiao (2010) splits the difference between supply and demand by dividing one into the other. He demarcates China's water resources in a quantity expressing average water per person: 2220 cubic meters of water per person, a figure on the low end of worldwide averages. Stone (2008) of *Science* uses the disparities between water use per person in Turkmenistan and Uzbekistan to illustrate the hubris and wrong-thinking behind Turkmenistan's Golden Age Lake water project. And so forth. These populations, alive and expected to be alive, bring us back to role of demand in scarcity. It marks a distinction in the data, this fixation on supply in the oil tropes and, by contrast, substantial acknowledgement of demand and use in water tropes (though, certainly we find many references to water supply as well).

Looking at water more generally, quantities relating to water also work together with the main metaphors and synecdoches outlined above. For instance, Service (2009) cites the extra 5.5 trillion liters per year that corn for ethanol production will need. The figure lends a

numerical value to help further the "thirsty" metaphor for corn. It also adds a tangible quantity to the scarcity-as-demand synecdoche. *Businessweek*'s Herbst (2009) describes in numerical terms water's value as an industrial input by noting the financial risks to technology producers of water scarcity: "A water-related shutdown at a fabrication facility operated by a large tech company could result in $100 million to $200 million in missed revenue during a quarter, according to the report."

In Kenneth Burke's own words, metonymy constitutes a "reduction" of reality. A writer can't tell the story of every single person the world over who depends on water every drill rig in the ground. Instead, they write the story of supply, demand and human populations by expressing them in as individual quantities. The deployment of all these figures seems natural enough—the data is thoroughly littered with them. But it is important to stop and note that these quantities are human inventions—symbols—designed to help us manage reality, the entirety of which we cannot see or understand in a given instant. Also, and more to the point, these symbols effectively reduce to numerical characters the uncountable qualities attached to human lives, economies and livelihoods, as well as natural environments. The process of reducing all those qualities into neat, manageable quantities is a pitiless, if journalistically necessary, simplification. In aggregating scarcity through supply, demand, production and consumption figures, we lose many issues of interest: the qualitative costs of resource extraction; the struggles of individuals in procuring resources for themselves and their families; the ecological losses from extracting, refining and consuming resources; etc.

Discussion

From its beginning this study was meant to be exploratory in purpose and design. With little attention in media studies given to how journalists approach the topic of resource scarcity, Kenneth Burke's master tropes seemed to me deft tools for sketching out a swath of the landscape. Burke saw reality as neither entirely physical nor entirely constructed by humans. He offered an alternative conception of reality, one that unfolded through a constant tension between our primitive, biological needs and social constraints, as well as between the physical and the symbolic (Bertelsen, 1993). Reality, then, is constantly under a process of symbolic transformation by humans as we struggle to understand and communicate it.

With this tension between the physical and symbolic in mind, I have tried to delineate some trends in scarcity rhetoric using Burke's tools for understanding symbolic action. My first and primary research question asked, *How do journalists use rhetorical tropes to construct the concept of natural resource scarcity?* That question seeks both a description of the data as well as an interpretation of its meaning. In the previous section I tried to provide a detailed and granular answer to this question. Now I'll look at some of the broader themes in the data and their rhetorical implications.

The tropes discussed in the previous section likely do not come as earth-shattering revelations. Terms such as "water wars" and "peak oil" are established elements of our lexicon, but the fluidity of the metaphors—their different meanings in the hands of different writers—surprised me. If anything, I assumed the metaphors and other tropes used by writers in constituting resource scarcity would hold some implicit meaning, and some of them do.

But often we see that the tropes' meanings are still being wrangled over. They are, often, challenged or contested. Looking back, this probably shouldn't have surprised me. The finding is in keeping with the work of Mark P. Moore (1993; 2003; 2009) on the role Burke's tropes play in environmental and resource rhetoric. Moore found that, for example, when the spotted owl of the Pacific Northwest took on a synecdochic quality in rhetoric, this synecdoche's meaning was contested among stakeholders. Not to mention, Burke himself noted that these representations are often in contest among groups within a society.

In some cases, writers deliberately set out to alter the public meaning of a trope. One especially clear example of this was Wendy Barnaby's essay on "water wars," in which she not only argued against the prevalence of actual violence over scarcity but also openly attacked the rhetorical "myth" of the water war. Most writers who used the "water wars" metaphor seemed especially aware of its status and meaning as a metaphor, and an overly used one at that, and they either distanced themselves from it, reworded it or hedged in some other way. We see plenty of other examples, too. The oil rush metaphor could serve to either romanticize the search for the world's remaining oil supplies, or it could be a vehicle for criticism of that same pursuit. The "water project" came in two distinct iterations—one hubristic and doomed, the other modest and hopeful. Oil bets and blue gold could be the objects of scorn or legitimate responses to scarcity. "Thirsty" can metaphorically capture the vital water needs of the world's human population or, alternately, the distortive effects of certain human choices in water use. So, the meanings of the tropes are not predetermined. Writers invest them with meaning and couch them in context.

One instance where this is not the case, where a metaphor does come already loaded with meaning, is the flurry of labels used to describe those who ascribe to peak oil's logic

and imminent predictions—the "peakists" and "peakers" and "Hubbertists." Even journalists that seemed sympathetic to their viewpoint couldn't help but apply the label. Perhaps the terms are too catchy to avoid. Another explanation is that the terms signify the polarity of the debate over oil scarcity. Whether the writer intends so or not, the labels paint oil pessimists as ideologues huddled in a camp of the likeminded, as boosters and optimists scoff from their own camp. Hemmingsen (2010) called this entrenched dialectic in the peak oil debate a "stale dichotomy" between optimists and pessimists. It would seem to be an active one, still.

This is an exception that reveals a rule, and a significant point where my findings diverge from Moore's work. While I found differences in and contests over the tropes, I found no consistent polarity which the tropes created. Rather, there was a spread of meanings around each trope, not necessarily in direct opposition to the others. One potential explanation for this is that Moore studied the rhetoric of stakeholders in resource and environmental debates while this study looked at the rhetoric primarily of journalists, who by tradition generally try to maintain an appearance of neutrality. This fact alone perhaps merits notice: that journalists, too, construct critical features of reality through tropes. Very often, they use the same tropes often deployed by stakeholders and other actors in scarcity issues, such as scientists, economists and policymakers. In other words, journalists and other actors share some rhetorical tools, generally borrowed by journalists from other fields. Just *how* journalists use the tropes discussed in this study may differ from other actors, but that they use them at all is a significant finding of this study—and one that I myself took for granted when beginning, which is evident in the structure of my first research question.

Fluid as these tropes are, we see commonalities, too, of course. Taking peak oil as an example, a vocabulary of decline and depression accompanied mention of the peak

regardless of the apparent attitude of the writer. Similarly, writers who invoked the petrocracy trope connected scarcity with political power, and political power to corruption. The "panic" metaphor grounds scarcity in human emotion and risk-perception. These shared qualities are precisely what distinguish them as tropes.

The synecdochic forms corresponding to the metaphors also describe commonalities in the data. Very broadly, these synecdoches are used to explain scarcity or stress scarcity's causes, effects, parts, etc. In everyday parlance, these instances of synecdoche I've pulled out could be called themes or a writer's focus. But the usefulness of Burke's notion of synecdoche is that it allows us to isolate the rhetorical consequences of fixating upon a part of a phenomenon in substitute of the whole, or an effect in substitute of a cause. For example, accompanying the "oil rush" metaphor is a synecdoche that substitutes wealth for scarcity. In one sense, this is a focus on oil's ability to produce wealth in times of relative scarcity. But the choice to focus on this in an article can be done so at the exclusion of other effects of scarcity, such as environmental tradeoffs and inequalities in the distribution of wealth and resources. Moreover, the focus on an effect limits the space and time to examine the causes of scarcity. Finally, it assumes a cause-effect relationship, which may or may not be justified.

One notable pattern in the data is that most of these synecdochic forms underline the effects of scarcity. Scarcity-as-wealth ("oil rush," "oil bet" and "blue gold"), scarcity-as-power ("petrocracy"), scarcity-as-a problem ("water project"), and scarcity-as-conflict ("water war") mostly view oil and water scarcity in terms of effects. Although the impetus is drought, a cause of scarcity, scarcity-as-disaster ("creeping disaster") also looks at scarcity mainly through its effects on communities and commerce. Meanwhile, geology-as-scarcity

("peak oil") and demand-as-scarcity ("thirsty world") give emphasis to the causes of scarcity. And the "oil panic" is split down the middle, with scarcity-as-fear and fear-as-scarcity forms.

This dominance of effects might leave the causes of scarcity unexamined by contrast. Of course, the appearance of a cause-as-effect trope might be accompanied by detailed explanations of the causes behind scarcity. For instance, Vince's article about fog harvesting in Lima offers an account of the causes of water scarcity in the area (i.e., melting snowpack at an important river's head). But the primary focus of the article is on an effect of scarcity: the human effort to adapt. That focus supersedes a full discussion of scarcity's causes. For while Vince notes the diminishing glaciers that feed Lima's main water source, the article does not delve into institutional and societal structures that guide water distribution in Peru. So while a writer may do his or her best to summarize cause, these synecdoches that conflate cause with effect show how writers prioritize one over the other. The stark exception to this is the peak oil trope, which ruminates over the cause of oil scarcity. To this end, my findings largely support the assertion of Bridge and Wood (2009) that peak oil is a "meta narrative" that positions scarcity in terms "below-ground" concerns—or, framed through Burkian synecdoche, the "geology-as-scarcity" trope explains scarcity through geologic causes.

Another implication of this predominance of cause-as-effect forms (where scarcity is the cause) is that writers attribute a wide range of phenomena to scarcity. The water war trope again provides a useful example. Corresponding with the metaphor is a synecdoche that supplants scarcity (cause) with conflict (effect). This substitution often takes place when writers assume a cause-effect relationship. Again, the exceptions can prove the rules. That cause-effect relationship between scarcity and conflict, and by extension that cause-as-effect synecdoche, was open to contest. Barnaby calls up the synecdoche only to subvert it. She

drives a rhetorical wedge between the association of scarcity and conflict by disputing the notion that scarcity causes conflict, and that water conflict is a microcosm of water scarcity more generally. But few writers tackled a synecdochic form so openly, and many did not at all. Zakaria, for instance, presupposed that oil scarcity (cause) creates political power (effect) in the case of Vladimir Putin. As another example, Phillips took as natural that financial speculators will convert scarcity (cause) into wealth (effect) and did so without examining scarcity's other social effects.

This leads us to another potential problem with the prevalence of cause-as-effect synecdoches. Attributing these many effects to scarcity could obscure other potential causes of social problems that are commonly defined in terms of scarcity. As noted earlier, some political ecologists have criticized rhetoric that uses scarcity as an explanation for resource distortions, conflict and other social outcomes that alternative factors, especially class inequality, could explain (LeBillon and Cervantes, 2009; Bridge 2011; Mehta, 2011). This relationship—between inequality and perceived scarcity—is something almost totally unexplored in the articles I examined. Deep case studies of specific topics could help shed light on areas where there is a problem. I will say that, overall, this broad absence of a discussion about inequality as it relates to resource scarcity warrants note and further study.

Synecdoche entails not only substitution of cause and effect, but also part for whole, container for thing contained and so forth. And here you can see the interpretive mark of qualitative research. Many of the synecdoches listed above as cause-as-effect substitutions could also be thought of as part-as-whole, whole-as-part, etc. For example, fears of economic risks are an effect of scarcity, but they also represent a part of how scarcity is experienced. Hence, scarcity-as-fear could be interpreted either as cause-as-effect or whole-as-part. But as

cause-as-effect, it tells us more, and it seems more descriptive of what I saw in the data, which is why I've examined it as such here. Another caveat I should add to my findings is that the data do not necessarily fit neatly with one trope or another as much as I have perhaps made it seem through the organization of the "Findings" section. For example, many articles about oil allude to fear and risk but weren't categorized with "the oil panic." To what extent a focus becomes a synecdochic substitution is largely a matter of degree, as well as interpretation. Finally, some metaphors and synecdoches were left out altogether. As a matter of method, I specifically looked for shared patterns in the data so I could address the research questions. Given that language is constantly filtered through what Burke describes as the master tropes, a full account of every instance of metaphor, synecdoche, metonymy and irony would simply not be possible.

Another question this study asked was: *What is the relationship of publication and topic to the construction of natural resource scarcity?* In retrospect, these two elements, topic and publication, did not belong in the same question together. News topic and publication have very different relationships to the findings. So I'll address them separately.

In doing this study I wanted to understand rhetoric around resource scarcity broadly, but of course scarcity is felt through specific resources and different resources have different roles in society, meaning we can expect the rhetoric around them to change depending on the resource. To account for this, but still gain insight into how resource scarcity is constructed more generally, I included prominent examples of a renewable and nonrenewable resource to give me the ability to draw comparisons and contrasts. Water and oil both loom large in the public imagination and, as we have seen, come with considerable rhetorical baggage. Although some of that baggage may be idiosyncratic to oil and water's respective histories,

some findings here can, I think, shed light on resource scarcity more generally. In some ways, oil and water are representative—or synedochic, if you like— of resources issues more broadly. Some of the writers under analysis here articulate this explicitly. Greene, while parsing conflicting statistics about the oil supply, asked in his article for *Science*, "But what is oil anyway? What is a resource?" (p. 828). Royte, in her *New York Times Magazine* profile of Orange County's recycled water system, draws a connection between water and other resources that are being depleted around the world.

Notably, none of the recurring tropes concerning oil relate to demand for or use of oil. Peak oil, oil panic, oil rush, oil bet, petrocracy: Every one of them describes, in some way, the supply of oil. The tropes themselves do not draw attention to growing demand for oil or how (or why) oil is used. This is especially surprising given that four out of the six magazines included in this analysis are U.S. publications. As noted previously, the U.S. consumes a disproportionate amount of the world's oil relative to its population. Further, much of the price rise of oil over the last 12 years can be attributed to growing demand, especially in China and India. I would have expected to see, then, recurring metaphors and synecdochic forms that look at oil scarcity through the perspective of demand, such as the "thirsty" trope metaphor for water scarcity does.

To be sure, some isolated metaphors concerning oil consumption do show up in the data. Bryan Walsh of *Time* and Peter Maas of *New York Times Magazine* make reference to U.S. "addiction" to oil. This is a trope that describes our dependence on and heavy use of oil. Bill Saporito also called U.S. consumers "energy pigs" because of their oil consumption. I did not specifically address these metaphors in my findings because they are fairly isolated

compared to those metaphors I did discuss. Moreover, they played only a small role in the articles themselves.

On the other hand, the "thirsty" metaphor describing water demand shows up in six articles. Also, demand for water and water conservation figured prominently in the other tropes concerning water. For example, many instances of the unobtrusive "water project" looked at ways of cutting back on water use. Often solutions to drought-related disaster (in the "creeping disaster" trope) included use-cutting measures. The same cannot be said for the oil tropes. Very little reflection was given to why the U.S. consumes as much oil as it does; whereas with water, much attention and, indeed, many critiques were given to the use of water. The metonymies that appeared in tandem with oil and water scarcity tropes likewise show this divergent focus, with most numerical expressions of oil scarcity focusing on supply—production rates, production amounts in terms of barrels, and so on. Meanwhile, quantities used to convey water scarcity included population figures, demand quantities and amounts of water used per person.

This finding seems even stranger when we consider the general nature of each resource. Oil is finite, nonrenewable: there is only so much in the ground, and once burned, oil is gone forever; but much of our freshwater can be returned through the hydrological cycle. The big question is *why* this distinction shows up in the data between oil and water. One potential explanation is that writers and audiences are simply closer to water. They see it and use it every day. They are more aware of it. And of course, water is, at the end of a day, a far more vital resource than even oil. Civilization got along for thousands of years without making fuel out of petroleum. However, civilization—indeed, life on earth—would not exist but for water. This surely should make water more significant in the public imagination and

perhaps give writers firm moral ground on which to criticize water usage. Another possible explanation concerns the construction of this study. If I had looked at articles about pollution, as opposed to scarcity, we might find far more attention given to oil's use. Yet, that would still leave the question: Regarding scarcity *specifically*, why such little focus on oil consumption and demand, given that demand is arguably the most critical component of scarcity's definition?

All this said, when compared to demand, we still find a strong focus on water supply in the tropes concerning water scarcity. Combining oil and water tropes, supply of resources dominate the rhetorical construction of scarcity. This is a problem if the lack of demand-specific tropes prevents audiences from reflecting on their society's resource use. As noted in the literature review, Le Billon and Cervantes (2009) accused the press of "banalizing" resource issues by focusing on scarcity and violence even as their own public and governments failed to reduce demand. Bridge (2011) also critiqued the emphasis on the physical oil supply—specifically as conceived of by peak oil adherents—as a form of environmental determinism which strips nations and communities of their communal will. Mehta (2011) made similar observations regarding water. How much of a resource we use and to what ends are highly relevant topics of discourse when addressing scarcity.

Along with possibly preempting a broader discussion about resource conservation, this finding also brings us to the issue of distribution. An emphasis on supply over use can obscure disparities that exist in resource access. For example, the peak oil trope's fixation on the geologic endowment of oil overlooks the present disparity among countries in global oil use. The oil "bets" and "rushes" either painted the creation of wealth from oil in energetic tones or critiqued the "rush" because of environmental risks; none of the writers looked at the

effect of high prices and rising scarcity to poorer regions and communities. For a developing country without an oil endowment, an era of rising prices could impede economic momentum. To take an example from water scarcity tropes, only Palmer points to inequities in the current structure of international trade as factors in water scarcity. Likewise, Kaufman was unique in his condemnation of the commodification water in terms of its impact on poor populations.

More generally, we can take the relationship between topic and scarcity tropes as a sign that media play an important role in shaping public consciousness and understanding of resource scarcity in a similar way that Boykoff (2009), Hansen (2011) and Sachsman, Simon and Valenti (2010) propose the media do in shaping public awareness of the environment. This might also suggest that natural resources are unobtrusive for audiences in the same way that Ader (1993) describes environmental issues, if we assume that the strong role of the media in shaping consciousness is related the unobtrusive nature of natural resource issues. Further studies that look at the media's agenda setting role in natural resource issues could help better establish the full reach and extent of the media's ability to shape public awareness of and debates over natural resource issues.

As for publication, I'll discuss its relationship to the rhetorical construction of scarcity in tandem with this study's third research question, which is where it probably belonged all along. This question asks, *What do representations of scarcity suggest about the relationship between writers and their audiences?* Because publication has so much to do with a writer's relationship to his or her audience, this is probably the better place to discuss it.

This study examines the work of writers from varying backgrounds. Most are journalists by profession, but some are scientists, economists or other specialists. Accordingly, most of the articles are news or news features; those that are opinion or commentary I have noted as such. One important qualification: All of the publications that I included in my analysis are Western in origin. *Time*, *New York Times Magazine*, *Businessweek* and *Science* are based in the U.S., and the *Economist* and *Nature* are based in the U.K. The U.S. and the U.K. are among the world's wealthiest nations. Resource scarcity, meanwhile, is both a universal phenomenon around the world and experienced very differently in rich and poor nations. Assertions I make about how writers and publications conceptualize scarcity therefore cannot be thought of as universal. Even this varied group of writers and publications target a relatively homogenized audience, one that is Western, well educated and relatively wealthy.

If we take account of the specific tropes deployed—that is, consider which writers for which publications use which tropes—we don't see much difference among publications. Take the "creeping disaster" as an example: *Science* and *Businessweek* published no articles using the trope while one article appeared in *Time*, one appeared in *Nature*, one appeared in the *Economist* and one appeared in *New York Times Magazine*. Here I must caution the reader from drawing quantitative conclusions from a qualitative study. The sample here is not representative and certainly not large. The "creeping disaster" trope could very well have appeared in articles not included in my analysis for several reasons. My purpose in offering that count is to show that any given trope could emerge in any given publication. The only places where I saw an uneven use of a trope was with "peak oil," which appeared in four different *Science* articles. That accounts for more than half of all instances of the trope in the

data, and Kerr alone wrote three of the four. *Science* also carried four instances of "the water project," which is almost half of the nine total appearances of that trope.

Where we do see differences among writers and publications is in *how* the tropes are deployed, and in those differences we can learn something about the relationships those writers and publications have with their audiences. To a strong degree, we see writers from science-oriented magazines usually adding more contextual information to either illustrate the concept represented by a trope or to affect its meaning. Kerr and Greene of *Science* and Witze of *Nature* elucidated the peak oil trope with heady discussions about production rates and the different sorts of oil likely to be drilled in the coming decades. Meanwhile, Walsh and Saporito of *Time* boiled the peak oil concept down to what amounts to a sound bite. Worse, Walsh even misrepresented the technical logic behind the peak trope and Saporito misrepresented the position of the "peakists" who subscribe to that logic. Elsewhere we see Kauffman of *Nature* try to subvert the water scarcity-as-wealth synecdoche as writers from the *Economist* and *Businessweek* took the trope for granted. *Nature*'s Schiermeier and Schindler also looked at the "rush" trope from a more critical stance, with both writers tempering the oil scarcity-as-wealth trope with environmental cautions and focusing on the hazards of "rushing" to extract oil. We also saw how Barnaby (also of *Nature*) consciously and forcefully dissects the water war metaphor and the scarcity-as-conflict synecdoche. Similarly, Palmer adds an important dimension to "the water project" trope by noting the relationship between infrastructure and biodiversity loss and offers information and understanding as an alternative solution to scarcity. In short, the writers of science magazines rely less on assumed meanings of the tropes, and they showed a far greater tendency to tie the meanings of the tropes to environmental concerns. The PhD-wielding audiences of the

science journals are the beneficiaries of this nuanced, context-laden, sometimes adversarial use of scarcity tropes. The latter might be the result of the writers themselves more than the audience. Those writers that challenged the meaning and social underpinnings of a trope were outside commentators rather than journalists. But we should also consider what an audience of scientists means to the construction of scarcity. Debates between optimists and pessimists often fall along professional lines, with the optimists' camp made up mostly of economists and scientists more often taking a pessimistic stance.

How science writers related the tropes to the environmental consequences of resource commodification differs pointedly from the writers of business-oriented publications. Writers for *Economist* and *Businessweek*, in the main, took the role of profit and markets in managing scarcity for granted. Very often they viewed the tropes through the point of view of businesspeople and investors. The underlying assumption to both the *Economist*'s and *Businessweek*'s coverage of oil and scarcity is that high prices are bad, because high oil prices slow economic growth. The commodification of water also seems taken for granted in the publications. Scarcity, rather than a broad sociological phenomenon, was most often treated rhetorically as a macroeconomic variable or an opportunity for financial or business investments. This finding would seem to partly support Homer-Dixon's (1995) claim that the business media help affirm the neoclassical view of resources, which emphasizes the efficiency and efficacy of market forces. However, the business publications did for the most part take scarcity issues seriously (whereas a neoclassicist such as Julian Simon might not). But, again, their primary concern with scarcity was its macroeconomic consequences and implications for investors. Indeed, the publications usually adopted the point of view of the investor class or positioned them as protagonists. Asking why this is the case takes us to the

publications' audience. The *Economist* and *Businessweek* both enjoy—and market themselves to—a wealthy audience made up largely of upper level managers and executives. The lingering question is whether audience, in the case of business publications, actively limits how, when and if writers use scarcity tropes. From my research it would seem to, but more research is needed to explore this process.

The two general interest magazines didn't follow each other as closely as the magazines in the other two groups. And that makes sense. General interest publications are, by their nature, big tents, housing a variety of content and voices. Consider Bryan Walsh and Bill Saporito, both of *Time*. These are very different writers who approach their audience differently and reveal divergent attitudes through the scarcity tropes. Saporito writes a finance column and views the world as a stage full of rational and irrational economic actors. On the other hand, Walsh, who covers both oil and water, makes an effort to temper scarcity tropes with caveats about the environment.

What's more, *Time* writers differ from *New York Times Magazine* writers, who very often added more context to deepen the meaning and alter understanding of the tropes. We can see this in the contrast between how Zakaria and Rosenberg approached the "petrocracy" trope. Zakaria, writing for *Time,* assumed a strong relationship between scarcity and political power and offered it as a blunt explanation for Vladimir Putin's lock on the Russian presidency. Rosenberg explored the same trope, but added far more contextual detail, looking closely at the mechanisms linking oil scarcity to power in Venezuela. Rosenberg took great pains to make sure her audience understood the petrocracy not just as a trope, but as a political entity. She laid out a case rather to prove that the petrocracy was an apt metaphor to describe Venezuela, rather than assuming the synecdochic relationship between oil scarcity

and political power on behalf of her audience, as Zakaria did. One could go so far as to say that Zakaria relied on the synecdochic strength of the scarcity-as-power trope to make his case about Putin for him.

In fact, we see more differences between the two general interest magazines than we do between them as a group and the other publications in this study. Other *New York Times Magazine* writers challenged the meaning of tropes outright, as we saw with many of the science writers. Royte questioned the underlying value of a water project on philosophical grounds. She argued that the water project's ability to produce water—a hallmark of the water projects big and small, actual and metaphorical—allowed people to continue their same bad habits. Likewise, Davidson argues the folly of the "oil panic" trope. We can't say the same for *Time* writers, who for the most part took the tropes' meanings as given and passed those meanings on little or un- changed to their audiences. As for those audiences, nothing about their basic demographics would seem to signify why *Time* assumes a preordained meaning in the tropes or why *New York Times Magazine* adds more context to metaphors or is more apt to challenge a synecdochic substitution. In fact, they reach similar audiences—which are well-educated and relatively wealthy—though *Time's* is much larger. One possibility is that the sheer size of *Time*'s audience forces its writers to avoid strong challenges to common meanings and instead to *rely* on those common meanings when constructing scarcity for an audience of millions.

Limitations and Suggestions For Further Study

I meant for this study to help fill a gap in mass communications research. Overall, we see a dearth in studies on the communication of resource scarcity. Given the importance and

complexity of the subject, it's a big hole to fill and this study's findings are, as an attempt to help fill that hole, quite modest. As I've noted, I have traded a degree of depth for breadth in the scope and methodology of this study. All of the tropes I have outlined here are just that—outlines. Any given trope explored here could easily become the subject of its own study. The use of metonymy to describe scarcity, too, merits more attention than I have given it. Furthermore, I limited this study by both topic—i.e., the resource under study—and publication type. Scarcity rhetoric concerning other resources—forests, land, animal life and various minerals (aside from oil)—could well produce important findings if studied. And magazines are but one kind of journalism, with writers for magazines representing one type of communicator, and a fairly specialized one at that. By opening the study to newspapers, broadcast, photographs, etc., we could bring more insight to the subject than what I've offered here.

Of Burke's tropes, I have left out irony. Irony could be a useful tool for exploring the tensions between optimists and pessimists in journalism about scarcity, especially regarding peak oil. The water project trope also provides fertile ground for Burkian irony, with the large water project, meant to represent collective effort and solve a collective problem, doomed by its own efforts to control nature. In the tropes more generally, we see and push and pull between perspectives on the issues at play, to which Burkian irony could add another layer of understanding.

And of course there is room for many different forms of research aside from a Burkian analysis to tackle the issue of scarcity communication. Rhetorical analysis gives us a close-up look at the language and symbols used by speakers, but discourse analysis could provide a wider-range look at recurring symbolic systems and their implications for public

dialogue. Media theories, too, could provide much insight. Given the established nature of the media as agenda setter with environmental issues, gauging the role of the media in setting the agenda on scarcity in public dialogues is needed. Qualitative and quantitative research into the kinds and frequency of media frames around resource scarcity could also help illuminate the media's role in shaping debate and public understanding around these issues.

This study was also limited by how it defined natural resources and scarcity. For my purposes, the most basic definition of natural resources—as being materials from the environment used in industrial production—sufficed. But that definition has rhetorical, discursive and far-reaching social, legal and environmental implications. As far back as Aldo Leopold, one of the forerunners of the modern conservation movement, commentators have lamented the strictly economic value placed on nature as a resource (Leopold, 1966). To my own consternation, the definition of natural resources I worked with here excludes those animal species and natural systems that bear no direct impact on industrial production or economic livelihoods. A more inclusive definition of natural resources would allow researchers to look at intersections and tensions between scarcity communication and environmental communication—which is precisely why I did not use such a definition. That task is well beyond the scope of this study, but it is one that might prove vital in the coming decades.

Along with all the things this study is *not*, it is also restricted by my own limitations. My curiosity and journalistic ambitions drove me to the subject of this study. My interest in resource scarcity first sparked about two years ago when someone explained to me the concept of "peak oil" for the first time. Peak oil's logic of scarcity—that, as supplies diminish prices rise and, without widespread substitution of another fuel, the economy

drags—made sense to me. And as we've seen elsewhere, considering peak oil can get one thinking about other resources as well.

To me, thinking about natural resources and resource constraints is a bit like thinking about outer space or anything else dealing with huge numbers and large-scale aggregations. The many, many billions of barrels of crude oil that the world uses every year, or the trillions of gallons of water that pass through plumbing, irrigation systems, factories and power plants—these are not things we can really wrap our minds around, even though we can do our best to measure them. It all makes for engaging, if sometimes anxious, thought experiments. As a journalist-in-training I have looked to resources as a potential reporting niche that I could work in. The topic of scarcity, which in daily life plays out as economic competition, is a compelling one to me as a journalist as well as a media researcher. Along with all the lofty aims of academic discovery, I hoped doing this research would make me a better-informed journalist (not to mention job candidate).

I haven't approached this analysis from any particular ideological or critical perspective. Again, the purpose of this study was exploratory. More than anything, I just wanted to see what was out there, to see how journalists and other writers are dealing with the topic of resource scarcity. I studied economics as an undergraduate, so I am certainly familiar with efficient market theory and the neoclassical view that guides resource optimists such as Julian Simon. As an undergraduate then, and now as a journalist and researcher, I am skeptical of neoclassical faith in markets. This could have something to do with the fact that, over the course of my undergraduate studies in economics, I saw the global financial system teeter on the edge of collapse and the world's economies subsequently stumble. And though the gloom and doom of the neo-Malthusian perspective has a morbid appeal for me, I do see

some validity in the optimist's insistence that humans and their social institutions are resourceful and adaptable. More than either of these perspectives, I find myself leaning toward that third group, who say the optimists and pessimists are both missing the point, that more pressing than resource scarcity are the sharp disparities in resource distribution within and among nations. The critical branch of political ecology points to scarcity rhetoric as an obfuscator, drawing attention away from inequalities and environmental distortions. If I had come across these critics earlier in my research, I might have designed this thesis to better to address the topic of inequality as it relates to resource scarcity.

References

Ader, C. (1995). "A longitudinal study of agenda setting for the issue of environmental pollution." *Journalism and mass communication quarterly*, 72(7), pp. 300-311.

American Association for the Advancement of Science (2013). *About Science and AAAS*. Retrieved 15 March from http: http:.sciencemag.org/site/help/about/about.xhtml

Anonymous (23 May 2009). "Bust and boom." *The Economist*, 391, pp. 73-75. Retrieved 19 December 2012 from ProQuest.

_____ (6 March 2010). "Plumbing the depths." *The Economist*, 394, pp. 15-17. Retrieved 19 December 2012 from ProQuest.

_____ (22 May 2010). "Liquid gold." *The Economist*, 395, p. 36. Retrieved 19 December 2012 from ProQuest.

_____ (22 May 2010). "Business begins to stir." *The Economist*, 395, pp. 8-11. Retrieved 19 December 2012 from ProQuest.

_____ (22 May 2010). "The most valuable stuff in the world." *The Economist*, 395, pp. 14-16. Retrieved 19 December 2012 from ProQuest.

_____ (22 May 2010). "To the last drop." *The Economist*, 395, pp. 17-19. Retrieved 19 December 2012 from ProQuest.

_____ (12 June 2010). "Facing a freeze." *The Economist*, 395. Retrieved 19 December 2012 from ProQuest.

_____ (4 September 2010). "Over a barrel." *The Economist*, 396. Retrieved 19 December 2012 from ProQuest.

_____ (31 March 2012). "Keeping it to themselves." *The Economist*, 402. Retrieved 19 December from ProQuest.

_____ (4 April 2012). "Feeling peaky." *The Economist*, 403, p. 86. Retrieved 19 December 2012 from ProQuest.

_____ (16 June 2012). "Hidden treasure." *The Economist*, 403, pp. 12-14. Retrieved 19 December 2012 from ProQuest.

_____ (21 July 2012). "Drying times." *The Economist*, 404. Retrieved 19 December 2012 from ProQuest.

Auty, R.M. (1993). *Sustaining development in mineral economies: The resource curse thesis*. New York: Routledge.

Barlow, M. and Clarke, T. (2002). *Blue gold: The fight to stop the corporate theft of the world's water.* New York: The New Press.

Barnaby, W. (19 March 2009). "Do nations go to war over water?" *Nature*, 458, pp. 282-283.

Barnett, H.J. and Morse, C. (1963). *Scarcity and growth: The economics of natural resource Availability*. Baltimore: John Hopkins Press.

Bartlett, A.A. (2000). "An analysis of U.S. and world oil production patterns using Hubbert-style curves." *Mathematical geology*, 32(1), pp. 1-17.

Bell, J.E., Autry, C.W., Mollenkopf, D.A., Thornton, L.A. (2012). "A natural resource scarcity topology: Theoretical foundations and strategic implications for supply chain management." *Journal of Business Logistics*, 33(2), pp. 158-166.

Berfield, S. (11 June 2008). "There will be water." *Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Bertelsen, D.A. (1993). "Kenneth Burke's conception of reality: The process of transformation and its implications for rhetorical criticism." In Chesebro, J.W. (Ed.). *Extensions of the Burkian system*. Tuscaloosa: The University of Alabama Press.

Bloomberg L.P. (2013). *Bloomberg Businessweek: Audience*. Retrieved 15 March 2013 from http://bloombergmedia.com/magazine/businessweek.

Bridge, G. (2011). "Past peak oil: Political economy of energy crises." In Peet, R., Robbins, P. and Watts, M.J. (Eds.). *Global political ecology*. London: Routledge.

Bridge, G. and Wood, A. (2009). "Less is more: Spectres of scarcity and the politics of resource access in the upstream oil sector." *Geoforum*, 41 (2010), pp. 565-576.

Burke, K. (1937). *Attitudes toward history*. Berkeley: University of California Press.

Burke, K. (1962). *A grammar of motives*. Berkeley: University of California Press.

Burke, K. (1968). *Language as symbolic action: Essays on life, literature, and method*. Berkeley: University of California Press.

Chowdhury, N. (2009). "Singapore's all wet." *Time*, *174*(11), p. 8-9. Retrieved 19 December 2012 from EBSCOhost.

Corbet, S. (28 December 2008). "Solution in a pot." *New York Times Magazine*, p. 38. Retrieved 19 December 2012 from ProQuest.

Cox, R. (2010). *Environmental communication and the public sphere*. London: Sage Publications.

Coy, P. (13 May 2008). "Oil's murky math." *Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

David, P. and Wright, G. (1997). "Increasing returns and the genesis of American abundance." *Industrial and corporate change*, 6(2), pp. 203-245.

Davidson, A. (1 April 2012). "The real oil shock." *New York Times Magazine,* p. 12. Retrieved 19 December 2012 from ProQuest.

DiPaola, A., Carey, G., Smith, G. and Reed, S. (16 June 2011). "Saudi Arabia is putting itself first." *Bloomberg Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Dobkowski, M. and Wallimann, I. (2002). *On the edge of scarcity*: *Environment*, *resources*, *population*, *sustainability, and conflict*. Syracuse: Syracuse University Press.

Duclos, S., Otto, J. P., and Konitzer, D. (2010). "Design in an era of constrained resources." *Mechanical Engineering*, 132(9), pp. 36-40.

Economist Newspaper Limited (2013). *The Economist Group: Media information*. Retrieved 15 March 2013 from http://www.economistgroupmedia.com.

EIA (2013). "Short term energy and summer fuels outlook." Energy Information Administration, http://www.eia.gov/forecasts/steo/realprices.

Erfle, S. and McMillan, H. (1989). "Determinants of network news coverage of the oil industry during the late 1970s." *Journalism quarterly,* 66(1), pp. 121-128.

Finsterbusch, K. (2002). "Scarcity and its social impacts." In Dobkowski, M. and Wallimann, I. (Eds). *On the edge of scarcity*: *Environment*, *resources*, *population*, *sustainability*, *and conflict*. Syracuse: Syracuse University Press.

Foroohar, R. (2011). "Fear and loathing in the oil markets. *Time*, *177*(10), p. 22. Retrieved 19 December 2012 from EBSCOhost.

Foss, S. (1989). *Rhetorical criticism: Exploration and practice*. Prospect Heights: Waveland Press, Inc.

Gertner, J. (2 October 2007). "The future is drying up." *New York Times Magazine*, pp.68-77, 104, 154-55. Retrieved 19 December 2012 from ProQuest.

Gleick, P.H. (1998). *The world's water 1998-1999: The biennial report on freshwater resources*. Washington, D.C.: Island Press.

Gordon, G. (12 August 2012). "Is the era of oil nearing its end?" McClatchy, http://www.mcclatchydc.com/2012/08/12/160930/is-the-era-of-oil-nearing-its.html.

Greene, D.L. (14 May 2010). "Oil peak or panic?" *Science*, 328, p. 828.

Greenwood, V. (2012). "The urban physicist Geoffrey West." *Discover*, 33(8), pp. 52-55.

Gurr, T.R. (1985). "On the political consequences of scarcity and economic decline." *International studies quarterly*, 29 (1), pp. 51-75.

Hamilton, A. (2011). "Droughtbusters." *Time*, *178*(13), p. B1-B7. Retrieved 19 December 2012 from EBSCOhost.

Herbst, M. (2 January 2008). "Can the economy handle $100 oil?" *Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Heinberg, R. (2003). *The Party's Over: Oil, war and the fate of industrial societies.* Gabriola Island: New Society Publishers.

Hemmingsen, E. (2010). "At the base of Hubbert's Peak: Grounding the debate on petroleum 14 scarcity." *Geoforum,* 41, pp. 531-540.

Herbst, M. (26 February 2009). "Water scarcity: Hidden risks to business." *Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Homer-Dixon, T. (1995). "The ingenuity gap: Can poor countries adapt to resource scarcity?" *Population and development review*, 21(3), pp.587-612.

Homer-Dixon, T. (1999). *Environment, scarcity, and violence*. Princeton: Princeton University Press.

Humber, Y., Katsuyo, K. and Tsuyoshi, I. (15 November 2012). "Japan's hottest commodity: Water." *Bloomberg Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

IEA (2012). *Oil Market Report*. International Energy Administration. www.oilmarketreport.org.

Jial, L. (18 June 2010). “Water shortages loom as northern China’s aquifer’s are sucked dry.” *Science*, 328, pp. 1462-1463.

Karl, T.L. (1997). *The paradox of plenty: Oil booms and petro-states*. Berkeley: University of California Press.

Kaufman, F. (24 October 2012). “Futures market: Wall Street’s thirst for water.” *Nature*, 490, pp.469-471.

Kerr, R.A. (25 March 2011). “Peak oil production may already be here.” *Science*, 331, pp.1510-1511.

_____ (3 February 2012). “Technology is turning U.S. oil around but not the world’s.” *Science*, 335, pp. 522-523.

_____ (10 August 2012). “Are world’s oil prospects not declining all that fast?” *Science*, 337, p. 633.

Klare, M.T. (2001). *Resource Wars: The new landscape of global conflict*. New York: Henry Holt Company.

Leopold, A. (1949). *A Sand County almanac: With essays on conservation from Round River*. New York: Ballantine Books.

Liebler, C. and Bendix, J. (1996). “Old-growth forests on network news: News sources and the framing of an environmental controversy.” *Journalism and mass communication quarterly*, 73(1), pp.53-65.

Le Billon, P. and Cervantes, A. (2009). “Oil prices, scarcity, and geographies of war.” *Annals of the Association of American Geographers*, 99(5), pp. 836-844.

Lowenstein, R. (19 October 2008). “What Price Oil?” *New York Times Magazine*, pp. 46-51. Retrieved 19 December 2012 from ProQuest.

Maas, P. (23 December 2007). “The fuel fixers.” *New York Times Magazine*, p. 26. Retrieved 19 December 2012 from ProQuest.

Matsa, K., Rosenstiel, T. and Moore, P. (2011). “Magazines: A shake-out for news weeklies.” http://stateofthemedia.org/2011/magazine-essay.

McCoy, K. (28 September 2012). “The nation’s water costs rushing higher.” USA Today,1A.

Mehta, L. (2011). “The social construction of scarcity: The case of water in western India.” In Peet, R., Robbins, P. and Watts, M.J. (Eds.). *Global political ecology*. London: Routledge.

Mish, F.C. (2012). *Merriam-Webster's collegiate dictionary, eleventh edition.* Springfield: Merriam Webster, Inc.

Moore, M.P. (1993). "Constructing irreconcilable conflict: The function of synecdoche in the spotted owl controversy." *Communication monographs*, 60 (September), pp. 258-274.

Moore, M.P. (2003). "Making sense of salmon: Synecdoche and irony in a natural resource crisis." *Western journal of communication*, 67(1), pp. 74-96.

Moore, M.P. (2009). "The Union of Concerned Scientists on the uncertainty of climate change: A study of synecdochic form." *Environmental communication*, 3(2), pp. 191-205.

Murphree, V. and Aucoin, J. (2010). "The energy crisis and the Mobil Oil Corporation's debate with the media 1973-1983." *American Journalism*, 27:2, pp.7-30.

Myers, N. and Simon, J. (1994). *Scarcity or abundance?: A debate on the environment*. New York: W.W. Norton & Company.

Nature Publishing Group (2013). *advertising@npg*. Retrieved 15 March 2013 from http: http://www.nature.com/advertising.

New York Times Company (2013). In *New York Times media kit* (2013). Retrieved 15 March 2013 from http: nytmarketing.whsites.net/mediakit/sunday-magazine.

Nicholson, W. and Snyder, C. (2007). *Intermediate microeconomics and its application, 10th Edition*. Mason: Thomson South-Western.

Nisbet, M., Maibach, E.and L., Anthony (2011). "Framing peak petroleum as a public health problem: Audience research and participatory engagement in the United States." *American Journal of Public Health*, 101(9), pp. 1620-1626.

Orr, D.W. and Soroos, M.S. (1979). *The global predicament: Ecological perspectives on world order*. Chapel Hill: The University of North Carolina Press.

Palmer, M.A. (30 September 2010). "Beyond infrastructure." *Nature*, 467, pp. 534-535.

Pearce, D.W. and Turner, R.K. (1990). *Economics of natural resources and the environment*. Baltimore: John Hopkins University Press.

Pelletier, N. (2009). "Of laws and limits: An ecological economic perspective on redressing the failure of contemporary global environmental governance." *Global environmental change*, 20, pp. 220-228.

Pennisi, E. (11 April 2008). "The blue revolution, drop by drop, gene by gene." *Science*, 320, pp. 171-173.

Philips, M. (19 April 2012). "Why Obama's crackdown on oil speculators won't work." *Bloomberg Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Randers, R. and Behrens, W. (1979). "Watching for the foothills: Signaling the end to growth in a finite world." In Orr, D.W. and Soroos, M.S. (Eds.). *The global predicament: Ecological perspectives on world order*. Chapel Hill: The University of North Carolina Press.

Reed, S. (23 June 2008). "Inside Saudi Arabia's new mega-oil field." *Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Reyna, S. and Behrends, A. (2008). "The crazy curse and crude domination: Toward an anthropology of oil." *Focaal—European Journal of Anthropology*, 52, pp. 3-17.

rnes, N. (18 October 2007). "The South: In hot water about water." *Businessweek*. Retrieved 5 January 2013 from www.businessweek.com.

Rosenberg, T. (4 November 2007). "The perils of petrocracy." *New York Times Magazine*, pp. 42-80. Retrieved 19 December 2012 from ProQuest

Ross, M.L. (2008). "Blood barrels: Why oil wealth fuels conflict." *Foreign Affairs*, May/June 2012, pp. 35-37.

Ross, M.L. (2004). "How do natural resources influence civil wars? Evidence from thirteen cases." *International organization*, 58, pp. 35-67.

Ross, M.L. (2012). *The oil curse: How petroleum wealth shapes the development of nations*. Princeton: Princeton University Press.

Rotella, C. (14 August 2011). "A darker shade of green." *New York Times Magazine*, pp. 35-38. Retrieved 19 December 2012 from ProQuest.

Royte, E. (10 August 2008). "A tall, cool drink of sewage." *New York Times Magazine*, pp.30-33. Retrieved 19 December 2012 from ProQuest.

Saporito, B. (2011). "Bling vs. vroom." *Time*, 178(8), p. 60. Retrieved 19 December 2012 from EBSCOhost.

_____ (2012). "Stumped at the pump." *Time*, 179 (11), p. 12. Retrieved 19 December 2012 from EBSCOhost.

Seale, C. (1999). *The quality of qualitative research*. London: Sage Publications.

Service, R. (23 October 2009). “Another biofuels drawback: The demand for irrigation.” *Science*, 326, pp. 516-517.

Schiermeier, Q. (20 March 2008). “A long dry summer.” *Nature*, 452, pp. 270-273.

_____ (24 July 2008). “Oil cost hits ship studies.” *Nature*, 454, p. 372.

_____ (31 January 2012). “The great Arctic oil race begins.” *Nature*, 483, pp. 13-14.

Schindler, D. (25 November 2010). “Tar sands need solid science.” *Nature*, 468, pp. 499-501.

Smith, J.L. (2012). “On the portents of peak oil (and other indicators of resource scarcity).” *Energy Policy*, 44, pp. 68-78.

Stone, R. (28 May 2008). “A new Great Lake—or Dead Sea?” *Science*, 320, pp. 1002-1005.

Tietenberg, T. (2000). *Environmental and natural resource economics*, *fifth edition*. Reading Addison-Wesley.

Time Inc. (2013). *Time media kit*. Retrieved 15 March 2013 from http:timemediakit.com.

U.N. (2013). *Water for people, water for life: The U. N. world water development report*. UNESCO Publishing and Berghahn Books.

U.N. (2012). *Coping with water scarcity: An action framework for agriculture and security*. Food and Agriculture Organization of the United Nations.

Vince, G. (5 November 2010). “Out of the mist.” *Science*, 330, pp. 750-751.

Wagner, L.A. (2002). “Material flows in the economy: Material flows, scarcity, and the environment.” *U.S. Geological Survey Circular 1221*. U.S. Geological Survey.

Welch, S. and Miewald, R. (1983). “Natural resource scarcity: An introduction.” In Welch, S. and Miewald, R (Eds.). *Scarce natural resources: The challenge to public policymaking*. Beverly Hills: Sage Publications.

Wallace-Wells, B. (16 January 2011). “The will to drill.” *New York Magazine*, pp. 39-43.

Walsh, B. (2012). “The future of oil.” *Time*, *179*(14), pp. 28-35. Retrieved 19 December 2012 from EBSCOhost.

_____ (16 July 2012). “Over a barrel.” *Time*, 180(3), pp. Retrieved 19 December 2012 from EBSCOhost.

Walsh, B., Hylton, H., & Krueger, A. (2011). “Parched earth.” *Time*, *178*(7), pp. 40-45. Retrieved 19 December 2012 from EBSCOhost.

Walsh, B., Thottam, J., Singh, M., & Williams, D. (2008). “Dying for drink.” *Time*, *172*(24), pp. 46-49. Retrieved 19 December 2012 from EBSCOhost.

Witze, A. (4 January 2007). “That’s oil, folks...” *Nature*, 445, pp.14-17.

Yergin, D. (1991). *The prize: The epic question for oil, money, and power*. New York: Simon and Schuster.

Yin, R. (2011). *Qualitative research from start to finish*. New York: Gilford Press.

Zakaria, F. (2012). “How oil is propping up Putin.” *Time*, 179(7), p. 21. Retrieved 19 December 2012 from EBSCOhost.

Zinam, O. (1982). “The myth of absolute abundance: Economic development as a shift in relative scarcities.” *American journal of economics and sociology*, 41(1), pp. 61-76.