

2015

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Recommended Citation

Melinda Harm Benson, *Reconceptualizing Environmental Challenges—Is Resilience the New Narrative?*, 21 J. Envtl. & Sustainability L. 99 (2015)

Available at: <https://scholarship.law.missouri.edu/jesl/vol21/iss1/5>

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Reconceptualizing Environmental Challenges—Is Resilience the New Narrative?

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RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

*"The world we have created is a product of our thinking; it cannot be
changed without changing our thinking."²*

I. INTRODUCTION

How we think about environmental management challenges is important. It matters because our characterization of these challenges dictates both how we perceive them and then, correspondingly, how we integrate these perceptions into our legal and institutional frameworks.³ The question posed in this Article is whether “resilience” is actually a new way of conceptualizing the social-ecological challenges of the Anthropocene.⁴

² This quote is a common paraphrase of the following quote from Albert Einstein, “A new type of thinking is essential if mankind is to survive and move toward higher levels.” See DAVID E. ROWE & ROBERT SCHULMANN, EINSTEIN ON POLITICS 383 (2007).

³ How we articulate and think about environmental challenges literally changes our capacity to address them. See generally MARK WALDMAN & ANDREW NEWBERG, WORDS CAN CHANGE YOUR BRAIN (summarizing psychological research using fMRI scanners to examine neural changes happening in the human brain via dozens of stress-producing hormones and neurotransmitters as they react to both negative thoughts and words such as “no” and positive thoughts and words. The results reveal that the stress-responses induced by negative thoughts and emotions immediately interrupt the normal functioning of your brain by impairing logic and reason). As will be discussed, *infra*, this is problematic given the negativity-based nature of dominant environmental discourse.

⁴ See Erle C. Ellis, Dorian Q. Fuller, Jed O. Kaplan and Wayne G. Lutters, *Dating the Anthropocene: Towards an Empirical Global History of Human Transformation of the Terrestrial Biosphere*, *Elem. Sci. Anth.* 1: 000018 doi: 10.12952/journal.elementa.000018 at 1. The Anthropocene is increasingly invoked as the current and emerging geological period, one in which humans are the dominant drivers of change. “Dates for the beginning of the Anthropocene range from the Pleistocene/Holocene boundary, to the mid-Holocene rise of agriculture, approximately 7000 years BP to the industrial revolution, circa AD 1800 (Steffen et al., 2011) to the Atomic Age” *Id.* (citations omitted). See also Zalasiewicz J, Williams M, Haywood A, Ellis M. *The Anthropocene: A New Epoch of Geological Time?* 369 *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A: MATHEMATICAL, PHYSICAL AND ENGINEERING SCIENCES* 835 (2011); Carol P. Harden, Anne Chin, Mary R. English, Rong Fu, Kathleen A. Galvin, Andrea K. Gerlak, Patricia F. McDowell, Dylan E. McNamara, Jeffrey M. Peterson, N. LeRoy Poff, Eugene A. Rosa, William D. Solecki, and Ellen E. Wohl, *Understanding Human-Landscape Interactions in the "Anthropocene"* 53 *ENVTL. MGMT.* 4 (2014); Nicholas A. Robinson, *Sustaining Society in the Anthropocene Epoch*, 41 *DENV. J. INT'L L. & POL'Y* 467 (2013).

These challenges are formidable. They include unprecedented and irreversible rates of biodiversity loss,⁵ exponential increases in per-capita resource consumption,⁶ and global climate change.⁷ They are “wicked problems” in the sense that they contain interweaving elements of complexity, uncertainty, and value judgments, making them dynamic and ongoing challenges.⁸

The concept of “resilience” is increasingly invoked in discussions among natural resource managers and environmental scholars as a way of describing environmental goals.⁹ This Article describes resilience as a narrative—a story we tell ourselves about the social-ecological dynamics—and then examines what the possible implications of this narrative might be for environmental governance.¹⁰ By examining environmental management

⁵ H. WOLINSKY, *WILL WE WAKE UP TO BIODIVERSITY?*, 12 *EMBIO REP.* 1226, 1226-27 (2011); OSVALDO E. SALA ET AL., *GLOBAL BIODIVERSITY SCENARIOS FOR THE YEAR 2100*, 287 *SCIENCE* 1770, 1770-74 (MARCH 10, 2000).

⁶ See generally W. V. REID ET AL., *MILLENNIUM ECOSYSTEM ASSESSMENT SYNTHESIS REPORT 17* (2005); N. Myers, *Consumption: Challenge to Sustainable Development*, 276 *SCIENCE* 53, 53-54 (April 4, 1997).

⁷ See generally U.S. GLOBAL CHANGE RESEARCH PROGRAM, *U.S. NATIONAL CLIMATE ASSESSMENT* (2014); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *CLIMATE CHANGE 2013: SYNTHESIS REPORT* (2013).

⁸ See Joshua Farley, *Wicked Problems*, 57 *BIOSCIENCE* 797, 797 (2007); BRYAN G. NORTON, *WICKED PROBLEMS AND SUSTAINABILITY: A PHILOSOPHY OF ADAPTIVE ECOSYSTEM MGMT.* 132-38 (2005).

⁹ See Melinda Harm Benson & Ahjond Garmestani, *Can We Manage for Resilience? The Integration of Resilience Thinking into Natural Resource Management in the United States*, 48 *ENVTL. MGMT.* 392, 399 (2011).

¹⁰ The term “narrative” is employed deliberately and for two reasons. First, it invokes the tools of social construction, a postmodern theoretical orientation that unhinges our thinking from the moorings of determinism, essentialism and other positivist trappings that tend to narrow our perception of environmental challenges. To date, much of this type of work in legal scholarship emanates from critical legal studies, which tends to concern itself with race, class, gender and other legal categories, overturning accepted norms and standards in legal theory and practice and situating them within larger contexts of historical inequality and marginalization. See generally JAMES BOYLE, *CRITICAL LEGAL STUDIES* (1992); Richard Delgado, *Critical Race Theory: An Annotated Bibliography*, 79 *VIRGINIA L. REV.* 461 (1993); J. Paul Oetken, *Form and Substance in Critical Legal Studies*, 100 *YALE L. J.* 2209 (1991); Relatively little critical legal scholarship applies similar techniques to environmental issues. See, e.g., Richard Delgado, *Our Better Natures: A Revisionist View of Joseph Sax's Public*

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

approaches as narratives, their underlying assumptions and strategies and the meanings they correspondingly make can be examined.¹¹

Before examining resilience as a narrative, there are two other environmental narratives to examine: the narrative of tragedy and the narrative of sustainability. This Article argues that the tragedy and sustainability narratives are two stories about social-ecological relations that have characterized much of our thinking about environmental challenges since the early beginnings of the environmental movement in the United States. Each is reflected in our current laws and policies. While all three narratives—tragedy, sustainability and resilience—have substantial overlap

Trust Theory of Environmental Protection, and Some Dark Thoughts on the Possibility of Law Reform, 44 *Vanderbilt L. Rev.* 1209 (1991); My second reason for employing “narrative” as a way of approaching our current orientation to environmental challenges stems from my own background in mental health. In addition to a law degree, I have a graduate degree in community counseling, and I often view environmental problems through the lens of mental health strategies and techniques and then apply mental health approaches on a cultural scale. My one published example of this to date employs the concept of “addiction” and applies it to our collective relationship to oil. See Melinda Harm Benson, *Are We Addicted to Oil? Lessons from Mental Health*, 14 *SOUTHWESTERN GEOGRAPHER* 121 (2010). The theoretical orientation of narrative therapy takes the position that our stories matter—the meaning we assign events in our lives dictates in large part the tenor and quality of our experience. See MICHAEL WHITE & DAVID EPSTON, *NARRATIVE MEANS TO THERAPEUTIC ENDS* (1990); Narrative therapy is a close cousin of the more popular Solution-Focused Therapy approach. Both are postmodern in orientation and emphasize the client’s present circumstances and desired future. See Jeff Chang & David Nylund, *Narrative and Solution-Focused Therapies: A Twenty-Year Retrospective*, 32 *J. OF SYSTEMIC THERAPIES* 72, 73 (2013).

¹¹ As Professor Michael Burger explains, “[s]tories have played a particularly important role in the development of environmental and natural resources law in the United States.” See Michael Burger, *Recovering from the Recovery Narrative: On Glocalism, Green Jobs, and Cyborg Civilization*, 46 *AKRON L. REV.* 909, 909 (2013). Professor Burger uses Caroline Merchant’s description of previous environmental narratives as including a “recovery narrative” (the biblical fall from grace and the quest to return to Eden) and “progressive narrative” (mainstream cultural perspectives and involves the search for a lost paradise through exploration, settlement, and the transformation of wilderness into a domesticated garden) and the related “declensionist narrative” (an environmentalist counternarrative attempts to either regain integrity of pristine nature through conservation/preservation). *Id.* at 910-11.

in terms of their influence, this Article situates them historically, arguing that while each narrative is currently informing environmental discourse in various ways, the resilience narrative is gaining prominence.

After a brief description of the tragedy and sustainability narratives, this Article provides some basic background regarding resilience and then contrasts resilience thinking with our previous ways of conceptualizing environmental challenges. Of particular importance is that each of these narratives has a different relationship to knowledge generally and science specifically. While the concepts of resilience and sustainability are often used interchangeably, part of the argument made in this Article is that, while not inherently incompatible concepts, (1) resilience and sustainability are not the same and, (2) resilience may be a more productive and helpful way of framing “Environmental Law 4.0”—future governance orientations to the challenges we face. Before addressing sustainability and resilience, however, it is important to understand the first and arguably still most influential narrative in environmental law—the tragedy narrative.¹²

II. TRAGEDY NARRATIVE

The tragedy narrative began post World War II. The dramatic end of the war—with the use of nuclear weapons on the Japanese communities of Hiroshima and Nagasaki—was a turning event in human history for many reasons, among them a recognition of the capacity of humans to use weapons of mass destruction.¹³ The end of the war gave rise to two intertwined

¹² This section draws heavily from the arguments set forth by Ted Nordhaus and Michael Shellenberger and what they describe as the “eco-tragedy” narrative. See TED NORDHAUS & MICHAEL SHELLENBERGER, *BREAKTHROUGH: FROM THE DEATH OF ENVIRONMENTALISM TO THE POLITICS OF POSSIBILITY* 21-40 (2007). These authors created a stir within the environmental community with their essay “The Death of Environmentalism” presented at the October 2004 meeting of the Environmental Grantmakers Association, in which they argued that the environmental movement in the United States was fumbling its response to climate change because of the environmental community’s narrow definition of its self-interest leads to a kind of policy literalism that undermines its power. See Ted Nordhaus and Michael Shellenberger, *The Death of Environmentalism: Global Warming Politics in a Post-Environmental World*, *Grist*, January 14, 2005, <http://grist.org/article/doi-reprint/> (last visited May 6, 2014).

¹³ Viewed by some as the beginning of the Anthropocene. See also *supra* note 4

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

aspects of this new reality. On the one hand, there was a sense of achievement: our new capacity to change our world was viewed with optimism and a sense of opportunity.¹⁴ On the other hand, this new capacity filled us with fear. The invention of nuclear weapons brought with it an unprecedented ability to annihilate. World Wars I and II also developed something arguably more culturally influential than nuclear weapons—they brought us better living through chemistry.¹⁵ The proliferation and use of chemical compounds that occurred both during and following these wars changed our world. While there are of course many post-WWII events worthy of discussion in terms of their influence, there are three events within this era that are often pointed to as being responsible for the birth of the American environmental movement.

The first is the proliferation of pesticides and herbicides in American agriculture and Rachel Carson's subsequent book *Silent Spring*.¹⁶ *Silent Spring* is a beautifully written and scientifically based examination of the impact of pesticides, most notably DDT, on birds and other wildlife. Because of this publication, Rachel Carson is often referred to as the mother of the environmental movement.¹⁷ She showed us the darker side of better living through chemistry and raised the alarm regarding the unintended consequences of pesticides.

The second event associated with this narrative is the worldwide distribution of the first view of the world itself—a photo called “Earthrise” taken by the Apollo 8 crew in December of 1968.¹⁸ It showed us Earth as it

(literature on the Anthropocene).

¹⁴ See NORDHAUS & SHELLINGER, *supra* note 12 at 6.

¹⁵ This phrase is a variant of a DuPont advertising slogan, “Better Things for Better Living...Through Chemistry.” DuPont adopted it in 1935 and it was their slogan until 1982. See Trif Alatzas, *DuPont touts 'miracles'* THE NEWS JOURNAL (Wilmington, DE) (April 29 1999).

¹⁶ RACHEL CARSON, *SILENT SPRING* (1962).

¹⁷ See generally MARK HAMILTON LYTLER, *THE GENTLE SUBVERSIVE: RACHEL CARSON, SILENT SPRING, AND THE RISE OF THE ENVIRONMENTAL MOVEMENT 2007*; see also NORDHAUS & SHELLINGER, *supra* note 12 at, 21.

¹⁸ See generally DON NARDO, *THE BLUE MARBLE: HOW A PHOTOGRAPH REVEALED EARTH'S FRAGILE BEAUTY* (2014).

appears from deep space for the first time.¹⁹ It became an iconic image—the delicate fragility of our planet—and like *Silent Spring*, is also given credit for helping launch the environmental movement of the 1970s.²⁰

The last precipitating event took place a few months later, when in June of 1969, an oil slick and debris in the Cuyahoga River caught fire in Cleveland, Ohio. It drew national attention to water quality and other environmental problems not only in Ohio but also throughout the United States.²¹ But as Ted Nordhaus and Michael Shellenberger point out in their book *Breakthrough: From the Death of Environmentalism to the Politics of Possibility*, this was not the first time the Cuyahoga River caught fire.²² The 1969 blaze lasted approximately thirty minutes and did approximately fifty thousand dollars in property damage. However, several other fires occurred on the Cuyahoga River between 1868-1952, and the 1952 fire was actually more devastating, lasting days and causing over 1.5 million dollars in damage.²³

But it was the 1969 fire that brought forward environmental awareness. Which just goes to show: timing is everything when it comes to the meaning we place on individual events as narratives unfold. All these events—Carson's book, the Earthrise photo and the Cuyahoga River fire—came at a time when Americans felt deeply vulnerable but also incredibly optimistic.²⁴ It was this combination of concern and idealism that gave birth to the environmental movement. While there was a growing fear of our newfound capacities to alter our world, there was also faith in the ability of science and technology to make the world a better place.²⁵

This narrative ushered in the “regulatory era” of the 1970s—a suite of environmental laws that took an ambitious and prescriptive approach to

¹⁹ *Id.*

²⁰ See NORDHAUS & SHELLENBERGER, *supra* note 12, at 21.

²¹ See NORDHAUS & SHELLENBERGER, *supra* note 12, at 21-22.

²² See NORDHAUS & SHELLENBERGER, *supra* note 12, at 23-24.

²³ See NORDHAUS & SHELLENBERGER, *supra* note 12, at 23.

²⁴ See NORDHAUS & SHELLENBERGER, *supra* note 12, at 6.

²⁵ See generally NORDHAUS & SHELLENBERGER, *supra* note 12; RICHARD LAZARUS THE MAKING OF ENVIRONMENTAL LAW 2004.

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

environmental management. These laws, which include the Toxic Substances Control Act,²⁶ Endangered Species Act,²⁷ the Clean Water Act,²⁸ the National Environmental Policy Act,²⁹ and the Clean Air Act³⁰ among others, share a number of characteristics. First they tend to take a “media” specific approach, meaning they focus on one kind of “problem”—air, water, waste, etc.—at a time.³¹ Second, they are “command and control” in the sense that they rely on specific, enforceable regulatory requirements to meet their goals.³² They are also jurisdictionally bound in the sense that they engage federal authority (often with state implementation) and reinforce traditional scales of governance.³³ Many of them rely on risk assessment and technology to identify and meet regulatory targets.³⁴ All are fear-based in the sense they are driven by health (as opposed to environmental) concerns and are framed around some perceived problem that needs to be solved. They each rely heavily on science to provide answers about the nature and extent of the risks involved and then on technology to provide workable solutions.³⁵

While most of these statutes have not reached their stated goals, it must be recognized that they have achieved significant successes, particularly with regard to pollution control, but also in terms of preventing species extinction and bringing increased environmental awareness with regard to federal agency actions.³⁶ Some of these laws from the 1970s have been

²⁶ 15 U.S.C. § 2601 (2006).

²⁷ 16 U.S.C. § 1531 (2006).

²⁸ 33 U.S.C. § 1251 (2006).

²⁹ 42 U.S.C. § 4331 (2006) [hereinafter NEPA].

³⁰ 42 U.S.C. § 740 (2006).

³¹ The noticeable exception to this is NEPA, which takes a more comprehensive approach to assessment of environmental impacts. *See generally* Sam Kalen, *Ecology comes of age: NEPA’s lost mandate*, 21 DUKE ENVTL. LAND POL’Y FORUM 113, 121 (2010).

³² *See* JAMES SALZMAN & BARTON H. THOMPSON, ENVTL. LAW AND POLICY 46 (2007).

³³ *See generally id.*

³⁴ *Id.* at 32.

³⁵ *Id.*

³⁶ For example, Clean Water Act established a national goal that all waters of the U.S. should be fishable and swimmable. The goal was to be achieved by eliminating all pollutant discharges into waters of the U.S. by 1985 with an interim goal of making the waters safe for fish, shellfish, wildlife and people by July 1, 1983 86 Stat. 816: 33 U.S.C. 1251. But a state

amended—perhaps most significantly the Clean Air Act Amendments of the 1990s³⁷—but it is fair to collectively characterize most of them as operating more or less the same as they have for decades.³⁸ This prescriptive command-and-control approach proved very effective addressing what might be considered the “low hanging fruit” or “end of pipe” environmental problems, *i.e.*, those that can be addressed by identifying causes and then placing restrictions or processes on specific sources.³⁹

Unfortunately, however, this approach is ill-equipped to take on the next generation of environmental challenges. As already noted, these challenges include global climate change, biodiversity loss and increased rates of resource consumption—challenges with a different set of characteristics.⁴⁰ These characteristics include high degrees of complexity, associated radical uncertainties, and multi-scalar system dynamics. Gone are the days when a scientist like Rachel Carson could carefully review the literature on an environmental concern, isolate the cause, and raise the alarm in a way that results in meaningful change.⁴¹ The global climate change reports from the United Nation’s Intergovernmental Panel on Climate Change over the last two decades perhaps provide the most saddening example of this shift.⁴² Despite a scientific consensus that anthropocentric causes are the critical driver of climate change, policy efforts have continued

survey from 2000 reports that 28 percent of river miles, 23 percent of lake acreage and 15 percent of estuary miles failed to support swimming all or part of the time. There were similarly depressing numbers for the “fishable,” goal with 34 percent of river miles 20 percent of lake acreage and fifty two percent of estuary miles not supporting aquatic life all or part of the time. *See* SALZMAN & THOMPSON, *supra* note 32 at 137.

³⁷ 42 U.S.C. § 7401 et seq. (1990 Amendments to the Clean Air Act of 1970, Pub. L. No. 101-549, 104 Stat. 2399).

³⁸ *See generally*, SALZMAN & THOMPSON, *supra* note 32 (providing a basic overview of current domestic environmental laws in the relative successes and explaining that most had earlier incarnations that lacked mandatory provisions and instead encouraged state action).

³⁹ *See generally* SALZMAN & THOMPSON, *supra* note 32.

⁴⁰ *See supra* notes 3-8 and accompanying text.

⁴¹ *See supra* note 17.

⁴² *See* IPCC SYNTHESIS REPORT, *supra* note 7. Intergovernmental Panel on Climate Change has now published five assessment reports on climate change, available at <http://ipcc.ch/>, each one more alarming than its predecessor. *See also* W. Neil Adger & Jon Barnett, *Four reasons for concern about adaptation to climate change*, 41 ENVIRONMENT AND PLANNING A 2800 (2009) (summarizing IPCC efforts and implications).

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

to languish.⁴³ The tragedy, fear-based rhetoric regarding climate change has been ineffective.

Carson's formula of "science + fear = change"—a recipe that is still the main strategy embraced by the American environmental movement today—has realistically not worked for decades.⁴⁴ The reasons for this are many, but there are three worth highlighting. One is that Americans no longer have the sense of optimism and prosperity they did after WWII.⁴⁵ As a result, we are collectively less willing to take on environmental problems, fearing that doing so would harm economic growth.⁴⁶ Another reason is that we no longer have the same relationship with and trust in the federal government—which has been the primary source of the "change" aspect of Carson's formula. Increasingly, the federal government (and "government" in general) is viewed with skepticism.⁴⁷ Finally, this formula is no longer effective because a fear-based discourse tends to have a limited shelf life and a narrow window of opportunity. Issues like global biodiversity loss do not lend themselves to this type of rhetoric. Even climate change seems immune, in part because it is difficult to isolate any single weather or other

⁴³ Robin Kundis Craig & Melinda Harm Benson (2013). *Replacing Sustainability*, 46 AKRON L. REV. 841, 842 (2013). As shorter, essay version is also available. See also Melinda Harm Benson and Robin Kundis Craig, *The End of Sustainability*, SOC'Y & NAT. RES. 1; <http://dx.doi.org/10.1080/08941920.2014.901467>.

⁴⁴ See generally NORDHAUS & SHELLENBERGER, *supra* note 12; see also Donald Ludwig, *The Era of Management Is Over*, 4 ECOSYSTEMS 758, 759 (1999) (arguing that management-based approaches lack the capacity to address wicked problems).

⁴⁵ See NORDHAUS & SHELLENBERGER, *supra* note 12 at 160-61, Rebecca Riffkin, *Climate Change Not a Top Worry in U.S.*, Gallup (March 12, 2014); <http://www.gallup.com/poll/167843/climate-change-not-top-worry.aspx?version=print> (last visited May 5, 2014). ("Climate change and the quality of the environment rank near the bottom of a list of concerns for Americans, who are instead far more worried about more basic economic issues such as the economy, federal spending, and the affordability of healthcare").

⁴⁶ See NORDHAUS & SHELLENBERGER, *supra* note 12, at 35-36.

⁴⁷ See *Trust in Government Nears Record Low, But Most Federal Agencies Are Viewed Favorably*, PEW CENTER FOR PEOPLE AND THE PRESS, <http://www.people-press.org/2013/10/18/trust-in-government-nears-record-low-but-most-federal-agencies-are-viewed-favorably> (last visited May 12, 2014) (showing trend of decline in trust of the government from 1958-2013).

environmental event and attribute it to climate change. Environmentalists pointed to events such as Hurricanes Katrina and Sandy in hopes of turning the tide of U.S. climate policy, but that has not happened.⁴⁸ Our collective capacity to use a single or small set of individual events as a catalyst for policy change seems to be over. There is no “Love Canal” equivalent for climate change.⁴⁹ Part of this is perhaps due to our relationship to these types of events in the “information age,” a context in which it is simultaneously more difficult to focus the culture’s attention and more challenging to gain the confidence of the public that the information is reliable.⁵⁰

On a deeper level, the tragedy-based narrative is problematic because it reflects an underlying belief that humans are *separate from* nature—that we are an outside influence, messing things up.⁵¹ This notion of separateness is a mistake in our perception of reality—an ontological misstep with serious consequences.⁵² By placing ourselves outside of nature, we animate both the ideas that nature is “ours” to use (a progressive/manifest destiny narrative)⁵³

⁴⁸ See Eric Berger, *Sandy Reopened Debate on Climate Change and Hurricanes*, HUFFINGTON POST (May 30, 2013), available at <http://www.chron.com/news/article/Sandy-reopened-debate-on-climate-change-and-4560857.php>; see also *Hurricanes and Climate Change*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS, <http://www.c2es.org/science-impacts/extreme-weather/hurricanes> (last visited May 5, 2014).

⁴⁹ See LOIS MARIE GIBBS, *LOVE CANAL: THE STORY CONTINUES* (1998) (documenting one community’s struggle with health problems related to toxic chemicals from an underground landfill, spurring national legislation to address storage of toxic substances).

⁵⁰ MANUEL CASTELLS, *THE POWER OF IDENTITY: THE INFORMATION AGE: ECONOMY, SOCIETY AND CULTURE VOLUME II* 168-86 (2011).

⁵¹ See Burger, *supra* note 11 (regarding separation narratives).

⁵² See NORDHAUS & SHELLINGER, *supra* note 12, at 135 (“We are neither a cancer on, or stewards for, the planet. We are neither destined to go extinct nor to live in harmony. Rather, we are the first species to have any control whatsoever over how we evolve.”).

⁵³ Bill McKibben, perhaps one of the most influential environmentalists of our time, provides the quintessential example of this narrative in his book *The End of Nature*, in which the end of nature is human-influenced climate change and other human-based events that make the influence of human beings felt everywhere on the planet, i.e., when humans are everywhere, nature is nowhere. See generally BILL MCKIBBEN, *THE END OF NATURE* (2006). This narrative also has biblical roots with its story that humans have either “dominion over” or responsibility for “stewardship of” the earth, depending on the interpretation of the text. See generally David G. Horrell, Cheryl Hunt, & Christopher Southgate, *Appeals to the Bible in Ecotheology and Environmental Ethics: a Typology of*

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

and what Professor Sarah Krakoff has described as a narrative based on the idea that we are “saving the environment from people and preserving pristine places from contamination.”⁵⁴ This is pathologizing our current condition—characterizing humans as the main agent of disease/destruction. Little wonder then that young people are generally not attracted to the environmental movement.⁵⁵ The tragedy narrative—the casting of environmental challenges as scary events that must be immediately addressed by science and technology based regulation—has run its course. While there is no doubt that there have been tremendous gains with this strategy, the challenges of the Anthropocene require a new set of strategies and approaches.

III. SUSTAINABILITY NARRATIVE

The second narrative is the sustainability narrative. This environmental management story focuses less on problems and fears and more on finding a more balanced way to manage the impacts associated with resource consumption and other environmental woes. “Sustainability” in this case refers to the long-term ability to continue to engage in a particular activity, process, or use of natural resources.⁵⁶ To some extent, this narrative also gained initial influence in the 1970s when “multiple-use-sustained-yield”

Hermeneutical Stances, 21 *STUDIES IN CHRISTIAN ETHICS* 219 (2008).

⁵⁴ See generally Michael Burger *et al.*, *Rethinking Sustainability to Meet the Climate Change Challenge*, 43 *ENVTL. L. REP.* 10342, 10355 (2012).

⁵⁵ See Jean E. Twenge, Keith W. Campbell, & Elise C. Freeman, *Generational Differences in Young Adults' Life Goals, Concern for Others, and Civic Orientation*, 102 *J. OF PERSONALITY AND SOC. PSYCHOL.* 1045 (2012) (summarizing three studies examined generational differences in life goals, concern for others, and concern for social problems between Baby Boomers (born 1946–1961) at the same age, GenX'ers (born 1962–1981) and Millennials (born after 1982)). In general, civic orientation (e.g., interest in social problems, political participation, trust in government, taking action to help the environment and save energy) is in generational decline, with some of the largest declines appeared in taking action to help the environment. *Id.* In most cases, Millennials slowed, though did not reverse, trends toward reduced community feeling begun by GenX. See also Liz Klimas, *New Study: Young People Aren't As Into Environmentalism As You Might Think*, *THE BLAZE*, Mar. 15, 2012 <http://www.theblaze.com/stories/2012/03/15/new-study-young-people-arent-as-into-environmentalism-as-you-might-think/>.

⁵⁶ See Craig & Benson, *supra* note 43, at 846-47.

became the management principle for many natural resource management regimes⁵⁷ and early United Nations conferences began to articulate development goals.⁵⁸ It is fair to say, however, that sustainability as a narrative really gained steam as a way of conceptualizing environmental goals much later when the international community embraced sustainable development at the 1992 UN Conference on Environment and Development in Rio de Janeiro, incorporating it into both the Rio Declaration and Agenda 21.⁵⁹ This conference, known as the “Earth Summit”, was the same conference during which world leaders opened for signature the UN Framework Convention on Climate Change.⁶⁰

In an article presented at Akron Law Review’s symposium *The Next Generation of Environmental and Natural Resources Law: What Has Changed in Forty Years and What Needs to Change as a Result*,” Robin Craig and I made the observation that the pursuit of sustainability as an environmental goal has occurred concurrently with an emerging climate change era.⁶¹ We argue that there are underlying assumptions about sustainability that are important to reexamine, particularly in light of climate change. Specifically, the sustainability narrative tends to operate with the underlying assumptions where we: (a) know what can be sustained; and (b) have the capacity to hold onto some type of stationarity and/or equilibrium.⁶² We argue that this narrative has also reached the end of its usefulness, as it has had little to no influence over the “wicked problems” described *supra*.⁶³ The pursuit of sustainable development goals has not resulted in effective mitigation of climate change; greenhouse gas emissions have continued to

⁵⁷ See Craig & Benson, *supra* note 43, at 846.

⁵⁸ See Craig & Benson, *supra* note 43, at 849 (citing UNITED NATIONS, REPORT OF THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT: OUR COMMON FUTURE (General Assembly Resolution 42/187), at ¶27 (Dec. 11 1987), available at <http://www.un-documents.net/our-common-future.pdf>).

⁵⁹ See generally Jeffery D. Kovar, *A Short Guide to the Rio Declaration*, 4 Colo. J. INT’L ENVTL. L. & POL’Y 119 (1993).

⁶⁰ *Id.*

⁶¹ See Craig & Benson, *supra* note 43, at 842.

⁶² See Craig & Benson, *supra* note 43, at 858-59.

⁶³ See *supra* notes 3-8 and accompanying text.

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

increase, as have resource consumption patterns in terms of pace and scale.⁶⁴ Biodiversity loss is increasing at exponential rates.⁶⁵

In the summer of 2012, the UN held the “Rio + 20” conference, reflecting on the twenty years that passed since the Earth Summit.⁶⁶ In anticipation, the U.N. Environment Programme issued its Global Outlook report, which Executive Director Achim Steiner summarized by stating, “[I]f current patterns of production and consumption of natural resources prevail and cannot be reversed and ‘decoupled,’ then governments will preside over unprecedented levels of damage and degradation.”⁶⁷ The report emphasized the increasingly likely possibility of large-scale irreversible change, concluding that as human pressures on the Earth system accelerate, critical thresholds at various scales are quickly being approached or, in some cases, have already been exceeded.⁶⁸ Particular emphasis was placed on non-linear change—impending social and ecological thresholds that, once crossed, would prove irreversible.⁶⁹

The report reflects a growing consensus that “stationarity” (the idea that natural systems fluctuate within an unchanging envelope of variability) is dead.⁷⁰ Yet any cursory review of environmental programs and associated academic literature reveals that, as a culture, we still embrace this narrative.⁷¹ In *Replacing Sustainability*, we argue that we must admit that we have no

⁶⁴ See *supra* note 7 and accompanying text.

⁶⁵ See *supra* note 6 and accompanying text.

⁶⁶ United Nations Environment Programme, GLOBAL ENVIRONMENT OUTLOOK 21-22 (5th ed. 2012), available at <http://www.unep.org/geo/geo5.asp>.

⁶⁷ United Nations Environment Programme, *World Remains on Unsustainable Track Despite Hundreds of Internationally Agreed Goals and Objectives*, PRESS RELEASE (June 6, 2012) <http://www.unep.org/geo/>.

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ See Robin Kundis Craig, *Stationarity Is Dead—Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 10-16, 23-27 (2010); P.C.D. Milly et al., *Stationarity Is Dead: Whither Water Management?*, 319 SCIENCE 573, 573 (2008).

⁷¹ See generally Michael Burger, *supra* note 11, at 54.

idea what we can sustain.⁷² Our overarching thesis can be summarized with this three-pronged analysis: (1) sustainability goals for natural resources and the environment are based on assumptions of stationarity, (2) climate change and associated ecological dynamics are eliminating our ability to rely on stationarity, and therefore (3) we need a new paradigm for a world of continual change.⁷³

It's not that sustainability is not a laudable ideal; the issue is whether the sustainability narrative is still a helpful way of conceptualizing environmental governance goals. One particularly strong element of the sustainability story is that we cannot consider environmental, economic and social issues in isolation, and that *inter* and *intra* generational equity must be considered when crafting policy approaches.⁷⁴ However, rather than driving difficult conversations regarding the trade-offs required when examining the future costs of present actions, the sustainability narrative has devolved into a "have it all" discourse grounded in green consumerism.⁷⁵ By definition, sustainability assumes that there are desirable states of being for social-ecological systems⁷⁶ that humans can maintain. This is a questionable assumption under the best of circumstances. In practice, sustainability-based goals proved difficult to achieve even before climate change and other related factors came on the scene.⁷⁷

While sustainability remains a vibrant narrative of much interest to many natural resource practitioners and legal scholars, efforts to "rethink" sustainability and its role in a climate-changed world are on the rise. In 2012, a group of law professors formed an Environmental Law Collaborative in an effort to take on this challenge.⁷⁸ Their initial efforts included an article in which the concept of sustainability is examined from various perspectives.

⁷² See Craig & Benson, *supra* note 43, at 879.

⁷³ See Craig & Benson, *supra* note 43, at 878-80.

⁷⁴ See Benson & Craig, *supra* note 43, at 4.

⁷⁵ See generally ADRIAN PARR, HIJACKING SUSTAINABILITY (2009) (describing the commodification of the sustainable development concept).

⁷⁶ Hereinafter "SES."

⁷⁷ See Craig & Benson, *supra* note 43, at 878-79.

⁷⁸ See, e.g., Burger et al., *supra* note 54.

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

Michael Burger, for example, describes a “story of sustainability.”⁷⁹ He notes that, while sustainability has been the most influential environmental idea of the last 30 years, its underlying story is a utopian one—one that is at best unrealistic and at worst deceptive:

Sustainability has failed...to compel the radical transformational at the core of the countercultural social movement that invented modern environmental politics. Rather than inspire changes in the way we live necessary to actually redress the environmental crises, the sustainability story brackets big-ticket items like capitalism and consumerism, reifies existing actors and hierarchies, and affirms basic patterns of social organization, production and consumption. In short it is a deceptive story that perpetuates existing power dynamics that are in many respects the causes of global climate change.⁸⁰

While Professor Burger’s argument regarding increasingly inappropriate tenor of the sustainability narrative was shared by many of his colleagues, the notion of jettisoning the concept of sustainability in favor of a new environmental goal was not the dominant view.⁸¹ There remains a general reluctance to let go of this narrative. A key consideration is whether there is a new, perhaps more helpful and appropriate way to view social ecological relations. The question now considered is whether a narrative that invokes “resilience” is worthy of consideration.

IV. THE RESILIENCE NARRATIVE

In order to meaningfully engage the realities of social-ecological change in the Anthropocene, new policies and institutions must be developed that accommodate uncertainty and anticipate non-linear alterations of SES. The concept of “resilience” is increasingly invoked by natural resource

⁷⁹ See Burger et al., *supra* note 54, at 10356-57.

⁸⁰ See Burger et al., *supra* note 54, at 10356.

⁸¹ See generally Burger et al., *supra* note 54.

managers and academic scholars.⁸² The question presented here is two-fold. The first is whether there is embedded within this idea of resilience a new narrative. The second is whether the resilience narrative and its subsequent approaches to SES dynamics provide a sufficiently *different* and more *productive* orientation to challenges ahead.

In addressing the later question, it is important to examine whether sustainability and resilience are really different narratives. While not inherently incompatible concepts, resilience and sustainability are not the same. In fact, resilience scholars would be well advised to drop the sustainability narrative and its associated baggage. As explained *supra*, the pursuit of sustainability inherently assumes that we: (a) know what can be sustained; and (b) have the capacity to hold onto some type of stationarity and/or equilibrium.⁸³ These assumptions are no longer appropriate given the dynamics of SESs.⁸⁴

In contrast, resilience thinking is grounded in an acknowledgement of uncertainty and disequilibrium within SESs, with a ground-level acknowledgement that change is not only always possible but also to be expected. Resilience, as employed here, is defined as “the capacity of a system to absorb a spectrum disturbance and reorganize so as to retain essentially the same function, structure, and feedbacks—to have the same identity.”⁸⁵ The focus is therefore on *change* as well as the system’s capacity

⁸² See Benson & Garmestani, *supra* note 9, at 399. Scholarship in this area is too voluminous to summarize, but those interested in more information should check out the Resilience’s Alliance’s on-line journal *Ecology and Society* available at www.ecologyandsociety.org.

⁸³ See *supra* note 62 and accompanying text.

⁸⁴ In fact, assumptions of stationary and equilibrium were probably never appropriate for ecological systems. See DANIEL B. BOTKIN, *DISCORDANT HARMONIES: A NEW ECOLOGY FOR THE 21ST CENTURY* (1992) (arguing ecological systems are constantly fluctuating, and our plans, policies, and laws governing the environment must change to reflect this new understanding).

⁸⁵ See BRIAN WALKER & DAVID SALT, *RESILIENCE PRACTICE 3* (2012). This definition comes from the Holling School of ecological resilience; see generally C.S. Holling, *Resilience and Stability of Ecological Systems*, 4 ANN. REV. ECOLOGY & SYSTEMATICS 1 (1973). For an assessment of the varying definitions of resilience and their associated implications, J.B. Ruhl, *General Design Principles for Resilience and*

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

to meaningfully respond to change. In contrast to the sustainability narrative, the emphasis in resilience thinking is on understanding the dynamics and complexities of the SESs, not on determining and then maintaining a fixed system state. The emphasis is *building adaptive capacity* rather than *maintaining stationarity*.

Resilience also acknowledges “surprise,”⁸⁶ the unpredictable qualities of SES, as well as novelty, creative and innovative elements within complex systems.⁸⁷ A related and critical component of a resilience orientation is the recognition that regime shifts can and will occur. As a result, a resilience narrative allows for a more realistic approach to management in the Anthropocene because it acknowledges nonlinear change and provides a way

Adaptive Capacity in Legal Systems: Applications to Climate Change Adaptation Law, N. CAROLINA L. REV. (2011).

⁸⁶ Carl Folke, 16 GLOBAL ENVIRONMENTAL CHANGE 16, 253–267 (2006); C.S. Holling, *The Resilience of Terrestrial Ecosystems: Local Surprise and Global Change*, SUSTAINABLE DEVELOPMENT OF THE BIOSPHERE, 292–317 (1986).

⁸⁷ Craig R. Allen & C.S. Holling, *Novelty, Adaptive Capacity, and Resilience*, ECOLOGY & SOC’Y (2010):

Novelty is generated as a result of the normal dynamics of complex systems. In terms of a panarchy with a discontinuous structure, novelty is generated at the edge of scale breaks (at the transitions between domains of scale) as a result of the highly variable distribution and occurrence of resources in space and time, which in turn is reflected in the high variability in biotic components of the system. This generation of novelty creates options for systems, is critical in maintaining adaptive capacity, and serves as a reservoir of potential functions that may be required following transformations or as normal system dynamics evolve. In the thermodynamics and gain literature, this has been termed internal complexification because it builds upon extant structures. Such novelty is at the heart of resilience. *Id* (citations omitted).

Allen and Holling describe three types of novelty: background, incremental and punctuated. Background novelty is generated as a result of the normal dynamics of complex systems. Incremental novelty describes, self-organizing and dynamic elements of a complex systems (such as an ecosystem, that adds complexity over time). Punctuated novelty is expressed by sudden, transformative shifts in system processes, which may occur at multiple scales.

of thinking about how to foster the SES components and dynamics we value and want to protect.

Where regime shifts occur, the emphasis is on transformation, defined as the system's capacity to reconceptualize and create a fundamentally new system with different characteristics."⁸⁸ Intentional transformation involves a conscious and deliberate negotiation from one system state to another. A system's transformative capacity is defined by the ability of the actors within the system to (1) be prepared to change (as opposed to being in a state of denial); (2) have the options for change (the identification of possible new "trajectories" for the system shift); and (3) have the capacity to change (the ability to make choices from among the possible new trajectories).⁸⁹

In this way, adaptive capacity within a SES can serve two purposes. Adaptive capacity is crucial, both when the management orientation is to maintain the current system state and when SES dynamics are such that transformation should or will occur. Transformative capacity highlights an important element of resilience theory that is often overlooked in policy discussions invoking the concept: a system state of "resilience" is not inherently "good" or "bad."⁹⁰ There are many examples of relatively stable and resilience SESs that are not desirable situations in which we *want* transformation to occur. An algae-ridden eutrophic lake is a stable ecological system but rarely a desirable system state.⁹¹ Repressive dictatorships can also be remarkably resilient and decisively undesirable; the "Arab Spring" has been invoked as an example of regime change within a social system.⁹² Any notion of "building resilience" must be therefore followed by the

⁸⁸ WALKER & SALT, *supra* note 85, at 100.

⁸⁹ WALKER & SALT, *supra* note 85, at 101.

⁹⁰ See generally Sandy Zellmer & Lance Gunderson, *Why Resilience May Not Always Be a Good Thing: Lessons in Ecosystem Restoration From Glen Canyon and the Everglades*, 87 NEB. L. REV. 893 (2009).

⁹¹ WALKER & SALT, *supra* note 85, at 7-9.

⁹² See Steven Heydemann & Reinoud Leenders, *Authoritarian Learning and Authoritarian Resilience: Regime Responses to the 'Arab Awakening'*, 8 GLOBALIZATIONS 647, 652-653 (2011) (arguing that the spread of protests throughout the Arab world can be viewed as the product of social learning by Arab citizens).

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

questions—resilience *of what and to what?*⁹³ In other words, it is necessary to first identify overarching systems states (referred to as general resilience) and/or elements of the system we want to keep (specified resilience). Once the desired outcomes are recognized, an assessment of the perturbing factors and disturbances that must be considered when addressing potential or existing threats can take place.⁹⁴

If resilience theory only conceptualized processes for maintaining a system state, it would look more like (and be more compatible with) the sustainability narrative. The emphasis on regime change and transformability, however, allows for a more realistic and productive orientation to many of the challenges we face, which are often characterized by factors outside of our control. The SES I inhabit, New Mexico's Middle Rio Grande Valley, provides a relevant example.⁹⁵ I live in Albuquerque, a high desert city striving to maintain its cultural, social and ecological identity while facing a changing climate.⁹⁶ Like most watersheds in the American Southwest, the Rio Grande watershed is adapted to highly variable ecological conditions.⁹⁷ Its hydrograph is characterized by early season snowmelt in the upper reaches of the watershed, which includes part of southern Colorado, as

⁹³ Stephen Carpenter, Brian Walker, J. Marty Anderies & Nick Abel, *From Metaphor to Measurement: Resilience of What to What?*, 4 *ECOSYSTEMS* 765, 767 (2001) (identifying various definitions of resilience).

⁹⁴ Stephen R. Carpenter & William A. Brock, *Adaptive capacity and traps*, *ECOLOGY AND SOCIETY* 13(2): 40 (2008) <http://www.ecologyandsociety.org/vol13/iss2/art40/>; see generally Carl Folke, Johan Colding, & Fikret Berkes, *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change* (2002).

⁹⁵ A resilience assessment of the Middle Rio Grande watershed is forthcoming in a special issue of the Idaho Law Review on adaptive management. See Melinda Harm Benson, Dagmar Llewellyn, Ryan Morrison & Mark Stone, *Water Governance Challenges in New Mexico's Middle Rio Grande Valley: a Resilience Assessment*, *IDAHO L. REV.* (in review).

⁹⁶ See generally Glen M. MacDonald, *Water, climate change, and sustainability in the southwest*, 107 *PROC. OF THE NAT. ACADEMY OF SCI.* 21256 (2010) (introducing the National Academy of Science Climate Change and Water in Southwestern North America Special Feature).

⁹⁷ TETRA TECH EM, *ENDANGERED SPECIES HABITAT RESTORATION ISSUES IN THE MIDDLE RIO GRANDE EXECUTIVE SUMMARY* 15-17 (2003) (detailing historical and contemporary hydrograph).

well as late summer monsoonal rain patterns that historically distribute the majority of precipitation in the Middle Rio Grande Valley in July, August and September.⁹⁸ Estimates are that 93% of New Mexico’s watersheds have become increasingly drier and that the timing of the runoff peak is an average of one week earlier than in the mid-20th century. The Rio Grande is no exception.⁹⁹ Temperature increases have already been observed in New Mexico and are predicted to continue.¹⁰⁰ Furthermore, milder winters and hotter summers are likely to result in increasing demand for water due to longer growing seasons and increased plant and human use.¹⁰¹ At the same time, hotter and drier conditions will increase evaporative losses from reservoirs, stream flows and soils.¹⁰² There will be consequences—both socially and ecologically—related to these shifting patterns, which can be summarized simply as “less water and more demand.”

At the same time, drier and hotter conditions are causing large-scale wildfires and subsequent flooding events.¹⁰³ In 2011, the Albuquerque-Bernalillo Water Utility Authority had to shut down its drinking water supply plant, which takes water directly from the Rio Grande, for several months when ash from the Los Conchas fire in the upper watershed overwhelmed the

⁹⁸ See U.S. BUREAU OF RECLAMATION, JOINT BIOLOGICAL ASSESSMENT BUREAU OF RECLAMATION AND NON-FEDERAL WATER MANAGEMENT AND MAINTENANCE ACTIVITIES ON THE MIDDLE RIO GRANDE, NEW MEXICO, PART IV – THE MIDDLE RIO GRANDE ENDANGERED SPECIES COLLABORATIVE PROGRAM RECOVERY IMPLEMENTATION PROGRAM, FINAL DRAFT (July 18, 2013) [hereinafter Joint Biological Assessment], <http://www.usbr.gov/uc/albuq/envdocs/ba/MRG/Part4/BA-Part-IV.pdf> (last visited April 25, 2014) [hereinafter Recovery Plan]; See generally Lindsay A. Bearup, Reed M. Maxwell, David W. Clow & John E. McCray, *Hydrological Effects of Forest Transpiration Loss in Bark Beetle-impacted Watersheds*, NATURE CLIMATE CHANGE (2014), <http://www.nature.com/nclimate/journal/vaop/ncurrent/full/nclimate2198.html#access>.

⁹⁹ U.S. FISH AND WILDLIFE SERVICE, RIO GRANDE SILVERY MINNOW RECOVERY PLAN, FIRST REVISION 38 (2010).

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Id.*

¹⁰³ See Tania Schoennagel, Thomas T. Veblen, & William H. Romme, *The Interaction of Fire, Fuels, and Climate Across Rocky Mountain Forests*, 54 BIOSCIENCE 661, 666 (2004).

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

system's filtration capacity.¹⁰⁴ Projections are that larger fires will continue, and the forest die-off, resulting from a climate change-induced combination of less moisture, increased bark-beetle infestation, and high fuel loads resulting from decades of fire suppression, will provide an unprecedented stress on New Mexico forests—with corresponding impacts on water quality.¹⁰⁵

By using tools and approaches from each of the narratives discussed to examine the challenges in my home watershed, the benefits and limitations of each become visible. A tragedy narrative places great emphasis on isolating the problem and understanding the nature and extent of the risk. The extensive climate modeling taking place, including the U.S. Bureau of Reclamation's West-Wide-Climate Risk Assessment, is reflective of this narrative.¹⁰⁶ This work is part of the agency's efforts under the Secure Water Act in 2009, which directs the agency to assess risks to the water resources of the American West, analyze the extent to which those risks will impact water deliveries, and develop strategies to mitigate those risks.¹⁰⁷ To date, however, those strategies do not include reexamining water allocation regimes in the West under the prior appropriation doctrine, a very (one might say pathologically)¹⁰⁸ resilient regulatory framework based on historical use

¹⁰⁴ Sandra Postel, *Wildfires in the Western U.S. Are on the Rise, Posing Threats to Drinking Water*, NATIONAL GEOGRAPHIC NEWS WATCH (April 29, 2014), <http://newswatch.nationalgeographic.com/2014/04/29/wildfires-in-the-western-u-s-are-on-the-rise-posing-threats-to-drinking-water>.

¹⁰⁵ *Id.*; see also A. Park Williams, Craig D. Allen, Constance I. Millar, Thomas W. Swetnam, Joel Michaelsen, Christopher J. Still, & Steven W. Leavitt, *Forest responses to increasing aridity and warmth in the southwestern United States*, 107 PROC. OF THE NATIONAL ACADEMY OF SCIENCES 21289, 21291 (2010).

¹⁰⁶ See generally Dagmar Llewellyn & Seshu Vaddey, *West-Wide Climate Risk Assessment: Upper Rio Grande Impact Assessment*, USBR (2013), <http://www.usbr.gov/WaterSMART/wcra/docs/urgia/URGIAMainReport.pdf>.

¹⁰⁷ BUREAU OF RECLAMATION, SECURE WATER ACT SECTION 9503(C)—RECLAMATION CLIMATE CHANGE AND WATER 2011 2-3 (April 2011) [hereinafter BOR Secure Water Act Report]. The Secure Water Act was incorporated into and passed as part of the Omnibus Public Land Management Act of 2009, 123 Stat. 991 (2009), *codified as* 16 U.S.C. §§ 9501-9510.

¹⁰⁸ See Zellmer & Gunderson, *supra* note 90, at 935.

rather than current needs.¹⁰⁹ Nor do they consider the need to re-examine water allocations under existing interstate compact agreements, notably the Colorado River Compact of 1922, which inaccurately assumes stationarity by allocating a specific amount of water to each state in the basin.¹¹⁰ Current approaches to climate change in the Middle Rio Grande watershed present an example of how “science + fear = change” is no longer a successful formula. More science on climate change has not resulted in more action.¹¹¹ Furthermore, the tragedy narrative operates best in situations where there is relatively little uncertainty and relatively great capacity to control,¹¹² whereas many of the elements involved here, such as wildfires, are both unpredictable and uncontrollable by nature.¹¹³

The sustainability narrative also struggles in this context. What can we sustain in this SES moving forward? Efforts to maintain current forest regimes are likely futile,¹¹⁴ yet the current “multiple-use, sustained yield” management orientation ignores this reality.¹¹⁵ The impact of land cover

¹⁰⁹ See UTTON TRANSBOUNDARY RESOURCES CENTER, WATER MATTERS 1-1 to 1-5 (2014), <http://uttoncenter.unm.edu/projects/water-matters.php> (last visited May 2, 2014).

¹¹⁰ See Robert W. Adler, *Revisiting the Colorado River Compact: Time for a Change*, 28 J. LAND RESOURCES & ENVTL. L. 19, 26-27 (2008) (outlining compact provisions).

¹¹¹ See, e.g., Karl Ritter, *U.N. Climate Talks Impasse Ends as China and India Drop Demands*, WASHINGTON POST (November 23, 2013), available at http://www.washingtonpost.com/national/health-science/impasse-ends-at-un-climate-talks-china-and-india-drop-demands/2013/11/23/fdd10970-547d-11e3-a7f0-b790929232e1_story.html; The latest round of international negotiations stumbled on the word “commitments.” Instead, more than 190 countries agreed in Warsaw to start preparing “contributions” to be adopted in 2015. Brad Plummer, *Why the U.N. Climate Talks Keep Breaking Down, in Five Simple Charts*, WASHINGTON POST BLOGSPOT (2013), <http://www.washingtonpost.com/blogs/wonkblog/wp/2013/11/20/why-the-u-n-climate-talks-keep-breaking-down-in-charts/>.

¹¹² See BYRON K. WILLIAMS, ROBERT C. SZARO, & CARL D. SHAPIRO. ADAPTIVE MANAGEMENT: THE US DEPARTMENT OF THE INTERIOR TECHNICAL GUIDE 6 (2009).

¹¹³ See Robert B. Keiter, *The Law of Fire: Reshaping Public Land Policy in an Era of Ecology and Litigation*, 36 ENVTL. L. 301, 313-14 (2006).

¹¹⁴ See *supra* notes 103-105 and accompanying text.

¹¹⁵ Much of the watershed is public lands managed by the U.S. Forest Service, which is governed by a multiple-use, sustained yield mandate under the National Forest Management Act of 1976 (16 U.S.C §§ 1600-1687) and the Multiple-Use, Sustained-Yield Act of 1960 (16 U.S.C. §§ 528-531).

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

change on water availability is uncertain, and, given the unpredictable and profound impacts of wildfire and drought, any emphasis on sustaining existing resources and rates of associated productivity and growth seem misplaced. The Colorado River Compact again provides an example. Allocations to states under the compact were made during a relatively wet period in the basin's history.¹¹⁶ And while there is often talk within the basin for the need to take a "sustainable" approach to water use and management,¹¹⁷ this ignores the reality that these allocations were never realistic historically and are certainly no longer realistic given the projected impacts from climate change.¹¹⁸

A resilience narrative embraces the idea that the Rio Grande Valley is a dynamic, complex SES system that has undergone, and will continue to be characterized by, highly variable rates of change. Rather than trying to determine what can be "sustained," the management emphasis would be on understanding the basin's complexity and building its adaptive capacity. Where, as is the case here, the resilience of the ecological system is both weakened and subject to only limited management control, the capacity of the *social* elements of the system to be adaptive becomes critically important.¹¹⁹ Encouragingly, the U.S. Bureau of Reclamation's work in the

¹¹⁶ Connie A. Woodhouse, Stephen T. Gray, & David M. Meko, *Updated Streamflow Reconstructions for the Upper Colorado River Basin*, 42 WATER RESOURCES RES. 1, 14 (2006) (explaining that river allocations under the Compact were based on one of the wettest periods in the past 5 centuries and that droughts more severe than any 20th to 21st century event occurred in the past).

¹¹⁷ See, e.g., Peter H. Gleick, *Water in Crisis: Paths to Sustainable Water Use*, 8 ECOLOGICAL APPLICATIONS 571 (1998).

¹¹⁸ See Milly, *supra* note 70; BUREAU OF RECLAMATION, SECURE WATER ACT SECTION 9503(C)—RECLAMATION CLIMATE CHANGE AND WATER 17-40 (April 2011).

¹¹⁹ Joyeeta Gupta, Catrien Termeer, Judith Klostermann, Sander Meijerink, Margo van den Brink, Pieter Jong, Sibout Nooteboom, & Emmy Bergsma, *The Adaptive Capacity Wheel: A Method to Assess the Inherent Characteristics of Institutions to Enable the Adaptive Capacity of Society*, 13 ENVTL. SCI. AND POL. 459, 461 (2010) (Elements of adaptive capacity for institutions include (1) encouraging the involvement of a variety of perspectives, actors and solutions;(2) enabling social actors to continuously learn and improve their institutions;(3) allowing and motivate social actors to adjust their behavior;(4) and mobilizing leadership qualities;(5) mobilizing resources for implementing adaptation measures; and (6) supporting principles of fair governance). For an assessment of the need

basin under the Secure Water Act in 2009 invokes the concept of *ecological* resilience.¹²⁰ But without a more adaptive strategy for the *social* elements of the system, this work is unlikely to produce a meaningful and responsive approach to climate adaptation.¹²¹

We are at a critical juncture with regards to integrating resilience-thinking into actual structures of governance.¹²² We do have an opportunity to change our story, but in order to do so, we have to correspondingly let go of previous narratives. To date, there has been a reluctance to do so, especially to the extent to which resilience is perceived as a vehicle for normalizing existing relations, including historical inequities and environmental harms.¹²³ In other words, resilience is currently in danger of falling into the same traps Professor Burger described with regard to sustainability—a narrative that perpetuates existing power dynamics and historically inequitable allocation regimes. While much of the resilience-

for adaptive capacity within legal systems, see J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems: Applications to Climate Change Adaptation Law*, 89 N.C. L. REV. 1373, 1375-77 (2011).

¹²⁰ See Craig & Benson, *supra* note 43, at 869-870. (noting that the Secure Water Act invokes the concept of resilience by directing the agency to: analyze the extent that the risks to water supply will impact water deliveries to the contractors of the Secretary of the Interior, hydroelectric power generation facilities, recreation at Reclamation facilities, fish and wildlife habitat, applicable species listed as an endangered, threatened, or candidate species, water quality issues, flow and water dependent *ecological resiliency*, and flood control management. The Secure Water Act was incorporated into and passed as part of the Omnibus Public Land Management Act of 2009, 123 Stat. 991 (2009), *codified as* 16 U.S.C. §§ 9501-9510.)

¹²¹ See Craig & Benson, *supra* note 43, at 872-75.

¹²² Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 Vand. L. Rev. 1 (2013).

¹²³ For more information regarding critiques of the theory along these lines, see Muriel Cote & Andrea J. Nightingale, *Resilience Thinking Meets Social Theory: Situating Social Change in Socio-Ecological Systems (SES) Research*, 36 PROGRESS IN HUMAN GEOGRAPHY 475 (2012); Debra J. Davidson, *The Applicability of the Concept of Resilience to Social Systems: Some Sources of Optimism and Nagging Doubts*, 23 SOC'Y & NAT. RES. 1135 (2011); Alf Hornborg, *Zero-Sum World: Challenges in Conceptualizing Environmental Load Displacement and Ecologically Unequal Exchange in the World-System*, 50 INT'L J. OF COMPARATIVE SOCIOLOGY 237 (2009); Mark Welsh, *Resilience and Responsibility: Governing Uncertainty in a Complex World*, THE GEOGRAPHICAL J., (2013); doi: 10.1111/geoj.12012.

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

oriented work to date has ignored the problematic nature of existing power relations and historical inequities, this is arguably a problem with various applications of the resilience concept rather than the theory itself. We bring our (often unquestioned) perceptions of SES and the values that inform those perceptions to any application of resilience thinking. Still, the ability of resilience thinkers to be more critical in this regard will play a large role in determining the extent to which resilience actually becomes a sufficiently *different* and more *productive* orientation.¹²⁴

V. CONCLUSION

This Article examines three different narratives that operationalize different types of beliefs about social-ecological relations. Presented in roughly chronological order in terms of their relative influence on environmental law and policy, first came the tragedy narrative. A tragedy-oriented story sees people as creators of problems that need to be solved and focuses on using the tools of modernity, including the scientific method and tools from economics such as risk assessment, to understand those problems. It then crafts mechanisms to control and manage that risk. While many of the significant environmental successes of the past several decades are attributable to this approach, this storyline has several limitations. The wicked problems of the Anthropocene do not lend themselves to traditional “command and control” solutions because their extreme complexity and associated radical uncertainties make risk assessment and control limited at best. Perhaps even more importantly, humans are cast as the source of environmental problems by being outside forces that are messing up nature and ruining the planet. This reflects the social construction of an ontology in which humans are separate from nature. It is a shame and fear-based approach that has proven unsuccessful in motivating humans to take on environmental challenges during the last several decades. The tragedy narrative has taken us as far as it can.

The sustainability narrative is no longer an appropriate way to conceptualize environmental goals. Given the end of stationarity and the

¹²⁴ See Benson & Craig, *supra* note 43, at 4.

inherent disequilibrium of dynamic systems, it probably never was. The sustainability narrative takes a more optimistic, but inevitably naïve, view of social-ecological relations. Based on the idea that we can somehow determine the appropriate pace and scale of resource extraction and use, sustainability makes inaccurate assumptions about our capacity to maintain a state of ecological equilibrium. Sustainability's "have it all discourse" serves the interests of the status quo existing power allocations that profit enormously from assumptions that green consumerism and further development can address the wicked problems we face. The concept of stationarity was effectively destabilized in the natural sciences long ago, but the storyline continues in our laws and policies through the narrative of sustainability.

Resilience is a new, emerging narrative—one that provides a more helpful orientation toward management in the Anthropocene. It places emphasis on research and policy efforts that help us to understand and cope with change. Shifting the governance focus from sustainability to resilience is not admitting defeat, nor is it abandoning the goals of *intra-* and *inter-*generational equity. This is an important contribution of the sustainability narrative we should keep. In fact, the resilience narrative arguably has the potential to do a better job of taking on current power relations and historical inequities, but it requires transparent discussions about what we value in our SES and the trade-offs we face.

Regardless of any particular narrative or way of conceptualizing social-ecological relations, the way in which we perceive and therefore orient ourselves towards environmental challenges matters. The stories we tell about our situation not only assign meaning to past and current events, but also determine the options available to us. A resilience narrative has the potential to foster and develop the strategies that are necessary to anticipate and negotiate our complex and rapidly changing world. These strategies will necessarily include a number of elements. One is a healthier relationship to science and other forms of knowledge production in the Anthropocene. When we examine the narratives currently animating most environmental governance regimes, we notice assumptions about the role of science and its ability to provide definitive answers. But the scientific method has never been good at—or built for—providing such answers. Past narratives reflect a

RECONCEPTUALIZING ENVIRONMENTAL CHALLENGES—IS RESILIENCE THE NEW NARRATIVE?

faith in science and technology often based on hubris—the future will require humility.

An additional related assumption underlying past narratives involves our ability to take action and control situations that are identified as environmental challenges. Unfortunately, the nature and complexity of climate change and other wicked problems do not lend themselves to resolution or control. That is not to say that action is not critical. Rather, future strategies cannot realistically be expected to “solve” these problems. Instead, we will be responding to them as meaningfully and effectively as we can. Another assumption held by past narratives relates to *how* meaningful responses will take place. The UN’s incapacity to rally the international community to take on enforceable commitments to reduce greenhouse gas emissions is perhaps the most significant and tragic example of the failure of formal, historically based institutions moving forward. Future strategies will embrace both formal and informal institutional methods at a variety of temporal and spatial scales.

A narrative of resilience has the ability to embrace these strategies. Rather than relying on science to provide timely answers, resilience thinking focuses on asking interesting questions that allow for refinement of continually emerging understandings of SESs. Rather than identifying an institutional “fix,” resilience focuses on building adaptive capacity—a vitally important characteristic whether the goal is to maintain a certain SES state or gracefully transform to a new one. It is a narrative grounded in understanding and responding to change. As such, it provides a new way of thinking about our relationship to the environmental and natural resource challenges of the Anthropocene. As a way to reconceptualize social-ecological relations resilience has the potential to shift the environmental governance paradigm in new and interesting ways.

