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ENVIRONMENTAL REALISM

Challenging Solutions

Kristan Cockerill,
Melanie Armstrong,
Jennifer Richter,
and Jordan G. Okie

Environmental Realism

"The authors offer a bracing synthesis of particular case studies of environmental 'solutionism' in action and theoretical research into the complex ways that human societies and biophysical environments have developed and interacted over time."
—**Vera Norwood**, *Emerita Professor, University of New Mexico, US*

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CHAPTER 1

Why Challenge Solutions?

Abstract Labeling a problem "environmental" creates a pervasive belief that science and technology can, should, and will generate solutions for issues ranging from pandemic disease to stream functions to nuclear contamination. These, however, are "wicked problems" that defy simple or long-term solutions, but rather must be continually managed. Further, what are defined in the twenty-first century as "environmental problems" are often the consequence of perceived "solutions" implemented in a previous era. The perception of these issues as problems is derived, in part, from Enlightenment ideas segregating *Homo sapiens* from nature and a belief that humans can contain or control biophysical processes. Solutionist thinking and language perpetuates a self-referential problem-solution-problem cycle that begs the question of what constitutes a "solution" and simultaneously elides the reality that human systems and biophysical systems are inseparable.

Keywords Solutionism · Wicked problem · Human-culture divide

Following the 2009 L'Aquila earthquake in Italy, six seismologists and one government official were convicted of manslaughter for not predicting the risk that an earthquake would pose to people and property. The magnitude of 6.3 quake killed 300 people and left the city in ruins. The legal case prompted outrage within the scientific community and

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spotlighted key issues in how physical phenomena, risk assessment, and public expectations connect (Kolbert 2015; Nosengo 2012, 2010; Hall 2011). In an open letter to Italy's president, the American Association for the Advancement of Science representative Alan Leshner (2010) wrote, "It is manifestly unfair for scientists to be criminally charged for failing to act on information that the international scientific community would consider inadequate as a basis for issuing a warning." Although the defendants were acquitted on appeal, scientists report the initial verdict had a chilling effect on what they are willing to say to the media or to public officials. Indicted scientists characterized this case as a "warning to researchers, who may find themselves in legal trouble because of the way non-scientists such as public officials or journalists translate their risk analyses for public consumption" (Hall 2011). Several years after the case was settled, when asked about the longer-term impacts from the legal action, an Italian geologist noted that "it had pushed scientists in Italy to become latter-day Cassandras, always erring on the side of catastrophe" (Kolbert 2015).

The events following the Italian earthquake exemplify what research has suggested: People view the biophysical world as increasingly within human control. Rochford and Blocker (1991) found that though people attach disparate meanings to flooding "disasters," such events are often "interpreted as within the bounds of scientific prediction, if not control" and they are, therefore, "contested events in which blame is allocated and conflict ensues." More recent research finds similar results, showing the public's distinction between "natural and human-induced hazards is slowly vanishing" (Wachinger et al. 2013). This has potentially serious implications, as public officials may be blamed not only for their response (or perceived lack thereof) but also for the severity of a biophysical event itself (Wachinger et al. 2013). Indeed, studies show that throughout the twentieth century, US voters failed to reelect incumbent officials in elections following floods and drought (Achen and Bartels 2004) and officials in India are punished in reelection following years with low rainfall (Cole et al. 2012). Even if not blaming officials for an event, voters who "believe that government could have done more to prevent the level of damage, . . . are willing to attribute blame and punish incumbents accordingly" (Arcenaux and Stein 2006).

In the following pages, we argue that simultaneous shifts in language and thinking are required to fully acknowledge that "natural disasters" or "environmental problems" are both mislabeled and are often catalyzed by

human attempts to predict and control biophysical processes. We employ an interdisciplinary approach to examine the deeply intertwined relationships among human biology, human culture, and the planet's ecological, geological, and atmospheric systems. In doing so, we embrace environmental realism, which acknowledges that biophysical phenomena (e.g., floods, earthquakes) are "normal" and are core to the planet's history and function. Further, environmental realism accepts that *Homo sapiens* are fully part of the planet's complex systems. If human society wishes to engage in beneficial and long-term environmental management practices, it requires collapsing dualisms between humans and biophysical systems and reducing solutionist language that binds us to false perceptions of both.

Establishing social institutions to control biophysical events, and then blaming those who manage those institutions for any failure to control has a long history in human societies. Achen and Bartels (2004) report that some scholars think Egyptian pharaohs were held responsible for annual Nile flooding and when the river did not flood it may have shortened their reign and their lives. During the plague years of the fourteenth century, political and religious leaders were discredited for failing to defend the common welfare, and one result included an increase in social and political movements that targeted disliked minorities, including Jews (Achen and Bartels 2004). What is new in modern society is the role that science plays in public expectations about control of, and risk from, biophysical events. There is now a social expectation that scientists, and those who use scientific data, can and should produce impossibly precise knowledge of biophysical systems and subsequently provide accurate predictions of potential impacts from biophysical phenomena (e.g., floods, earthquakes, epidemics) so that individuals may avoid harm. The Italian earthquake case is an obvious example. There are other, more pervasive examples, as people routinely ignore potential risks in their environment—by building in earthquake zones, flood prone areas, water-scarce areas, and on steep slopes—while they simultaneously balk at paying high insurance rates (Nossiter and Schwartz 2006; Orts and Spigonardo 2013; Hanscom 2014; Bramwell 2014). People also manage their bodies in ways that produce health risks, choosing unhealthy behaviors like smoking or consuming fatty foods, knowing that they are increasing their personal risk of becoming ill or dying young. The availability of private health and property insurance perpetuates the belief that people can mitigate the impacts from biophysical systems through individual best practices. At the same time, governments establish zoning,

building, and health codes, which help create a belief that social institutions can manage biophysical systems. If biophysical systems can be controlled, then there is no (or less) risk, and hence, no need for insurance.

People create governments as well as institutions to protect their human rights, individual well-being, and personal property. In liberal democracies, an inherent tension exists between governments and citizens in part because people make investments in their well-being and their property, predicated on societal stability, and anticipate that government will work to protect those investments. When citizens charge governments with protecting them from risk, and governments respond by building systems to mitigate risk, public perception of how much risk they might encounter in their daily lives shifts.

Large-scale demonstrations of governance have attempted to mitigate risks from biophysical phenomena. In doing so, social systems have established risk management as a principal way that governments protect a "basic" human right to live without threats to body or property. Moreover, governments accrue power and authority by demonstrating how they are managing risk and by recruiting citizens to join in the social work to mitigate risk. The interplay between governments that promise to protect citizen health and property, and the citizens who turn to government to "solve" issues like flooding, earthquakes, disease, and waste management, is deeply rooted in our cultural systems.

Governing well implies meeting public expectations, and therefore, public institutions seek efficient, one-time solutions to problems that emerge from the stochasticity of biophysical systems. Ideologically, this widens a perceived gulf between nature and culture, in which social institutions must be separate from the biophysical world to attempt to control it. Further, when our attempts to control fail, there must be someone to blame. The expectation that people can live without risk exists in pervasive tension with the expectation that individuals and social institutions will maintain less risky conditions and that scientists will provide the knowledge needed to reduce or eliminate risk.

Because scientists have been successful in illuminating ways to predict and contain some risky processes, especially on smaller geographical or temporal frames, such as local, seasonal flooding or single-tree lightning strikes, this limited achievement "tempts us to simply turn to scientists and say: 'Tell us what will happen . . . '" (Sarewitz et al. 2000). The perception that scientists can predict the future equates knowledge of the biophysical present with future risk. People transform the idea of a risk into a problem,

which they then expect to be solved and eliminated. This represents an overly simplistic cognitive fixation on discrete problems designating pre-packed, commensurate solutions.

Alas, most significant issues facing humankind, including persistent poverty, crime, and a diverse array of environmental issues, are "wicked," not in the sense of being evil but rather because they are embedded in complex systems, can be defined or framed in multiple ways and at their core are about human values. These wicked problems are intractable and can never be solved. As Rittel and Webber (1973) stated in their influential article on wicked problems, "[A]t best they are only re-solved—over and over again." Although several decades have passed since Rittel and Webber had concluded that "wicked problems" must be managed rather than "solved," a social and political emphasis on solving these types of problems persists.

Scholars and others do increasingly recognize that "solutions" often catalyze new problems. In describing the history of water management, for example, Solomon (2010) writes, "intensified use of water and other vital resources were followed by population increases that in turn so increased consumption that they ultimately depleted the further intensification capacity of the society's existing resource base and technologies. Such resource depletions thus presented each society with a moving target of new challenges requiring perpetually new innovative responses to sustain growth." Defries (2014) describes this cycle as the "big ratchet" in explaining how agriculture has continuously "solved" human crises only to generate new problems, requiring new solutions. This idea of a cyclical relationship among problems and solutions begs the question of what constitutes a solution.

The word "solution" as commonly used and understood implies an end-state where a problem has been "fixed," and therefore, will no longer require attention. The "fix" may be perceived to be technical, social, individual, or some combination of these. Solution-seeking represents a quest for stability, predictability, normalcy, and certainty, and does not recognize the cyclical structure of problems and solutions. When collective groups share and act upon a desire for stability and predictability, they develop a common worldview that scholars have deemed "solutionism."

The term "solutionism" has been used for decades in diverse ways. It may have been used first by Huntington in 1957 to note that the "new conservative" movement was in part "a critique of utopianism and 'solutionism'" (Qtd in Quinion 2013). Although solutionism is perhaps most

commonly applied to ideas surrounding technological innovation, it is definitively not limited to the techno-fix, which has been well documented as a flawed approach to addressing social problems (Fox 1995; Huesemann and Huesemann 2011; Morozov 2013). The general idea of "solutionism" has been critiqued as being simplistic and misleading (Quinion 2013; Morozov 2013; Baker 1984). In 1959, Hodnett cautioned readers to "Beware of 'solutionism'—the flabby optimism that there is a simple answer and that it will yield to the magic of a personality, 'brainstorming,' sitting down and talking things over, or other tribal nostrums." Alluding to some of the broader social implications of solutionism, in 1984, Baker defined the term as "the belief that for every problem there exists a solution; and successful persons are those who solve problems."

To be clear, we recognize different kinds of problems and the multiple terms used to delineate them. Rittel and Webber (1973) differentiate between wicked and tame problems; Schumacher (1977) discusses divergent and convergent problems; Glouberman and Zimmerman (2002) define simple, complicated and complex problems; while Ackoff (1974) and Horn and Weber (2007) describe "social messes." A key factor in each of these categorizations is the level of complexity, and hence, the "solvability" of the problem. Wicked, divergent, and complex problems, as well as social messes, are all similarly characterized as not having a singular endpoint (i.e., no definitive solution). Tame, simple/complicated, and convergent problems, on the other hand, do have singular solutions. Examples include math problems, developing a vaccination, or constructing a building or bridge to meet specific load requirements. These are not necessarily easy problems to solve, but they do have a clearly defined endpoint. Using the language of solutions is appropriate for these kinds of problems. Our concern lies in applying this same solutionist language and subsequently the same expectations to problems that will not have clearly defined or singular endpoints.

There is evidence that solutionism, expressed more broadly, is a pervasive cognitive trait that limits social action. Maxwell (1991) posits there "is the belief that there must be a perfect solution, somewhere, to every problem," and this reduces the incentive to make an incremental social change because people are expecting and waiting for that definitive, perfect solution. Further, she believes "solutionism is not a well-recognized phenomenon and that it gets much of its power from this lack of recognition" (Maxwell 1991). Indeed, when presenting the idea for

this book to students, friends, and colleagues, we encountered initial resistance to the very idea that there may not be solutions to pressing problems as well as resistance to the idea that people do expect solutions. In fact, one early anonymous reviewer, after expressing support for several ideas in the manuscript, expressed uncertainty "about how serious the 'solutionism' problem really is."

Yet, Maxwell's (1991) premise aligns well with current understandings of human cognition and subsequent behavior. From an evolutionary perspective, making sense of the world and ensuring survival relied on knowing what might happen under particular circumstances. Being able to readily identify a potential problem (i.e., risk of being eaten) and then solve that problem (i.e., avoid the risk by running away) enabled *Homo sapiens* to flourish. People are subsequently prone to seek and imagine patterns even where no patterns exist because this provides a sense of certainty to what are often highly stochastic, nonlinear and unpredictable phenomena (Kahneman 2011). This tendency to imagine patterns where they do not exist is known as a *clustering illusion*, and it provides a false sense of security because predictions are derived from a perceived but nonexistent pattern. Further evidence of a human desire for certainty is found in an overreliance on numerical data. Because numbers are perceived as "certain," people are inclined to accept quantitative statements or arguments, even when they are specious (Seife 2010). This contributes to expectations that science, which often speaks the language of math, can find concrete solutions to perceived problems.

Despite the numerous cautionary notes about solutionist thinking, the cognitive appeal of solutionist ideas has allowed the word "solution," with the concomitant notion of permanence or stability, to thoroughly permeate contemporary society. Advertisements and business slogans are rife with solutions. In fact, Dow Chemical has trademarked the slogan, *Solutionism: The New Optimism*. Federal funding agencies and graduate school programs highlight "solving problems" as their focus. The MacArthur Foundation, host of the "genius grants" has established the 100&Change grant to award $100 million to "help solve a critical social problem" (MacArthur 2016).

Calls for interdisciplinary education and research often hinge on the premise that individual disciplines have failed to solve society's most pressing problems, and hence, interdisciplinarity is needed to do what individual disciplines could not (National Academy of Sciences 2005; Repko 2008; Jacobs 2014). In assessing the role of higher education to

advance a more sustainable future, Hart and colleagues (2016) conclude the number one lesson is, "universities must realize that the well-honed academic habit of studying problems without emphasizing solutions is ever more troubling in today's world." Political speech relies on solutionism. For example, a transcript from a 2016 US Republican candidate debate features 22 references to "solutions" or "solving" problems (The Washington Post 2016). Particularly relevant to our premise, a search for the phrase "environmental solution" within the Google Books database finds a marked increase in the number of entries since 1990. The emphasis on solutions is so pervasive it is very difficult to not use the term "solutions" in reference to perceived problems. The subsequent reaction is not to assess the feasibility of solving any particular problem, but to consistently seek a new approach that promises it will find *the solution*.

Drawing evidence from across multiple disciplines, we argue that labeling problems as "environmental" or "disasters" reflects deep-seated cultural values rooted in Enlightenment ideology about the concept of nature and the perfectibility of the human condition. Embedded in this ideology are assumptions about biophysical systems and the human relationship to these systems, assumptions about what science is and what it can or should do, and assumptions about risk. Further, calling these phenomena "problems" establishes a self-referential expectation that there is a solution. Language, history, and biology bind humans to a worldview oriented toward solution-seeking. People build institutions and infrastructure around the expectation that their interactions with the world will be comprised of problems and solutions. As perceived "solutions" are promulgated, people adjust to their new realities even as they seek, through language, and advance toward, through biology, a new turn in the cycle of problems and solutions.

This basic premise that environmental realism must avoid focusing on solutions will surely elicit diverse reader reactions, provoking discussion and debate. First, for those who are unconvinced about the pervasiveness and potential implications of solutionism we encourage you, in your daily life, to observe where and under what circumstances you encounter specific language or the concept of "solving" environmental problems. Second, we want to be clear that nothing in our argument is intended to give license to abdicate human responsibility for our role in creating or exacerbating risk to ourselves and other species. We recognize that complex historical, political, economic, and cultural interactions affect how solutionist thinking is made manifest in addressing biophysical