Searching for Sustainability in the New Century

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The twenty-first century is likely to see the stabilization of the human population. However, meeting even the most basic needs of a population at least half again as large as today's implies greater production and consumption of goods and services, increased demand for land, energy, and materials, and intensified pressures on the environment and living resources. A deep challenge, therefore, faces political leaders, institutions, and the law: can this also be a transition to sustainability, in which the people living on Earth over the next half-century meet their needs while nurturing and restoring the planet's life support systems? The symposium's speakers and panels outline the scientific and social envelope of a Sustainability Transition, posing the question of how today's practitioners and legal scholars may facilitate the reconciliation of today's transformative human economy and the economy of nature upon which all life depends.

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INTRODUCTION

The transformation of the natural world continues apace as human technology continues to expand in reach and scale. During the nineteenth and twentieth centuries, the imprint of the human species on the natural world rose to geological proportions: we drove species extinct, began to modify global climate, and altered land uses on a large scale by clearing forests, irrigating deserts, and draining wetlands. Today, technology and trade continue to expand in reach and scale. The environmental degradation of the twenty-first century may equal or exceed the losses of its predecessors. Nonetheless, in the last third of the twentieth century, environmentalism has proved to be surprisingly effective in responding to the despoliation of nature. Legal and technological innovations to preserve wildlands, redress environmental insults to human and natural communities, and to improve the transparency of decisionmaking have broadly affected human enterprises that exploit nature, both in the United States and elsewhere. The force of environmentalism has been cultural as well as regulatory, and over the past generation we have rediscovered the beauty, complexity, and essential reality of the natural world and the human societies that inhabit it.

In this symposium we explore the possibility of a sustainable future, a world in which the complexity of the natural world may be reconciled with human needs. I want to emphasize the word “hope,” which is used here with an unconventional spin:

[H]ope is not the same as optimism. Optimism adopts the role of the spectator who surveys the evidence in order to infer

that things are going to get better. Yet we know that the evidence does not look good. ... Hope enacts the stance of the participant who actively struggles against the evidence in order to change the deadly tides. ... To live is to wrestle with despair yet never to allow despair to have the last word.\(^7\)

Humanity can achieve a material economy in which both humans and the Earth's life support systems flourish,\(^6\) but turning that possibility into reality will demand much of ourselves and our institutions. Lawyers and legal institutions, in particular, are destined to play a central role in social learning,\(^9\) as individuals, organizations, and societies search for an economy and social order that meets the urgent claims of the present while conserving the natural and social resources essential to the needs of the future.\(^8\)

I

SUSTAINABILITY TRANSITION

Many of the law students who organized this meeting are likely to see the end of human population growth. That is the surprising message of scientists who have studied the current demographic transition.\(^11\) Since the mid-seventeenth century, the human race has gone from a species characterized by a high birth rate and a high death rate toward one with a low death rate and, with a time delay of several generations, a low birth rate.\(^12\)

Conventional projections from the United Nations show five scenarios for population in the coming century and a half.\(^13\) Popular imagination envisions continuing growth,\(^14\) but, in fact, the demographic experts' middle of the road scenario shows stabilization in the latter part of the twenty-first century. This stabilization, however, comes at a high level, somewhere under

\(^7\) CORNEL WEST, RESTORING HOPE: CONVERSATIONS ON THE FUTURE OF BLACK AMERICA xii (1997).
\(^8\) See OUR COMMON JOURNEY, supra note 6, at 7.
\(^9\) Id. at 48-51.
\(^10\) WORLD COMM’N ON ENV’T AND DEV., OUR COMMON FUTURE (1987).
\(^12\) See COHEN, supra note 11, at 46.
\(^14\) This is a plausible projection. The United Nations analysis uses five long-term scenarios. The two high cases show continued growth to 2150. See id.
10 billion. That is more than fifty percent higher than the benchmark of 6 billion that we passed in 1999.\textsuperscript{15}

In 1995, the National Academy of Sciences created a committee called the Board on Sustainable Development. Led by one of the speakers at this conference, Professor William Clark, the Board considered the following question:

Can the transition to a stabilizing human population also be a transition to sustainability, in which the people living on earth over the next half-century meet their needs while nurturing and restoring the planet's life support systems?\textsuperscript{16}

The Board's report, \textit{Our Common Journey} (OCJ), appeared late in 1999. It explored the following definition of a sustainability transition:

For a successful transition to sustainability, the world must provide the energy, materials, and information to feed, house, nurture, educate, and employ many more people than are alive today—while preserving the basic life support systems of the planet and reducing hunger and poverty.\textsuperscript{17}

This is a definition grounded in normative commitments: a sustainability transition is a path of social and economic evolution that would go from today's world of inefficient energy use and throw-away material culture, toward an economy that uses energy with high efficiency and recycles virtually all materials. In the course of a transition to sustainability, the human population would also reverse today's rising inequality and provide a future in which basic human needs are met.

This is a utopian-sounding premise, but over the past two centuries, scientists and engineers have transformed many daydreams, and a few nightmares, into mundane realities. The Board on Sustainable Development asked what technology and science—including social science and innovations—would be needed if such a sustainability transition were to emerge. Here is what we concluded:

[B]ased on our analysis of persistent trends and plausible futures, the Board believes that a successful transition toward sustainability is possible over the next two generations. This transition could be achieved without miraculous technologies or drastic transformations of human societies. What will be required, however, are significant advances in basic knowledge, in the social capacity and

\begin{thebibliography}{9}
\bibitem{16} \textit{OUR COMMON JOURNEY}, supra note 6, at 15.
\bibitem{17} \textit{Id.} at 31.
\end{thebibliography}
technological capabilities to utilize it, and in the political will to turn this knowledge and know-how into action.

[Because the pathway to sustainability cannot be charted in advance, it will have to be navigated through trial and error and conscious experimentation. The urgent need is to design strategies and institutions that can better integrate incomplete knowledge with experimental action into programs of adaptive management and social learning.]

The term "social learning" lies at the heart of this symposium. If humans are to grasp the technological and organizational possibilities that can enable a sustainable future, human institutions and laws must facilitate these choices. We need to do so even though the content of many of those choices is unknown today. The priorities identified in Our Common Journey cover an ambitious span, fostering transitions in population, urbanization, agriculture, energy, and materials, all while conserving biodiversity and improving human well-being.

Most of this agenda is familiar; these issues have been the social and environmental challenges of the twentieth century.

The search for sustainability is a journey for which there are no maps. Our Common Journey argues that it is possible to lower the size of the human population by 10 percent or more below the current projections—by a billion people—by the mid-twenty-first century. Currently, growth is concentrated in the developing countries, which have young populations with a large demographic momentum. As those young people grow to adulthood, they will have children. History in the West and a half-century of population activities demonstrate, however, that if educational and economic opportunities are available to young women, many of them will choose to delay marriage and child-

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18. Id. at 6-7, 10.
20. OUR COMMON JOURNEY, supra note 6, at 302-20.
21. See ANDREWS, supra note 4, passim.
22. OUR COMMON JOURNEY, supra note 6, at 303-05.
23. See COHEN, supra note 11, at 372-73.
This is a dynamic one can see in American high schools as well as in poor countries.25

II

CROWDING THE COMMONS

Biologist Garrett Hardin popularized a scenario of human behavior that he called the "tragedy of the commons." Hardin's theory is a parable illustrating the difficulties of environmental governance. Consider a pasture, he said, open to many flocks of sheep. When there are only a few sheep on a large meadow, all can prosper. But as the numbers grow, there comes a point when the meadow cannot grow enough grass to feed all the animals that graze there. What happens then, he explained, is that to each herder, adding an animal still makes sense because it increases his own flock by one animal. At the same time, everyone's animals suffer a little bit, because the grass is no longer sufficient. But if any one herder holds back, others will increase their herds. This is the remorseless logic of the tragedy, Hardin observed: the pasture will become more and more crowded until it is ruined by herders, each of whom is acting in a rational way. It is the rationality of their choices that makes this a tragedy.

Hardin's point is that the natural world is a commons, a shared environment in which humans lurch past the point of wise use, polluting air with auto exhaust and industrial emissions, overfishing the seas, and over-populating the planet. Hardin connected population growth to economic growth. Both exert pressures on the natural world and both are shaped by the disconnection between individual interests and the collective good. If Hardin is right in discerning an inevitable tragedy of the commons, a sustainability transition will be hard or impossible.

Figure 1 presents some data compiled by the World Bank, which throw interesting light on Hardin's analysis. Several different measures of environmental distress are plotted on the

27. See, e.g., ANDREWS, supra note 4, at 158-61.
vertical axis, with an economic indicator—Gross Domestic Product per capita—along the horizontal axis. The top panel shows a stark reality of economic development: until people have clean water, they are sick too often to contribute to economic growth. The bottom panel shows that we struggle still with the generation of trash and carbon dioxide emissions.

FIGURE 1

Environmental problems may worsen or improve with income growth

The middle panel, however, shows something both remarkable and ordinary. If one looks across the world, both at developing countries and rich ones, there is a strikingly clear pattern with respect to two important air pollutants. As incomes
rise, people somehow find ways to clean up urban air. This is why Pittsburgh is now a very livable city and is no longer the smoky town of my childhood. It also suggests that, if the economic growth their people are pursuing comes to pass, Mexico City and Beijing may be heading toward a less-polluted future.

What is happening is environmental reform. The turning over of the curves in Figure 1 is not automatic, but it is the product of widening understanding of the harms caused by air pollution and the patient gathering of social will. What experience seems to show is that environmental reform of air pollution is achieved and is shown often enough to show up in this data set.

That is good news, but it is not enough. As Professor Pamela Matson demonstrates in this symposium, global-scale environmental effects are increasingly reinforcing local-scale impacts of human activity. This is the problem called "multiple stressors" in Our Common Journey—the fact that the inadvertent effects of human activities are beginning to reinforce one another. Since the driving forces are themselves unintentional, the interactive effects are surprising and unexpected. Thus, although the signals of climate change are not yet unambiguous in global averages, there are regional phenomena that appear to be linked to planetary-scale changes. The persistence of the seasonal Antarctic ozone hole has surprised scientists, who expected that the observed decrease of ozone-depleting chemicals would begin to moderate the springtime decrease in stratospheric ozone concentrations. One possible explanation is unexpected high-altitude cooling, which may be a manifestation of global climate change. Climate changes at the global level may also be affecting the availability


32. OUR COMMON JOURNEY, supra note 6, at ch. 4.


34. Id.
of fresh water, with severe consequences for the poor who depend directly upon the productivity of the land.\(^{35}\)

The growth of scientific understanding leads us to realize that we draw sustenance from many commons. The growth of the economy leads us to crowd more and more of them. After all, it is only within the past generation that we have realized that small changes in the composition of the atmosphere, a global commons, could affect climate or the stratospheric ozone layer that protects life on Earth. Simply recognizing these challenges presses our disciplinary sciences to their outer limits. Learning to address these pressures, which by definition cross jurisdictional boundaries, will require innovations in contracts, law, and public policy, as well as in science and monitoring.

II

INSTITUTIONAL CHALLENGES

In 1993, Professor Joseph Sax, a professor here at Boalt Hall, published an insightful commentary on the important ruling of the Supreme Court in *Lucas v. South Carolina Coastal Commission*.\(^{36}\) His article made an observation that resonates with the agenda here. He explained that the institutional core of a sustainability transition concerns what he called the "economy of nature"—the functional relationships that govern the ecosystems used and needed by humans—and the contrasting web of obligations that shape the "transformative" economy—the arrangements of property and contract that govern human use of natural resources. Adapting the rules of the transformative economy is central to a sustainability transition.

Let me approach Professor Sax's distinction between the transformative and natural economies concretely, by telling you of a dream being pursued by two of the world's leading conservation organizations, the World Wildlife Fund (WWF)\(^{38}\) and The Nature Conservancy.\(^{39}\) Both organizations have now embarked on international programs to preserve the Earth's

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37. Id. § III.

38. See generally, Olson & Dinerstein, supra note 1.

rapidly dwindling store of biodiversity. The Conservancy has emphasized methods for planning, so that its analysts and stewards can identify and protect conservation areas that will retain their full range of species over time. WWF’s approach has emphasized geography, identifying 200 eco-regions that represent a complete sample of the major habitat types of the planet. Not every species is included in the Global 200, but every family of species is included. If we can save these regions’ biodiversity we shall have a sample that contains all the hues in the rainbow of creation.

### TABLE 1
CONTRASTING UNDERSTANDINGS OF HUMANS’ PLACE IN NATURE

<table>
<thead>
<tr>
<th>ECO-REGION CONSERVATION</th>
<th>HUMAN UTILIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscapes . . . identified by naturalists</td>
<td>Property &amp; sovereignty . . . defined by owners &amp; rulers</td>
</tr>
<tr>
<td>. . . understood as ecosystems</td>
<td>. . . within boundaries set by human use, institutions, &amp; memories</td>
</tr>
<tr>
<td>. . . governed by disturbance regimes</td>
<td>. . . seeking homogeneity within use classes and high productivity</td>
</tr>
<tr>
<td>. . . that shaped the pre-Industrial landscape.</td>
<td>. . . to maximize (long-term) utility.</td>
</tr>
<tr>
<td>A biotic system — independent of institutions</td>
<td>Historical — bound by precedent and institutional tradition; rational to individuals</td>
</tr>
</tbody>
</table>

This is a wonderful vision, but hidden in it is a century of labor for lawyers. This plan for eco-region conservation will be different from our current philosophy of human utilization of property in fundamental ways, a point elaborated in Table 1.

Naturalists see landscapes, but people own property. An owner’s knowledge is rooted in place-dependent economic activities (like farming), organized according to the time scales of human tenure and institutions including inheritance and land speculation, and anchored in spatial scales shaped by human mobility. An owner’s knowledge is different from, and sometimes

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40. See Karen Schmidt, Rare Habitats Vie for Protection, 274 SCI. 916 (1996).
41. See generally Anderson et al., supra note 39.
42. See generally Olson & Dinerstein, supra note 1.
a great deal more humane and historically informed than, the scientist's geographic information system or species lists.

The prevalence of owner's knowledge means, in turn, that humans divide and conceive of landscapes in particular ways. Figure 2 shows a map taken from a 1993 analysis of how to protect the Northern spotted owl in Pacific Northwest forests.\textsuperscript{44} The map shows the key watersheds to be managed because they lie within the geographic range of the owl.

Compare this with Figure 3, a map showing the county governments in that same geographic area.\textsuperscript{45} One can see the qualitative difference in these images. The ranges of biota are governed by precipitation and topography, and the boundaries, to a large extent, are set by watersheds. Humans, by contrast, choose readily defensible borders, such as rivers, to mark jurisdiction and property, or else draw straight lines on the land.\textsuperscript{46} Our boundaries rarely follow nature's boundaries.

The differences in boundaries reflect differences in ecological processes. As shown in the third row of Table 1, human control of land aims at homogeneity—as in lawns—rather than the higgledy-piggledy texture of a forest, shaped by natural disturbances like storms. On cultivated lands, humans install and maintain ecosystems at early successional stages in which productivity is high.\textsuperscript{47} Far from treating pre-development landscapes as a benchmark, the natural landscape is treated as

\textsuperscript{44} Forest Ecosystem Mgmt. Assessment Team (FEMAT), \textit{Forest Ecosystem Management: An Ecological, Economic, and Social Assessment} II-39 (1993) (Appendix A of a draft supplemental environmental impact statement on management of habitat for late-successional and old-growth forest related species within the range of the Northern spotted owl).

\textsuperscript{45} \textit{Id.} at II-44.


\textsuperscript{47} \textit{Id.} at 262-306.
a starting point for transformation, not the destination but rather the gatepost of what the Pilgrims called their "errand into the wilderness." With the invention of fossil-fueled equipment in this century, the human pursuit of homogeneous landscapes intensified, and drastic changes in land uses became the rule where there was profit to be made.

The contrast between eco-region conservation and human utilization as ways of looking at the land is a contrast between sets of assumptions. As stated in the bottom row of Table 1, eco-region conservation takes as its organizing premise the communities of biota. An ecosystem management approach envisions a landscape shaped primarily by disturbances of non-human origin over spans of time that are long in comparison to human temporal horizons. Such a perspective operates independent of institutional considerations, in sharp contrast to human ownership and transformations of land. Human utilization, meanwhile, has been utilitarian and has been shaped by historical processes such as precedent, property, and the rational interest of individual landowners seeking to maximize the benefits they can obtain from domesticated ecosystems.

These contrasts in assumptions run deep in institutional design and broadly across economic endeavors. Thus, harmonizing the human and natural scales called for in ecosystem management is difficult. Just how difficult is suggested by Professor Sax in his discussion of the Lucas case. I have taken Table 2 from his paper, which contrasts the transformative economy with the economy of nature and

50. Sax, supra note 36, at 1442-45.
51. Id. at 1445.
compresses a rich and subtle analysis into a series of contrasting views. The labels “transformative economy” and “economy of nature” parallel what I identified as “human utilization” and the “eco-region perspective” in Table 1.

**TABLE 2**
TRANSFORMATIVE ECONOMY VS. NATURE’S ECONOMY

<table>
<thead>
<tr>
<th>TRANSFORMATIVE ECONOMY</th>
<th>ECONOMY OF NATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracts are separate. Boundary lines are crucial.</td>
<td>Connections dominate. Ecological services determine land units.</td>
</tr>
<tr>
<td>Land is inert/waiting; it is a subject of its owner’s dominion.</td>
<td>Land is in service; it is part of a community where single ownership of an ecological service unit is rare.</td>
</tr>
<tr>
<td>Land use is governed by private will; any tract can be made into anything.</td>
<td>Land use is governed by ecological needs; land has a destiny, a role to play.</td>
</tr>
<tr>
<td>All land is equal in use rights (Blackacre is any tract anywhere).</td>
<td>Use rights are determined by physical nature (wetland, coastal barrier, wildlife habitat).</td>
</tr>
<tr>
<td>Landowners have no obligations.</td>
<td>Landowners have a custodial, affirmative protective role for ecological functions.</td>
</tr>
<tr>
<td>Land has a single (transformative) purpose.</td>
<td>Land has a dual purpose, both transformative and ecological.</td>
</tr>
<tr>
<td>The line between public and private is clear.</td>
<td>The line between public and private is blurred where maintenance of ecological service is viewed as an owner’s responsibility.</td>
</tr>
</tbody>
</table>

The analysis Sax advances complements the scientific perspective that Professor Harte advances in this symposium. The economy of nature stresses the interconnections within and among ecosystems, while the transformative economy stresses the division of land and waters into individually managed units whose benefits may be appropriated by their owners. These contrasts underscore, in legal and institutional terms, the gulf between the ways that humans use ecosystems and the processes and rhythms of the world as understood by ecological science. Surprisingly, Professor Sax reaches a conclusion more optimistic than might be suggested by the deep gulf that separates the transformative and natural economies. His scholarship demonstrates that institutions have changed on a time scale of generations to accommodate industrialization,

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52. Id.
urbanization, and changing patterns of family life. In the later twentieth century, Sax observed,

[Ex]tensive public regulation, active participation by the community in determining how land shall be used, and affirmative obligations imposed on private developments have increasingly become part of the land use process. The demands of the economy of nature, however subtly, have worked their way into the governance of land use. Wetlands regulation and coastal management have been in place in some states for nearly thirty years. . . . After all, property is functional.\(^5^4\)

That is, property adapts to reality.

If a sustainability transition is to be a reality, then the legal community has a strategic contribution to make: to lead institutions and to fashion laws so that a sustainable reality can emerge in a humane and efficient way. This is, of course, the role of jurisprudence, to read precedent and experience in ways that clarify the present and facilitate the future.\(^5^5\) For example, the improvement of transparency through the National Environmental Policy Act\(^5^6\) and the body of litigation it inspired was a founding achievement of environmental law.\(^5^7\) As that example shows, durable change and social consensus can emerge, perhaps surprisingly, from controversy and litigation.

III

LEARNING AND SURPRISE

The sustainability transition is not a clear destination but a search; that is why the National Academy of Sciences study refers to the transition as a "common journey."\(^5^8\) A shared journey into unknown terrain will be an experience full of surprise. Consider the rise of the Internet, a journey that has taken a human generation so far. The Internet has been a tool to enable many users to use a single computer, a medium for email, and a way to provide access to data sources far from the user. And then, explosively, the Internet became cyberspace—the locus of the worldwide web, e-commerce, and a forum and network for reorganizing the global economy. Along the way, there have been visionaries, architects, engineers, and investors. Virtually all of them have been surprised. If a sustainability

54. Sax, supra note 36, at 1451.
57. See, e.g., Andrews, supra note 4, at 287-89.
transition succeeds, it will share some of these characteristics—it will be a social process propelled by decentralized forces and actors, seeking to explore advantages and to solve problems that emerge from their interactions with one another, as well as the opportunities and threats of a changing natural world.

Surprises should be expected in a sustainability transition. Indeed, surprises have been plentiful already, none more startling than the demographic transition itself. Some poor nations have seen their population growth slow down before living standards have improved, moving faster than was seen in the history of Western Europe.69

There is, however, a paradox here. As Professors Harte, Matson, and Rowland all make clear in this symposium,60 the large and growing human presence in the natural world points to a need for management. Yet as I have emphasized above, surprise is a certainty. Surprise and management do not mix well. This paradoxical combination of management and uncertainty is very much in the consciousness of the corporate managers of the globalizing economy.61

William Clark, Jonathan Wiener,62 and others in this symposium discuss institutional frameworks that enable us to cope with this paradox. An important idea is one familiar in the business world: what gets measured gets managed. In a practical sense, looking at sustainability means measuring three sets of things: the state of the environment or human society, the pressures that human activity is putting on that state, and society's responses to changes in that state. By paying attention to environmental and social indicators, we can manage and learn which responses work and which do not.

Surprisingly, we do not do this often and we hardly ever do it systematically. We do not manage many environmental or social variables that we care about, including hunger63 or conversion of

59. See COHEN, supra note 11, at 46.
63. OUR COMMON FUTURE, supra note 10, at 246.
land to shopping malls. More importantly, we do not learn how to deal better with the challenges we already face.

Yet most of the social and environmental statistics needed to gauge pressures, states, and responses are already available, at least in rough form, as information collected for taxation, regulation, or other administrative purposes. We have the materials at hand to learn by doing. The problem is that learning of this kind is done in public, so it can be punishing to be wrong. The activist's bias is to hold the rascals to account for inadequate performance. But in the search for a sustainable economy we need also to recognize the value of learning and the inevitability of innocent error. So the task is not only to gather information; it is also to create a political environment in which learning from mistakes is more rewarding than hiding them. This will be an achievement in the age of "gotcha" journalism and a 24-hour news cycle.

**CONCLUSION**

A sustainability transition, if it were achieved, would mean a fundamental change in the framework of the human condition. Hunger and poverty, together with war and life-threatening disease, would cease to be the preeminent concerns of our species. Although these would linger as realities to be faced by many from time to time, they would no longer be the first priority each day. This seems like an idealistic objective even to describe until one sees that all the people attending this symposium already live this way, as do many residents of the rich nations of the world.

In the globalizing economy, the rule of law has become a battle cry of the corporate missionaries promising riches and promoting free trade. What I have tried to suggest here, however, is that law also plays a critical role in the transition ahead. American law may well determine whether that transition reaches sustainability—particularly if the global march of capitalism is as successful as many hope. But if this is to happen, the law must engage with the challenges of nature's economy.

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