

Forest Service “to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of the people of the United States.” Even if timber harvest were not, by law, one of the multiple uses of the national forests, the Forest Service would still have an obligation “to improve and protect the forest.”

One way of doing that is to actively manage the vegetation. Many forests are so overgrown and unhealthy that they are prone to devastation by drought, wildfires, insects, and disease. By removing some of the trees, we can restore these

forests, making them better able to withstand natural disturbances such as fires and insect outbreaks.

Some of the materials removed can be sold. Americans use a lot of wood, and it makes more sense to generate it from a restored forest than to import it from overseas, where forest protections might be fewer. Wood products store carbon, keeping it from adding to greenhouse gases. Best of all, the value recovered lets us do more restoration work.

The days of large-scale timber harvest on national forest land are over. But timber harvest still has a role to play in restoring forests for the benefit of future generations.

Review Questions

- Were you surprised to learn that timber is harvested on the national forests? Why or why not?
- Advocates of timber production on the national forests often cite the fact that this practice is mandated by a law that dates back to 1897. How much weight should this argument carry as part of the debate? Explain your answer.

- Put yourself in the position of a county official in an area adjacent to a national forest that traditionally has relied heavily on timber production to support its economy, but that is also recognized for its scenic beauty. Recommend an economic development strategy for the county.

Further Research

Society of American Foresters

<http://www.safnet.org>

Ecological Restoration Institution

<http://www.eri.nau.edu>

Healthy Forests and Rangelands

<http://www.forestsandrangelands.gov>

Wild West Institute

<http://www.wildwestinstitute.org>

American Lands Alliance

<http://www.americanlands.org>

Montana Logging Association

<http://www.logging.org>

- List the key stakeholder groups involved in and impacted by the debate over timber production on the national forests.

What are their primary motives and motivations? What tactics are they employing to pursue their goals?

- How much national forest land is designated as wilderness? Do you think this is sufficient? Why or why not?
- Both essayists acknowledge the need to reduce fuels within the forests to prevent wildfire, but they recommend different approaches. Some of the Web sources also recommend fire management strategies. Describe some of these approaches. Which would you support, and why?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?

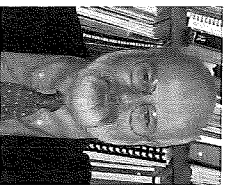


SPRAWL

VIEWPOINTS

Should we aim to prevent sprawl when planning our cities?

Reducing Sprawl Has Advantages Over Conventional Planning



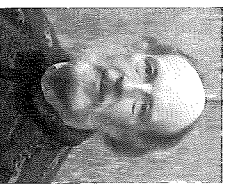
Arthur C. Nelson, Ph.D., FAICP, is director of the Metropolitan Institute at Virginia Tech where he is also professor of urban affairs and planning. He has written more than two dozen books and national monographs along with more than 200 other works in planning, growth management, infrastructure finance, resource land preservation, housing, economic development, transportation, planning law, and pedagogy.

Urban sprawl is typically manifested in one or more of the following land use or development patterns: leapfrog or scattered development; ribbon or strip commercial or other development; or large expanses of predominantly low-intensity, low-density, or single-use development. Among the outcomes of this development pattern are traffic congestion, environmental contamination, income and racial segregation of neighborhoods, jobs-housing mismatch, local fiscal disparities, and premature conversion of farmland to urban uses.

George Galster at Wayne State University, Royce Hanson and Hal Wolman at George Washington University, and Steven Coleman and Jason Freitheg at the University of Maryland, Baltimore County created eight indices of urban sprawl to measure its presence and assess its outcomes. They are density, continuity, concentration, compactness, centrality, nuclearity, diversity and proximity. Research finds that urban areas incorporating planning and design approaches that reduce urban sprawl in these respects perform better than others across several economic, social, and environmental dimensions. With my colleagues at Virginia Tech, Casey J. Dawkins and Thomas W. Sanchez, we found that in these areas, “urban containment” planning:

- **Increases density**
- **Prevents the outward expansion of urban development (“continuity”) through such techniques as urban growth boundaries**

The Myth of Urban Sprawl



Randal O’Toole is an economist and Senior Fellow at the Cato Institute, which seeks to solve environmental and other problems while maintaining America’s personal freedom. He is the author of *The Best-Laid Plans: How Government Planning Harms Your Quality of Life, Your Pocketbook, and Your Future*. He has taught environmental economics at Yale, the University of California at Berkeley, and Utah State University.

- **Concentrates development in urban areas through clustering of land uses, especially at transit nodes, through minimum density zoning and inclusionary housing policies (“compactness,” “diversity,” and “proximity”); and**
- **Directs high-density and -intensity land uses toward the central business district and selected nodes elsewhere (“centrality” and “nuclearity”).**

These areas also enjoy measurable improvements over time relative to urban areas that do not engage in urban containment with respect to:

- **Racial integration**
- **Economic development**
- **Central city reinvestment**
- **Improved housing opportunity especially for lower income households**
- **Agricultural land supply and preservation of other open spaces**
- **Automobile dependency**
- **Environmental quality**
- **Overall quality of life of neighborhoods**

Urban containment planning is comprehensive, long term, and most sensitive to identifying and meeting development demands. This is in contrast to conventional planning that uses exclusionary zoning, fiscal zoning, or other land-use practices to create single-dimensional communities catering to specific market niches at the exclusion of others.

Roughly half to three-quarters of the current demand for new housing is in attached or compact forms. Moreover, roughly half of the current demand for neighborhoods is for those within proximity of transit, shops, schools, and in socially and economically integrated communities. Urban containment may be better at achieving these emerging market demands than conventional planning.

Russians say Americans have no real problems, so they make them up. Urban sprawl is one of those made-up problems. Yet the proposed remedy to sprawl—sometimes called “smart growth,” though it is anything but smart—will cause far more problems than it solves.

The U.S. Department of Agriculture says that urban development does not threaten American farm productivity, nor is it a threat to rural open space. All of the cities, suburbs, and towns in the United States occupy less than 4% of the nation’s land area.

University of Southern California planning professors Peter Gordon and Harry Richardson point out that low-density development is a remedy for, not the cause of, congestion, air pollution, and many other problems. Studies claiming that suburbs cause obesity, crime, and other social problems are little more than junk science, being based on inadequate data with little statistical significance and usually confusing cause and effect.

So-called smart growth says more people should live in high-density, mixed-use developments. These developments can be attractive to some people, mainly young adults with no children. But the market for them is limited. Polls show that more than 80 percent of Americans still aspire to live in a single-family home with a yard.

Review Questions

- Consider the following two statements:

“Roughly half to three-quarters of the current demand for new housing is in attached or compact forms. Moreover, roughly half of the current demand for neighborhoods is for those within proximity of transit, shops, schools, and in socially and economically integrated communities.”

“So-called smart growth says more people should live in high-density, mixed-use developments. These developments can be attractive to some people, mainly young adults with no children. But the market for them is limited. Polls show that more than 80 percent of Americans still aspire to live in a single-family home with a yard.”

What additional information would you need to determine which of these contradictory arguments you agree with? How would you find this information?

Further Research

Smart Growth Online

<http://www.smartgrowth.org>

The Antiplanner

<http://ti.org/antiplanner>

Smart Growth America

<http://www.smartgrowthamerica.org>

American Dream Coalition

<http://americandreamcoalition.org>

Sightline Institute: Studies on Health and Sprawl

http://www.sightline.org/research/cascadia_scorecard/res_pubs/cs2006/health-sprawl-resources

Metropolitan Institute at Virginia Tech

<http://www.mi.vt.edu>

- Drawing from information gleaned from some of the Websites above, provide evidence that either supports or refutes the following statement:

Attempting to impose smart growth on more people has many unfortunate effects. Because it doesn't significantly reduce the miles people drive, it increases congestion; and because cars pollute more in stop-and-go traffic, it increases air pollution. Smart growth makes homeownership unaffordable to low- and middle-income families, and makes neighborhoods more vulnerable to crime.

Instead of attempting to impose their lifestyle preferences on others, city officials should simply ensure that people pay the full costs of whatever lifestyle they prefer. Once that happens, people can be free to choose to live in high densities or low, and to drive, walk, bicycle, or ride transit.

- Put yourself in the position of someone who is running for county commissioner in a formerly rural county that is rapidly urbanizing. What is your platform on land-use planning? Do you support low-density development, urban containment and compact communities, or some combination thereof? Explain your rationale.

- As with many environmental dilemmas, opinions on the drawbacks and benefits of sprawl are based on the values (ideas about what seems important) of individuals and communities. Describe the ways in which the opinions expressed in the two essays incorporate or address specific social or cultural values.

Studies claiming that suburbs cause obesity, crime, and other social problems are little more than junk science, being based on inadequate data with little statistical significance and usually confusing cause and effect.

- Assess the credibility of each Website. Which sources seem the most reliable, and why?
- What further sources can be explored for the purpose of obtaining additional (unbiased) information?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research? Explain your answer.



VIEWPOINTS

TOXIC AGENTS IN THE ENVIRONMENT
Should new chemical products receive more testing for health and safety before being brought to market than they currently do?

Testing Must Ensure Public Health



Warren Porter is a toxicologist and physiological ecologist at the University of Wisconsin-Madison. He evaluates the connections among climate, animal energetics, and behavior and environmental contaminants using statistical experimental design and mechanistic computer models.

Like most things in life, the controversy over product testing arises because both approaches have valid advantages and disadvantages.

Allowing industry to follow the innocent-until-proven-guilty approach, with limited testing, reduces development costs for new chemical products and may lead to greater economic activity. If industry were required to comprehensively test chemical product safety before introduction to the public, chemical industry profits could fall and result in job loss and costly new product development. Consumer prices might rise to cover these costs. A hidden cost in all this is the childhood development cost, which appears to be rising rapidly due to developmental alterations in intellectual, immune, endocrine and sexual development in response to chemical exposures.

Comprehensive testing would lower the number of chemicals that adversely affect biological species, but the cost is prohibitive and may be technically impossible. Current testing assumes a chemical agent is innocent until proven guilty.

Our definition of *innocent* is often too narrow. In the innocent-until-proven-guilty approach, *what the consumer actually buys is never tested*, because only ultra-pure active ingredients are tested. Surfactants and nonionic solvents

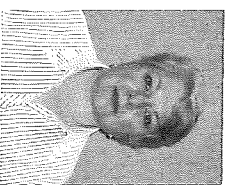
(“other ingredients”) are added to improve the active ingredients’ lipid or water solubility, and these other ingredients are frequently very active biologically. Also, production contaminants are not tested and registered. Therefore, a so-called *innocent product* can cause cancer and reproductive defects.

The assumption of a linear dose response is also coming under increased scrutiny, especially at very low physiological doses, where hormonal, immune, and neurological processes respond. At much higher pharmacological doses, where toxicity testing is typically done, the responses of physiological systems to the same chemical can be very different.

Given the inherent inadequacies of the testing process and the uncertainty of the economic impacts, both government and industry should share the responsibility of testing to ensure public safety. It seems apparent, however, that given recent events toxic regulation by governmental agencies is not working well. The public is shifting what it will buy, especially in terms of organic food purchases. Organic agricultural practices have now been demonstrated to be superior to chemical production methods, *especially in times of drought*, because of higher water retention properties of organic soils and because of the abundance of natural soil fungi in organic soils that promote nutrient transport to the roots.

Business opportunities abound in being able to find naturally derived healthy products for consumers. This suggests that it is in the best interests of everyone to conserve and protect plant and animal species *and the environments in which they exist*, since not only do they represent the irreplaceable DNA libraries of billions of years of experimentation, but there are often important interspecies interactions that are crucial for the existence of many natural products.

An Industry Perspective



Marian K. Stanley is Senior Director for the American Chemistry Council, which she joined in 1990. She is responsible for the management of chemical-specific issue groups in the Council’s self-funded Chemical Products and Technology Division.

Chemical manufacturers already take an active role in testing new chemicals, and in fact, this role is required by current EPA regulations. Additionally, government often tests chemicals to learn more about hazard or exposure. These government data, added to the body of knowledge generated by industry, tell us quite a lot about these compounds.

What exactly are hazard and exposure? Simply put, the health risks (or benefits) presented by any chemical compound—even simple things like water, salt, and caffeine—depend on two factors: the hazard (toxicity) of the substance, and exposure to it. Most people understand, for example, that the health risk presented by aspirin depends in part on the amount to which a person is exposed—doctors say that exposure to a little bit of aspirin every day might be harmless or even helpful to some people with heart disease, but they caution that ingesting several bottles of aspirin at once might be lethal.

So how do new chemicals get evaluated before they enter the market or are used to make other materials? Manufacturers typically start by conducting screening-level toxicological

and environmental studies and proceed to more or higher-tier studies as warranted. There is no single comprehensive testing program that is appropriate for all industrial chemicals. This process is considered appropriate for the introduction of a chemical in the marketplace because if the screening level testing shows any adverse effects, more sophisticated or higher level testing is triggered. To conduct higher-tier studies automatically is time consuming, difficult and would needlessly kill hundreds of laboratory animals.

The Toxic Substances Control Act requires almost all new commercial substances to undergo Premanufacture Notification (PMN) review, and to describe this preliminary process as an innocent-until-proven-guilty approach is an oversimplification. When the EPA reviews a PMN, it considers the physical and chemical properties of the substance, structural similarity to other compounds of known toxicity, and potential for human exposure and environmental release. If there is no evidence of harm from preliminary testing, longer term or more

specialized testing may not be conducted. In some cases, the EPA may require additional testing to determine whether the chemical poses an unreasonable risk to human health or the environment. If the EPA finds risk can be addressed by reducing exposure, it may enter into a binding agreement with the manufacturer to require exposure reduction activities, rather than additional laboratory testing.

Manufacturers often voluntarily conduct new studies to support the continued safe use of their chemicals. The 150 member companies of the American Chemistry Council represent about 90% of U.S. chemical production. These companies are committed to Responsible Care®, under which chemical manufacturers, as good stewards of their products, continue to test as new data and methodologies become available. There is a role for both government and industry in chemical testing, and it is important that the EPA and manufacturers work together in evaluating chemicals to improve health, safety, and the environment.

Review Questions

- What is your opinion of the EPA testing process as the authors have described it? Is it sufficiently protective? Why or why not?
- Consider the following statements:

“Our definition of *innocent* is often too narrow. In the innocent-until-proven-guilty approach, *what the consumer actually buys is never tested* . . . Therefore, a so-called innocent product can cause cancer and reproductive defects.”

Further Research

US EPA: Chemical Information Collection and Data Development (Testing)

<http://www.epa.gov/opptintr/chemtest>

Responsible Care®

<http://www.responsiblecare.org>

American Chemistry Council

<http://www.americanchemistry.com>

Chemical Kids — Environmental Toxins and Childhood Development

<http://www.socialworktoday.com/archive/marapr2007p37.shtml>

Children’s Environmental Health Network—Making Chemicals Child Safe

<http://www.cehn.org/cehn/chemicals%20&%20Vcccp/>

Chemicals_ child_safe.htm

Scorecard: The Pollution Information Site

<http://www.scorecard.org>

“The Toxic Substances Control Act requires almost all new commercial substances to undergo Premanufacture Notification (PMN) review, and to describe this preliminary process as an innocent-until-proven-guilty approach is an oversimplification.”

What information would you seek out to better understand and resolve these seemingly contradictory statements, and to determine which statement you agree with?

- Describe the Responsible Care® approach to chemical testing. To what extent will this program help protect the public from chemical hazards?
- What needs and opportunities exist for reforming chemical policy to better protect children from chemical exposures? What is your opinion of these strategies?
- Use the Scorecard site to identify pollution sources and impacts in the area closest to your hometown. How does this information affect your perspective on the environmental quality of that area, and on the need for and approaches to pollution prevention there?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research? Explain your answer.



VIEWPOINTS

FRESHWATER RESOURCES: DAM REMOVAL

Have many dams outlived their usefulness, and if so, should we dismantle them?

Dams for Today and Tomorrow



Thomas Flint is a fifth-generation farmer, actively farming in Grant County, Washington. He was elected to the Grant County Public Utility District board of commissioners in 2000, is founder and director of the public education effort known as AgFARMation, is a grassroots activist, and holds director's positions on the Black Sands Irrigation District and the Columbia Basin Development League.

Christine L. Stallard is a public affairs consultant in Oregon, specializing in hydropower and natural resource issues.



Our need for dams today is greater than ever because of their ability to store and regulate water for our growing needs and because of their role as a renewable, non-polluting source of energy. Over the past century, global water use has increased at twice the rate of population growth. World population is expected to grow by 50%, to 9 billion people in total, by 2050. The dams and reservoirs in place on our river systems address our human population's growing needs for water—to drink and to prevent flooding, to provide a clean and reliable source of electricity, to supply water needed to irrigate crops and to transport our commodities for domestic and world trade, to create recreational opportunities, and to provide habitat for fish and wildlife.

Ninety percent of the dams in the United States are small, local projects that lack controversy. Yet consider what dams, whether controversial or not, across our great country do every day for millions of people. Along the Mississippi, 70% of America's grain exports are barged to the Gulf of Mexico.

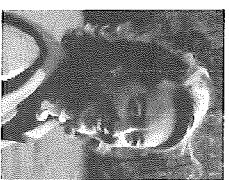
Dams support 55 million irrigated acres of crop and pasture (mostly in the arid West). Dams and reservoirs carry water to millions of people through canals and aqueducts. Dams regulate excess water, which helps communities avoid billions of dollars in flood damage.

With dams, however, come environmental concerns such as fish passage, changes to water quality, and altered habitats. Investments in dam improvements have boosted fish survival and made generating electricity with water more efficient than any other form of generation. The challenge for any community is to balance the economic, environmental, and social considerations in utilizing dams. Today's choices often reflect the values, needs, wealth, and options of different communities and countries. It should be no surprise that in a world where 1.7 billion people are without electricity, hydropower is being developed in 80 countries.

With recent emphasis being placed on global warming, dams that generate electricity become an even more important part of our future. Like wind, solar, and geothermal, dams harness a renewable “fuel”—flowing and falling water—to generate electricity. In the process, the air stays clean and there are no toxic by-products. Using the water in our rivers to generate electricity means as a nation we are not subject to disruptions from foreign suppliers, cost fluctuations, and transportation issues. Our energy supply is domestic and secure.

Our challenge is to make decisions that embrace what research, sound science, technological innovation, and engineering prowess offers. We can embrace these things while also staying true to our historic and evolving cultural, environmental, and economic values. We owe it to future generations to make thoughtful, responsible policy choices about dams that affect not only our way of life, but theirs.

The Case for Dam Removal



Sara Nicholas wrote this essay while employed by American Rivers and now works for the state of Pennsylvania. She has a master of science degree in environmental science from the Yale School of Forestry.

The dams currently in existence in the United States were built to provide a variety of services, including flood control, water supply, and hydropower, which runs mills and generates electricity. Although many dams continue to provide a useful service, large numbers are considered obsolete, providing no direct

economic, safety, or social function. For example, many mill dams continue to stand across streams and rivers 100 to 200 years after the mill they powered went out of operation or was torn down. These dams should be considered for removal.

Regardless of size, all dams harm riparian environments. Dams block the free flow of water down a stream corridor and create a pool, or impoundment, behind them—an artificial lake in the middle of a stream community. Impounded waters often divide into layers by temperature and depth, with heated waters in the upper layer and oxygen-poor cooler water in the lower layer. The macroinvertebrates that fish depend on for food cannot survive under these lake conditions. Carp and

non-native lake fish that can survive in hotter and oxygen-poor waters often displace trout and other cold-water stream species. Dams block the movement of migratory fish and other aquatic species, preventing them from reaching upstream areas to feed, spawn, and successfully reproduce. Dams also block river sediments that would normally travel downstream and replenish beaches or gravel stream bottoms, where most macroinvertebrates live and where fish spawn.

Rivers are dynamic systems. They move within floodplains, exchanging nutrients, sediments, and interacting on many levels. When dams interrupt that exchange, river functions are impaired, and the fish and wildlife dependent on free-flowing river systems do not thrive as well. Once a dam has outlived its utility, it makes great sense to restore the river back to its original condition.

Review Questions

- On what points do you think the authors agree? On what points do they seem to disagree?
- Describe at least one benefit that you think would result from following each author's recommendations. Describe any harm you think might result.

Further Research

Northwest RiverPartners

<http://www.nwrivertpartners.org>

National Hydropower Association

<http://www.hydro.org>

American Rivers

<http://www.americanrivers.org>

Building Big: The Dam Challenge

<http://www.pbs.org/wgbh/buildingbig/dam/challenge/index.html>

Elwha dam removal gets final go-ahead

http://seattletimes.nwsource.com/html/localnews/2001998230_elwha06m.html

Friends of the Earth: River Restoration

<http://www.foe.org/camps/reg/nw/river/index.html>

- What are the benefits of hydropower? What are the environmental impacts?

- Describe some of the strategies that the actors featured in the above Websites are employing to pursue their policy goals. Which strategies have the greatest potential success, and why?

- Assess the dam removal success stories featured in the above Websites. What factors, strategies, and approaches account for the greatest successes?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?

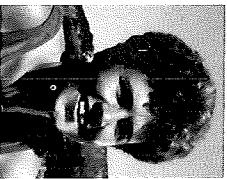


VIEWPOINTS

MARINE CONSERVATION

Do marine reserves and other forms of no-fishing zones provide an effective way to address problems facing the ocean's biodiversity and fisheries?

Marine Reserves Restore Ecosystems



Jane Lubchenco is a professor of marine biology and zoology at Oregon State University. She works with policymakers, business leaders, private foundations, religious leaders, other scientists, governmental and nongovernmental organizations, and students to help figure out how to make a transition to sustainability. She is a member of the National Academy of Sciences, and Co-founder of the Leopold Leadership Program, PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans), and COMPASS (Communication Partnership for Science and the Sea). She studies coastal marine ecosystems around the world.

Marine reserves are a powerful tool for protecting and restoring marine ecosystems. They are successful because they protect not only species but also habitats. Also called “no-take” areas, marine reserves are areas of the ocean that are completely protected from extractive or destructive activities. In the past, there were innumerable naturally recurring marine reserves around the oceans—places that were too far from land, too deep, or too rocky to fish. Modern technology systematically eliminated those reserves. Today we protect far less than 1% of the oceans in established reserves.

Recent scientific studies have demonstrated that reserves provide a clear benefit to conservation of marine organisms. An analysis of peer-reviewed scientific studies on more than 124 reserves around the world showed that on average, biomass increased 446%, abundance increased 166%, average individual size increased 289%, and diversity increased 21% inside reserves. These significant increases occurred in both temperate and tropical reserves.

It is especially important to protect large individuals of marine organisms, which produce disproportionately more offspring than smaller ones. For example, a 37-cm (14.6-in.) vermilion rockfish produces 150,000 young, whereas a 60-cm (23.6-in.) rockfish produces 1.7 million young! Allowing

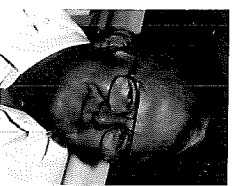
individuals to get large is one of the best ways to maintain healthy populations or to recover depleted ones. Because most fisheries target the very large individuals, protecting some of them in reserves can greatly enhance the likelihood that there will be sufficient new young to replenish the population.

Modeling results and an increasing number of field studies indicate that reserves can also substantially benefit many fisheries. The benefit comes from both spillover (fish or invertebrates moving away from the reserve) and export (larvae produced inside the reserve and transported away by currents). However, not all species will recover immediately when a reserve is established. Species that grow slowly and reproduce late will need longer to colonize and recover.

Networks of marine reserves, connected by the movement of organisms, are likely to provide the best combination of conservation and fishery benefit. A network provides protection for a large total area and a long perimeter over which organisms can escape to reseed adjacent areas. Networks can also be designed to accommodate areas where other activities (fishing, recreation) are desired.

Natural science and social science studies of marine reserves are an active and exciting area of investigation. Many countries and states have active processes establishing, monitoring, and evaluating new networks of reserves. Australia has set aside 33% of the Great Barrier Reef Marine Park Authority in a network of marine reserves. California has recently established networks of marine reserves and marine protected areas (areas that allow some kinds of fishing but are managed for conservation goals) in the central coast and has a process in place for designating similar networks in other areas of the state's coastal waters.

Networks of reserves are not a panacea—they need to be coupled with good fishery management and pollution control—but marine reserves are one of the most promising tools available for solving the problems plaguing ocean environments today.



Michael Leach is past president of the International Game Fish Association (IGFA). He has written the conservation column for *Marlin Magazine* for the past nine years. He is a freelance outdoor writer and fishing tournament director.

If you close off part of the ocean from all forms of “take,” there will obviously be more fish in the

“No-Fishing” Zones Do Not Prevent Overfishing

protected area. That is just common sense. However, a major problem with our oceans is severe overfishing. Fish are being killed faster than they can replenish themselves. There is a simple way to improve this situation—stop killing so many fish.

“No-fishing” zones don't accomplish this. What they do is to shift the fishing pressure from the preserve to another area. When American bison were being destroyed by market hunters, would the solution have been to put aside a large ranch where the bison were protected and tell the market

hunters they could hunt everywhere but on the ranch? Of course not. Anything short of reducing the number of fish being killed, such as marine reserves, not only won't solve the problem, but also may give a false impression that something is being done, thus delaying action to actually solve the problem.

There are many traditional fishery management tools that can be used to prevent overfishing. These tools include bag limits, size limits, slot limits, closed seasons, protected species, and catch-and-release-only species. For commercial fishermen there are quotas, gear restrictions, trip limits, and limited entry, plus all the management tools listed above for recreational anglers.

A major problem for fishery managers has been politics. Commercial fishing interests have very effective lobbyists who have been instrumental in preventing or delaying needed management restrictions. If lobbying fails, they often challenge regulations through the court system. The result is management regulations that are not restrictive enough. Marine reserves will not solve this problem.

In cases where remote, pristine areas are meant to be preserved, perhaps marine reserves allowing only catch and release could be effective. Examples of this are the remote reefs in northern Hawaii and some snapper spawning areas far west of Key West, Florida. However, "no-fishing" zones by themselves will not rebuild fisheries.

Review Questions

- Based on your interpretation of the essays, are marine reserves most effective for (a) protecting biodiversity, (b) rebuilding fisheries, or (c) both? Explain your answer.
- According to Michael Leach, "Anything short of reducing the number of fish being killed, such as marine reserves, not only won't solve the problem, but also may give a false impression that something is being done, thus delaying action

to actually solve the problem." Do you agree with this statement? What strategies might help prevent this problem?

- The debate surrounding marine reserves and fisheries management involves a range of stakeholders. List four categories of stakeholders. Which constituencies might collaborate to accomplish their policy goals, and what strategies would they pursue?

Further Research

NOAA's National Ocean Service
<http://www.oceanservice.noaa.gov>

Pacific Coast Federation of Fishermen's Associations: *Marine Protected Areas and Marine Reserves*
<http://www.pcffa.org/MPA.htm>

United Nations Environment Programme: *World Conservation Monitoring Centre*
<http://www.unep-wcmc.org>

PISCO: *The Science of Marine Reserves*
<http://www.piscoweb.org/outreach/pubs/reserves>

The Great Barrier Reef Marine Park
<http://www.gbrmpa.gov.au>

California Department of Fish and Game: *Marine Life Protection Act Initiative*
<http://www.dfg.ca.gov/MRD/mlpa>

- How well are the strategies, policies, and/or protected areas described by the sources listed working to protect marine biodiversity and rebuild fisheries? Provide three examples to illustrate your response.
- Drawing from the essays as well as the Web sources, put yourself in the role of a fisherman who supports the marine reserves concept. Explain the rationale behind your support. Next, put yourself in the role of a fisherman who opposes the concept. Explain your rationale.
- Are the sources provided reliable?
- Is there bias or an agenda to any of the sources providing the information?
- What further sources can be explored for the purpose of obtaining additional (unbiased) information?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?



OUTDOOR AIR POLLUTION

Is government regulation the most effective policy approach to reduce outdoor air pollution?

VIEWPOINTS

Government Regulation is Essential to Reducing Air Pollution



John Walke is a senior attorney and the Clean Air Director with the Natural Resources Defense Council in Washington, D.C., where he directs the organization's clean air litigation, lobbying, and general advocacy. Mr. Walke was formerly an air pollution attorney with the U.S. Environmental Protection Agency's Office of General Counsel, and before that, an attorney with a law firm.

Government regulation is the most effective approach for reducing air pollution. This is made clear given the nature of that pollution, the economics of pollution source behavior, and the proven effectiveness of regulation and ineffectiveness of non-regulatory approaches.

Air pollution does not respect fence lines or state borders. Its control requires coordinated action and authority that only governments can provide. Air pollution is also a classic result of market failure; there is little or no economic incentive for individual or collective polluters to pay for the costs of pollution abatement rather than impose those costs upon the public and the commons. These problems are only amplified when air pollution is transported hundreds or thousands of miles; when its origins are unknown and its effects diffuse; and when its health hazards result from very low concentrations, through cumulative exposures, with potentially long latency periods.

Government regulation of air pollution at its source, with rigorous monitoring, reporting, and enforcement, addresses these problems most effectively and cost-effectively. Such regulation can occur through traditional performance standards, such as mandatory pollution limits in permits or rules, or through market-based approaches to regulation, such as the trading of air pollution credits. Since its passage in 1970, the federal Clean Air Act has cut emissions of the six primary air pollutants in half while gross domestic product has increased over 150 percent. From 1970 to 1990, the law resulted in benefits with a mean estimate of \$22 trillion compared to actual costs of one-half trillion dollars.

By contrast, voluntary approaches to air pollution control are proven, repeated failures. A voluntary program promoted by then-Texas-Governor George W. Bush reduced emissions by less than one percent and was repealed by the legislature in favor of regulation that has proven far more effective. An EPA-administered, voluntary global warming program has resulted in half the participants setting no emission reduction targets, one-quarter slowing emissions growth but *increasing* actual emissions, and only one-quarter even committing to reducing emissions.

Government regulation has proven most effective for regulating conventional air pollution and is now essential to reduce global warming pollution as well.

Want Cleaner Air? Embrace Capitalism



Jerry Taylor is a senior fellow at the Cato Institute.

Contrary to popular belief, it is businessmen—not government bureaucrats or environmental activists—who deserve most of the credit for the environmental gains over the past century and who represent the best hope for a greener tomorrow.

Environmental amenities, after all, are luxury goods. America—like many developing nations today—had no real environmental movement until living standards rose sufficiently that we could turn our attention from simply providing food, shelter, and a reasonable education to higher “quality of life” issues. The richer you are, the more likely you are to be an environmentalist. And people wouldn't be rich without capitalism. Wealth not only breeds environmentalists, it begets environmental quality. There are dozens of studies showing that,

as per capita income initially rises from subsistence levels, air and water pollution increases correspondingly. But once per capita income hits between \$3,500 and \$15,000 (depending on the pollutant), the ambient concentration of pollutants begins to decline just as rapidly as it had previously increased. This relationship is found for virtually every significant pollutant in every single region of the planet.

The argument that wealth creation, not regulation, is the primary driver of environmental quality is supported by the fact that pollution declines in the United States generally predated the passage of laws mandating pollution controls. In fact, for most pollutants, declines were greater *before* the federal government passed its panoply of environmental regulations than after the EPA came upon the scene.

Much of this had to do with individual demands for environmental quality. People who could afford cleaner-burning furnaces, for instance, bought them. People who wanted recreational services spent their money accordingly, creating

profit opportunities for the provision of unspoiled nature. Property values rose in cleaner areas and declined in more polluted areas. The market will supply whatever people are willing to spend money on. And when people are willing to spend money on environmental quality, the market will provide it.

Meanwhile, capitalism rewards efficiency and punishes waste. Profit-hungry companies found ingenious ways to reduce the natural resource inputs necessary to produce all kinds of goods, which in turn reduced environmental demands on the land and the amount of waste that flowed

through smokestacks and water pipes. This trend was magnified by the shift away from manufacturing to service industries, which characterizes wealthy, growing economies. The latter are far less pollution-intensive than the former. But the former are necessary prerequisites for the latter.

Capitalism has saved more lives threatened by environmental pollution than all the environmental organizations combined. This is not to say that government regulations haven't had an impact or aren't sometimes worthwhile. It is to say, however, that free markets are the best friends the Earth could have.

Review Questions

- Is there a “middle ground” between these two perspectives? If so, describe its key points. Are there other alternative viewpoints?
- Assess the possible consequences for air quality of: (a) fewer regulations and (b) capitalism with fewer restraints. Which is your preferred scenario, and why?

- Each author provides examples to support his argument. Can you think of examples of other environmental problems that were resolved primarily through government regulation? How about examples of environmental benefits produced as a result of greater wealth or capitalism?

Further Research

Foundation for Research on Economics & the Environment
<http://www.free-eco.org>
Natural Resources Defense Council: Air
<http://www.nrdc.org/air>
Southern Company: Air
<http://www.southerncompany.com/planetpower/air.asp>
The Property and Environment Research Center
<http://www.perc.org>
U.S. Environmental Protection Agency: Office of Air & Radiation
www.epa.gov/oar
Environmental Defense: Air Quality
<http://www.environmentaldefense.org/page.cfm?tagid=97>

- Review the organizational mission statements or institutional descriptions (usually found in the “About” section) provided in the six Websites listed above. Using examples, describe how the mission statements reflect differing values and approaches to addressing environmental problems.

- Identify specific policy, regulatory, or market-based strategies or techniques that exemplify each organization’s mission.
- Describe two approaches to addressing air pollution that are described within the Web sources. If these approaches have been implemented, have they been effective? What accounts for their effectiveness or ineffectiveness? If they have not yet been implemented, do you think they will be effective? Why or why not?
- Are the sources provided reliable?
- Is there bias or an agenda to any of the sources providing the information?
- What further sources can be explored for the purpose of obtaining additional (unbiased) information?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?

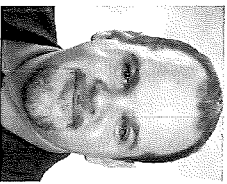


VIEWPOINTS

RESPONDING TO CLIMATE CHANGE

Must regulations be part of governmental climate change policies?

Carbon Taxes, Not Regulations, Are the Best Climate Policy



Kenneth P. Green is a Resident Scholar at the American Enterprise Institute where he studies environmental policy with an emphasis on climate change and energy policy. Trained as an environmental scientist, Ken has studied environmental policy for over 15 years, his ideas appearing frequently in the media, and he has published a broad range of materials on both U.S. and Canadian environmental policy.

Evidence strongly suggests the Earth's climate is warming, and humanity's greenhouse gas emissions are responsible for a significant share of that warming since the 1950s. Extrapolation of current trends suggests additional warming, with secondary environmental impacts such as sea level rise; increased frequency of floods and drought; heat waves; increased storm intensity; and so on. In response to these threats, many environmental advocates call for an unprecedented regulatory regime to control fossil fuel use, the major contributor to manmade global warming.

But there is widespread agreement among economists and public policy analysts that regulations are extremely inefficient approaches to managing environmental problems, particularly those such as climate change, where polluting activities span nearly all aspects of human life; cross all jurisdictional borders; have high levels of uncertainty with regard to costs and benefits; and impose differing costs and benefits. In one study of 24 major federal environmental, health, and safety regulations implemented from 1991 to 1998, for example, policy analysts Robert Hahn, Randall Lutter, and Kip

Viscusi found that only nine of the examined rules produced benefits greater than their costs. Even worse, although 11 of the rules fulfilled their purpose in reducing mortality, 13 of the rules actually led to increased mortality.

Such poorly designed regulations continue to surface. One need only consider recent regulations mandating ever-higher levels of corn-based ethanol in motor-vehicle fuel as an example. Corn-based fuel ethanol (the only major source available for the foreseeable future) requires massive amounts of fossil fuel combustion in production, and creates environmental problems such as land consumption, fresh water consumption, soil depletion, chemical pollution, formaldehyde emissions and increased ozone formation. Within only a few years of implementation, corn-based fuel ethanol has raised food prices enough to significantly raise protein prices not only in the developed world, but in the developing world where it can least be afforded.

A far superior approach to greenhouse gas control lies in environmental tax reform: shifting tax revenues from productive activities (work, production) to consumptive or wasteful activities (carbon emissions). Taxing greenhouse gas emissions accomplishes several desirable goals in one stroke: It creates an economy-wide incentive to reduce greenhouse gas emissions, is largely transparent, and operates within pre-existing institutional frameworks adept at fraud prevention. It produces revenue that can be used to reduce other taxes in order to offset the economic harm of higher energy prices; is predictable and adjustable; shifts some revenue generation from production to consumption; and can be implemented internationally if desired.

Using Carrots and Sticks to Reduce the Risks of Climate Change



Internationally recognized as one of the world's leading experts in climate change, Stephen H. Schneider is the Melvin and Joan Lane Professor for Interdisciplinary Environmental Studies, Professor of Biological Sciences, Professor (by courtesy) of Civil and Environmental Engineering and a Senior Fellow in the Woods Institute for the Environment at Stanford University.

Continuing a "business as usual" emissions trajectory in which we keep dumping our smokestack and tailpipe waste into the atmosphere as if it were an unpriced sewer raises serious concern for managing risk, since the likelihood of increased global warming beyond a few degrees before the end of this century (with negative impacts) is a better-than-even

bet. Few security agencies, businesses, or health institutions would accept such high odds of potentially dangerous outcomes without implementing hedging strategies to protect themselves, societies, and nature from such risks. This is a planetary scale extension of the risk-averse principles that precipitate investments in insurance, deterrence, precautionary health services, and business strategies to minimize downside risks of uncertainty.

I recommend a portfolio of strategies—a mix of regulatory and financial incentives and private sector initiatives combining carrots and sticks—to reduce the risks of climate change.

We need disincentives to phase out reliance on energy sources with high emissions consequences like coal burning at a massively increasing scale and incentives to produce more research, development, and market share for low-emissions-producing or consuming energy-related technologies,

including both supply options and demand-side management with performance standards for appliances, automobiles, and buildings—mandated by law to be effective.

We need public-private partnerships to foster learning-by-doing projects to make renewable energy systems cheaper and more available and explore the cost and safety of alternatives. What's required is not just investment in R&D but rather investment in Research, Development and Demonstration—learning-by-doing—whereby prototype systems are developed and deployed to compete for future market share based on their improved performance. There is little learning-by-doing without the “doing.”

Similarly, there can be little return on investment until there is investment. Policies need to focus on incentives to promote such investments. However, “carrots” like public support of

private ventures in cleaner technologies alone won't suffice—penalties must also be implemented for dumping tailpipe and smokestack wastes into the atmosphere. With no clear disincentives, this dumping will likely continue to increase. Phasing in “dumping fees” over time is essential to reduce emissions and stimulate private investment in greener alternatives. We'll need either a carbon emission fee or a cap-and-trade program, which allows those who must emit under the cap to find the lowest cost options to meet their obligations. Although some think everybody should have to meet their own obligations, rather than paying someone else to do it for them, as long as emissions reducers are responsible for paying their share of the cuts and their trades are real cuts in emissions, then I support doing it at lower costs. Trading will increase political buy-in to climate policy by getting to a reduced emissions target more cost-effectively.

Review Questions

- Consider the following statement: “. . . regulations are extremely inefficient approaches to managing environmental problems. . .” Do you agree with this statement? If so, provide examples. If not, what types of regulations would be most effective in addressing climate change?
- Assess the possible consequences of each essayist's argument. Which argument would result in the greatest benefit? The greatest harm?

Further Research

How Should the United States Regulate Greenhouse Gas Emissions?
http://www.aei.org/publications/filter.all.pubID.26438/pub_detail.asp

ClimateChange Net

<http://www.climatechange.net>

Evaluating the Kyoto Approach to Climate Change

http://www.reason.org/pb_kyoto.pdf

RealClimate

<http://www.realclimate.org>

What's Best—Emission Reduction or Adaptation and Sequestration?

http://www.aei.org/publications/pubID.24949/pub_detail.asp

Climate Change: Caps vs. Taxes

http://www.aei.org/publications/filter.all.pubID.26286/pub_detail.asp

- The essayists recommend a variety of policy approaches to address climate change—regulations, taxation, incentives, caps and trading, etc. Using examples, describe how these types of approaches have been applied to other environmental problems that have been introduced in previous chapters of the text or that you have discussed previously in your course. What “lessons learned” from these experiences can be applied to the climate change problem?

- The authors and Web sources represent different institutions with different missions. Describe the institutional mission that is most closely associated with each author and Website. What are their similarities and differences? In the case of climate change, how might an institutional mission influence a recommended policy approach, if at all?

- What major stakeholders are represented in the climate change debate? How might these stakeholders employ some of the information provided by the Websites to achieve their policy goals?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?



FOSSIL FUELS

Should we drill for oil in the Arctic National Wildlife Refuge?

Dedicate 8% to Support Domestic Energy



Ken Boyd received a Bachelor's and a Master's degree in geology from Rensselaer Polytechnic Institute in Troy, N.Y. He worked for both Gulf Oil and Marathon Oil as an exploration geophysicist and was the Director of the Division of Oil and Gas for the State of Alaska from 1995 to 2001. He is currently working as an oil and gas consultant.

For the past 30 years, Alaska's oil has been important to the people of Alaska and the nation as a whole. Currently Alaska is supplying about 15% of our nation's domestic oil, nearly one of every seven barrels. This is down from over 20%, but thanks to new technology and a continuing commitment to explore and drill, that number will stay firm for about six more years. The Coastal Plain of the Arctic National Wildlife Refuge (ANWR) is estimated to contain, on average, more than 10 billion barrels of oil. If true, this will more than double the amount of oil Alaska is currently producing, thus decreasing our nation's dependence on foreign oil imports. Only drilling will confirm whether this oil will be found in commercial quantities.

Yet there are those who decry exploring and drilling the Coastal Plain. One common lament is that ANWR is "the last great wilderness." This ignores the fact that 92% of ANWR is already in wilderness and refuge status. There are those who would prefer to ignore the Congressional mandate to evaluate the 1002 area (the only section of ANWR being considered for

oil development) and simply lock it up as wilderness. While putting the 1002 area into wilderness status may placate those of that view, it does not remove the fact that people live on the Coastal Plain. For example, the Inupiat Eskimo people who live in the village of Kaktovik on Barter Island largely support drilling and resent their home being called "wilderness." This is where they have lived for centuries, and they subsist and recreate on this land. A political designation of the 1002 area as "wilderness" will not make it so.

The federal government currently owns about 235 million of Alaska's 365 million acres, about 64% of the state. That's bigger than the entire state of Texas. It's larger than Washington, Oregon, and California combined. Fifty-eight million of these acres are designated as "official" wilderness, which accounts for 56% of the nation's total. About 40% of Alaska's land is in some sort of protected status, including wilderness land. Alaska has the largest state park system in the country. The notion that Alaska is somehow "short" on wild places is simply wrong. If Alaska's wilderness lands were made into a state, it would be the 11th largest in the nation.

A comprehensive energy plan will be composed of many parts. Conservation is one part, as are potential alternative sources of power. Ignoring our own domestic oil sources denies us the ability to achieve a greater measure of energy self-sufficiency and security. There is no single solution, but opening the Coastal Plain of ANWR to responsible oil development clearly needs to be an important part of the equation.

Drilling in the Arctic Refuge Is Not a Solution to Our Energy Problems, It's a Distraction



Karen Wayland is the Natural Resources Defense Council's legislative director and an adjunct professor at Georgetown University. Dr. Wayland, who holds a dual Ph.D. in geology and resource development, was a legislative fellow for Sen. Harry Reid (D-Nev.) on nuclear waste, water, energy, and Native American issues before joining NRDC's staff.

The Arctic National Wildlife Refuge is one of the last unspoiled wild areas in the United States. Its 1.5-million-acre coastal plain is rich in biodiversity, home to nearly 200 species, including polar bears, musk oxen, caribou, and millions of migratory birds.

There is no way to drill in the refuge without permanently harming this unique ecosystem or destroying the culture of

the native Gwich'in people, who have depended on caribou for thousands of years. The little oil beneath the refuge is scattered in more than 30 small deposits. To extract it, roads, pipelines, air strips, and other industrial infrastructure would be built across the entire area.

Drilling the Arctic Refuge would do nothing to lower gas prices or lessen our nation's dependence on imported oil. According to the U.S. Geological Survey, the refuge holds less economically recoverable oil than what Americans consume in a year, and it would take 8-10 years for that oil to reach the market. A recent U.S. Energy Department report found that oil from the Arctic Refuge would have little impact on the price of gasoline, lowering gas prices by less than two pennies—in 2025.

If we boosted the fuel economy performance of our cars and trucks just 1 mile per gallon annually over the next

15 years, we would save more than 10 times the oil that could be recovered from the refuge. We have the technology today to accomplish that goal.

The United States has 3% of the world's oil reserves but consumes 25% of all oil produced each year. We cannot drill

our way to lower gas prices. By focusing on efficiency and alternative fuels, we can improve our energy security and preserve the Arctic Refuge for future generations.

Review Questions

- Do you think it is worth drilling for oil in ANWR? Why or why not?
- List other strategies to reduce America's dependence on foreign oil beyond drilling in ANWR. Which strategies hold the most promise, and why?
- Consider the two contradictory statements:

“Drilling the Arctic Refuge would do nothing to lower gas prices or lessen our nation's dependence on imported oil.”

“The Coastal Plain of ANWR is estimated to contain, on average, more than 10 billion barrels of oil. If true, this will more than double the amount of oil Alaska is currently producing, *thus decreasing our nation's dependence on foreign oil imports.*”

What information would you seek out to determine which statement is the most accurate?

- What other alternative viewpoints might there be to this issue?

Further Research

Arctic National Wildlife Refuge

<http://www.anwr.org>

Natural Resources Defense Council: Arctic Refuge 101

<http://www.nrdc.org/land/wilderness/arcticrefuge/factsheets.asp>

Environmentally Responsible Energy Production in ANWR

<http://www.doi.gov/anwr>

Battle Over Arctic Refuge Drilling Heats Up

<http://www.ens-newswire.com/ens/mar2003/2003-03-12-10.asp>

USGS: ANWR 1002 Area

<http://energy.usgs.gov/alaska/anwr.html>

Natural Resources Defense Council: Energy

<http://www.nrdc.org/energy>

assigned the task of writing a position paper on drilling in ANWR, which predictions would you feel comfortable citing as credible assessments? Explain how you would use these assessments to argue your point.

- Peruse the Web sources listed with the goal of checking some of the facts presented in the two essays. Using data referenced within the Web sources, explain how these sources either support or refute specific statements. In addition, assess the credibility and legitimacy of the sources you have cited.
- Is there bias or an agenda to any of the sources? Explain your answer.
- What further sources can be explored for the purpose of obtaining additional (unbiased) information?

- Many of the Web sources listed above make predictions or assessments of the amount of oil that could be recovered from oil drilling in ANWR, as well as its role in reducing America's energy dependence. If you were a policy analyst

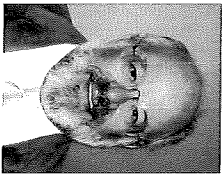
Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?



NUCLEAR POWER

Should we revitalize and expand our use of nuclear power?

Nuclear Power: A Deadly and Needless Energy Source



Karl Grossman is a professor at the State University of New York College at Old Westbury and an investigative journalist who has authored books and written and hosted television programs about nuclear power.

Nuclear power is deadly and unnecessary. Disasters like the 1979 Three Mile Island nuclear plant accident, the catastrophic Chernobyl plant explosion in 1986—and worse—are what will happen regularly if the United States and other nations move anew to build nuclear power plants.

The disastrous impacts of nuclear power are acknowledged in government documents. The U.S. Nuclear Regulatory Commission (NRC) conducted a study in the 1980s, *Calculation of Reactor Accident Consequences 2*, estimating for each U.S. nuclear plant the “peak early fatalities,” “peak early injuries,” “peak cancer deaths,” and “costs in billions.” For the Indian Point 3 plant near New York, it calculated an accident causing 50,000 “peak fatalities,” 141,000 “peak early injuries,” 13,000 “peak cancer deaths,” and \$314 billion in property damage in 1980 dollars. The cost of a part of America left uninhabitable for millennia would be nearly \$1 trillion in today’s dollars.

Nuclear power is so dangerous that there’s a law called the Price-Anderson Act that limits a plant owner’s liability for an accident, now at \$10 billion. If nuclear power is so safe, why is there a need for the Price-Anderson Act?

The likelihood of an accident is far from “almost impossible” as atomic promoters once claimed. The NRC has conceded

a 45% probability of a severe core melt accident every 20 years among the 100 U.S. atomic plants.

And it doesn’t take an accident for a nuclear plant to spread radioactivity and contaminate and kill. There are “routine emissions” of radiation at every plant, as well as tons of lethal radioactive waste that each plant produces annually, which must be isolated for thousands to millions of years. Moreover, in an age of terrorism, nuclear plants are sitting ducks. Al-Qaeda attack plans that target nuclear plants have been found.

Atomic promoters currently seeking a “revival” of nuclear power argue that nuclear plants don’t produce greenhouse gases and contribute to global warming but, in fact, the overall “nuclear cycle”—which includes uranium mining and milling, enrichment, fuel fabrication, and disposal of radioactive waste—produces significant greenhouse gas emissions that contribute to global warming. Further, they like to claim that nuclear power would replace increasingly expensive imported oil when, in fact, only three percent of electricity in the United States is generated with oil. Nuclear power has nothing to do with oil or gas.

We need not take the colossal risk of atomic power. Safe, clean, renewable energy technologies—wind, solar, hydrogen, geothermal, tidal and hydropower, among many others—are ready. They’re sustainable and here today, and they can unhook us from fossil fuels without threat to life.

Let’s have energy that won’t kill us and our children—energy we can live with.

Nuclear Power: A Central Necessity for Sustainable Global Development



John Ritch is director general of the World Nuclear Association and president of the World Nuclear University partnership. From 1994 to 2001, he was U.S. ambassador to the International Atomic Energy Agency and several other U.N. organizations. Previously, he served for 22 years as an advisor to the U.S. Senate Foreign Relations Committee. He was educated at the U.S. Military Academy and Oxford University.

We live in a world that has only *begun* to consume energy. During the next 50 years, as Earth’s population expands from 6.5 billion toward 9 billion, humanity will consume more energy than the combined total used in all previous history.

With carbon emissions threatening human health and the stability of the biosphere, the security of our world requires a massive transformation to clean energy. This crisis is global. Today India and China are gaining rapidly on Europe and America in per capita energy consumption and climate-endangering emissions.

Renewable energy such as solar, wind, and biomass can help. But only nuclear power offers clean energy on a massive scale.

Some “environmental” groups still spread misinformation about nuclear power. But here are the facts:

- **Safety.** Based on 12,500 reactor-years of experience, nuclear power is the safest large-scale source of energy. The Chernobyl reactor used Soviet technology with no resemblance to today’s technology.

- **Sustainability.** Uranium, the essential nuclear fuel, is plentiful, and supplies will be available for centuries.
- **Waste.** Nuclear power extracts enormous energy from tiny amounts of uranium. The small amounts of waste can be safely managed and placed in scientifically validated deep geological repositories with no long-term environmental harm.
- **Transport.** Nuclear materials are packaged in strong, meticulously engineered containers. In both national and international commerce, thousands of shipments, covering many millions of miles, have occurred without a single significant accident.
- **Proliferation.** Atomic bombs result from sophisticated, government-supported military programs, not from civil nuclear power. If and when such threats appear, the international community must develop a specific response.

Review Questions

- Consider the following pairs of contradictory statements. Create a research plan outlining the steps you would you take to decide which argument you agree with. What additional information would you need, and how would you find it?

Pair #1

“Safe, clean, renewable energy technologies—wind, solar, hydrogen, geothermal, tidal and hydropower, among many others—are ready. They’re sustainable and here today, and they can unhook us from fossil fuels without threat to life.”

“Renewable energy such as solar, wind, and biomass can help. But only nuclear power offers clean energy on a massive scale.”

Further Research

Nuclear Information and Resource Service
<http://www.nirs.org>

Nuclear Age Peace Foundation
<http://www.wagingpeace.org>

Beyond Nuclear

www.beyondnuclear.org

World Nuclear Association

<http://www.world-nuclear.org>

World Nuclear University

<http://world-nuclear-university.org>

World Nuclear News

<http://www.world-nuclear-news.org>

- The Website of the Nuclear Information and Resource Service (www.nirs.org) offers a video debate on the pros and cons of nuclear energy. How do the perspectives of the panelists differ or build on the perspectives of the essayists

- **Terrorism.** Nuclear power plants are among the most robust and well-protected structures ever built. For a terrorist, they represent perhaps the least tempting targets in a modern industrial society.
- **Cost.** Nuclear energy is already cost-competitive, and trends point to falling nuclear prices and rising fossil prices. A carbon tax would add to the nuclear advantage.
- **Global Usability.** Nuclear power is operating in countries representing two-thirds of total human population, and usage is expanding.

An informed public debate—focused on facts rather than myths—will demonstrate that nuclear energy is indispensable to sustainable global development.

Pair #2

“Disasters like the 1979 Three Mile Island nuclear plant accident, the catastrophic Chernobyl plant explosion in 1986—and worse—are what will happen regularly if the United States and other nations move anew to build nuclear power plants.”

“Based on 12,500 reactor-years of experience, nuclear power is the safest large-scale source of energy. The Chernobyl reactor used Soviet technology with no resemblance to today’s technology.”

- Assess the possible consequences of implementing policies based on each argument. Which approach would reap the greatest benefits to society? Which would cause the greatest harm?

above? How does this debate further enhance your understanding of the issues?

- Several of the Websites listed above include arguments for and against the use of nuclear power. Which arguments are most convincing, and why?
- Which Web sources are the most (and least) credible or reliable? Explain how you came to this determination by perusing the sites.
- Do any of the Web sources reflect a specific bias or agenda? Provide examples.
- What further sources can be explored for the purpose of obtaining additional (unbiased) information?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research? Explain your answer.

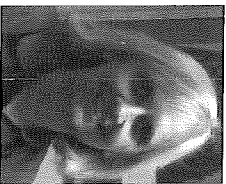


HYDROGEN

VIEWPOINTS

Does a “hydrogen economy” promise to reduce fossil fuel dependence, expand renewable energy, and fight global warming?

The Road to a Hydrogen Economy



Dr. Joan Ogden is Professor of Environmental Science and Policy at the University of California, Davis and Co-Director of the Sustainable Transportation Energy Pathways Program at the campus's Institute of Transportation Studies.



Daniel Sperling is Professor of Civil and Environmental Engineering and Environmental Science and Policy, and Director of the Institute of Transportation Studies at the University of California, Davis. He is also a member of the California Air Resources Board.

In the near term, improving fuel economy could slow the rise in oil use and greenhouse gas emissions from cars and trucks. But in the longer term, the transportation sector needs to switch to low-carbon, non-petroleum fuels. Hydrogen is one of the only long-term transportation fuels that could radically reduce greenhouse gas emissions, while simultaneously cutting air pollutant emissions and oil use to nearly zero.

About 97% of today's transportation energy comes from oil. Using hydrogen would reduce oil dependence by allowing us to use a variety of widely available resources for transportation. Hydrogen can be made with zero or near-zero emissions from renewable sources like biomass, solar, wind, hydropower, and geothermal, fossil fuels like natural gas or coal (with carbon capture and sequestration), and nuclear energy.

Technologies that use hydrogen, notably fuel cells, are making rapid progress. Hydrogen fuel-cell vehicles build upon hybrid electric and battery electric technologies. These cars have several times the efficiency of today's conventional gasoline cars, and zero tailpipe emissions. Most major automakers

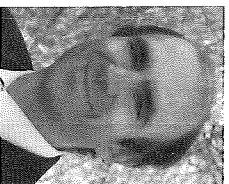
are developing hydrogen vehicles, investing hundreds of millions of their own dollars. Honda, Toyota, and GM have announced plans to commercialize hydrogen fuel-cell vehicles between 2012 and 2020.

In the past decade, the vision of a hydrogen-fueled future has gained momentum. Seventeen countries have announced national programs to develop hydrogen energy, committing billions of dollars in public funds. In North America, over 30 states and several provinces are developing regional road maps for hydrogen vehicles or “hydrogen highways.” Automakers and energy companies are working with governments to introduce the first fleets of hydrogen vehicles and refueling mini-networks in California, the northeastern United States, Europe, and China.

Hydrogen offers long-term societal benefits, but also faces a number of challenges before it could become a major fuel. While many of the technologies necessary to build a hydrogen energy system already exist, time is needed to develop emerging technologies, especially fuel cells for automotive use, mechanisms to store hydrogen on vehicles, and zero-carbon technologies for producing hydrogen. A new refueling infrastructure must be built to supply hydrogen to vehicles. Finally, consistent policies are needed to account for the large external costs of energy, especially global climate change, air pollution health damages, and oil supply insecurity. Such policies are instrumental to introducing more efficient, cleaner technologies like hydrogen.

Hydrogen is not a replacement for near-term measures like increasing fuel economy standards for gasoline cars. Even under the most optimistic assumptions, it would be several decades before hydrogen fuel-cell vehicle technologies could make a globally significant impact on reducing emissions and oil use. Even so, hydrogen could yield benefits far greater than those possible with efficiency alone. This underscores the importance of research, development, and demonstration of hydrogen technologies now, so they will be ready when we need them.

Hydrogen Without the Hype



Joseph Romm is a senior fellow at the Center for American Progress, where he oversees the blog *ClimateProgress.org*. He is author of *Hell and High Water: Global Warming—The Solution and The Politics* (William Morrow, 2007) and *The Hype About Hydrogen* (Island Press, 2004). Dr. Romm served as Acting Assistant Secretary at the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy during 1997 and Principal

Deputy Assistant Secretary from 1995 through 1998. He holds a Ph.D. in physics from MIT.

Hydrogen fuel-cell cars increasingly appear to be an environmental dead end. At the same time, the scientific consensus is strengthening that human-induced global warming may well be catastrophic. That's why Tony Blair committed Britain to “reduce our carbon dioxide emissions by 60% by 2050.”

We must start cutting emissions quickly. Yet even hydrogen advocate Dan Sperling wrote in 2004: "Hydrogen is neither the easiest nor the cheapest way to gain large near- and medium-term air pollution, greenhouse gas, or oil reduction benefits." Hydrogen is a misdirection of resources away from strategies that can achieve far larger benefits for far less money for decades to come.

When will hydrogen cars make sense? In January 2005, Bill Reinert, U.S. manager of Toyota's advanced technologies group, was asked when hydrogen fuel-cell cars would replace gasoline-powered cars or hybrids, and he replied, "If I told you 'never,' would you be upset?" The Director of MIT's Sloan Automotive Lab told Congress in mid-2005, "the total time to noticeable impact" for hydrogen fuel-cell cars "is likely to be more than 50 years."

Hydrogen cars are not a good use of renewables. A megawatt-hour of electricity from renewables like wind power, if used to make hydrogen for a future fuel-cell vehicle, would save 500 pounds less of carbon dioxide than the best *current* hybrids. That is less than the savings from using the same amount of renewable electricity to displace a future natural gas plant (800 pounds), and far less than the savings from dis-

placing coal power (2,200 pounds). And you don't need to build the expensive electrolyzer, hydrogen delivery infrastructure, and fuel-cell vehicle.

As a 2003 analysis in *Science* magazine concluded, hydrogen won't be close to a cost-effective climate solution "until CO₂ emissions from electricity generation are virtually eliminated." We just can't wait that many decades. Worse, a 2004 report from the European Union's Joint Research Centre found that hydrogen cars deployed anytime soon could well *increase* greenhouse gas emissions.

And any future excess zero-carbon electricity would be better used to charge the battery on a hybrid that can be plugged into the electric grid. Such a "plug in" hybrid can travel three to four times as far on a kilowatt-hour of renewables as a hydrogen fuel-cell car could, since it avoids the huge inefficiency of converting electricity to hydrogen and then *back* to electricity.

So we are at least several decades from a time at which serious investments in hydrogen cars or infrastructure makes sense environmentally. While we wait, we must push fuel efficiency and advanced hybrids. We should promote biofuels and hybrids that can be plugged into the electric grid, as discussed in my book, *The Hype about Hydrogen*.

Review Questions

- Do you agree that there exists a "hype" about hydrogen? If so, why do you think this hype exists? How might the "hype" advance or detract from the further development and use of energy conservation and renewables?

Further Research

The Hype About Hydrogen

<http://www.issues.org/20.3/romm.html>

The Car and Fuel of the Future: A Technology and Policy Overview

<http://www.energyandclimate.org/ewebeditpro/items/O79F7833.pdf>

Hydrogen Pathways Program, University of California, Davis

<http://hydrogen.its.ucdavis.edu>

United States Department of Energy: Hydrogen Fuel Cells and

Infrastructure Technologies Program

<http://www.eere.energy.gov/hydrogenandfuelcells>

H2 Mobility: Hydrogen Vehicles Worldwide

<http://www.h2mobility.org>

International Partnership for a Hydrogen Economy

<http://www.iphe.net/NewAtlas/atlas.htm>

- For each essay, extract and list the author's three key points. To what extent do these arguments differ? Are there areas of overlap?

- Based on your review of the essays and Web sources, describe the different types of energy-saving automobiles of the future. Which are the most promising, and why?
- What are other countries doing to promote hydrogen cars? Are these efforts ahead of or behind those of the U.S.? Why do you think this is the case?
- Now that you have reviewed the Web sources, go back to your lists of key points from the essays. What research and data can you find from the Websites to support or refute each point?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research?



VIEWPOINTS

HAZARDOUS WASTE

Has the Superfund program been a success?

A Long Way To "Cleanup"



Katherine Probst is a Senior Fellow at Resources for the Future, a non-partisan think tank in Washington, DC. Over the past twenty years, Ms. Probst has authored many reports on ways to improve the Superfund and other hazardous waste programs. She was the lead author of a report requested by Congress entitled *Superfund's Future: What Will It Cost?*

substances. This is actually a good thing, in that many organizations, both public and private (the federal government is a major player in terms of responsibility for Superfund sites), now take proactive measures to avoid future Superfund liability. Thus, Superfund's liability scheme has been extremely successful in accomplishing two of the original goals that Congress set forth when it enacted CERCLA in 1980—limiting the costs to the government of cleaning up sites and encouraging better management of hazardous substances in the future.

More challenging is how to determine the success of the actual cleanups conducted under the Superfund program. Superfund's cleanup standards are considered to be extremely protective. That said, our ability to actually "clean up" sites—that is, return them to an uncontaminated state—is severely limited. We just don't have the technology, at any cost, to remediate much of the contamination at Superfund sites. And, at many sites, cleanups take years, if not decades, to implement. Cleaning up contaminated groundwater, soils and sediments—especially when there are large volumes of contaminated media—is still a major technical hurdle. In evaluating the program's success, many tout the number of sites on the NPL where remedies have been constructed. As of May 25, 2007, 954 out of 1010—or 94% of non-federal sites—fell in this category. But completed construction is a far cry from cleanup standards being met. We still have a long way to go for Superfund sites to be truly "cleaned up."

The Superfund program is probably one of the most controversial federal environmental programs in the United States; it is the program many people love to hate. Many in the private sector decry the law's all-encompassing liability scheme, strict cleanup standards, and, they say, excessive cost. The flip side of all this, however, is that the law's liability scheme has been extremely effective in getting "responsible parties" to pay for cleanup. Approximately 70% of cleanups of sites on the U.S. Environmental Protection Agency's National Priorities List (NPL)—the list of sites where federal dollars can be spent on long-term cleanups) are paid for directly by private parties. This is much more efficient than having the government pay to clean up these sites, and then seek to recover what they have spent from those found liable.

There is another key benefit of the law's liability scheme—the very draconian nature of the liability standards that many detest has raised the cost of improper disposal of hazardous

Cleanup at a Cost



Michael W. Steinberg is Senior Counsel in the Litigation Practice Group resident in the Washington, DC office of Morgan, Lewis & Bockius LLP. His practice focuses on litigation, with special emphasis on the federal Superfund law and the numerous state cleanup programs based on Superfund.

When Superfund was enacted in 1980, we had no idea of how many sites there were, or how to go about cleaning them up. The original presumption was that a few hundred sites needed to be cleaned up to remove the legacy of industrial waste disposal practices. Today we know that hundreds of thousands of contaminated sites exist, most of them with fairly low levels of contamination. The varied sources of contamination include universities, hospitals, and—most especially—our federal, state, and local governments. As Pogo said in 1971, gazing sadly at a garbage heap, "We have met the enemy, and he is us."

Since 1980, EPA has developed institutional capability and expertise, ultimately establishing a program that operates fairly effectively and performs a critical function in society. Tens of thousands of sites have now been evaluated, short-term removal actions have been taken at several of those sites, and longer-term remedial actions are slowly being completed at the most severely contaminated sites. At most of these sites, American industry provides the leadership, technical resources, and funding to perform the required cleanup work. Unfortunately, Superfund does not evaluate sites based on the realistic risks they pose to human health. Risk assessments are based on assumptions that are conservative at best and implausible at worst (for example, "assume that a family lives at this oil refinery for 30 years and drinks only groundwater..."). Superfund's lack of realism about risk makes it extremely difficult to prioritize sites for cleanup or to allocate society's finite cleanup dollars. This also reinforces public fears.

Superfund was intended to tackle a limited number of sites posing major health risks, and to clean them up quickly. Today we know that relatively few sites pose risks of that magnitude. We also know that most contaminated sites cannot be cleaned up quickly. For example, most Superfund sites include contaminated groundwater. Despite the original hopes for universal removal and destruction of contaminants found in groundwater, it is often not technologically feasible—or economically sensible—to pursue the goal of making the groundwater drinkable.

Finally, Superfund's rigid cleanup standards make many cleanups inordinately costly, without achieving commensurate real-world benefits. This lack of cost-effectiveness is not some esoteric point of economic theory; it means we are literally wasting society's finite cleanup dollars. Superfund is primarily a program for the protection of public health, yet other government programs provide far greater health benefits relative to their costs.

Review Questions

- Do you think it is realistic or advisable for the Superfund program to have established such strict protective standards? Why or why not?
- Put yourself in the position of a policy maker who must develop a list of Superfund sites to be cleaned up, ranked in priority order. Assuming there exists a finite amount of

resources available for cleanup, how would you prioritize which Superfund sites *should* be cleaned up, and to what extent? What criteria would you use? What types of studies (if any) would you seek out to make your decision?

- What other alternative viewpoints might there be surrounding this issue?

Further Research

Number of NPL Actions and Milestones by Fiscal Year
<http://www.epa.gov/superfund/sites/query/queryhtm/nplfy.htm>

U.S. Environmental Protection Agency: Superfund
<http://www.epa.gov/superfund>

Resources For the Future Research Topic: Superfund
<http://www.rff.org/superfund>

Exaggerating Risk: How EPA's Risk Assessments Distort the Facts at Superfund Sites Throughout the United States
<http://www.p2pays.org/ref/34/33297.pdf>

Prepared Statement of Michael W. Steinberg on Behalf of the Superfund Settlements Project

http://epw.senate.gov/109th/Steinberg_Testimony.pdf

Superfund Pollution Locator
<http://www.scorecard.org/env-releases/land>

- The Superfund Program involves a structured analysis to score sites for NPL eligibility. Describe the primary components of this analysis and, using examples, provide your assessment of its potential effectiveness in identifying the sites most in need of cleanup.
- What does the map of Superfund sites at www.scorecard.org tell you about the geographic distribution of pollution threats and risks in the U.S.? What does it fail to tell you?
- Assess the credibility of each Website. Which sources seem the most reliable, and why?
- What further sources can be explored for the purpose of obtaining additional (unbiased) information?

Is the weight of the evidence enough to persuade you to agree with one point of view or the other? Has your viewpoint changed from what it was prior to doing your research? Explain your answer.

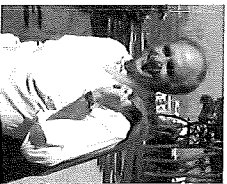


VIEWPOINTS

STRATEGIES FOR SUSTAINABILITY

Is there hope for a sustainable future, in which both environmental quality and human well-being are improved? What can we do to advance sustainability?

GLOBALLY: Hope for Sustainability



David Orr is the Paul Sears Distinguished Professor of Environmental Studies and Politics at Oberlin College and a James Marsh Professor at the University of Vermont.

Hope is a verb with its sleeves rolled up. Hope for a sustainable future requires the courage to reach farther, dig deeper, confront our limits and those of nature, work harder, *and* dream dreams.

A sustainable future requires that people be asked to be citizens again—to know more, think more, take responsibility, participate publicly, and, also, to suck it up. They will have to see the connections between what they drive and the wars we fight, the stuff they buy and crazy weather, the politicians they elect and the spread of poverty and violence. They must be taught to see connections between climate, environmental quality, security, energy use, equity, and prosperity. They must be asked to think and see, and to face and speak the truth.

Telling the truth means that we will have to speak clearly about the causes of our failures. It means summoning people to a higher vision than that of the affluent consumer society. If we fail to deal with causes, there are no band-aids that will save us for long. So, what does an increasingly sustainable society look like? My list consists of communities with:

- Front porches
- Public parks
- Local businesses
- Windmills and solar collectors
- Local farms and better food
- Local employment
- Bike trails

- Summer baseball leagues
- Community theaters
- Better poetry
- Neighborhood book clubs
- Bowling leagues
- Better schools
- Vibrant and robust downtowns with sidewalk cafes
- Great pubs serving microbrews
- More kids playing outdoors
- Fewer freeways, shopping malls, sprawl, television
- No more wars for oil or anything else.

Nirvana? No! But it is still possible to create a future that is a great deal better than what is in prospect. Ironically, what we must do to avert the worst effects of climate change and improve environmental quality are mostly the same things we would do to build sustainable communities, create prosperous economies, and improve our future prospects.

Finally, as an educator I believe that if people only knew more, they would act better. Some of what they need to know is new, but most of it is very old. On my list of things people ought to know are a few technical things like the laws of thermodynamics, the basic sciences of biology and ecology, and fundamentals of carrying capacity. They ought to know, too, about human fallibility, gullibility, and the inescapable problem of ignorance. I would hope that they would be taught how to distinguish those things that we *can* do from those that we *should not* do.

Authentic hope can be found only in our capacity to discern the truth about our situation and ourselves, and to summon the fortitude to act accordingly. In time the truth will set us free from illusion, greed, ill will, and self-imposed destruction, moving us toward a more sustainable future.

ON CAMPUS: A Positive Outlook for Sustainability



Nan Jenks-Jay is Dean of Environmental Affairs at Middlebury College in Vermont, where she also teaches in the Environmental Studies Program. For over two decades she has been actively involved in the advancement of environmental studies programs, their transformation of higher education, and their impact on sustainability.

As centers of learning, colleges and universities have a responsibility to advance goals for global sustainability. Few experiences have as profound an impact on changing individuals and transforming the places where they live as education. Therefore, the more than 4,000 liberal arts colleges, universities, and community colleges throughout the United States can play a major role by educating millions of students about sustainability as they prepare to enter the work force

and society. Fortunately, a growing number of academic institutions are addressing sustainability in myriad ways. Students are being informed through courses, research, and direct involvement in activities focused on the greening of their campuses. Graduates are prepared to take action as they enter a world in which the environment is inextricably linked to local and global issues.

Although the challenges associated with becoming a more sustainable world can be somewhat daunting, they are not insurmountable. As microcosms of society, institutions of higher education are demonstrating how to achieve goals for sustainability, which have an impact on and are transferable to other sectors of society. Models already exist on many campuses where, for example, carbon emissions are being reduced, locally grown food is served in dining halls, building design and construction are certified through LEED standards, and alternative energy is employed through biofuels, geothermal, wind turbines, and photovoltaics.

Not only are colleges and universities recognizing that they have a responsibility to address sustainability, but many are leading the charge. Over 300 colleges and universities signed the American College and University Presidents Climate Commitment to become carbon-neutral. The goal is for 1,000 institutions—one quarter of those in the United States—to

join this climate change commitment. Imagine the impact if every school shifted its practices to become climate-neutral.

However, many administrators, employees, educators, and students still need to understand more about the pathways leading to sustainability. The template for a sustainable future is embedded in an integrated, system-wide approach, one that creates a shared institutional value, with the support of senior-level leadership. Actions must transcend traditional institutional boundaries and engage a diverse set of individuals, from the trustees to the grounds crew to the students. Collaborations will need to draw on varying types of expertise, resulting in shared outcomes and new networks. Achievements must be celebrated and setbacks should become fuel for reflection. The freedom to explore new ideas is essential as existing techniques are replaced by new innovations.

Each day the growing number of sustainability initiatives on campuses across the country is leveraging even greater change within their regions and beyond. The magnitude of influence that higher education can have on sustainability is yet unmeasured, but could be massive. Therefore, we must assure that each of our colleges and universities is making a real commitment to a global agenda that will bring about a sustainable future.

Review Questions

- What does *hope* for a sustainable future mean to you? How does it resemble or differ from the visions that the essayists present?
- Create your own list of elements of a sustainable community. What steps must be taken to realize this vision?

Further Research

David W. Orr
<http://www.davidworr.com>
University Leaders for a Sustainable Future
<http://www.ulsf.org>
Middlebury College Environmental Affairs
<http://www.middlebury.edu/administration/enviro>
Oberlin College Office of Environmental Sustainability
<http://www.oberlin.edu/sustainability>
Rocky Mountain Institute
<http://www.rmi.org>
The Land Institute
<http://www.landinstitute.org>

- Each author discusses the range of knowledge and understanding that school administrators and employees, educators, students, and society as a whole must gain in order to pursue a path toward sustainability. Have they left anything out? If so, what have they missed?

- How do the principles and approaches espoused through the Websites of the Rocky Mountain Institute and The Land Institute apply to campus sustainability?
- Drawing from information presented via the Web sources, sketch out a plan for enhancing sustainability on your own campus.

How has your perspective on approaches to and prospects for future sustainability changed from what it was prior to reading the essays and doing your research?

