Chapter 14
THE FUTURE OF INTERNATIONAL ENVIRONMENTAL LAW: A LAW OF THE ECOLOGICAL COMMONS?

Humankind's modern history is tragically marked by the squandering of nonrenewable resources, the wanton killing of precious life species, and the overall contamination and degradation of delicate ecosystems. So severe have these ecological misbehaviors become, indeed, that, alone and together, they now threaten Planet Earth to a degree unprecedented since the dinosaurs.

You have read some about these matters in our preceding chapters—in Chapter 5 (species depletion) and Chapter 6 (climate change) especially. This concluding chapter, the work of independent commons scholar David Bollier of Amherst, Massachusetts[a] in cooperation with Burns Weston, is in direct response to this dire predicament. Premised on the belief that the environment, from local to global, will go only from bad to disastrous so long as we continue to do humankind's business as usual, it presupposes the urgent need for a fundamental shift in our manner of ecological governance. The time is long past due for us to move away from the flawed premises of neoliberal economics and its legal and political warrants that privilege the efficiency of private enterprise, liberalized trade, and relatively unregulated markets to the virtual exclusion of environmental and social justice concerns. Now brought "face to face with stark, discomfiting images of a non-future,"[b] it is time for an ecological governance paradigm that, in the words of James Gustave Speth, insists upon "a revitalization of politics through direct citizen participation in governance, through decentralization of decision making, and through a powerful sense of global citizenship, interdependence, and shared responsibility."[c] Many astute observers are coming to the same

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[a] *See* www.Bollier.org. While we have made some minor modifications, David Bollier retains the copyright to this chapter. The authors and publishers are grateful to him for permission to use the conception he developed and hereby acknowledge our deep indebtedness to him.

[b] BURNS H. WESTON & TRACY BACH, RECALIBRATING THE LAW OF HUMANS WITH THE LAWS OF NATURE: CLIMATE CHANGE, HUMAN RIGHTS, AND INTERGENERATIONAL JUSTICE 60 (Vermont Law School, 2009).

[c] JAMES GUSTAVE SPETH, THE BRIDGE AT THE EDGE OF THE WORLD: CAPITALISM, THE ENVIRONMENT, AND CROSSING FROM CRISIS TO SUSTAINABILITY 225 (2008). Speth writes with substantial experiential credibility. Professor of Law at Vermont Law School at this writing, he is the former Dean of the Yale School of Forestry and Environmental Studies (1999-2009) and Administrator, United Nations Development Programme and

conclusion.[d] Thus this chapter presupposes that we presently are blessed with an unusual opening in our legal and political culture for introducing new ideas for rigorous and just environmental protection—locally, regionally, globally, and points in between.

One such idea that holds out great promise is the paradigm of ecological governance known as *the commons*, an abiding mode of sustainable resource management and community governance, as suggested by the Antarctic regime considered in preceding Chapter 13. It has a long and venerable history in law and social tradition, and is closely tied to the evolution of human rights. It stretches back to the Magna Carta, the Romans, and even earlier, and has been a perdurable institution for managing land, water, wildlife, and other elements of nature. Arguably the commons is as old as *homo sapiens* itself.

In modern times, the commons has become a default paradigm of social production and governance on the Internet;[e] it provides an intellectual critique of free market fundamentalism; and it is a platform for re-imagining the governance, economics, and cultural stewardship of shared resources of many types, including nature. The commons is, however, less an ideology than intellectual scaffolding used to develop innovative legal and policy norms, institutions, and procedures by which "commoners" (sometimes the general public, other times a distinct community) can manage a given set of ecological resources sustainably. A commons constitutes a kind of social and moral economy. It is a matrix of perception—a worldview—that can loosely unify diverse fields of action now largely isolated from one another.

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chair of the UN Development Group (1993-99). Prior to his UN service, Speth was Founder and President of the World Resources Institute; Professor of Law at Georgetown University; Chairman of the US Council on Environmental Quality; and Senior Attorney and Cofounder of the Natural Resources Defense Council.

[d] *See, e.g.*, GAR ALPEROVITZ, AMERICA BEYOND CAPITALISM: RECLAIMING OUR WEALTH, OUR LIBERTY, AND OUR DEMOCRACY (2005); PETER BARNES, CAPITALISM 3.0: A GUIDE TO RECLAIMING THE COMMONS (2006); LESTER R. BROWN, PLAN B 3.0: MOBILIZING TO SAVE CIVILIZATION (2008); JARED DIAMOND, COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED (2005); AL GORE, OUR CHOICE: A PLAN TO SOLVE THE CLIMATE CRISIS (2009); WILLIAM GREIDER, THE SOUL OF CAPITALISM: OPENING PATHS TO A MORAL ECONOMY (2003); JAMES HANSEN, STORMS OF MY GRANDCHILDREN: THE TRUTH ABOUT THE COMING CLIMATE CATASTROPHE (2009); MICHAEL HARDT & ANTONIO NEGRI, COMMONWEALTH (2009); ELIZABETH KOLBERT, FIELD NOTES FROM A CATASTROPHE: MAN, NATURE, AND CLIMATE CHANGE (2006); DAVID C. KORTEN, THE GREAT TURNING: FROM EMPIRE TO EARTH COMMUNITY (2006); BILL MCKIBBEN, DEEP ECONOMY: THE WEALTH OF COMMUNITIES AND THE DURABLE FUTURE (2007); _____, EAARTH: MAKING A LIFE ON A TOUGH NEW PLANET (2010); DAVID ORR, DOWN TO THE WIRE: CONFRONTING CLIMATE COLLAPSE 40 (2009); ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990). *See also* WESTON & BACH, *supra* note **b.**

[e] *See, in particular,* DAVID BOLLIER, VIRAL SPIRAL: HOW THE COMMONERS BUILT A DIGITAL REPUBLIC OF THEIR OWN (2009).

But what, more exactly, is "the commons"? In its broadest sense, "the commons" is a governance system for using and protecting "all the creations of nature and society that we inherit jointly and freely, and hold in trust for future generations."[f] Typically, a commons consists of non-state resources controlled and managed by a defined community of commoners, directly or by delegation of authority. Where appropriate or needed, the state may act as a trustee for a commons or formally facilitate specific commons, much as the state chartering of corporations facilitates market activity. But a commons need not be state-sanctioned in order to be effective or functional.

Although the commons is often associated with physical resources (land, air, water) or, more precisely, pools of physical resources, it is equally—indeed, most importantly—a cultural phenomenon. The commons is primarily about the self-determined norms, practices, and traditions that commoners devise for nurturing and protecting their shared resources ("commoning"). In this acute sense, a *commons* is to be distinguished from a *common-pool resource* (CPR), a term often used to describe a good, often depletable, that is usually expensive to prevent others from using, though not impossible. Economists would say that a CPR is "subtractible"—it can be used up or become congested.

To distinguish a CPR from a commons is important because there are many possible socio-economic-political arrangements for protecting and maintaining a CPR, and for determining how its benefits may be used without the CPR being part of a commons One can imagine government taking charge of a river irrigation system, for example, and deciding who may have what quantities of water, and under what terms. Or one can imagine a private owner managing a forest CPR, enabling utterly exclusive control of the right to sell access and use rights to others. Or as so often happens, a CPR could be treated as an *open access regime* in which there are no preexisting property rights or rules for managing the resource; everyone treats the water or fish or timber as "free for the taking."

A *commons*, however, is a quite different thing—an often-overlooked regime for managing a CPR that eschews individual property rights and state control, relying instead on common property arrangements that tend to be socially organized and enforced in complicated, idiosyncratic ways. The commons does not necessarily require the ministrations of law or state action because, traditionally, it has been a self-organized, socially negotiated system. Operating without the centralized mandates of the state or the structures of market exchange, properly designed commons can sustainably manage arable

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[f] THE STATE OF THE COMMONS: A REPORT TO OWNERS FROM TOMALES BAY INSTITUTE 3 (2003).

fields, forests, fisheries, wild game, irrigation waters, and countless other ecological resources, and have done so historically.

With the rise of modern market economies and liberal state polities, however, the commons as a system of management and culture has been largely marginalized and ignored. Mainstream economists presume that individual property rights and market exchange are the most efficient, responsible means for allocating access to, and use of, natural resources and for generating material wealth and "progress." They often cast the commons as a failed management system or an inefficient vestige of pre-modern life.

This chapter reviews the historical misconceptions and empirical realities about the commons as a means of ecological governance. We also explore the operational dynamics of private property and the commons, and survey a range of modern-day ecological commons. While the feasibility of the commons paradigm has been shown for forests, fisheries, water, and other natural resources, one of the preeminent challenges of our time is to devise new types of institutions and policies for safeguarding natural-resource commons, particularly for the global atmosphere, oceans, fresh water systems, and genetic resources.

Much of the recent interest in the commons has been catalyzed by the pioneering fieldwork and analyses of 2009 Nobel Laureate Professor Elinor Ostrom and scholars associated with the Workshop on Political Theory and Policy Analysis at Indiana University and the International Association for the Study of the Commons (IASC). Their transdisciplinary fieldwork and theoretical studies have sought to explain how communication, cooperation, and trust can surmount "collective action" problems, which accurately describes the challenge of protecting our afflicted ecosystems. In the case of ecological resources, the problem is, generally, how to allocate and limit the use of finite, depletable resources or resources having limited capacities for self-renewal.

As a wide range of "market enclosures" have intensified over the past thirty years, interest in the commons has surged. Enclosures occur when private business enterprises, often with the overt or tacit support of government and the law, privatize and commodify ecological resources owned or used by a distinct community (a rainforest, a lake, an aquifer) or ethically belonging to everyone (the humane genome, the atmosphere, wilderness). Typically, enclosure aims to reap private market gains from a common asset without taking account of its full, long-term market and non-market value.

Property theorist John Locke famously declared that one has a natural right to assert private property rights in things that one makes with one's own

labor. Usually omitted from Locke's formulation, however, is his significant added qualification: "at least where there is *enough, and as good, left in common for others*."[g] Locke does not develop this idea; he is, after all, intent on establishing the moral and legal justifications for private property. Still, he raises an issue that cannot be simply ignored: the exercise of private property rights may encroach upon and even destroy resources that belong to everyone.

Enclosures usually describe intrusions upon recognized commons or public property, particularly when they rely upon coercion, disenfranchisement, under-payment or simple trespass. But by Locke's own formulation, enclosure may also be fairly applied to open-access regimes where "no one" owns the resource. After all, is any element of nature truly *res nullius*—an inert object that can be privately owned without regard for a given community or humanity as a whole? Indigenous peoples and peasants frequently rely upon open-access common pool resources for subsistence, yet do not have formal legal title. Surely their subsistence-use constitutes some form of moral entitlement that should not be regarded as a nullity by a commercial appropriator whose labor alone is said to justify its self-declared ownership. Similarly, as inhabitants of the planet, every human being may not have formal legal ownership of the atmosphere or oceans, yet we do have at least a collective ethical entitlement to their preservation as healthy planetary ecosystems—some say even a *legal* entitlement, in fairness to future generations at least.[h]

Enclosures are justified as a necessary means to increase production of material wealth, and the appropriated lands and other resources are regarded as vacant or belonging to no one (*res nullius*) and therefore without value in the first place. To victimized commoners who had used a now-appropriated resource in a collective fashion for non-market, subsistence purposes, however, enclosure is experienced as a profound dispossession and violation. For them, naming a commons as a commons is the first step toward protecting and reclaiming resources that they once enjoyed as a matter of right.

Enclosure is now a pervasive dynamic. Multinational bottling companies are laying claim to groundwater supplies and freshwater basins that once sustained local ecosystems and communities.[i] Agriculture-biotech

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[g] JOHN LOCKE, TWO TREATISES OF GOVERNMENT 329 (1965) (emphasis added).

[h] *See, e.g.*, EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY (1998-99). *See also*, Burns H. Weston, *Climate Change and Intergenerational Justice: Foundational Reflections*, 9 VT. J. ENVT'L L. 375 (2008); _____*The Theoretical Foundations of Intergenerational Ecological Justice, in* ENCYCLOPEDIA OF CLIMATE CHANGE (forthcoming from ABC-Clio in 2012).

[i] *See, e.g.,* MAUDE BARLOW, BLUE COVENANT: THE GLOBAL WATER CRISIS AND THE COMING BATTLE FOR THE RIGHT TO WATER (2009); ELIZABETH ROYTE, BOTTLEMANIA: BIG BUSINESS, LOCAL SPRINGS AND THE BATTLE OVER AMERICA'S DRINKING WATER (2009); ALAN SNITOW & DEBORAH KAUFMAN (WITH

companies are actively supplanting conventional crops with proprietary, genetically modified crops whose seeds are sterile or may not be shared.[j] High-tech industrial trawlers are eclipsing coastal fishing fleets and over-exploiting ocean fisheries to the point of exhaustion.[k] Biotech companies and universities have now patented approximately one-fifth of the human genome.[l] Many companies enjoy free or cut-rate access to minerals, grazing areas, and timber on public lands.[m]

One reason that enclosures are tolerated and even welcomed by some is because one person's enclosure is often another person's idea of freedom and progress. The private economic gains generated by converting natural resources into marketable products are enormous. They also tend to produce many secondary, spillover benefits for society, such as jobs, products, and economic growth. But these gains can be illusory or unsustainable. When the scope of property rights and market activity compromises the integrity of ecosystems, "economic development" becomes a matter of cannibalizing nature's capital. In such circumstances, market activity becomes ecologically destructive and anti-social, and not a net gain for society.

As economist Herman Daly pointed out in his 1997 book, *Beyond Growth*, the core problem with modern-day economic theory is that it fails to differentiate between mere growth in the volume of market activity (e.g., Gross Domestic Product) and healthy, socially beneficial development that can be ecologically sustained over time. The commons offers a vocabulary for talking about the proper limits of market activity. It helps force a conversation about the "market externalities" that often are shunted to the periphery of economic theory, politics, and policymaking. It helps ask questions such as: How can appropriate limits be set on the market exploitation of nature? What legal principles, institutions, and procedures can help manage a shared resource fairly and sustainably over time, sensitive to the ecological rights of future as well as present generations?

MICHAEL FOX), THIRST: FIGHTING THE CORPORATE THEFT OF OUR WATER (2007).

[j] *See, e.g.*, KEITH AOKI, SEED WARS: CONTROVERSIES AND CASES ON PLANT GENETIC RESOURCES AND INTELLECTUAL PROPERTY (2008).

[k] *See, e.g.,* Charles CLOVER, THE END OF THE LINE: HOW OVERFISHING IS CHANGING THE WORLD AND WHAT WE EAT (2006); Daniel Pauly & Jay Maclean, IN A PERFECT OCEAN: THE STATE OF FISHERIES AND ECOSYSTEMS IN THE NORTH ATLANTIC OCEAN (2003).

[l] 310 SCIENCE No. 5746 (Oct. 14, 2005).

[m] *See, e.g.*, David Bollier, *The Abuse of the Public's Natural Resources, in* DAVID BOLLIER, SILENT THEFT: THE PRIVATE PLUNDER OF OUR COMMON WEALTH 85-97 (2002).

Although there is a rich body of academic literature that explores many of these questions, much of it is focused on the use of natural resources in the so-called developing world. There has been far less examination of how modern, industrialized countries might balance market activity and ecological commons more prudently. This is due in part to the intellectual premises and worldview of neoliberal economics, which, since the collapse of the Soviet Union in 1991 especially, has become the dominant framework for political culture and public policy in industrialized societies worldwide.

Modern-day economics as a discipline valorizes growth, technological innovation, and consumerism as preeminent goals, and posits a world of rational individuals intent on maximizing their material self-interests. Most of these premises are taken for granted as appropriate and receive little empirical scrutiny or theoretical challenge. This attitude is gradually changing, however, chiefly because the October 2008 economic crisis provoked a great deal of soul-searching within the field. Also, alternative economic approaches—from behavioral economics, complexity theory economics, ecological economics, and "post-scarcity economics," among others—are starting to win new converts.

Studying the commons means transcending the limitations of conventional economics by taking into account the larger social, human, and ecological context of economic activity. The actual costs and benefits of economic activity are scrutinized and seen holistically; a community's values, norms, and social practices as embodied in a particular local, national, or international context are evaluated; economic exchange, not less than commoning itself, is understood to implicate a complex set of social variables. Thus, the theater of relevant inquiry extends well beyond the economic factors of those things that a for-profit business enterprise regards as germane. To study commons is to go beyond strict economics; it implicates anthropology, environmental science, political science, and social psychology, as well as culture, the empirical study of specific stewardship practices, and the law.

There is no "universal template" of a commons for the simple reason that each is rooted in idiosyncratic circumstances. Partly for this reason, therefore, as the focus of commons scholarship has expanded to encompass so-called "new commons" such as Wikipedia and free software as well as commons in industrialized societies, there has been an explosion of new analytic concepts and theorizing about the commons. The field is very much a work-in-progress, as the real-life examples are evolving and mutating all the time. The commons has become, in fact, the focus of a robust and diversified transnational movement. Its participants seek new forms of social relationships—"commoning"—to expand their political, economic, and cultural sovereignty over particular resources (an aquifer, a fishery, a forest, a software

program, a body of creative works). Led by farmers in the global South, social democrats in Europe, digital activists seeking to control their own creativity and culture, and many other "tribes" of commoners, the movement is not ideologically driven or intellectually monolithic. It is, rather, a highly eclectic, decentralized movement grounded in discrete, practical projects.

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Against the foregoing backdrop, we arrive, then at the two central questions that shape this chapter. First, what does the commons paradigm mean for better management of ecosystems? Second, if commons eco-management means better eco-management, is this true for global as well as local ecosystems and ones in between (e.g., the atmosphere, a sea, a forest or prairie), or is it a truth that has but limited environmental validity or utility?

Section A looks at the conceptual and historical background of the commons through readings by ecologist Garrett Hardin and commons scholars Elinor Ostrom, Bonnie McCay and James M. Acheson, and Lewis Hyde. These readings consider the so-called "tragedy of the commons," introduce the commons as a governance paradigm, and outline some salient management practices for successful commons.

The commons introduces new notions of stewardship over the long term, often in contrast to regimes of private property rights and exclusive individual ownership for market gain. Accordingly, Section B examines the deep tensions between private property law and the commons, although the boundaries separating the two may vary greatly and be fuzzy depending on the context and political history of a given resource. Economist Karl Polanyi has called land, labor, and money "fictitious commodities"[n] because they are dynamic, changing elements of ecosystems and human society. Thus, attempts by markets to treat them as bounded, static pieces of legal property (ownership) are destined to warp their essential nature on many occasions. To explore these tensions and dynamics social scientist Bradley Bryan, Director of the Minor Program in Technology and Society at the University of Victoria, looks at indigenous people's ontological conceptions of property. Environmental and natural resource law scholar Mary Christina Wood reassesses the public trust doctrine. And Michael Heller and Rebecca Eisenberg, real property and intellectual property law scholars respectively, analyze the anti-competitive, anti-innovative effects of diffuse, fragmented property rights, often known as the "tragedy of the anticommons."

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[n] KARL POLANYI, THE GREAT TRANSFORMATION: THE POLITICAL AND ECONOMIC ORIGINS OF OUR TIME, ch. 6 ("The Self-Regulating Market and the Fictitious Commodities: Labor, Land, and Money") (1944).

Next, in Section C, we survey a number of contemporary ecological commons and proposals for new commons, with a special focus on the specific legal and policy mechanisms that make these commons feasible. The ecological commons described here include:

- acequias (community-operated waterways) that enable Native Americans to steward scarce water supplies in New Mexico;
- the Potato Park in Peru that empowers indigenous people to assert stewardship rights over a genetically valuable potato;
- community fishing regimes for endangered fisheries;
- the Solar Commons in Phoenix, Arizona, that uses public rights-of way to generate power for a commons trust;
- "stakeholder trusts" and "social charters" as a new paradigms of governance of ecological resources; and
- new sorts of Internet-mediated ecological commons.

Section C also considers the institutional innovation that will be necessary to establish new sorts of commons to manage planetary resources such as the atmosphere, the oceans, and fresh water and glacial ecosystems.

Finally, in Section D, we consider the future of the commons and ecological governance. It is necessarily speculative, as you might imagine. As Yogi Berra (among others) allegedly said: "It is difficult to make predictions, especially about the future." All the same, we invite you to think "out of the box" and imagine the commons' future potential with us. Your appraisals and recommendations as well as your caveats and reservations are welcomed. The best way to predict the future, as many have said, is to invent it. And the best way to shape it is to be one of its inventors.

A. NATURE AS A COMMON POOL RESOURCE AND ELEMENTAL HUMAN ACTIVITY

The commons as a set of social practices extends into the deep mists of pre-history. It has flourished as if by spontaneous self-organization in human societies, with and without the support of monarchies, republics, and other systems of power. Evolutionary scientists studying the evolution of human genetics, neurobiology, and language believe that cooperation is hard-wired into the human species as an "evolutionary stable strategy," an inborn capacity that gives humans a long-term competitive advantage in the struggle to survive.

In this sense, the commons precedes formal law and its institutions, most notably the state.

Nonetheless, there is an irregular but discernible arc of legal innovations going back millennia that have recognized and supported commons-based practices. In 1900 B.C. in Babylon, there were forestry conservation laws. In Egypt in 1370 B.C., Pharoah Akhenaten established nature reserves. In Roman times, in 535 A.D., Emperor Justinian established a distinct legal category for types of property set aside for public use—*res publicae*—and a category for property that consisted of natural things used by all, such as air, water and wild life: *res communis*.

The Magna Carta and the oft-overlooked companion Charter of the Forest, signed by King John in 1215 and 1217, respectively, recognized the basic rights of commoners to use the commons for subsistence purposes.[o] For example, commoners were granted formal rights to gather wood from the forest for their homes and fires; to let their sheep graze on the common meadows; and to shoot wild game on open land. The commons functioned as a "social safety net," as we might call it today.

One of the challenges in crafting contemporary forms of commons-based law is to understand its dynamic relationship with social practice and culture. In terms of advancing the commons, law does not necessarily mandate outcomes; rather, it generally enables or facilitates certain social practices by establishing institutional structures and procedures and enforceable parameters. The commons does not exist merely because there is a set of legal instruments (e.g., statutes, regulations, case law), but because it is a lived reality that commoners find useful and actively support. While the modern state has frequently incorporated vestiges of the commons into its formal legal codes, ratifying long-held social beliefs as a matter of enforceable law (as in the case of public trust doctrine in environmental law, for example), it is important to recognize that the commons consists of more than formal legal rules. Its essence lies in the participatory social practices and moral norms that arise from the "bottom up" and reflect the on-the-ground needs and interests of commoners.

Our contemporary understanding of the commons, unfortunately, has not only lost sight of this idea, it has been skewed by the much-cited essay that biologist Garrett Hardin wrote in 1968, "The Tragedy of the Commons."[p] The essay has been hugely influential in shaping (and misshaping) public understanding about the commons as a viable system for managing resources.

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[o] *See, e.g.*, PETER LINEBAUGH, THE MAGNA CARTA MANIFESTO—LIBERTIES AND COMMONS FOR ALL (2008).

[p] *See infra* Subsection 1, next.

More than a generation of economists and policy analysts have elevated Hardin's parable into a truism—that a commons is inherently impractical and unsustainable.

This general conclusion has been buttressed by a sizeable literature about the "prisoner's dilemma" and other game-theory experiments over the same period. In the typical scenario of a prisoner's dilemma model, "rational" players locked in separate rooms and unable to communicate with each other, are told to make choices that will maximize their individual self-interest. The recurring dilemma is that individuals can potentially maximize their long-term benefit if they can somehow cooperate with the other—but each also has powerful incentives to cheat on any agreements to cooperate. This highly abstract model purports to show that cooperation is usually irrational and unlikely to solve collective-action problems.

1. THE "TRAGEDY OF THE COMMONS"

Garrett Hardin, *The Tragedy of Commons*, 162 SCIENCE 1243-48 (1968)

The tragedy of the commons develops in this way. Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.

As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component.

1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1.

2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1.

Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another. . . . But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is

the tragedy. Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

2. BASIC PRINCIPLES OF ECOLOGICAL COMMONS

Professor Elinor Ostrom, a political scientist at Indiana University and more recently Arizona State University, has spent several decades doing empirical research and theorizing about how real-life commons work, especially in managing natural resources. From Nepal to Switzerland and from Turkey to Los Angeles, Professor Ostrom's painstaking fieldwork and analytic models have identified key design principles of successful commons, and for her path-breaking work she was awarded the 2009 Nobel Memorial Prize in Economic Sciences. Perhaps because she is not an economist, however, Ostrom has recognized that conventional free-market theories fail to account for many social, moral, and institutional factors that affect economic behavior. Ostrom has been especially attentive to the relational aspects of economic activity—the ways in which people interact with each other to forge rules and negotiate informal social understandings in the course of managing resources.

Sometimes working with political scientist Vincent Ostrom, her husband, Elinor Ostrom's work has concentrated on the governance of "common-pool resources" (CPRs)—collective resources over which no one has private property rights or control, such as fisheries, grazing lands, and groundwater. Although these resources are certainly vulnerable to a "tragedy of a commons" outcome, many communities of resource-users have developed shared understandings and social norms—and even formal legal rules—that enable them to use the CPRs sustainably over the long term.

Working with the Workshop on Political Theory and Policy Analysis at Indiana University, Dr. Ostrom and her colleagues have developed what is known as the "institutional analysis and development" framework (or IAD) as a template for assessing common pool resources and the public policies that might support them. The IAD focuses on the dynamics of collective action communication, cooperation, and trust—and the institutional and social rules that help them flourish.

Ostrom's thinking about resource governance has also stressed "polycentrism," the idea that there should be multiple centers of management authority for resources because the rule-sets for different governance systems (say, the federal government, local government, and participatory commons) can each play important, differentiated roles. In a polycentric system, the principle of *subsidiarity* holds that governance should occur at the lowest, most

decentralized level possible in order to be locally adaptive; one-size-fits-all governance structures tend to be less effective, less flexible, and more coercive.

In her 1990 book, *Governing the Commons*, Ostrom investigated successful commons governance systems for Swiss alpine meadows and Japanese mountain forests as well as the *huerta* irrigation institutions in Spain, and *zanjera* irrigation communities in the Philippines.[q] Many of the systems have flourished for centuries in allocating use rights to limited, fluctuating resources like water and in establishing responsible rules for stewardship, oversight and punishment of rule-breakers. The notable achievement of these commons is their ability to balance human use with ecological protection, even in periods of drought or other crises.

Each community evolved its own particular rules tailored to the specific "physical systems, cultural views of the world, and economic and political relationships that exist in the setting," Ostrom noted.[r] Yet despite their differences, these commons also have many similarities, she notes: "Extensive norms have evolved in all of these settings that narrowly define 'proper' behavior. Many of these norms make it feasible for individuals to live in close interdependence on many fronts without excessive conflict. Further, a reputation for keeping promises, honest dealings, and reliability in one arena is a valuable asset. Prudent, long-term self-interest reinforces the acceptance of the norms of property behavior. None of these situations involves participants who vary greatly in regard to ownership of assets, skills, knowledge, ethnicity, race or other variables that could strongly divide a group of individuals."[s]

Although the circumstances of small, subsistence-based communities are quite different from those of modern, industrialized cities and towns, Ostrom has argued that commons-based regimes can also work in the latter situations as well. Based on extensive fieldwork in the 1950s and 1960s with Louis Weschler, Ostrom assessed how a governance system arose in California to protect endangered groundwater basins from overuse and likely ruin (from the contamination of nearby ocean water). Instead of allowing a race to over-pump scarce water supplies, government at multiple levels collaborated to establish a governance system that remained "largely *in* the public sector without [government] being a central regulator…. No one 'owns' the basins themselves. The basins are managed by a *polycentric set* of limited-purpose

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[q] ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990).

[r] *Id.* at 89.

[s] *Id.*

governmental enterprises whose governance includes active participation by private water companies and voluntary producer associations. This system is neither centrally owned nor centrally regulated."[t]

Following are three readings that respond to Garrett Hardin's "tragedy of the commons" parable. The first is from Elinor Ostrom's classic work, *Governing the Commons* (1990) in which she sets forth an empirically based typology of "design principles" for successful commons. The second reading, by anthropologists Bonnie J. McCay and James M. Acheson, is an overview of ecological commons and the types of contextual factors that affect their functioning. The third reading is a brief article by commons historian Peter Linebaugh—author of *The Magna Carta Manifesto: Liberties and Commons for All* (2005) and other books—which conveys some of the interpersonal, spiritual, and even metaphysical nature of the commons from his Marxist perspective.

ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 29, 30, & 88-90 (1990)

. . . The central question in this study is how a group of principals who are in an interdependent situation can organize and govern themselves to obtain continuing joint benefits when all face temptations to free-ride, shirk, or otherwise act opportunistically. Parallel questions have to do with the combinations of variables that will (1) increase the initial likelihood of self-organization, (2) enhance the capabilities of individuals to continue self-organized efforts over time, or (3) exceed the capacity of self-organization to solve CPR problems without eternal assistance of some form.

* * *

The term "common-pool resource" refers to a natural or man-made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use. To understand the processes or organizing and governing CPRs, it is essential to distinguish between the resource system and the flow of resource units produced by the system, while still recognizing the dependence of the one on the other.

Resource systems are best thought of as stock variables that are capable, under favorable conditions, of producing a maximum quantity of a flow variable without harming the stock or the resource system itself. Examples of resource systems include fishing grounds, groundwater basins, grazing areas, irrigation canals, bridges, parking garages, mainframe computers, and streams, lakes, oceans, and other bodies of water. . .

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[t] *Id.* at 135-36.

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Despite all the differences among the CPR settings described—and substantial differences exist—all share fundamental similarities. One similarity is that all face uncertain and complex environments. In the mountain common, the location and timing of rainfall cannot be predicted. In the irrigation systems, erratic rainfall is again a major source of uncertainty. Whereas the construction of physical works tends to reduce the level of uncertainty, it tends to increase the level of complexity in these systems. Irrigators must have practical engineering skills as well as farming skills.

In contrast to the uncertainty caused by these environments, the populations in these locations have remained stable over long periods of time. Individuals have shared a past and expect to share a future. It is important for individuals to maintain their reputations as reliable members of the community. They expect their children and their grandchildren to inherit their land. In other words, their discount rates are low. If costly investments in provision are made at one point in time, the proprietors—or their families—are likely to reap the benefits.

Extensive norms have evolved in all of these settings that narrowly define "proper" behavior. Many of these norms make it feasible for individuals to live in close interdependence on many fronts without excessive conflict. Further a reputation for keeping promises, honest dealings, and reliability in one arena is a valuable asset. Prudent, long-term self-interest reinforces the acceptance of the norms of proper behavior. None of these situations involves participants who vary greatly in regard to ownership of assets, skills, knowledge, ethnicity, race or other variables that could strongly divide a group of individuals. . . .

The most notable similarity of all, of course, is the sheer perseverance manifested in these resource systems and institutions. The resource systems clearly meet the criterion of sustainability. . . . Now the task is to begin to explain [the] sustainability and robustness [of selected cases], given how difficult it must have been to achieve this record in such complex, uncertain, and interdependent environments in which individuals have continuously faced substantial incentives to behave opportunistically.

* * *

Although the particular rules that are used within these various settings cannot provide the basis for an explanation of the institutional robustness and sustainability across these CPRs, part of the explanation that I offer is based on the face that the particular rules differ. The differences in the particular rules take into account specific attributes of the related physical systems, cultural views of the world, and economic and political relationships that exist in the setting. Without different rules, appropriators could not take advantage of the

positive features of a local CPR or avoid potential pitfalls that might be encountered in one setting but not others.

Instead of turning to the specific rules, I turn to a set of seven design principles that characterize all those robust CPR institutions, plus an eighth principle used in the larger, more complex cases. . . . By "design principle" I mean an essential element or condition that helps to account for the success of these institutions in sustaining the CPRs and gaining the compliance of generation after generation of appropriators to the rules in use. . . .

Table [14.1]. ***Design principles illustrated by long-enduring CPR institutions***

1. Clearly defined boundaries
   Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself.

2. Congruence between appropriation and provision rules and local conditions
   Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and/or money.

3. Collective-choice arrangements
   Most individuals affected by the operational rules can participate in modifying the operational rules.

4. Monitoring
   Monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are the appropriators.

5. Graduated sanctions
   Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, by officials accountable to these appropriators, or both.

6. Conflict-resolution mechanisms
   Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between ppropriators and officials.

7. Minimal recognition of rights to organize
   The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.

For CRPs that are parts of larger systems:

8. Nested enterprises
   Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

BONNIE J. MCCAY & JAMES M. ACHESON, THE QUESTION OF THE COMMONS: THE CULTURE AND ECOLOGY OF COMMUNAL RESOURCES 6-8 (1996)

One cannot properly generalize from the tragedy-of-the-commons model without incorporating contextual factors,[1] such as, for example, the presence or absence of rules about uses of the commons, alternatives to exploitation of common resources, ways of monitoring and controlling the behavior or others in a commons, and so forth. Ignoring these contextual factors, many of which are assumptions built into the model, leads to the mistake of assuming that because people are engaged in common-property activity, they are involved in a tragedy of the commons.

Unfortunately, many of those using the tragedy-of-the-commons model have failed to recognize its assumptions and verify their applicability to the case at hand. Among those assumptions are that common property is always of the open-access variety; that the users are selfish, unrestricted by social norms of the community, and trying to maximize short-term gains; that the users have perfect information; and that the resource is being used so intensively that overexploitation and depletion are possible.

The individualistic bias of most commons models leads to underestimates of the ability of people to cooperate in commons situations[2] and contributes to the tendency to avoid social, historical, and institutional

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[1] *See* Andrew P. Vayda, *Actions and Consequences as Objects of Explanation in Human Ecology* (paper presented at the Second International Conference of the Society for Human Ecology, Bar Harbor, Maine, 1986).

[2] *See* Carlisle. F. Runge, *Common Property Externalities: Isolation, Assurance and Resource Depletion in a Traditional Grazing Context*, 63 AM. J. AGRICULTURAL ECON. 595 (1981); R. Kimber, *Collective Action and the Fallacy of the Liberal Fallacy*, 33 WORLD POL. 178 (1981).

analysis.[3] The model of the tragedy of the commons fails to recognize the social nature of property institutions, even though Western law, like the customs and law of many non-Western groups,[4] clearly conceives of property in social terms: "property rights do not refer to relations between men and things, but, rather, *to the sanctioned behavioral relations among men that arise from the existence of things and pertain to their use."*[5]

Moreover, as most authors in this volume assume, property rights are thoroughly embedded in historically specific social contexts whose meanings vary. . . . [Ethnographer Bronislaw] Malinowski found that common property, with joint owners, included not only equal rights of use but also complex and variable systems of rights, duties, functions, and obligations. The Trobriand institution [the social system of gift-exchange and reciprocity that Malinkowski famously studied] also balanced individual and collective interests held to be irreconcilable in common property situations.

> On a close inquiry we discover in this pursuit a definite system of division of functions and a rigid system of mutual obligations, into which *a sense of duty and the recognition of the need of cooperation enter side by side with a realization of self-interest, privileges and benefits*.
>
> *Ownership, therefore, can be defined neither by such words as 'communism' nor 'individualism,' nor by reference to 'joint-stock company' system or 'personal enterprise,' but by the concrete facts and conditions of use. It is the sum of duties, privileges, and mutualities which bind the joint owners to the object and to each other* [emphasis added].[6]

. . . Once we pay attention to the "concrete facts and conditions of use" emphasized by Malinowski, private property too is seen to be a complex set of social duties, privileges and mutualities,[7] not a necessary and "natural"

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[3] *See* Daniel W. Bromley, *Land and Water Problems in an Institutional Perspective*, 64 AM. J. AGRICULTURAL ECON. 834 (1982).

[4] *See* Paul Bohannan, *Land, "Tenure," and Land Tenure*, *in* AFRICAN AGRARIAN SYSTEMS 101 (Daniel Biebuyk ed., 1982); E. A. HOEBEL, THE LAW OF PRIMITIVE MAN (1954).

[5] *See* Erik G. Furubotn & Svetozar Pejovich, *Property Rights and Economic Theory: A Survey of Recent Literature*, 10 J. ECON. LIT.1137 (1972).

[6] BRONISLAW MALINOWSKI, CRIME AND CUSTOM IN SAVAGE SOCIETY 20-21 (1926) [emphasis added].

[7] *See* Bromley, *supra* note 3; J. H. Dowling, *Property Relations and Productive Strategies in Pastoral Societies*, 2 AMERICAN ETHNOLOGIST No. 3 419 (1975).

evolutionary response to resource scarcity [as viewed by some] property rights theorists, who see the transition to private property as an inevitable and natural response to resource scarcity.[8]

The thesis of the tragedy of the commons fails to distinguish between common property as a theoretical condition in which there are no relevant institutions (open access) and common property as a social institution (the commons). The assumption that common property is the same thing as open-access is historically inaccurate. It also leads to arguments that restrictions on access are the only effective means of resolving commons problems, arguments that, when implemented, have led to tragedies of people dispossessed of their livelihoods by the enclosure of common lands.[9] In true common property situations, rights of access or use are shared equally *and* exclusive to a defined group of people. "Common property is not 'everybody's property,'"[10] although it may be perceived and acted upon that way in specific circumstances.

PETER LINEBAUGH, "ALL FOR ONE AND ONE FOR ALL,"
SOME PRINCIPLES OF THE COMMONS,
Counterpunch (Weekend Ed. Jan. 8-10, 2010)
http://www.counterpunch.org/linebaugh01082010.html

Human solidarity as expressed in the slogan "all for one and one for all" is the foundation of commoning. In capitalist society this principle is permitted in childhood games or in military combat. Otherwise, when it is not honored in hypocrisy, it appears in the struggle contra capitalism or, as Rebecca Solnit shows, in the disasters of fire, flood, or earthquake.

The activity of commoning is conducted *through* labor *with* other resources; it does not make a division between "labor" and "natural resources." On the contrary, it is labor which creates something as a resource, and it is by resources that the collectivity of labor comes to pass. As an action it is thus best understood as a verb rather than as a "common pool resource." Both Lovelock's "Gaia Hypothesis" and the environmentalism of Rachel Carson were attempts to restore this perspective.

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[8] *See* Harold. Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. No. 2, at 347 (1967).

[9] *See* Siegfried V. Ciriacy-Wantrup & Richard C. Bishop, *"Common Property" as a Concept in Natural Resources Policy*, 15 NAT. RESOURCES J. No. 4 713 (1975); W. G. HOSKINS & L. D. STAMP, THE COMMON LANDS OF ENGLAND AND WALES (1963).

[10] Ciriacy-Wantrup & Bishop, *supra* note 9.

Commoning is primary to human life. Scholars used to write of "primitive communism." "The primary commons" renders the experience more clearly. Scarcely a society has existed on the face of the earth which has not had at its heart the commons; the commodity with its individualism and privatization was strictly confined to the margins of the community where severe regulations punished violators.

Commoning begins in the family. The kitchen where production and reproduction meet and the energies of the day between genders and between generations are negotiated. The momentous decisions in the sharing of tasks, in the distribution of product, in the creation of desire, and in sustaining health are first made here.

Commoning is historic. The "village commons" of English heritage or the "French commune" of the revolutionary past are remnants from this history, reminding us that despite stages of destruction parts have survived, though often in distorted fashion as in welfare systems, or even as their opposite as in the realtor's gated community or the retailer's mall.

Commoning has always had a spiritual significance expressed as sharing a meal or a drink, in archaic uses derived from monastic practices, in recognition of the sacred *habitus.* Theophany, or the appearance of the divine principle, is apprehended in the physical world and its creatures. In north America ("turtle island") this principle is maintained by indigenous people.

Commons is antithetical to capital. Commoners are quarrelsome (no doubt), yet the commons is without class struggle. To be sure, capital can arise from the commons, as part is sequestrated off and used against the rest. This begins with inegalitarian relations, among the Have Lesses and the Have Mores. The means of production become the way of destruction, and expropriation leads to exploitation, the Haves and Have Nots. Capital derides commoning by ideological uses of philosophy, logic, and economics which say the commons is impossible or tragic. The figures of speech in these arguments depend on fantasies of destruction—the desert, the life-boat, the prison. They always assume as axiomatic that concept expressive of capital's bid for eternity, the a-historical "Human Nature."

Communal values must be taught, and renewed, continuously. The ancient court leet resolved quarrels of over-use; the *panchayat* in India did the same, like the way a factory grievance committee is supposed to be; the jury of peers is a vestigial remnant which determines what a crime is as well as who's a criminal. The "neighbor" must be put back into the "hood," as they say in Detroit, like the people's assemblies in Oaxaca.

Commoning has always been local. It depends on custom, memory, and oral transmission for the maintenance of its norms rather than law, police, and media. Closely associated with this is the independence of the commons from government or state authority. The centralized state was built upon it. It is, as it were, "the pre-existing condition." Therefore, commoning is not the same as the communism of the USSR.

The commons is invisible until it is lost. Water, air, earth, fire—these were the historic substances of subsistence. They were the archaic physics upon which metaphysics was built. Even after land began to be commodified during English Middle Ages it was written,

> *But to buy water or wind or wit or fire the fourth,*
> *These four the Father of Heaven formed for this earth in common;*
> *These are Truth's treasures to help true folk*

We distinguish "the common" from "the public." We understand the public in contrast to the private, and we understand common solidarity in contrast to individual egotism. The commons has always been an element in human production even when capitalism acquired the hoard or laid down the law. The boss might "mean business" but nothing gets done without respect. Otherwise, sabotage and the shoddy result.

Commoning is exclusive inasmuch as it requires participation. It must be entered into. Whether on the high pastures for the flock or the light of the computer screen for the data, the wealth of knowledge, or the real good of hand and brain, requires the posture and attitude of working alongside, shoulder to shoulder. This is why we speak neither of rights nor obligations separately.

Human thought cannot flourish without the intercourse of the commons. Hence, the first amendment linking the rights of speech, assembly, and petition. A moment's thought reveals the interaction among these three activities which proceed from lonely muttering to poetic eloquence to world changing, or

> Bing! Bing! the light bulb of an idea
> Buzz! Buzz! talking it over with neighbors or co-workers
> Pow! Pow! telling truth to power.

DISCUSSION NOTES/QUESTIONS

1. If the herdsmen in Garrett Hardin's notional commons could communicate and negotiate with one another, would the outcome of their use of the shared pasture be different? How? How not?

2. Hardin's essay has been criticized for conflating an "open access" regime, in which there are no rules or institutional governance for a natural resource, and "common property," in which there is a defined community managing it. As Hardin admitted in a 1998 essay *Extensions of "The Tragedy of the Commons,"* 280 *Science* 682:

> To judge from the critical literature, the weightiest mistake in my synthesizing paper was the omission of the modifying adjective "unmanaged." In correcting this omission, one can generalize the practical conclusion in this way: "A 'managed commons' describes either socialism or the privatism of free enterprise. Either one may work; either one may fail: "The devil is in the details."

To this may be added Lewis Hyde's puckish rejoinder:

> Garrett Hardin has indicated that his original essay should have been titled "The Tragedy of the Unmanaged Commons," though better still might be "The Tragedy of Unmanaged, Laissez-Faire, Common-Pool Resources with Easy Access for Noncommunicating, Self-Interested Individuals."

Lewis Hyde, *Common as Air: Revolution, Art, and Ownership* 40 (2010).

But, puckish humor aside, does not Hardin's admission itself raise a further issue of concern? Are "socialism" and "free enterprise" the only viable choices for avoiding over-exploitation of finite resources? Can you begin to generalize about what norms, structures, and social practices may be needed for a commons to function in the space *between* government and free enterprise?

3. Economist Mancur Olson, in his influential book *The Logic of Collective Action* (1965), argues that "rational, self-interested individuals will not act to achieve their common or group interests" (a brash claim that he qualified elsewhere in his book). Olson was describing a "collective action problem," a vexing, intractable scenario that cannot be easily resolved, according to traditional economists. Consider how Olson's formulation of the problem may frame our understanding of the challenge and dictate certain outcomes. For example, do "rational, self-interested individuals" seek to appropriate as much personal gain as they can from a collective resource—or do they realize that they exist within a social context and that selfish personal behavior might elicit condemnation? Are cooperative solutions realistic in the use of certain resources— say, a lake or a forest used for timber and hunting—and, if so, under what conditions? Can you identify reasons why members of a community might have trouble achieving a collective-action solution for managing a fishery or limited irrigation water diverted from a river? What steps might be taken to overcome these problems? Arbitration, conciliation, or some other third-party mediating process? Some form of joint management or ownership?

4. What is the difference between a common pool resource, common property, and a commons? What are the most significant ways in which a commons-based system of resource management differs from a market-based system? What are the primary goals of a business in respect of natural resources? How do commoners relate to "their" natural resources?

5. Consider the role that informal negotiations and collective norms can have in managing resources—for simple example, a cruise ship whose passengers, by social consensus, take possession of deck chairs only so long as they are sitting in them or if they leave a towel on them while in the pool. When, however, a new batch of passengers arrives at the next port and demands exclusive possession of deck chairs for the duration of the cruise, chairs suddenly become scarce. Thus can usage rules "create" scarcities and inequality. *See* Silke Helfrich et al., *The Commons -- Prosperity by Sharing* at 6 [report] (2010), *available at* http://commonsblog.files.wordpress.com /2010/10/gemeingueter.pdf (last visited Feb. 28, 2011). Another example of a "micro legal system" of resource management is a queue in front of a movie theater or store in which there is a shared, tacit agreement among people that access will be allocated on a first-come, first-serve basis. People standing in a queue frequently police this agreement by trying to shame or exclude anyone who attempts to cut in line. For examples of how communities can self-organize and police the use of resources without formal law, see Robert C. Ellickson, Order Without Law: How Neighbors Settle Disputes (1991) and Richard O. Zerbe, Jr. & C. Leigh Anderson, *Culture and Fairness in the Development of Institutions in the California Gold Fields*, 61 J. Econ. History 114 (2001).

6. Peter Linebaugh notes astutely that the commons is not just a resource, but an activity of cooperative human labor that itself is the engine of production—in other words, the commons is more a verb, *commoning*, than a thing. Once we begin to take a perspective that the commons is a relational activity, not a physical object, it opens up a broader, more complicated discussion about the commons and its dynamics. The subjective and interpersonal are validated as important factors in how resources are produced. The interdependencies among people and on natural systems come to the fore as relevant factors. Our ontological nature as human creatures in historical and cultural circumstances cannot be avoided or disguised through flimsy, objectifying models like *homo economicus*, which presume that human beings are rational, utility-maximizing, materialistic individuals and that the entire economy revolves around such attitudes and behaviors. Compare the differences in how Elinor Ostrom and Peter Linebaugh view the commons. What are the advantages and disadvantages of each epistemological approach?

3. MEDIEVAL COMMONS AND ENCLOSURES

Throughout history, commons have been inscribed within a wide variety of political systems and power relationships. This makes it perilous to over-generalize about the underlying principles that govern commons; the realities are highly variable. This is why Ostrom, *et al*. point only to general design principles, not specific rules. "Even similar resource and technology combinations such as irrigation systems—require variation in the rules that govern access, harvesting, investment, maintenance, monitoring, and sanctioning. Rules that work well for a flat valley-bottom system serving 100 farmers will not work well for a hilly system serving 15,000 farmers," writes commons scholar Joanna Burger, *et al.,* in *Protecting the Commons: A Framework for Resource Management in the Americas* (2001).

With that caution, the history of medieval commons is nonetheless instructive about some of the enduring principles that enable commons to manage limited resources successfully over long periods of time. There is a rich literature dealing with medieval commons by such historians as Silvia Federici, Christopher Hill, Peter Linebaugh, J. M. Neeson, Karl Polanyi, and E. P. Thompson. The following passage, by American essayist Lewis Hyde in his study of cultural commons, highlights some of the social and political features that make for a durable ecological commons. As Hyde explains, agricultural commons were stable and effective in 18th Century England in part because they imposed all sorts of limits on use rights to the commons, and commoners devised their own means for protecting against enclosures. In short, contrary to popular belief, medieval commons did not resemble the type of commons that Garrett Hardin imagined as archetypal.

LEWIS HYDE, COMMON AS AIR: REVOLUTION, ART AND OWNERSHIP 34-37 (2010)

The simple fact is that the commons were a form of property that served their communities for centuries because there were strict limits on the use rights. The commons were not open; they were stinted. If, for example, you were a seventeenth-century English common farmer, you might have the right to cut rushes on the common, but only between Christmas and Candlemas (February 2). Or you might have the right to cut branches of trees, but only up to a certain height and only after the tenth of November. Or you might have the right to cut the thorny evergreen shrubs called furze, but only so much as could be carried on your back, and only to heat your own house.

And these are simple restraints; most stints were more fully elaborated. If you were a farmer who had what were called "rights of common, appendant," you were constrained in the following ways: you must own land within the manor; you must actively cultivate your own land, your rights to the common pasture on "the lord's waste" arising out of your need to pasture your cattle in summer when you are cultivating; you may only pasture beasts needed in agriculture (oxen and horses to plow, sheep and cows to manure); you may only pasture your beasts during the growing season, when your land is under cultivation; you must not put more animals on the lord's land in summer than your own land can feed for the winter. In short, you must own and cultivate land distinct form the commons, and your use of the commons is limited by the size of your holding, limited in the kind of animal you may pasture, and limited to certain times of year.

In sum, use rights in the common were typically stinted, rarely absolute. No common was "open to all" and no "rational herdsman" was ever free to increase his herd at will. A true commons is a stinted thing; what Hardin

described is not a commons at all but what is nowadays called an unmanaged common-pool resource.

It should be noted, too, that as the commons were stinted, so was the market in goods (especially in grain). Markets could not operate without regard for the provisioning of commoners and the poor. Farmers, for example, were obliged to bring grain to market rather than sell it in the field to wholesalers, and markets themselves were fenced, as it were, so that speculators couldn't outbid the poor. A description of "the orderly regulation of Preston market" dated 1795 reads:

> The weekly markets…are extremely well-regulated. . . . None but the town's-people are permitted to buy during the first hour, which is from eight to nine in the morning: at nine others may purchase, but nothing unsold must be withdrawn from the market till one o'clock, fish excepted. . . .[11]

In another town, "hucksters, higlers, and retailers" were excluded from eight in the morning until noon. . . .

As with the constraints on the commons, markets were stinted for social and moral ends. No one was left to follow his or her own ends without regard for the group. In his 1993 book *Customs in Common*, historian E. P. Thompson cites a pamphlet from 1768 that, he says, "exclaimed indignantly against the supposed liberty of every farmer to do as he likes with his own. This would be a 'natural,' not a 'civil' liberty." The pamphlet itself declares that such liberty

> cannot then be said to be the liberty of a citizen, or of one who lives under the protection of any community; it is rather the liberty of a savage; therefore he who avails himself thereof, deserves not the protection, the power of Society affords.[12]

To these eighteenth-century eyes, a stinted market, one constrained by moral concerns, is a social market, while a wholly free market operating without limits is savage.

There is one last point to make about the way that the commons operated in premodern England. Only certain persons could use the commons, and only for limited purposes, but once established these uses were not to be cut off. In general no one could erect barriers to customary common rights, not

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[11] E. P. THOMPSON, CUSTOMS IN COMMON: STUDIES IN TRADITIONAL POPULAR CULTURE 195 (1993).

[12] *Id.* at 198.

the lord of the manor, not even the king. In fact, if encroachments appeared, commoners had a right to throw them down. Once a year, commoners would "beat the bounds," meaning they were perambulate the public ways and common lands armed with axes, mattocks, and crowbars to demolish any hedge, fence, ditch, stile, gate, or building that had been erected without permission. . . .

Such interventions and perambulations were convivial affairs. In the north of England, laborers, crowds of boys, and the local constable made up the annual procession, the village providing them with cake and beer. They walked their rounds during Ascension Day week, which is to say that protecting the commons and celebrating Christ's entry into heaven were one and the same. Annual perambulations assured the longevity of the commons; most of their history is therefore comic rather than tragic, if by comedy we mean a story with a social basis, a festive mood, and a happy ending.

DISCUSSION NOTES/QUESTIONS

1. Hyde's account emphasizes the importance of custom and stability in the commons, and how the imposition of market norms represented a profound change in people's sense of value, social relationships, and even time. He writes, at 39: "Enclosure means a shift away from lives guided by customs preserved in local memory toward those guided by national law preserved in writing. It means a shift in the value of change itself, once suspect and associated with decay, now praised and linked to growth. It means a change in the measurement and perception of time." How does governance and law change when it moves from the evolving field of social custom to a centralized system of statutes and court rulings? What are some of the advantages and disadvantages of "vernacular law," as Ivan Illich might put it? Of formal, written law? Consider these questions again after reading the short case studies in Section C, *infra*.

2. Hyde observes that, historically, "the commons were stinted." Medievals believed that certain social constraints were necessary for a functioning commons, and even for markets. They regarded markets without socially based rules as "savage" markets (as Hyde quotes from a 1768 pamphlet)—hence rules to assure that poor people could access the market and be protected against speculation. Can you name some contemporary analogues for stinting of the commons? What about constraints on, or "stints" of, the market? One might regard government regulation, mandatory bans and recalls, and consumer labeling as "stints" because they limit the absolute freedom of sellers in order to advance certain social and ethical goals. Consider why stinting may be valuable—and why orthodox economists might regard it as harmful "market intervention." What does this say about the contrasting definitions of "value" in a market versus a commons?

3. The relationship of markets to commons invariably raises questions of how to define *value.* For markets, the price system is seen as the best way to express value. In theory at least, individuals voluntarily express their decentralized preferences through open markets, and the resulting price is equated with value. Prices represent a

universal matrix for assigning value to anything, including life itself, as seen in the cost-benefit analyses made by regulatory agencies. Price, furthermore, is oriented toward *individual preferences*, not *collective interests and needs*, so there is an ontological commitment embedded in the very idea of price, i.e., an implicit determination of the meaning of human existence. But as property and environmental law scholars Frank Ackerman and Lisa Heinzerling make clear in *Priceless: Knowing the Price of Everything and the Value of Nothing* (2004), *price* is not necessarily coextensive with *value*. In the commons, value tends to be expressed in non-monetary ways. Value inheres in the community and its relationships, not in the individual alone. Generally, commoners are more committed to the shared management of resources and direct use than to market exploitation. That is, the fruits of the commons are generally inalienable because the commons produces for *use* value, not *exchange* value, and because the social/moral relationships within the commons are put at risk when the fruits of the commons (software code, scientific research, communal land) come under the sway of the market and its logic (money, impersonal relationships, episodic commitments, etc.). Which is not to say that the fruits of the commons are never marketable, for they often are; only that their marketability or alienability, and on what terms, is for the commoners as a collective to decide, not the individual commoner. The point is that a commons is not likely to survive if its participants have full individual freedom to decide whether to alienate certain use rights or other rights of membership; it opens the door to the full-scale marketization of relationships, resources, and social practices, and thus to the dissolution of the commons over time. Consider, for example, a specific resource such as land, water, or a software program, and the different implications of treating it as a commodity with a price versus a commons resource. How might people treat the resource differently?

4. The custom and stability associated with the commons, at least in medieval times, can be accurately seen as an impediment to unfettered individual freedoms of modernity. Hyde, at 41-42, urges us to remember "those feudal vassals who owed their lord the service of their swords, and below them those simple commoners obliged [to give their lord] honey, chickens, eggs, and time at the plow. Such people have no employers; they have lords and masters, and little or no freedom to alter the terms of their work. The great stability of the old agrarian commons was a great confinement, too. . . ." Yet the commons paradigm is not locked into a medieval time-frame, nor necessarily so all-encompassing of a person's life. It has many manifestations across the centuries, in different contexts, which themselves are dynamically adapting and evolving. In each instance, however, there is an emphasis on *relationships* over isolated individualism, and *long-term continuity* over episodic, short-term transactions; any individualism must be mindful of collective needs. This middle ground is being actively explored by many developing nations and indigenous peoples seeking to pioneer cultural alternatives to conventional economic development. Sometimes known as "critical traditionalism," the approach aims to regenerate and renew traditional practices from within, while selectively embracing elements of markets and modernity. In *Beyond Western Economics: Remembering Other Economic Cultures* (2009), Professor Trent Schroyer cites the work of the International Network for Cultural Alternatives to Development, which is trying to "view traditions as open books not closed systems [that] can be made more adaptive to contemporary circumstances."

B. PRIVATE PROPERTY AND COMMONS: TENSIONS, BOUNDARIES AND, SOCIAL CONTEXT

Any understanding of the commons requires that we grapple also with some deep-seated assumptions about the nature of private property. In modern industrialized societies, the correspondence between the individual and property is seen as self-evident. The social origins of, and state-backed support for, "private property" are all but invisible.

Yet there can be little doubt that property law is not only a creature of the state, through statutory definitions of scope and judicial enforcement of boundaries, but equally a creature of culture. Formal law bolsters as well as ratifies a society's cultural norms about the character of property rights. While this phenomenon is seen most clearly in societies with "exotic" cultural practices, the blurry and shifting boundaries between private property and the commons is evident in societies with highly developed economies as well. This is inevitable because systems of private property and common land can never be wholly distinct and mutually exclusive. Messy accommodations between them are routine, as seen in the familiar limitations on property rights exacted by zoning ordinances, access easements, environmental laws, and other expressions of public needs and values. Conversely, unless a piece of land is managed communally, even commons can and do accommodate a certain measure of individual autonomy.

Yet despite the mutual interpenetration of private property rights and commons in the same socio-economic system, the two regimes are fundamentally distinct. A market-based system of private property rights authorizes a person to sell and transfer individual ownership rights for cash. An ecological commons, by contrast, customarily prohibits an individual from making exclusive *ownership* claims on elements of nature. A commoner may have specified and exclusive *use rights* to fish at a given section of a river or to farm on a given plot of collectively owned land, but those rights typically are not exclusive *property rights* in William Blackstone's sense of "sole and despotic dominion."

In general, any individual entitlements that may exist in a commons are typically constrained by collective needs and norms. Since a commons is generally intended for personal or subsistence use, not market purposes, it is relatively normal for commoners to be allowed to alienate their use rights for cash or commercial purposes unless the members of the commons themselves agree to such an arrangement. The reason? Commoners recognize that their uses of resources are situated in a complex skein of social relationships and community commitments that could well be disrupted if individuals can opt out of the community by alienating their use rights, through purchase and sale in the market. Participants may realize, too, that the ecological stability of the

shared resource could be disrupted if individual commoners were allowed to profit from their use rights without constraint.

To be sure, it is possible for a commons to allow individuals to draw from a common-pool resource for personal market gain, as we see in Section C, Reading 3 *infra*, on the Namibian government's use of "resource rent" of a fishery. But the more that market purposes and norms govern the use of the common-pool resource, the less the regime resembles a commons.

In this section, we explore some of these tensions between private property rights and commons to illuminate the play that is possible in framing these two realms. The overarching theme of the next four readings is that the commodity logic of the market is essentially a social convention, not an immutable, self-evident fact, when applied to land and other natural resources. Property rights can be a highly useful fiction, but danger comes when the cultural assumptions about property are superimposed on biophysical ecosystems that have their own sovereign dynamics. In his 1995 book *Slide Mountain, or the Folly of Owning Nature*, Theodore Steinberg explores a series of oddities that occur when property rights are applied to various natural elements. When a plot of land on a mountain slides down onto someone else's land in an avalanche, the question then arises: Who owns that plot of land? There is a tendency among many free-market economists to recognize expansive, absolute private property rights despite the harm that may be inflicted upon indivisible collective resources such as the atmosphere and the oceans.

Given the realities of natural systems and the limitations of law itself, the legal boundaries that separate private property and commons may be porous. It can be hard to "fence nature in" to tidy packets of fungible units of property given the complex interdependencies that characterize nature. Moreover, this may not be even desirable. Part of the problem with regimes of private property is their tendency to isolate those aspects of nature that are clearly useful and can be sold in the market (e.g., the minerals in the ground, the monoculture crops that mass-scale farming can grow). By privileging the resources that can be monetized, the market perspective tends to care less about the overall health of the ecosystem or its long-term stability. What results is the "tragedy of the market," in which free riders exploit the marketable aspects of nature with little regard for its intrinsic ecological or cultural value.

1. "FICTIONAL COMMODITIES" LIKE LAND AND LABOR

KARL POLANYI, THE GREAT TRANSFORMATION: THE POLITICAL AND ECONOMIC ORIGINS OF OUR TIME 178-81 (1944, 1981)

What we call land is an element of nature inextricably interwoven with man's institutions. To isolate it and form a market out of it was perhaps the weirdest of all undertakings of our ancestors.

Traditionally, land and labor are not separated; labor forms part of life, land remains part of nature, life and nature form an articulate whole. Land is thus tied up with the organizations of kinship, neighborhood, craft, and creed—with tribe and temple, village, gild, and church. One Big Market, on the other hand, is an arrangement of economic life which includes markets for the factors of production. Since these factors happen to be indistinguishable from the elements of human institutions, man and nature, it can be readily seen that market economy involves a society the institutions of which are subordinated to the requirements of the market mechanism.

The proposition is as utopian in respect to land as in respect to labor. The economic function is but one of many vital functions of land. It invests man's life with stability; it is the site of his habitation; it is a condition of his physical safety; it is the landscape and the seasons. We might as well imagine his being born without hands and feet as carrying on his life without land. And yet to separate land from man and organize society in such a way as to satisfy the requirements of a real-estate market was a vital part of the utopian concept of a market economy.

Again, it is in the field of modern colonization that the true significance of such a venture becomes manifest. Whether the colonist needs land as a site for the sake of the wealth buried in it, or whether he merely wishes to constrain the nature to produce a surplus of food and raw materials, is often irrelevant; nor does it make much difference whether the native works under the direct supervision of the colonist or only under some form of indirect compulsion, for in every and any case the social and cultural system of native life must be first shattered.

* * *

Commercialization of the soil was only another name for the liquidation of feudalism which started in Western urban centers as well as in England in the fourteenth century and was concluded some five hundred years later n the course of the European revolutions, when the remnants of villeinage were abolished. To detach man from the soil meant the dissolution of the body economic into its elements so that each element could fit into that part of the system where it was most useful. The new system was first established alongside the old which it tried to assimilate and absorb, by securing a grip on such soil as was still bound up in precapitalistic ties. The feudal sequestration of the land was abolished.

* * *

The second step, overlapping the first, was the subordination of land to the needs of a swiftly expanding urban population. Although the soil cannot be physically mobilized, its produce can, if transportation facilities and the law permit. *"Thus the mobility of goods to some extent compensates the lack of interregional mobility of the factors* [author's added emphasis]; or (what is really the same thing) trade mitigates the disadvantages of the unsuitable geographical distribution of the productive facilities."[13] Such a notion was entirely foreign to the traditional outlook. "Neither with the ancients, not during the early Middle Ages—this should be emphatically asserted—were the goods of every day life regularly bought and sold."[14] . . . Surpluses of grain were supposed to provision the neighborhood, especially the local town; corn markets up to the fifteenth century had a strictly local organization. But the growth of towns induced landlords to produce primarily for sale on the market and—in England—the growth of the metropolis compelled authorities to loosen the restrictions on the corn trade and allow it to become regional, though never national.

Eventually agglomeration of the population in the industrial towns of the second half of the eighteenth century changed the situation completely—first on a national, then on a world scale.

To effect this change was the true meaning of free trade. The mobilization of the produce of the land was extended from the neighboring countryside to tropical and subtropical regions the industrial-agricultural division of labor was applied to the planet. As a result, people of distant zones were drawn into the vortex of change the origins of which were obscure to them, while the European nations became dependent for their everyday activities upon a not yet ensured integration of the life of mankind. With free trade the new and tremendous hazards of planetary interdependence sprang into being.

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13 BERTIL OHLIN, INTERREGIONAL AND INTERNATIONAL TRADE 42 (1935).

14 KARL BÜCHER, ENTSTEHUNG DER VOLKSWIRTSCHAFT (1904).

DISCUSSION NOTES/QUESTIONS

1. One of the great advantages of treating land, labor, and money as property is that it enables a market for those resources to arise. It thereby becomes possible to enjoy ownership rights in them and to have incentives to invest and improve the resources. However, treating land, labor, and money as commodities also treats human beings and ecological systems as fungible and substitutable. The value of one piece of "property" can be expressed as a cash value and presumed to be substitutable for another instance of the same resource having the same price. The more complex particularity of the resource—its history, identity, and non-marketable aspects—the less significant is it regarded to be.

2. Consider how assigning property rights are a "useful fiction" as well as a "harmful fiction." What are some of the tensions that arise when resources that once existed outside the market, perhaps as a commons, are assigned private property rights? In what ways is the introduction of property rights a form of emancipation for some people (and which types of people?); and, by the same token, in what ways can the introduction of property rights serve to dispossess people (and again, which types of people?).

2. INDIGENOUS PEOPLES, NATURE, AND THE ONTOLOGY OF PROPERTY

Bradley Bryan, "Property as Ontology: On Aboriginal and English Understandings of Ownership," 13 CANADIAN JOURNAL OF LAW AND JURISPRUDENCE 1, 3-31 (2000)

One way that cultural differences manifest themselves is through cultural practices reflecting a vision of *property*. As understandings of property are one (if not the) primary foundation of social interaction in our culture, divergent understandings of property within a culture can create cleavages that wreak havoc on community. For this reason, a comparison of differing understandings of property demonstrates the possibilities and limitations of cross-cultural interpretation.

The kinds of social relations that underlie a conception of property include the way that a culture creates community in the relations among its members with respect to land use, knowledge of territory, entitlements to use, and the procurement of goods, among others. Property is an expression of social relationships because it organizes people with respect to each other and their material environment. Property is not so much a statement of a thing as it is a description of a set of practices that we go through in our daily life with others. Our ideas of property seem to be present in much of the way we comport ourselves with respect to each other and the world—which speaks of a very metaphysical conception of property in that "property" signifies something about our ontological status as beings in the world by providing qualitative indicia of the way we relate to it.

We can imagine that there are systems of social relations that may not look like those we call property, but are nonetheless highly nuanced and complex metaphysical understandings of beings' relations to each other and the earth. When Europeans first settled in North America, they understood the land as *terra nullius*, or occupied by no one. This is widely believed to be an erroneous assumption, that in fact Aboriginal peoples had sophisticated legal systems and governance structures at the time of contact. This kind of response directly channels our thinking toward Aboriginal modes of land use, to occupation, to possession, and hence to property. Therefore, the question "what is Aboriginal property?" only arises in the context of a legal culture that demands certain kinds of activity with respect to land.

* * *

The Okanagan people [of Canada] understood themselves each in relation to a material object or class of objects (animal, bird, insect, etc.) with the relationship referred to through the word *sumix*, which is translated continually as "power." The understanding of nature power mediated all relations in society because everyone understood his or her relationship to each other by virtue of the *sumix* with which they were intricately interwoven in nature. However, such expression of power through nature also involves a very sophisticated understanding of the spirit world, which is apparently receding at the onslaught of settlers. . . . The peoples of the Okanagan area understood "property" in terms of a specific relationship with nature and the land because they understood themselves as having a very specific place in relation to nature as well.

Okanagan storyteller Harry Robinson lived in this constitutive world, and lived to see it move into decline. "Harry's life was filled not with material things, but with the pervasive presence of a still-living mythological world. Every hill, valley, canyon, creek and river has its story." Indeed, the change from seeing nature as continually present in all his relations to the advance of the technological society was not easy for Harry Robinson.

* * *

"Property" is a very elusive concept in this regime of personal relations and spiritual connections, such that ownership is best understood as that set of nuances understandings about territory that are related to the hunt, and the ability to dream and see the hunt. "Territory" is not understood in a Cartesian fashion, but rather as a landscape filled with subtle signs regarding the existence of game, the time of the year, the passage of other tribes in the area, and the way one understands when one is entitled to be there—both by nature and by others. Such an understanding of entitlement goes far beyond our own in its intricacy.

* * *

The ontological structure of Aboriginal life necessarily means that "ownership" *per se* never actually occurs of exists, because such things are

simply not enframed as we would enframe them. Similarly, we do not have the ability to understand our land use in terms of climate, dreams, natural manifestations, or other key features of Aboriginal ontology to which we do not have access. So on the one hand we have a metaphysical picture of the world that speaks of beings that understand themselves as agents of a sophisticated and highly complex natural world. And on the other we are confused with how to proceed because we know that we are gargling concepts and ideas in a very haphazard way; indeed, we risk *creating* 'knowledge' out of nothing.

Aboriginal property is thus a conundrum for the Western legal system because as soon as we begin our study in a truthful way the terms revolt. We have looked at the various building blocks of Aboriginal reality, only to be able to conclude that such reality is diverse, that understandings of proprietary entitlement are inextricably bound up with the fundamental agency relations and ontological conceptions of the society.

N. Bruce Duthu, *The Recognition of Intergenerational Ecological Rights and Duties in Native American Law*, *in* BURNS H. WESTON & TRACY BACH, RECALIBRATING THE LAW OF HUMANS WITH THE LAWS OF NATURE: CLIMATE CHANGE, HUMAN RIGHTS, AND INTERGENERATIONAL JUSTICE, App. A (Vermont Law School, 2009)

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A. Traditional Ecological Knowledge

As with other domains of Indigenous knowledge and practice—*e.g.* systems of government, religion, philosophy, etc.—one encounters serious problems of definition when seeking to uncover or distill a body of traditional ecological knowledge relating to Indigenous peoples, including Native Americans. Among the confounding factors are the lingering influences of colonialism that often precipitated vast changes in the tribal landscape and introduced novel, sometimes conflicting, normative orientations to, or relationships with, the natural world.

Notwithstanding these limitations, the ecologist Fikret Berkes offers a workable definition of traditional ecological knowledge in the following terms:

> [A] cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.[15]

This definition accounts for both the cumulative and dynamic aspects by and

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[15] FIKRET BERKES, SACRED ECOLOGY: TRADITIONAL ECOLOGICAL KNOWLEDGE AND RESOURCE MANAGEMENT 8 (1999).

through which ecological knowledge is acquired and transmitted, particularly by "societies with historical continuity in resource use on a particular land."[16] Legal scholar Rebecca Tsosie adds that traditional ecological knowledge embraces "both Indigenous systems of environmental ethics and the group's scientific knowledge about environmental use that has resulted from generations of interaction."[17] According to Tsosie, these Indigenous systems of knowing and interacting with the natural world constitute a unique world view that, while distinctive in important ways, also shares the following attributes:

> [A] perception of the earth as an animate being; a belief that humans are in a kinship system with other living things; a perception of the land as essential to the identity of the people; and a concept of reciprocity and balance that extends to relationships among humans, including future generations, and between humans and the natural world.[18]

Thus: an attribute of unity between sacred landscapes and identity, both communal and individual.

This attribute is vividly illustrated in the worldview of the Ndee people or White Mountain Apache. The Ndee utilize the same word, "ni'" to convey the meaning of "mind" and "land." The anthropologist Keith H. Basso, who conducted much of his field research among the Ndee, notes that "[k]nowledge of places is . . . closely linked to knowledge of the self, to grasping one's position in the larger scheme of things, including one's own community, and to securing a confident sense of who one is as a person."[19] As "[i]nhabitants *of* their landscape," says Basso, "the Western Apache are thus inhabited *by* it as well, and in the timeless depth of that abiding reciprocity, the people and their landscape are virtually as one" [author's added emphasis].[20] In a similar vein, the Inuit employ the word "*sila*" for both "weather" and "the elements" and for "intelligence/consciousness" or "mind." In the Inuit worldview, "*sila* links the individual and the environment[;] a person who lacks *sila* is said to be separated from an essential relationship with the environment that is necessary for human well-being."

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[16] *Id.*

[17] Rebecca Tsosie, *Tribal Environmental Policy in an Era of Self-Determination: The Role of Ethics, Economics, and Traditional Ecological Knowledge*, 21 VT. L. REV. 225, 272–73 (1996).

[18] *Id.* at 276.

[19] KEITH H. BASSO, WISDOM SITS IN PLACES: LANDSCAPE AND LANGUAGE AMONG THE WESTERN APACHE 34 (1996).

[20] *Id.* at 102.

The spatial dimensions within which the Indigenous person is situated in her or his ancestral landscape also extend temporally across generations, from the ancestors to those yet to be born. For the Ndee people, the ancestors speak and guide the present generation—and future generations—through the ubiquitous reference points of place-names in the landscape. The landscape serves as a "repository of distilled wisdom, a stern but benevolent keeper of tradition, an ever-vigilant ally in the efforts of individuals and whole communities to maintain a set of standards for social living that is uniquely and distinctly their own."[21] In the words of an Ndee elder, "wisdom sits in places. It's like water that never dries up. You need to drink water to stay alive, don't you? Well, you also need to drink from places. You must remember everything about them. . . ."[22] The elder then prophecies: "Then your mind will become smoother and smoother. Then you will see danger before it happens. You will walk a long way and live a long time. You will be wise. People will respect you."[23]

As noted above, Indigenous worldviews embrace a concept of reciprocity and balance regarding relationships between people and their landscapes, and these concepts extend also to future generations. This sort of environmental ethic contributes to and informs Indigenous resource management practices of sustainability. In the contemporary context, as Tsosie contends, Indigenous peoples "thus advocate a Native concept of sustainability that 'means ensuring the survival of the people, land and the resources for seven generations.'"[24] This is not to suggest that historically, some Indigenous peoples in the present-day US did not engage in practices that were antithetical to this environmental ethic; the evidence suggests that some groups clearly did. In the modern era, one need only look at intra-tribal conflicts regarding clear-cut logging, or the siting of solid or hazardous waste dumps or fossil-fuel power plants on tribal lands to see contemporary expressions of this ecological paradox. But of course, one must be ever mindful of the intergenerational legacies of colonialism that often depleted the estates of tribal homelands and indeed, the tribal populations. At least in the modern era, the ecological paradox noted is often the byproduct of the colonial legacy that effectively constrains the options of tribal leaders trying to develop their lands to support contemporary communities.

B. Contemporary Tribal Resource Management Systems

As noted, contemporary tribal resource management systems often embrace their respective storehouses of traditional ecological knowledge,

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[21] *Id.* at 63.

[22] *Id*. at 127.

[23] Tsosie, *supra* note 17, at 287.

[24] *Id.* at 287.

beliefs, and practices, as is demonstrated by the examples that follow. A key attribute of these contemporary resource management systems is the prominence that tribes ascribe to the rights of future generations.

1. The Dine or Navaho Nation

The Dine or Navajo Nation explicitly recognizes the rights of future generations and the legal duties imposed upon the Nation in managing its natural resources. The Dine Natural Resources Protection Act (DNRPA) of 2005 embraces the environmental ethic of sustainability in its opening clauses:

> The Navajo Nation Council finds that the wise and sustainable use of natural resources in Navajo Indian Country traditionally has been, and remains, a matter of paramount governmental interest of the Navajo Nation and a fundamental exercise of Navajo tribal sovereignty.[25]

In the succeeding clause, the DNRPA references Dine Natural Law and the duty and responsibility owed to future generations:

> The Navajo Nation Council finds that the Fundamental Laws of the Dine . . . support preserving and protecting the Navajo Nation's Natural Resources, especially the four sacred elements of life—air, light/fire, water and earth/pollen—for these resources are the foundation of the peoples' spiritual ceremonies and the Dine life way, and that it is the duty and responsibility of the Dine to protect and preserve the natural world for future generations.[26]

These traditional ecological principles represent ground zero in an on-going intra-tribal battle among Dine citizens opposed to a tribal council proposal to build a massive 1,500 MW coal-fired power plant on the New Mexico portion of the Navajo Reservation. The opponents of this proposal suggest that reliance on alternative renewable energy sources like wind or solar power would be more consistent with Dine traditional ecological principles. According to Dine Fundamental law, the wind spirit or "*Nilch'i*" is a life force that, if accorded due "respect and offering," may be embraced within sustainable practices. Opponents of the coal-fired power plant maintain that using wind energy "in sustainable practices does not imply contaminating the air with harmful toxins[;] rather, the natural movement of Nilchi'i produces a force compatible and accommodating to modern sustainable living."[27]

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[25] Diné Natural Resources Protection Act of 2005 (on file with author), *available at* http://www.sric.org/uranium/DNRPA.pdf.

[26] *Id.*

[27] *See* Report by Ecos Consulting for Dine Citizens Against Ruining our Environment (Dine CARE), Energy and Economic Alternatives to the Desert Rock Energy Project 44 (Jan. 12, 2008) (on file with N. Bruce Duthu).

2. The Anishinaabe or Ojibwe

In the Great Lakes region, Anishinaabe or Ojibwe tribes from Wisconsin, Minnesota, and Michigan came together in the 1980s and 1990s to form an intertribal political body called the Great Lakes Indian Fish and Wildlife Commission (GLIFWC). The tribes delegated certain governmental functions to the GLIFWC to regulate tribal fishing and hunting rights, often in tandem with state resource management bodies. In 1992, seeking to infuse a distinctly Anishinaabe cultural ethic into its environmental management regime, the GLIFWC modified its mission statement and included the following reference to the "Anishinaabe Way:"

> The "Anishinaabe Way" underlies the unique approach to resource management which is brought by tribal people into the critical, modern day decisions regarding natural resources. Traditional thought directs management to be holistic and integrated, respectful of all creation. An understanding of the universal order and recognition of man's dependence on all other life forms, rather than his dominance, assures holistic management. Traditional thought also demands long-term vision, protecting the well-being, not just of the next generation or two, but of the "Seventh Generation," thus extending responsibility for the impact of management decisions far into the future.[28]

While giving voice to a uniquely Indigenous worldview, the GLIFWC's work in practice is often circumscribed by competing state interests and/or authority, particularly for off-reservation fishing resource management. Nonetheless, the GLIFWC's statement serves as powerful testament to the enduring force of traditional ecological knowledge and Indigenous environmental ethics in action. It is worth noting here that the Menominee Tribe of Wisconsin also embraces the "Seventh Generation" principle in its forest management plan which calls on managers to "remember that we are borrowing the forest from our grandchildren."[29]

3. Other Tribes

A number of other tribes have articulated natural resource and/or environmental management policies that explicitly reference the rights of or duties owed to future generations. The Colville Tribe, for example, in its Hazardous Substance Control ordinances, has this declaration of policy: "The beneficial stewardship of the land, air, and waters of the Colville Indian Reservation is a solemn obligation of the present generation for the benefit of

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[28] *Quoted in* Larry Nesper & James H. Schlender, *The Politics of Cultural Revitalization and Intertribal Resource Management: The Great Lakes Indian Fish and Wildlife Commission and the States of Wisconsin, Michigan, and Minnesota*, *in* NATIVE AMERICANS AND THE ENVIRONMENT: PERSPECTIVES ON THE ECOLOGICAL INDIAN 292 (Michael E. Harkin & David Rich Lewis eds., 2007).

[29] Berkes, *supra* note 15, at 35.

future generations."[30] The Confederated Tribes of the Grand Ronde Community of Oregon, in its statement of tribal government principles, includes the following language: "All actions of the Tribal Government and all who serve it shall be guided by the following values; . . . The needs and rights of future generations shall be considered in all decisions of Tribal Government."[31]

Finally, the White Mountain Apache Tribe's Environmental Code contains the following preamble in its water quality management regime:

> Tú, water, is one of the gifts of the Creator that is essential to the survival of the White Mountain Apache People. Water is inseparable from our land and culture. Our homeland has always been blessed with a great number of springs, streams, and meadows to sustain a diverse and vibrant community of plants, wildlife, and people. We have always sought to protect our precious natural resources and special places. We recognize that we must assert full authority over all the lands and waters of our Reservation to protect them from abuse. The standards for water quality in this Tribal Ordinance will guide the protection of our waters for present and *future generations*."[32]

B. Constitutionalizing the Seventh Generation Principle

It is appropriate to conclude this discussion of Indigenous intergenerational ecological rights and duties by noting that the Anishinaabe, among other tribal groups, have called for and produced the text of a proposed amendment to the U.S. Constitution that would entrench the rights of future generations. Noting that the Constitution's Preamble is addressed "to ourselves and our posterity," the members of the Seventh Generation movement have called for adoption of a "Seventh Generation Amendment" to the Constitution that provides the following:

> The right of citizens of the U.S. to enjoy and use air, water, sunlight, and other renewable resources determined by the Congress to be common property shall not be impaired, *nor shall such use impair their availability for use by the future generations*.[33]

The suggested amendment is notable for, among other things, recognizing the

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[30] Colville Tribal Law and Order Code § 4-16-2(a) (2004) (on file with N. Bruce Duthu), *available at* http://www.narf.org/nill/Codes/colvillecode/cc4ch16to17.htm.

[31] Tribal Government Purpose Ch. 200(c)(3)(H)(1994)(on file with N. Bruce Duthu), *available at* http://thorpe.osu.edu/archives/granderonde/ch200.htm.

[32] White Mountain Apache Environmental Code, Ch. 3 Pmbl.(on file with N. Bruce Duthu), *available at* http://thorpe.ou.edu/codes/wntnapache/env2chptr3pt1.htm.

[33] *As quoted in* WINONA LADUKE, ALL OUR RELATIONS: NATIVE STRUGGLES OF LAND AND LIFE 199 (1999) (author's added emphasis).

common interests and rights of all future generations, Indigenous and non-Indigenous. This drives home the Indigenous principle of the inter-relationship of all creation and our common stake in the integrity, security, and protection of our shared world.

DISCUSSION NOTES/QUESTIONS

1. One of the great virtues of property law in liberal democracies is its ability to provide a universal set of categories for defining natural resources and so enabling their ownership and market exchange. However, as the reading by Bradley Bryan suggests, this utilitarian achievement has its limits, most notably in helping us to understand how members of aboriginal societies orient themselves with respect to nature, and to each other, *without* conventional property categories. Besides helping to maintain a cultural identity and worldview, the ontological categories of aboriginal (or indigenous) peoples tend to help them act as effective long-term stewards of what might be called "natural resource commons." Why might this be so?

2. Some of the philosophical premises of modernity are very deeply rooted in our thinking and identities. This makes it is difficult to conceive of other ways of approaching the world and ordering human relationships to nature. The idea of "property" in the Western tradition, for example, implies an orientation toward the market use of resources without special regard for the long-term ecological consequences or the social meanings of nature to people; the price system presumes a basic equivalence among like-priced elements of nature. Societies that have a more direct, subsistence relationship to nature may therefore find property- and market-based sensibilities alien and even offensive. To the extent that generalizations can be made, how do aboriginal or indigenous peoples' notions of community norms and specified use rights constitute a functional commons according to the criteria outlined by Elinor Ostrom in Section A, *supra*? How does this ontological reality differ from that of societies that recognize alienable property rights and the supremacy of market-based relationships?

3. THE PUBLIC TRUST DOCTRINE

Mary Christina Wood, *Advancing the Sovereign Trust of Government to Safeguard the Environment for Present and Future Generations (Part I): Ecological Realism and the Need for a Paradigm Shift*, 39 ENVTL L. 43, 67-69 (2009)

Government as Trustee of Public Assets for Present and Future Generations

A trust bifurcates the property interest between the legal owner and the beneficial owner. The beneficiaries hold the beneficial title to all assets in the trust. The trustee holds legal title, encumbered with the responsibility to manage the trust strictly for the beneficiaries. This construct imposes a responsibility on the interests of the beneficiary class. In the case of the public trust [doctrine of environmental law], the beneficiaries are the citizens, both present and future generations. In a landmark trust opinion, *Geer v. Connecticut*[34] the Supreme Court said "the ownership [of migrating schools of fish, while in inland waters] is that of the people in their united sovereignty."[35]

The public trust is perpetual, designed by courts to secure the natural resources needed by both present and future generations. The concern for future citizens is the *raison d'etre* for the trust. As the Supreme Court said in *Geer*: "[I]t is the duty of the legislature to enact such laws as will best preserve the subject of the trust, and secure its beneficial use in the future to the people of the state."[36]

The core of the doctrine requires trust management for public benefit rather than private exploit. As the *Geer* Court stated: "[T]he power or control lodged in the State, resulting from this common ownership, is to be expected, like all other powers of government, as a trust for the benefit of the people, and not as a prerogative for the advantage of the government, as distinct from the people, or for the benefit of private individuals as distinguished from the public good."[37] The lodestar public trust opinion is *Illinois Central Railroad Co. v. Illinois (Illinois Central)*,[38] where the Supreme Court announced that the shoreline of Lake Michigan was held in public trust by the State of Illinois and could not be transferred out of public ownership to a private railroad corporation. In broad language, encompassing the public's fundamental right to natural resources, the Court stated:

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[34] 161 U.S. 519 (1896).

[35] *Id.* at 529

[36] *Id*. at 534.

[37] *Id*. at 529.

[38] 146 U.S. 387 (1892).

> [T]he decisions are numerous which declare that such property is held by the state, by virtue of its sovereignty, in trust for the public. The ownership of the navigable waters of the harbor, and of the lands under them, is a *subject of public concern to the whole people of the state*. The trust with which they are held, therefore, is governmental, and cannot be alienated. . . ."[39]

The trust therefore serves as a fundamental limitation of government's assertion of power to allow natural damage. While the current environmental laws give agencies control over natural systems and authority to allocate rights to private parties to pollute and destroy resources, the trust serves as a fundamental check on this authority. Simply stated, government trustees, who serve at the will of the public, may not allocate rights to destroy what the people legitimately own for themselves and for their posterity.

4. THE TRAGEDY OF THE ANTICOMMONS

Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998).

Anticommons property can best be understood as the mirror image of commons property. A resource is prone to overuse in a tragedy of the commons when too many owners each have a privilege to use a given resource and no one has a right to exclude another. By contrast, a resource is prone to underuse in a "tragedy of the anticommons" when multiple owners each have a right to exclude others from a scarce resource and no one has an effective privilege of use. In theory, in a world of costless transactions, people could always avoid commons or anticommons tragedies by trading their rights. In practice, however, avoiding tragedy requires overcoming transaction costs, strategic behaviors, and cognitive biases of participants, with success more likely within close-knit communities than among hostile strangers. Once an anticommons emerges, collecting rights into usable private property is often brutal and slow.

Privatization in postsocialist economies starkly illustrates how anticommons property can emerge and persist. One promise of the transition to a free market was that new entrepreneurs would fill stores that social rule had left bare. Yet after several years of reform, many privatized storefronts remained empty, while flimsy metal kiosks, stocked full of goods mushroomed on the streets. Why did the new merchants not come in from the cold? One reason was that transition governments often failed to endow any individual with a bundle of rights that represents full ownership. Instead, fragmented rights were distributed to various socialist-era stakeholders, including private or quasi-private enterprises, workers' collectives, privatization agencies, and local,

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[39] *Id*. at 455 [emphasis added].

regional and federal governments. No one could set up shop without first collecting rights from each of the other owners.

Privatization of upstream biomedical research in the United States may create anticommons property that is less visible than empty storefronts but even more economically and socially costly. In this setting, privatization takes the form of intellectual property claims to the sorts of research results that, in an earlier era, would have been made freely available in the public domain.

* * *

Patents and other forms of intellectual property protection for upstream discoveries may fortify incentives to undertake risky research projects and could result in a more equitable distribution of profits across all stages of R&D. But privatization can go astray when too many owners hold rights in previous discoveries that constitute obstacles to future research. Upstream patent rights, initially offered to help attract further private investment, are increasingly regarded as entitlements by those who do research with public funds. A researcher who may have felt entitled to coauthorship or a citation in an earlier era may now feel entitled to be a coinventor on a patent or to receive a royalty under a material transfer agreement. The result has been a spiral of overlapping patent claims in the hands of different owners, reaching ever further upstream in the course of biomedical research. . . .

DISCUSSION NOTES/QUESTIONS

1. The public trust doctrine, though limited under U.S. law, is a contemporary version of a legal principle that dates back to Emperor Justinian's rule during the Roman Empire: "By the law of nature, these things are common to humankind: the Air, running Water, the Sea . . . ." Institutes of Emperor Justinian, 2.1.1 (A.D. 529). The idea of ecological stewardship is commonplace among indigenous peoples and ancient societies as well. Can you speculate on why societies have embraced the idea of ecological stewardship and intergenerational obligation to protect natural resources? Can you also speculate on why, as "free market environmentalists" in the United States and other "advanced" economies argue, private market players are assumed or expected, at least implicitly, to perform as effective stewards of natural resource common-pool resources?

2. The "tragedy of the anticommons" is a concept that helps explain how unchecked expansions of private property rights—and the erosion of the commons—can choke off technological innovation, economic growth, and social well-being. Professor Michael Heller elaborates on this theme in *The Gridlock Society: How Too Much Ownership Wrecks Markets, Stops Innovation and Costs Lives* (2008). In many domains of commerce—biomedicine, high tech, film, music, real estate—he notes that there are "phantom tollbooths" that use property rights to extract tribute from the stream of commerce while contributing very little in return. For example, "patent trolls" are companies that amass portfolios of patents simply to use them as bartering chits to extract money from companies doing genuine innovation. Now that companies can actually patent "gene fragments," the profusion of individual property rights is

making it difficult for biotech companies to develop new therapeutic proteins and genetic diagnostic tests. There are too many bundles of patents spread among too many owners. In short, the *absence* of a commons of shareable knowledge is inhibiting scientific discovery and innovation. Can you explain why certain resources are more valuable if they are unowned and shareable, as in a commons, and not locked away as private property? Is this value best expressed in monetary terms or in non-quantifiable social or moral terms, or both? Explain. For more, see Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 Minn. L. Rev. 917 (2005)

C. CONTEMPORARY MODELS OF COMMONS GOVERNANCE

Far from being a "tragedy," the commons has shown itself to be a robust system of sustainable ecological management in countless contexts around the world. It is by no means a magic-bullet alternative to markets and state action, but it does offer a wide range of functional models for integrating human culture and practices with various common-pool resources of nature—models that, depending on context, could serve to complement, supplement, reconstitute, and even substitute for markets and state action.

In this Section C we offer a survey of some compelling working examples—(1) the acequia system in New Mexico that enables communities to manage scarce water supplies; (2) the Peruvian "Potato Park" that enables indigenous people to be stewards of rare potato varieties; (3) the system of "catch shares" in Namibia as a commons-based strategy for preventing over-harvesting of fish; and (4) the seed-sharing communities of *dalit* women in India who have resurrected traditional farming methods as a way to achieve "food security" for themselves.

We also examine the Solar Commons of Phoenix, a project-in-progress that will generate electricity for a commons trust using solar panels on city rights-of-ways, and the "Sky Trust" (also known as a "cap and dividend" system), a proposed "stakeholder trust" for curbing carbon emissions into the atmosphere while ensuring social equity. One of the more novel, innovative genre of commons are Internet-mediated commons that manage certain types of ecological resources, as in "participatory sensing" of water, air and other natural resources using electronic sensors, and "eco-crowdsourcing" that enables individuals to contribute to help aggregate data about geographically dispersed phenomena such as birds and butterflies.

This sampling of contemporary commons is hardly comprehensive; it merely adumbrates the range of commons-based models that are feasible. It is important to wade into the particularity of various commons because there is no universal template of the commons that applies in all circumstances. The character of a commons is determined by the nature of the specific resource

being managed, the community's distinctive history and culture, the special practices and values that are adopted by the community, among many other factors. It is tempting to look at an ecological commons through the lens of economics alone because economics promises to abstract key dynamics as universal rules. Yet this is perilous when so many other factors—cultural, legal, moral, political, scientific—influence the workings of a commons.

A successful commons knits together these many factors into a functional whole and so should be studied as such. Any number of disciplinary perspectives are of course useful in understanding commons, but one must also remember that commons tend to have an organic unity that integrates people, social protocols and the earth into a unitary system. Attention must be paid to personal, subjective meaning, moral codes and social traditions as much as biophysical realities, so that the *ethic* of stewardship and community is recognized.

It helps to remember the etymology of the word "commons." Alain Lipietz, a French political figure and student of the commons, has traced the word to William the Conqueror and the Normans. The Norman word *commun* comes from the word *munus*, which means both "gift" and "counter-gift," as a duty. The economist Karl Polanyi believed that human provisioning could be achieved through three basic modalities: *state authority, commercial trade*, and *social reciprocity*. *Munus*, the root word of commons, is related to this third "reciprocity" category. The commons, as a system of social reciprocity, is a moral and cultural economy as much as a material economy. Its operational logic goes beyond crude fiction of *homo economicus*—rational, utility-maximizing individuals—of conventional economics, and embraces patterns of cooperative human behavior that are much richer and more complicated.

We live in a time when the market and state are seen as the dominant systems of power and presumed to be the only effective systems of collective provisioning. In this context, the commons is generally seen as marginal, ineffectual, too small-scale to matter. Yet it is precisely because the commons works in particularistic ways that it can enlist certain human energies and adapt to the exigencies of ecosystems large and small.

The commons elicits human propensities to cooperate, negotiate, improvise, ideally according to principles of reciprocal tolerance and mutual respect, and thus evolve in ways that markets and the state cannot. Relying upon an institutional order as well as a social ethic of "gifts" and "duties," the commons can frequently organize people and tackle tasks that neither concentrated markets nor centralized state action can feasibly imagine. Yet precisely because centralized political and economic structures have trouble believing in the efficacy of the commons, we have seen a rise in state mandates

and the cash economy as the primary tools for getting work done. There has been a withering of what Ivan Illich called the "vernacular domain"—the spaces in our everyday life in which people create, shape and negotiate their own culturally respected systems of governance.

We are suffering from a decline of "commoning"—the commons as a verb, the commons as a set of social practices. "The allure of commoning," the historian of the commons Peter Linebaugh has written, "arises from the mutualism of shared resources. Everything is used, nothing is wasted. Reciprocity, sense of self, willingness to argue, long memory, collective celebration and mutual aid are traits of the commoner."[u]

Following are the examples of some working prototypes for managing diverse sorts of ecological commons that we recommended above for consideration.

1. NEW MEXICAN ACEQUIAS

JOSÉ A. RIVERA, ACEQUIA CULTURE: WATER LAND AND COMMUNITY IN THE SOUTHWEST xvii-xix (1998)

Throughout the upper Rio Grande bioregion, from the uplands of the north to the more desertic and mesa lands to the south, watercourses and their tributaries stand apart as the most defining features critical to all forms of life, biotic and human. For centuries, this region has been a homeland to the aboriginal peoples, the Tewa, Tiwa and Keres (Pueblo) Indians, and the descendants of the first European settlers, the *hispano mexicanos.* These cultures revere water, treasuring it as the virtual lifeblood of the community. The upper Rio Grande, the Rio Chama, the upper Rio Pecos, and other rivers and creeks stand out as the dominant natural systems of this southern Rocky Mountain province where it joins the great Chihuahuan Desert. Nestled within the canyons and the valley floors, tiny villages and pueblos dot the spectacular, enchanting landscape. Their earthen ditches, native engineering works known locally as acequias, gently divert the precious waters to extend life into every tract and pocket of arable bottomland.[40]

On a comparative basis, these acequia communities aptly fit the classic subsistence mode of water control described by Donald Worster, in his study of irrigation societies throughout world history and civilizations:

> In the first and simplest type of irrigation society, based on the local subsistence mode, water control relies on temporary structures and small-scale permanent works that interfere only minimally with the naturally flow of streams. The needs served by that simple technology are basic and limited: water is diverted to grow food for direct, personal consumption. . . . In such cases authority over water distribution and

> management remains completely within the local community, with those who are the users. They have within themselves, which is to say, within their vernacular traditions, all the skill and expertise required to build and maintain their water system.[41]

For hundreds of years, the acequia irrigation systems of the upper Rio Grande have supported human subsistence in line with the typology of functions described by Worster. But these systems have also performed other important roles not often recognized or valued by other stakeholders: social, political, and ecological. As a social institution, the acequia systems have preserved the historic settlements and local cultures spanning four major periods of political development in New Mexico: Spanish colonial (1598-1621), Mexican (1821-1848), territorial (1848-1912), and modern (1912-present). The great majority of acequia villages are unincorporated. In these instances the acequia institutions have functioned as the only form of local government below the county level.

As biological systems, the acequias have served other important objectives: soil and water conservation, aquifer recharge, wildlife and plant habitat preservation, and energy conservation. This record of accomplishment runs counter to the notion put forward by critics that the earth acequia irrigation canals are wasteful, abusive to soils, inefficient, and antiquated. Moreover, the fact that acequia communities continue to support human and other habitats, without depleting the resource base, is testimony to the existence and practice of a conservation ethic long ago ingrained in the local value system. As noted in later chapters of this book, the acequia papers, consisting of organizational rules, minutes, journals, and other documents, repeatedly express the values of resource sustainability and the need to maintain the social fabric of the community.

Since the early 1960s, however, water markets and the demographic forces behind them, such as population growth, immigration and land development pressures, have placed these fragile acequia communities at great risk. No one disputes that emerging water markets, if left unchecked, will severe water from the traditional agricultural uses in the region and cause economic stress to rural villages. Water laws in New Mexico, as in most western states, adhere to the doctrine of prior appropriation and the principle of severability, where water can be transferred to alternative beneficial uses. Like other property commodities, water rights can be bought and sold in the marketplace. Less well known, however, are the broader impacts on the regional and state economies that can result if these historic acequia villages literally dry up. Regional economies throughout the upper Rio Grande corridor are significantly dependent on the cultural-tourism businesses of the rural countryside and on the more recent high-

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tech industries that gravitate toward the urban centers. Interestingly, these industries often locate in the larger cities of the upper Rio Grande bioregion because of the cultural, scenic, recreational and other enchanting amenities that rural landscapes provide.

[*Eds*.—For more on acequias, see Sylvia Rodriguez, *Acequia: Water Sharing, Sanctity and Place* (2006) and Stanley G. Crawford, *Mayordomo: Chronicle of an Acequia in Northern New Mexico* (1988).]

2. THE POTATO PARK AS A TRUSTEE FOR PERUVIAN POTATOES

Alejandro Argumedo, *The Potato Park, Peru: Conserving Agrobiodiveristy in an Andean Indigenous Biocultural Heritage Area*
***in* PROTECTED LANDSCAPES AND AGROBIODIVERSITY VALUES**
(T. Amend, *et al*. eds., 2008)[v]

The Potato Park is a landscape conservation model focussed on the conservation and sustainable use of plant genetic resources through traditional Andean approaches to agrobiodiversity and landscape conservation. The Potato Park, as its name denotes, is an Indigenous Biocultural Heritage Area (IBCHA) that celebrates the tremendous diversity of native potato species and varieties characteristic of Andean food systems. As an IBCHA, the Potato Park has been proposed as a sui generis system for the protection of traditional knowledge because it aims to protect traditional knowledge systems within their cultural, temporal and spatial dimensions using a combination of positive and defensive protection tools (www.andes.org.pe website). The IBCHA model, which resulted from the process of establishing the Potato Park, describes a community-led and rights-based approach to conservation which protects and enhances local livelihoods and biocultural diversity using the knowledge, traditions, and philosophies of indigenous peoples related to the holistic and adaptive management of traditional agricultural landscapes. An IBCHA incorporates the best of contemporary protected area practice and rights-based governance approaches, including the approaches of IUCN's Category V Protected Areas and Community Conserved Areas (CCAs).

Description of the protected landscape

The Andean Mountains are among the most biologically and culturally diverse regions in the world. The region contains two recognised hotspots of biodiversity, two of the eight important centres of origin of major cultivated species (Vavilov Centres), and 20 of the 36 World Heritage Sites of South America. The Andean countries harbour more than 205 languages. This great diversity, however, is deteriorating rapidly in the face of global trends. Current conservation approaches in the region are deficient in that they have failed to comprehensively address socioeconomic, cultural, political and institutional

challenges.

The Potato Park is located within this context of cultural and biological diversity nurtured by Andean farmers. Quechua communities in the Pisac, Cusco area of Peru have established the Potato Park as a community-based, agrobiodiversity-focused conservation area. This initiative has brought together 7,000 villagers from six indigenous communities (Amaru, Chawaytire, Cuyo Grande, Pampallaqta, Paru-Paru and Sacaca) to jointly manage their communal land for their collective benefit. Their aim is to conserve their landscape, livelihoods and way of life and to revitalize their customary laws and institutions.

The Potato Park is located about 40 km from Cusco and about 3 km from the Pisac archaeological site. It includes 8,661 ha of community-managed land which ranges between 3,200 and 5,000 m above sea level. The Andean landscape of the park includes quechua and puna zones, with a season for gathering from the wild and for agriculture which coincides with the rainy season beginning in December. The area includes several high mountain lakes, rock paintings, a number of Inca historic sites and colonial churches. The region is an important micro-centre of origin and diversity of the potato. The potato has been cultivated by Andean farmers for over 7000 years. This tradition continues today with over 900 varieties of native potatoes currently being grown in the park area, together with various other Andean food crops. Traditional farming includes raising domesticated animals such as guinea pigs and llamas. Many wild species are used for food, medicines and ritual purposes. Traditional farming techniques, including the use of traditional tools, complementary plantings and ritual offerings to Pacha Mama (Mother Earth), are commonly practiced by the indigenous people of the park. The ancestral "mita," or community labour, is still widely practiced in the area.

Traditional Andean societies are based on principles of ecological, productive and social sustainability, leading the Inca society to be classified as an example of a sustainable society. The society had, at its core, a profound respect for Pacha Mama (Mother Earth) and reverence for the power and fragility of the Apus, the Mountain Gods. These principles have historically been integrated into landscape conservation strategies which combined the management of agricultural spaces with natural and culturally important areas (huacas) in a holistic management system. The management and agricultural practices of the Potato Park are based on such principles including exchange, reciprocity and nurturing. As per the belief in reciprocity, the earth gives crops to the farmers and, in return, the farmers give elaborate "pagos" (offerings or payments) to the earth. This approach to management of traditional agricultural systems is ecosystem based, and provides a nurturing environment for creating

diversity and maintaining the health of domesticated and wild plant and animal species as well as diverse ecological formations.

The Andean potato farmers' most important resources are local knowledge, their landscape and biodiversity. However, local knowledge may not be enough to respond to internationally regulated economies and new market opportunities. Using their resources to improve livelihoods requires developing new technologies using participatory techniques and improving linkages to international economic and food systems. Politicians and researchers are showing increasing awareness of the significance of biological diversity in landraces and cultivated crops and of farmers' traditional knowledge as the cornerstones of long-term food security. The Potato Park experience incorporates the maintenance of traditional knowledge and practices with adaptation to changing international economic relations to provide for the food security of Andean indigenous peoples (www.andes.org.pe website).

The models of protected areas and community conserved areas can provide direct benefits to farmers if their needs and priorities are recognised. Conservation approaches that focus on farmers' needs and include sustainable community management of agrobiodiversity, can address a wide range of concerns including crops and seeds in the fields, marketing, empowerment, as well as institutional and policy issues.

Description of the agrobiodiversity features

The Potato Park area is a centre of diversity for a wide range of Andean food crops including Quinoa (*Chenopodium quinoa*), Kiwicha (*Amaranthus caudatus*), Tarwi (*Lupinus mutabalisis*), Oca (*Oxalis tuberosa*), Mashua (*Tropaeolum tuberosum*) and, most importantly, the potato (*S. tuberosum*). The wealth of the area is based on the 1,200 traditional varieties or landraces of potato that are named, known and managed by the local people. A typical farm plot may contain 250-300 varieties.

The economy of the area around the Potato Park is largely dependent on the potato, both in terms of local consumption and the regional barter trade. This trade has the highlanders to exchange the carbohydrates and meat that they produce (in the form of potatoes, guinea pigs, llama and alpaca) for vegetable protein from the grains produced at middle altitudes, and for vitamins and essential fatty acids from the fruits and vegetables grown in sub-tropical gardens at lower altitudes that are nearer the Amazon. Vertical trade of this kind has been an integral part of the economy of the region since pre-Inca times.

The cultivation of this agrobiodiversity must be seen within the context of the traditional farming systems which have nurtured the diversity and

continue to do so. One of the salient features of traditional farming systems throughout the developing world is their high degree of biodiversity. These traditional farming systems have emerged over centuries of cultural and biological evolution and represent accumulated experiences of indigenous farmers interacting with the environment using inventive self-reliance, experiential knowledge, and locally available resources. In Latin America alone, more than two and a half million hectares under traditional agriculture in the form of raised fields, polycultures, agroforestry systems, etc. are evidence of successful adaptation to difficult environments by indigenous farmers . Many of these traditional agro-ecosystems, still found throughout the Andes, constitute major *in situ* repositories of both crop and wild plant germplasm. Plant resources are directly dependent upon management by human groups; thus, they have evolved in part under the influence of farming practices shaped by particular cultures and the forms of sophisticated knowledge they represent. The complexity of these production systems and the value of the indigenous knowledge upon which they are based must be recognised and appreciated as powerful resources and as complementary to western scientific knowledge. The study of agricultural biodiversity cannot be separated from the cultures that nurture it.

Legal status of the protected landscape

The Potato Park is not officially recognised as a Category V Protected Area under the IUCN, or as part of the national protected areas system of Peru, although it has great potential to be considered as part of a complementary system of protected areas.

A proposal for legal recognition of the Potato Park as IBCHA is being developed, based on the following national and international legislation: FAO International Treaty (Article 9); Convention on Biological Diversity (Article 8(j) and 10(c)); Peruvian General Law on the Environment; Peruvian Constitution of 1993; and ILO 169 Convention (approved by the Peruvian Parliament). The following elements are being considered for inclusion in the proposal:

- Introduce the concept of the Collective Biocultural Heritage of indigenous peoples and include measures for its protection

- Based on Article 149 of the Peruvian Constitution, and Articles 3, 4, 5, 7 and 8 of the ILO Convention, establish that the Potato Park will be managed under customary laws and practices of the communities that reside in or depend on the Park

- Underline the importance of the Biocultural Heritage Area for the maintenance and protection of the culture and food security of

Andean communities, as well as for the conservation and sustainable use of agrobiodiversity

- Declare and recognise the Potato Park landscape as a mega-centre of diversity of native potatoes

- Declare the Potato Park a GMO-free zone.

A great obstacle for the Potato Park has been the lack of options for its official recognition within the National System of Protected Areas (SINANPE). To this day, the Potato Park enjoys no legal recognition in spite of numerous meetings with government agencies like *Consejo Nacional del Medio Ambiente* (CONAM) and the *Instituto Nacional de Recursos Naturales* (INRENA). Largely due to the unfriendly policy and institutional environment on the national level, ANDES has looked primarily to the international level to build support for the Park. In 2001, for example, ANDES collaborated with the Rockefeller Foundation to test the viability of the Park as a sui generis system for the protection of traditional knowledge. This study, which emphasized that traditional knowledge could not simply be protected by laws, but had to be protected on the ground where people are part of a cultural process of protection and livelihoods, was meant for international audiences, especially the World Intellectual Property Organization where the results were presented in 2005. In 2003 the Fifth World Park's Congress in Durban, South Africa, where Potato Park technicians arrived to present their new model of conservation, also contributed to building international recognition for the Park. Locally, the Potato Park is recognised as a conservation area and is quickly becoming a popular ecotourism destination. Technicians from the Potato Park, along with ANDES staff, are currently working with organisations in three other areas to establish other Indigenous Biocultural Heritage Areas based on the Potato Park model and experience.

[*Eds.*—For more on the Potato Park, see Satoyama Initiative to United Nations University Institute of Advance Studies, *The* Ayllu *System of the Potato Park, Cusco, Peru* (May 3, 2010), *available at* http://satoyama-initiative.org/en/case-studies/americas/agriculture/ayllu-system (last visited Feb. 25, 2011.][w]

3. RESOURCE RENT: A COMMONS-BASED SOLUTION FOR OVER-FISHING

WORLD BANK, RESOURCE RENT AS A CENTRAL CONCEPT IN FISHERIES MANAGEMENT: THE CASE OF NAMIBIA (2004)

Resource rent[42] is a key concept in the management of fisheries as it refers to a source of considerable wealth, potentially or actually available to

society. Resource rent generated in fisheries can be a critical contributor to sustaining effective fisheries management, and can contribute to government revenue and to the wealth and wellbeing of society. If its potential is not well understood and there are no limits on fishing effort, this wealth will not be realised. Potential resource rents of great value can easily be squandered on excess capacity, leading to depletion of fisheries resources. Namibia, which became independent in 1990[43] is a good example of successful fisheries management leading to the generation and capturing of resource rent of significant value.

Case study[44]

BACKGROUND

Soon after independence, the new Namibian Government declared an EEZ, established a coherent fisheries policy, and enacted comprehensive fisheries legislation. The total catch of all species has varied since independence at between about 500,000 to 800,000 tonnes per annum; in 2000 the total catch was 623,786 tonnes. The contribution of the fisheries sector to GDP rose from about 4% at independence to 10.1% in 1998. About 95% of Namibia's total fish production is exported and the value of these exports in 1999 was about N$2.3 billion (US$333 million.[45] Fish and fish products contributed about 30% to total export earnings, with the demersal species bringing in about 84% of total earnings. Around 14,220 people are employed in the fisheries sector in Namibia, approximately half of whom are employed in onshore processing.

The hyper-arid Namib Desert has meant that very few of Namibia's people historically lived on the coast and exploited its rich fisheries resources. As a result there is no large artisanal fleet, common in many parts of the developing world and there are only about 300 licensed fishing vessels in the whole of the Namibian fisheries sector. The combination of desert and the topography of the coastline have meant that Namibia has only two harbours, those of Walvis Bay and Lüderitz, and no other significant landing sites, thus limiting the places where fish can be landed and increasing the ease with which the fishery can be controlled.

LIMITING CATCH

In mature fisheries some method of limiting the catch to what the stock can sustain, ultimately at a level of biomass approximating an optimum, needs to be implemented. Limiting catch means that some fishers are granted rights to harvest fish while others are excluded from the fishery. In the case of Namibia, output limits are used for the most important fisheries.

Total allowable catches (TACs), divisible into individual quotas, are set

annually for eight species: hake, horse mackerel, orange roughy, alfonsino, pilchard, red crab, rock lobster and monk (since 2001). Quotas may only be allocated to the holder of a "right of exploitation." Rights of exploitation are granted for periods of 20, 15, 10 or 7 years, depending on the extent to which the rights holder meets certain criteria. Quota fees are charged on all quotas and structured to encourage Namibian registration and ownership of fishing vessels.

Officially rights are not transferable. However, with the services of competent lawyers and accountants, ways are found of effectively transferring rights outright or leasing them on an annual basis.

Licenses are required for all vessels fishing in Namibian waters and are used to limit fishing effort in more minor fisheries that are not subject to a TAC and quota allocation (e.g. the tuna fishery).

GENERATION OF RENT

Reducing fishing effort is the key to generating rents in a fishery that has been overfished and employs excessive fishing capacity. To achieve this objective in the long term, the incentive structure needs to move away from the perverse incentive to harvest fish before others do so, and towards the use of just sufficient fishing effort to achieve optimal harvesting in the long term.

Effort was considerably reduced in the Namibian fisheries after independence, particularly in the hake fishery. In the preamble to a question put to the European Commission at the time of Namibia's independence, a Spanish MEP revealed that "more than 173 of the Community's freezer fishing fleet" were operating in Namibian water. These vessels were targeting hake, Namibia's most valuable stock.

Following the declaration of an EEZ and the introduction of *rights*, there was a successful clampdown on fishing by unlicensed vessels and fishing effort was dramatically reduced. By 1999 there were 19 freezer trawlers, 15 longliners and 53 wetfish trawlers targeting hake, a total 87 vessels mostly of smaller harvesting capacity than freezer trawlers. While it might be the case that there still exists excess capacity in the fishery, the reduction of effort has been substantial and has resulted in an industry that is better able to cope with the ecosystem perturbations that result in variable catch limits being set from year to year.

Two factors have contributed to the reduction in fishing effort: 1) clearly defined, enforceable rights, and 2) effective monitoring, control and surveillance.

1) ***Clearly defined, enforceable rights*** contribute to changing the incentive structure in fisheries so that there ceases to be any point in investing in capacity beyond what is needed to catch the quota efficiently. The incentive for each enterprise becomes to use the quota to produce the highest value product possible at the lowest cost possible. In Namibia rights are clearly defined in terms of specific quotas granted annually. Although the quotas are not specified as percentages, for the most part in practice they amount to a percentage of the total allowable catch. Long-term rights enable fishing enterprises to plan ahead and encourage more of a sense of stewardship in the long-term health of the fishery resource.

2) ***Effective monitoring control and surveillance*** is essential if rights holders are to have confidence that their rights will be enforced. Compliance with limitations on fishing activities depends on fishers recognising that limitations are necessary, and that they are workable, and thus being reassured that everyone in the fisheries will comply with the limitations imposed. Regulation with the consent of the regulated leads to greater compliance and lower costs of enforcement.

While it might be argued that the Namibian fisheries are relatively easy to manage because of the limited number of fishing vessels and fishing harbours involved in the Namibian fisheries, the post-independence Namibian Government, at an early stage, demonstrated its determination to ensure enforcement of fisheries laws and regulations. When a significant part of the Spanish fleet, then still in Namibian waters, defied the order to cease illegal fishing, the Government succeeded in taking tough enforcement action, despite being perceived as having very little capacity to do so.

This action is important to note as it provided an immediate signal that the Government was serious about enforcement, i.e. it displayed a capacity for "strong government." It did so aware that key European Commission officials strongly opposed such action, but was aware that the rebuilding of the fish stocks was important for Namibia's economic future. It also demonstrated that fishing companies, under certain circumstances were ready to seek, and even finance, enforcement action by Government.

The main focus of enforcement is now on the activities of licensed vessels. Most vessels, and all large vessels, carry onboard observers. Fisheries observers have defined career paths linked to training. They fulfill the dual role of observing and collecting catch data for scientific analysis. Fishing rights holders must pay an Observer Fund levy which is used to fund the Fisheries Observer Agency, a parastatal established to run the fisheries observer function.

CAPTURING RENT

In a rights based management system, it is important to establish the principle that, because a right to benefit from the productivity of a publicly owned resource has real value, payment should be made for it. This should be done even when the resource is depleted and there is not much, if any, resource rent being generated. By establishing the practice early on, even if the payment of a fee or levy is token, it establishes the principle that the broader society has a right to benefit from the productivity of the natural capital that belongs to the country and that management of fishing activities is part of the cost of fishing. The principle of rent capture by the Government is not questioned in Namibia today, although there will always be efforts by companies to argue for lower levies to enable them to retain more of the profit.

• ***Cost recovery***

Apart from normal company and income taxation, revenue is collected from the industry in the form of quota fees, bycatch fees, the Marine Resources Fund levies, the Fisheries Observer Fund levies and licence fees. These are presented in the table below for the 1994-1999. The costs of management also included in the table, however, do not include those costs effectively covered by donor funding.

* * *

The data on donor contributions to the work of the Ministry of Fisheries and Marine Resources (MFMR) shows that between 1995/6 and 1998/9 it ranged between N$30 million and N$36 million (MFMR, 1998b) per year. The reliability of these figures is questionable as difficulty assembling these figures has been experienced by the Ministry. It also is not clear what contribution donor funding has made to the normal, essential management expenditure of the Ministry and to what extent the funding could be considered expenditure addressing the pre-independence failures to provide adequately for education and training of a large part of the population. However, it is safe to conclude that, for most of the period since independence, the Government has succeeded in covering management costs by capturing part of the resource rent and, for most years, this revenue has made a net contribution to national revenue.

• ***Estimate of additional rent generated and remaining with the industry***

Data offering direct evidence of rent actually accruing in the Namibian hake fishery (i.e. in addition to that collected by Government) is difficult to come by. However, one indicate on that rent is being generated is the evidence provided by the informal market for quota. In perfect market conditions, the prices paid to lease quota for the year would reflect a discounted estimate of the resource rent expected from the harvesting of the quota during that year.

On the basis of the prices paid for hake[46] quota in Namibia, it is possible to argue that rent to the value of N$252 million (US$37m,[47] N$296million

(US$43m) and N$374 million (US$54m) accrued to companies in the Namibian hake fishery alone for the years 2000, 2001 and 2002 respectively. These sums may be regarded as conservative estimates of rent not collected by the Government and not dissipated in some other way.

Evidence also exists suggesting that additional potential rent is being lost as a result of some excess capacity in fishing effort and in the processing sector.

LESSONS LEARNED

Generally we judge success in relation to other similar experiences. Namibia has been very successful in both the generation of rent and in capturing sufficient rent to cover management costs and provide a net contribution to the national purse. Few other fisheries management authorities have achieved this.

Several lessons can be drawn from the experience of Namibia:

1. Establishing clearly defined and enforceable rights created an incentive structure that contributed significantly to an alteration in behaviour of fishers which, in turn has lead to resource rent of significant value being realised. With everything to be gained by using vessels and gear as efficiently as possible, fishing companies have substantially reduced the size of the fleet.

2. Effective enforcement of rules is important in re-assuring fishing companies that their rights were secure.

3. By charging quota fees from the start, when the resource was still depleted, the Namibian Government established the principle early on that payment for gaining benefit from the use of a public resource was normal acceptable practice. Government collection of resource rent is now no longer questioned. This has established a long-term revenue stream for government.

4. The fishing industry has flourished in Namibia since independence with the accumulation of wealth within the industry and investment in processing and other related industries.

[*Eds.*—For more on the enclosure of fisheries and proposed alternatives, see Charles Clover, *The End of the Line: How Overfishing is Changing the World and What We Eat* (2006); Daniel Paul & Jan Maclean, *In a Perfect Ocean: The State of Fisheries and Ecosystems in the North Atlantic Ocean* (2003).]

4. TRADITIONAL AGRICULTURE IN INDIA

David Bollier, *The Seed-Sharing Solution*
Blog Post (Jan. 29, 2011) *at* http://bollier.org/seed-sharing-solution

The women of Erakulapally—a small village two hours west of Hyderabad, India—spread a blanket onto the dusty ground and carefully made thirty piles of different seeds: their treasure, the symbols of their emancipation. A rich aroma wafts through the air.

For these women—all of them *dalit*, members of the poorest and lowest social caste in India – seeds are not just seeds. They are the vehicle for a remarkable transformation in their lives, local farming and their ecosystem.

Over the past twenty-five years, thousands of women in small villages in the Andhra Pradesh region of India have escaped from working as low-paid, bonded laborers, to become self-reliant farmers able to grow enough to feed their households. Food was once unaffordable and hunger common. Now the women can feed their families, often without having to buy anything in the market. Despite their status as *dalits*, they are no longer filled with fear and anxiety, but rather show great confidence and pride in themselves.

A group of us attending the recent conference of the International Association for the Study of the Commons drove out to meet the women last week. We were welcomed with a tasty millet-based drink and a short chorus of joyous singing. Our meeting was hosted by the Deccan Development Society (DDS), a grassroots organization that is helping the poorest rural women of India recover their rich traditions of sharing seeds and community-managed farming. The foyer of the building in which we met featured a "seed shrine"—dozens of small clay pots filled to the brim with colorful seeds.

The initial, short-term goal of the DDS project, when it began in 1983, was simply to enable the women to eat a second meal each day. But that goal has expanded into larger, long-term enterprise of self-empowerment. The women have created an extraordinary commons-based system of "food sovereignty" and "food security." They directly control their own seeds, grow their own food and manage their own landsan achievement that has enabled them to escape the high prices and volatility of food markets while growing more nutritious, local organic foods.

Indian food prices are now soaring at an 18% annual rate, causing growing social unrest and hunger throughout many parts of the country. But the 5,000 women in 75 Andhra Pradesh villages remain virtually untouched by the crisis. They not only have plenty of food for their needs, they have achieved food security without having to rely upon genetically modified seeds, monoculture crops, pesticides, outside experts, government subsidies or distant

food markets. Their story is all the more remarkable because they are outcasts in multiple ways: They are rural, poor, women and socially shunned *dalit.*

The march to food sovereignty began with the village sanghams, self-organized voluntary associations in which the women share their seeds and farming knowledge, and educate each other and their daughters and granddaughters. As we sit on the ground next to the village pre-school, talking to the women through a translator, we learn how the Erakulapally sangham revived traditional ways of growing food.

During the Green Revolution of the 1960s and 1970s, there was a big push to introduce large-scale commercial rice and wheat production. This ambitious project may have helped to mitigate hunger, but it also introduced subsidized monoculture crops that are alien to many Indian ecosystems, require harmful pesticides and are vulnerable to drought and market prices.

The Green Revolution displaced the traditional millet-based grains that generations of villages here had once grown. In the process, the cash crops led many farmers to abandon their fields. The land went fallow and local farming cultures disappeared.

It turns out that traditional crops are far more ecologically suited to the semi-arid landscape of Andhra Pradesh and its patterns of rain and types of soil. But to recover the old ways of biodiverse farming, the women had to find dozens of old, nearly forgotten seeds. They asked their mothers and grandmothers, who often had small bags of seeds, and they searched in private storage spots.

Eventually, they acquired enough of the seeds to multiply them through many rounds of cultivation. Soon they had enough to grow their own crops, for free. They didn't need to buy proprietary seeds, hybrids or genetically modified seeds every year. They didn't need synthetic pesticides and fertilizers.

Recovering the seeds wasn't enough. Because the land had lain fallow for so long, the soil was of very poor quality. So the women started a major effort to restore soil quality through vermicomposting (with worms). They put livestock manure and biomass into the soil, and used neem tree leaves as a natural pesticide. As a DDS brochure describes, the efforts have borne great fruit over the years:

> Since 1985, the women of DDS sanghams have used between them about 1.2 million eco-employment days to bring back under active cultivation over 10,000 acres of degraded agricultural lands.

> Consequently, they have been raising over three million kilos of grain every year, which is six times more than half a million kilos of grains they used to produce earlier.

The recovery of traditional agriculture did not come through "technology transfer" or expert agricultural research promoted by the Indian government. It came through a process of recovering the "people's knowledge." Instead of trying to grow marketable crops, the farmers worked to adapt to the local ecosystem and produce subsistence crops. They relied upon "mixed crop" plantings of six or seven different plants combined in the same field.

Mixed planting acts as a kind of "eco-insurance" in the event the rain comes too early or too late, or if the rain is too plentiful or too little. The mix of particular seeds varies depending upon the type of soil being used ("red" or "black"), and by the season in which planting is done. Under this system, at least *some* of the seeds will thrive no matter what the whether, ensuring that there will be enough food for a family to survive. The agro-biodiversity also renews and sustains the soil.

The agriculture is totally rain-fed, and does not rely upon any irrigation. And it requires few inputs. Yet it is highly productive. "Information technology has made us so arrogant," said P.V. Satheesh, one of the founders of DDS and the Director of the Zaheerabad Project, which includes the village of Erakulapally. "People act as if previous generations had no knowledge about agriculture." He scoffed that so much science-driven agriculture knowledge is "information based," not "knowledge based." Growing local food requires sophisticated local knowledge, he said, not just "information," he said.

In seed-sharing villages, every farmer has a complete knowledge of all the seeds used and everyone shares their seeds, as needed. Every household has their own "gene bank," or collection of seeds at home. "Our seeds, our knowledge," is how the women describe it. Every seed is a capsule of their knowledge. As if to respect the life-giving value of the seeds, no one is allowed to buy or sell them. They can only be shared, borrowed or traded.

The seeds are not just a means of production, however—a mere "economic input." Villagers have a social "relationship" with the seeds, which is a subtle reason for the success of their many village commons. "Every crop has a meaning in a women's life," said Satheesh. "The seeds are a source of dignity."

The promotion of genetically modified Bt cotton, for example, has deprived farmers of their agricultural knowledge. Bt is a monoculture crop that requires high inputs of chemical pesticides, fertilizers and water, and any production knowledge comes from Monsanto. By growing GMO crops, farmers become dependent upon the vagaries of markets, debt and outside experts. They don't own their seeds and forget their traditional ways of life and culture.

The introduction of proprietary seeds and competitive agriculture markets in India are often blamed for the epidemic of 200,000 farmer suicides between 1997 and 2007—an average of 20,000 suicides per year. Farmers unable to earn enough money from cash crops often feel trapped, socially isolated and despondent. Yet many Indian officials have ignored this crisis, seemingly more determined to live up to India's reputation in the foreign business press as an "economic tiger."

The vision of agriculture pioneered by the *dalit* women may seem quite modest compared to grand market-driven schemes, but they are in fact a more realistic, sustainable and socially attractive alternative. Community-controlled farming avoids most external market dependencies while providing genuine security and hope.

Besides its seed-saving, the sanghams have pioneered what they call the Alternative Public Distribution System, a system for cooperative crop storage and distribution. Villages create their own community grain funds, which serve as critical sources of food at times of shortage, especially for the poorest people in each village. The sanghams have established food kitchens for the hungry within their own communities, feeding the five or six people in a village who are too poor, disabled or elderly to raise their own crops.

The *dalit* women have even established their own "mobile market" which travels from village to village to sell their excess production. Each of the 280 women who have invested in the "mobile market" has earned an impressive 100% return on their investment. Making money is emphatically not the primary goal of the villagers' farming, however. The key goal remains mutual support and food sovereignty. The women realize that their intedependence as commoners remains vital to their long-term food security.

Their success has strengthened their hand in dealing with landlords who hire wage labor. Twenty years ago, *dalit* women earned only 5 rupees per day of toil in the fields, for example. But now, with their own supplies of food, they have been able to bargain with landlords for higher wages, earning as much as 100 rupees.

Interest in the Deccan Development Society model of self-sufficient traditional farming is growing. In coming years, DDS hopes to bring its empowerment model to 40 more villages so that it will reach 9,000 families and 50,000 people. It is also reaching out to conventional farmers. At a recent "Biodiversity Festival"—a regular event that celebrates their seeds and farming culture—the *dalit*women spoke with thousands of farmers to explain the advantages of their farming methods.

Perhaps the most astonishing outgrowth of the DDS sanghams has been its invention of "community media." Using camcorders and video-editing equipment, the non-literate women have produced several videos that help educate each other, challenge the myths about genetically modified crops, and celebrate their culture. They have produced some 70 films to date. Many have been translated into French, Spanish, Swahili and other languages, and distributed internationally. One of their films that takes on Monsanto and GMO seeds, *A Disaster in Search of a Success*, is particularly popular.

During our visit, an eight-year-old girl showed a short video that she had shot and edited herself. It featured her learning about traditional farming and included an admiring tribute to her 81-year-old grandmother, who sat beaming in the room during our meeting.

Developing inter-generational connections is especially important for the village sangham. "If they lose their connection to the soil, they've lost everything," explained Satheesh. As we talked, a barefoot young woman in a blue sari was shooting our conversation with a Panasonic camcorder on a tripod —raw footage for a future video.

In the industrialized West, the commons is often regarded as a metaphor for shared management of resources. Here the commons is vital not just for subsistence, but for survival. But once the commons takes root, as the women of Erakulapally and other villages have shown, an upward spiral of new emancipations begins.

[*Eds*.—For more about the Deccan Development Society, visit its website at http://ddsindia.com/www/default.asp (last visited Feb. 25, 2011). *See also* Jaideep Hardikar, *Crops of Truth*, The New Internationalist, Sept. 24, 2010, at http://www. newint.org/features/2010/09/01/seeds-rural-south-india (last visited Feb. 26, 2011)].

5. SOLAR COMMONS

Kathryn Milun, *The Solar Commons Demonstration Project,* http://solarcommons.org/index.html

The Solar Commons is a commons-based business model for photovoltaic solar energy development. It applies commons design principles to the

ownership and revenue management of solar energy collectors placed in public right of way and held by a community trust. Revenue from electricity sale to an adjacent user will be managed by the trust and directed to social equity and sustainable, commons education efforts in communities where the solar commons stands. The aim is to design an efficient and equitable solar energy system that produces green energy in a small scale distributed fashion producing a reliable, modest revenue stream for the local community while signaling through design and signage the economic and social benefits of the commons.

In 2009, with the generous support of the U.S. Green Building Council and other sponsors, the Solar Commons Team began designing a 10kW demonstration project. The system will produce an estimated 18,300 kWh of green electricity. This renewable energy will displace 27,450 pounds of annual carbon dioxide production that contributes to climate change. It will annually produce $1,830 in revenue to the Public Trust Owner, of which $183 will be reserved for maintenance expenses and an estimated $1,647 will be available for investment in energy saving improvements on low-income housing. This initial demonstration project can be scaled up to around 30kW to efficiently produce many more times the energy benefits noted here. Because the pilot project is the basis of our business model for solar commons energy development, the project will continue to benefit nonprofits across the nation as they seek to capture wealth in the fast growing green economy.

The goals of the demonstration project are twofold: Specifically, it shows us how to apply commons principles to own and co-manage solar energy and how to work with our city government, regulatory agencies, and financial institutions to create a community-owned source of green energy income to benefit the city's affordable housing community. More generally, the project aims are more ambitious: it shows us the opportunities and challenges of working with municipalities and market entities to build and co-manage a green economy that is both efficient and equitable.

The Demonstration Project will be built next to the Arizona Science Center, along the Metro Light Rail in downtown Phoenix. It will have a split ownership model:

Solar Commons Community Trust will own the following assets:

1. license/easement to use city property and

2. the revenue stream that accompanies the contract to sell solar electricity to the adjacent building.

The Trust will donate the photovoltaic hardware to the City of Phoenix and use part of the revenue stream to pay Phoenix for maintenance and insurance costs on the hardware.

• **The City of Phoenix** will own the hardware and the liability. The city of Phoenix will also "own" the reputation for innovation in green city design.

• **The Trustees** will be Clean Energy Corporation, a regional organization whose mission is to grow solar energy in Arizona. (Other potential trustees would ideally be a city's urban land trust, an entity that already serves the affordable housing community. The land trust is like the Solar Commons trust: it holds common assets on behalf of the community. Both the Land Trust and the Solar Commons Trust keep the value of their assets circulating back to the community. The Land Trust holds land assets on which low-income families can buy houses.)

The Solar Commons Trust holds renewable energy assets whose value will come back to the community too. Urban land trusts are an important commons sector tool to keep a city's housing stock affordable to the next generation. Solar Commons Community Trusts will likewise support renewable energy improvements on low-income houses, enabling the poor to enjoy the same future benefit of energy savings that will come to upper classes now outfitting their homes with solar energy systems.) So the pilot project will be mandated for the **beneficial use** in keeping affordable housing energy bills down in Phoenix.

The Demonstration Project will also serve an educational function. It sits in a prominent site in downtown Phoenix, next to the city's Science Center, visible from the Light Rail that provides efficient mass transportation to citizens of the sixth largest city in the US. Through signage and design, Phoenix pedestrians and transit riders will be able to note their city's first Solar Commons. They will come to understand that it belongs to them, is managed by commons principles, and benefits their city.

6. THE SKY TRUST AND OTHER STAKEHOLDER TRUSTS

Peter Barnes, the cofounder of Working Assets and a policy advocate, proposed the idea of a "Sky Trust" in 2001, later dubbed "cap and dividend" (a socially equitable version of a "cap and trade" system) when it was introduced as legislation in the U.S. Congress. As described in his book of the same year, *Who Owns the Sky? Our Common Assets And The Future Of Capitalism*, Barnes proposes a commons-based system for reducing carbon emissions into the atmosphere by propertizing (but not privatizing) the right to pollute.

Barnes also proposes, in a subsequent book published in 2006, *Capitalism 3.0: A Guide to Reclaiming the Commons*, a series of other "stakeholder trusts" as commons-based regimes for assuring the equitable use of collective resources.[x] Land trusts are a familiar example, but Barnes also identifies promising extensions of such models, including surface water trusts such as the Oregon Water Trust, groundwater trusts for endangered underground sources of water such as the Ogallala Aquifer, and watershed trusts such as the Tennessee Valley Authority. He also identifies community gardens, "air trusts" such as the Regional Greenhouse Gas Initiative launched by seven northeastern states to limit carbon dioxide emissions, and the proposed Buffalo Commons for the Great Plains, which aims to restore some of the lost habitat of native bison.

Commons scholar James Bernard Quilligan has put forward his own proposal for the creation of social charters, or "commons trusts," that establish specific legal authority for people to help each other manage and produce what each of them needs. By having legal control of commons resources, trust managers can "keep the value created through the commons within the commons," and so check the harmful effects of state-supported capitalism from which we now suffer.[y] A system of commons trusts would benefit multiple parties, Quilligan writes: "Private industry flourishes from the surplus resources which are rented from commons trusts, the socially marginalized and vulnerable receive a subsistence income from the state, and the primary assets of the commons are preserved and regenerated."[z]

Under commons trusts, value would not be based on the financial value of common assets in the marketplace, but on the "preservation of commons resources and the resilience of the system that manages and produces them . . . . Hence long-term wealth arises, not through consumer demand, investment or capital accumulation, but in the enhancement of the carrying capacity of the global commons to support life and life systems, expressed through sustainable choice."[aa]

This reading focuses on a specific type of commons trust, the Sky Trust cap and dividend model, a leading proposal for addressing climate change.

PETER BARNES, WHO OWNS THE SKY: OUR COMMON ASSETS AND THE FUTURE OF CAPITALISM 35, 62-64 (2001)

Cap-and-trade systems [say] "This is the total amount of pollution we'll allow. This is the maximum load line." Typically, that line gets lower every year, so pollution can be gradually phased down. These human-made lines

translate the inherent scarcity of a commons into information markets can respond to.

The next step in a cap-and-trade system is the creation and assignment of property rights—the right to emit a certain amount of waste (for example, a ton of nitric oxide) into a commonly owned sink (such as the Los Angeles air basin) within a given period of time (such as one year). These rights are created and assigned by government. They're a bit like leased parking spaces in a public garage. Whoever gets the spaces can use them, trade them, or sell them, but once the garage is full, that's it.

Cap-and-trade systems were a brilliant invention. They enable market economies to reduce nest-fouling, while letting businesses figure out the cheapest ways to do the job. For example, if a business can reduce its emissions for less than the cost of an emission permit, that's what it will do. If it can't it will buy a permit from another company that can. The bottom line is that companies—and hence consumers—spend less to reduce pollution than they would if *every* company were required to reduce pollution individually.

* * *

[T]he Sky Trust is one of three possible kinds of cap-and-trade systems. In one kind, the initial emission rights are given to historic polluters for free. In a second kind, the initial emission rights are sold to polluters by the government, which uses the revenue as it sees fit. In the third kind, the initial emission rights are given to a trust, which periodically sells them to polluters and distributes the revenue to all citizens equally.

The Sky Trust is a cap-and-trade system of this last kind. You can look at it as both a civic institution and as a mechanism for recycling scarcity rent. As a civic institution, it would embody our common ownership of a shared inheritance. Because of my business background, I sometimes think of it as a kind of mutual fund. Like all mutual funds, it would be owned by its shareholders and distribute its income equally per share. What would differentiate it from standard mutual funds are the nature of its shares—one per citizen, nontransferable—and its responsibility to future as well as current shareholders.

The key protections I'd build into the Sky Trust as a civic institution are *transparency* and *accountability*. By transparency, I mean that citizens should be able to see where every dollar comes from and goes. Thus, there'd be no co-mingling of sky income with other funds. Shareholders would receive an audited annual report with complete financial information. And this information would be instantly available on the World Wide Web.

Accountability would also be built into the legal structure of the Sky Trust, just as it is for other trusts. Unlike corporations, trusts have long-term missions that their trustees are legally bound to fulfill. If they deviate from their long-term mission, the trustees can be sued by beneficiaries. In some cases, trustees are elected by beneficiaries.

The Sky Trust's mission would be to preserve the mix of gases in the sky. Its trustees would be accountable not only to citizens alive today, but also to citizens yet unborn. They'd have three legal responsibilities: (1) to issue carbon burning permits up to a limit established by Congress; (2) to receive market prices for those permits; and (3) to distribute the income equally. These responsibilities, it turns out, are consistent to a remarkable degree. In the event there *were* a conflict between the trustees' responsibilities, preservation of the sky would take precedence.

The other way to view the Sky Trust is as a scarcity rent recycling machine. We, the users, pay scarcity rent for the sky because—well, because it's scarce. We, the owners, then get back our share of the scarcity rent because —well, because we're the owners. In terms of total money in and total money out, the whole thing's a wash. But for you, me and the millions of other individual citizens, the recycling of scarcity rent can make a big difference.

Why does recycling scarcity rent matter? Keep in mind this fact: If carbon emissions are limited, we as consumers will pay higher prices *whether or not there's rent recycling.* That's because the mere act of limiting carbon emissions will create scarcity rent, which will show up in higher prices. Think of it this way. If carbon emissions are limited, the effect is the same as limiting the supply of fossil fuels. That's what OPEC did in the 1970s, and you know what happened. Without rent recycling, the higher prices from limiting carbon emissions would be a windfall for the oil companies and their shareholders. *With* rent recycling we'd return the windfall to its rightful owners —ourselves.

Also remember this: Though everyone will *receive* an equal share of scarcity rent from the Sky Trust, not everyone will *pay* the same amount. Those who burn more carbon will pay more than those who burn less. If you drive a sports utility vehicle, you'll use more sky than if you ride a bus; hence you'll pay more scarcity rent. Since your dividend is the same no matter what, you'll come out ahead if you conserve, and lose money if you don't. In other words, money will flow from overusers of the sky to underusers. Economizers will be rewarded, squanderers will pay. This isn't only fair; it's precisely the right incentive to reduce pollution.

[*Eds.*—For more on the Sky Trust, see the website "Cap and Dividend" at www.capanddividend.org (last visited Mar. 1, 2011). *See also* Peter Barnes,

Robert Costanza, Paul Hawken, David Orr, Elinor Ostrom, Alvaro Umaña, & Oran Young, *Creating an Earth Atmospheric Trust: A System to Control Climate Change and Reduce Poverty* (Draft as of Jan. 2, 2008) on the website of Earth Incorporated, at http://www.uvm.edu/~msayre/EAT.pdf (last visited Mar. 1, 2011)]

7. DIGITAL TECHNOLOGIES AND ECOLOGICAL COMMONS

Many people make a strict division between "natural resource commons" and "digital commons" such as the Internet and online communities such as Wikipedia. This is understandable because the former tend to involve depleteable resources that are "rivalrous," as economists put it. One person cannot use it without the other being excluded from use. By contrast, digital commons tend to be infinite in scope and replicable at virtually no cost. There are other tensions between the two realms, most notably the fact that the Internet and electronic systems have a significant but largely invisible environmental impact, especially in the nonsustainable use of rare earth minerals in manufacturing computers, their consumption of electricity and in the irresponsible disposal of old electronic equipment.

Yet this divide between the two broad types of commons—digital and ecological—is misleading because there are, in fact, many constructive synergies between the two. The use of the Internet and computer systems is so pervasive that our knowledge about the natural environment and our systems for managing it are more integrated than we may imagine. In addition, commoners in both realms see themselves as long-term stewards of a resource on behalf of their communities. There is a shared ethic of responsibility, accountability and participation.

In this section, we look at a variety of instances in which digital technologies are being used in innovative ways to manage ecological resources as commons.

Participatory Sensing

The rise of online social networks, wikis, smart phones and other digitally networked devices and platforms, often known as Web 2.0, are enabling new forms of participatory information aggregation. The most famous example may be Wikipedia, which has amassed more than three million English-language entries from tens of thousands of volunteers, not to mention dozens of Wikipedias in other languages. Now, with the proliferation of cameras on inexpensive mobile phones, motion sensors and GPS systems and pervasive connectivity to telephone and Internet systems, it is possible for new forms of collective knowledge to be gathered and analyzed. This has enormous implications for how distributed communities of people can help monitor

natural systems in direct, reliable, and real-time ways, facilitating rapid identification of patterns and trends affecting the environment.

As described in a 2009 report by the Woodrow Wilson International Center for Scholars on "Participatory Sensing,"[bb] citizen-scientists using electronic devices have helped collect environmental data for such events as the Audubon Society's Christmas Bird Count, World Water Monitoring Day, and the University Corporation for Atmospheric Research's Project BudBurst. In one study, participants took cell-phone photos of plants at the fruiting stage of their life-cycle; large-scale bodies of such citizen-generated information and the timing of fruiting can reveal important information about the state of climate change. "Using people's everyday mobile phones to collect data in a coordinated manner could be applied to scientific studies of various sorts, such as accessing fishermen's extensive knowledge to identify and locate fish pathologies in the field or documenting the spread of an invasive species."[cc] The report notes that GPS-equipped mobile phones might also be used to photograph diesel trucks as part of a campaign to understand community exposure to air pollution.

The North American Butterfly Association invites people to submit counts of butterflies in their locality.[dd] Rarebirds.com is a location-based database of bird sightings that draws upon volunteer submissions.[ee] There are many examples of communities of shared interest using Web-based platforms to aggregate knowledge that could otherwise never be collected. For example, the Traditional Knowledge Digital Library is a repository of traditional knowledge about medicinal plants and formulations used in Indian systems of medicine. The website invites contributions to its database, whose purpose is to document the existence of various traditional remedies, and classify them, so that the international patent system will not be able to claim proprietary intellectual property rights in the knowledge. The database serves as a massive body of "prior art" that can be used to challenge patent applications that claim private rights in the knowledge. Indirectly, then, the Traditional Knowledge Digital Library serves as a tool for maintaining people's cultural practices and relationships with many plants and natural substances.

As new types of software applications and platforms are devised, we can expect new types of participatory aggregation of information, which in turn can be used to generate new types of knowledge and ecological management systems. Types of data that once was too expensive or unreliable to collect, may be gathered and applied in conventional policymaking and standards enforcement as well as new types of self-organized commons management and social sanctioning of polluters.

Digitally-based collaborations for commons-based strategies and eco-friendly management

The use of digitally based collaborations to create new types of knowledge and projects that, in turn, facilitate commons-based strategies and eco-friendly management is a growing phenomenon. Just as many digital communities come together to self-organize and create innovative software program or websites, so farmers have discovered the collaborative potential of the Internet. One of the more fascinating projects that I have learned about is the System of Rice Intensification (SRI) in India. As described in a paper by C. Shambu Prasad, "Agriculture and the New Commons,"[ff] many Indian farmers are pioneering a new form of "agroecological innovation" by using the Internet to share their agricultural insights and innovations. SRI emerged outside of the scientific establishment as a way to produce higher rice yields through "knowledge *swaraj*"—*swaraj* meaning "self-rule."

The SRI project is of some significance because the opening up of Indian agriculture to unfettered market forces has been catastrophic for millions of Indian farmers. Some 200,000 have committed suicide over the past ten years; most of them are attributed to the intense, even insuperable financial pressures and to loss of their traditional practices and identities to market-driven agriculture.

Rather than adopt the farming practices of the conventional market and the knowledge paradigm of the scientific/government establishment, however, the SRI practitioners use indigenous varieties of crops and shun chemical pesticides and fertilizers. The whole enterprise is a vast social network of Internet-mediated participation that is aimed at learning how to eke out better yields on marginal plots of land. Some farmers even learn to "play with the monsoon" and its capricious ways to build soil health. The SRI knowledge commons has scientists, farmers and citizens all talking together on the same platforms, rather than the market-oriented "experts" declaring how agriculture should be pursued.

Since its introduction in 1999, SRI has been embraced in forty countries as an "open source" system of rice farming. The Internet has accelerated the learning and innovation curve and has enabled a rich culture of learning to arise. SRI manuals developed by Indians are shared with farmers in Cuba and Sri Lanka, for example. By 2010, there were more than 400 members from 25 countries in an online SRI group.

The rise of the "open source hardware" movement is another example of electronic networks invigorating ecology-oriented commons. This diversified movement seeks to bring open source community principles to the

physical world. Its practitioners use digital technologies, the Internet and local manufacturing processes to build freely shareable machines. There is even an Open Source Hardware and Design Alliance that is working to facilitate this type of activity.[gg]

One of the more interesting branches of the movement is Open Source Ecology. OSE is dedicated "to the collaborative development of tools for replicable, open source, modern off-grid 'resilient communities.'" The idea is to design and build eco-friendly machines and tools for farming technology using open source principles. As the project explains:[hh]

> By using permaculture and digital fabrication together to provide for basic needs and open source methodology to allow low cost replication of the entire operation, we hope to empower anyone who desires to move beyond the struggle for survival and "evolve to freedom.
>
> By our analysis, most of the technologies needed for a sustainable and pleasant standard of living could be reduced to the cost of scrap metal + labor. There is immense potential for social transformation once this technology is fully developed for building interconnected self-sufficient communities, since people will be freed from material constraints and able to seek self-actualization.

The project may be a wildly ambitious, on-the-fringe project, but its organizers are no fools. They just have the courage to test their open-source convictions. They have their own facility, "Factor e Farm," at which they unabashedly seek to build the "Resilient Community Construction Set"—a set of machines that include a sawmill, pyrolysis oil, solar hearing units, an agricultural microcombine, a manual well-drilling rig, and many other machines—all open-source by design.

The goal of Open Source Ecology is to build open-source prototypes that can enable small-scale communities to flourish in as autonomous, local manner as possible. The organizers see economics, technology, social organization and politics as deeply inter-related—and so they want to remix the existing combo into a more wholesome, life-enhancing, cheaper, participatory package. As they explain:

> Economy creates culture and culture creates politics. Politics sought are ones of freedom, voluntary contract, and human evolution in harmony with life support systems. Note that resource conflicts and overpopulation are eliminated by design. We are after the creation of

> new society, one which has learned from the past and moves forward with ancient wisdom and modern technology.
>
> Furthermore, it should be noted that this is a real experiment, and product selection is based on us living with the given technologies. First, it is the development of real, economically significant hardware, product, and engineering. Second, this entire set is being compiled into one setting, and land is being populated with the respective productive agents. The aim is to define a new form of social organization where it is possible to create advanced culture, thriving in abundance and largely autonomous, on the scale of a village, not nation or state.[ii]

In concrete terms, this approach has given rise to the Life Trac, a low cost, multipurpose, open source tractor. Its most noteworthy features are its modularity, hydraulic quick-couplers, lifetime design, and design-for-disassembly. Add an attachment and the tractor becomes a backhoe. LifeTrac designs are openly available and intended to be modular, inexpensive, and easy to build and maintain—not complex, expensive, and proprietary.

Could such models slip the chains of Big Technology and Big Corporations and enable people to develop their own popular platform for shareable, participatory innovation in farm machinery? Open Source Economy sure hopes so. The core designers even hope to add the ability to use local biofuels and steam engines, making local production and autonomy even more feasible.

Still another intriguing example of using digital technologies to improve ecological management is the Global Innovation Commons, a massive interactive archive of energy-saving technologies whose patents have expired, been abandoned or simply have no protection. The idea behind the project, as described by its founder David C. Martin, is to let entrepreneurs and national governments query the database on a country-by-country basis to identify helpful technologies that are in the public domain. Once identified, these technologies for energy, water and agriculture are prime candidates for being developed at lower costs than patented technologies.

The World Bank is a partner on this project, along with the International Finance Corporation's infoDev unit. The World Bank has estimated that the technologies in the GIC database could save more than $2 trillion in potential license fees. The Global Innovation Commons essentially seeks to bring the advantages of the open-source software development model—open participation, faster innovation, greater reliability, cheaper costs—to technologies that are claimed to be patented.

Here's how the Global Innovation Commons describes the role of patents in impeding innovation—and how the new database helps establish a new open-innovation commons:

> For the past 30 years, patents have been abused. Rather than serving the public's expansion of knowledge, they've been used as business and legal weapons. Over 50,000,000 patents covering everything you do have served to keep you from benefiting in many aspects of your life. Many life-saving treatments have been kept from the market because they threaten established business interests. The world's ecosystem has been severely damaged because efficiencies have been kept from entering the market.
>
> In the face of all this, however, there is the good news: The thirty-year "cold war" of innovation is over. Today, you now have access to it all. In the Global Innovation Commons, we have assembled hundreds of thousands of innovations—most in the form of patents—which are either expired, no-longer maintained (meaning that the fees to keep the patents in force have lapsed), disallowed, or unprotected in most, if not all, relevant markets. This means that, as of right now, you can take a step into a world full of possibilities, not roadblocks. You want clean water for China or Sudan—it's in here. You want carbon-free energy—it's in here. You want food production for Asia or South America—it's in here.[ii]

Martin says that a great many patents are not novel at all. They simply duplicate innovations that were made decades ago. But patent applications often disguise this fact by using colorful and complicated language. And overworked government patent examiners, struggling with limited resources and seeking to avoid legal hassles, often grant new patents that are not truly warranted.

Martin is a major irritant to large tech companies because he is challenging a key rationale for patents—that they are essential in promoting innovation. He argues that patents often serve to *impede* innovative technologies and make them unaffordable—at precisely the time when all countries of the world, rich and poor, need to adopt cutting-edge energy technologies to cut carbon emissions.

In touting "open innovation," Martin takes the tradition of free software and digital commons to some new frontiers. The Global Innovation Commons promises to spur a strong new wave of technological innovation through the sharing of new ideas rather than through exclusive, private control of them. As Martin put it, "What we do is trawl documents for their true meaning. But what

we care about are basic human issues. In this case, it's to show up what belongs to the big guys and what belongs to society."[kk]

DISCUSSION NOTES/QUESTIONS

1. Commons scholar Peter Barnes has pointed out that the trust is a familiar legal form that can serve as a template for designing new sorts of commons institutions.[ll] The trust is to the commons as the corporation is to the marketplace, he has noted. "The essence of a trust is a fiduciary relationship," he writes. "Neither trusts nor their trustees may ever act in their own self-interest; they're legally obligated to act solely on behalf of beneficiaries. Trusts are bound by numerous rules, including the following: Managers must act with undivided loyalty to beneficiaries. Unless authorized to act otherwise, managers must preserve the corpus of the trust. It's okay to spend income, but not to diminish the principal. Managers must ensure transparency by making timely financial information available to beneficiaries."[mm] The trust model can be seen in privately own trusts, such as land trusts; municipally operated trusts such as public libraries; government-run trusts such as Social Security, a kind of intergenerational trust compact; and international trusts, such as the Potato Park and the proposed Yasuni ITT trust in Ecuador that would preserve regional lands with rich biodiversity and indigenous populations rather than extract oil reserves.[nn] Consider how the examples of Section 3 embody the general principles of a trust. Consider also, how the examples represent creative variations on trust principles but nonetheless protect the commons.

2. A key issue in the management of any commons is whether the resources ought to be made alienable for sale in the marketplace. Is the resource so precious and vital to a community's cultural identity that it would be destructive to sell it (e.g., the sacred knowledge, designs and artworks of indigenous people)? Or can the resource be sold without harming either the culture of the commons or the natural regenerative capacities of the resource itself (e.g., a fishery or forest)? Review the examples in Section 3 and assess whether a sale of the "fruits of the commons" could be harmful to the viability of the commons. Alternatively, might rules and norms be devised that allow a monetization of the common pool resource without encouraging its over-exploitation? The Namibian fisheries represent an artful admixture of market and commons dynamics. The system works because it permits market exploitation of a common pool resource yet relies upon commons-based rules—such as catch limits, private payment for the use of public resources, self-funded oversight and enforcement —to prevent over-exploitation of the fishery.[oo] Consider how a stable system of market exploitation and commons preservation might be devised in other resource domains.

3. Commons projects pioneered by Open Source Ecology and the Global Innovation Trust deal chiefly with knowledge and information, which unlike natural resources, are—as economists put it—nonrival and nonexclusive. One person's use of the resource does not preclude another's use of it, nor deplete it. Indeed, the more participants there are in the (information) commons, the greater the value generated. This dynamic can be seen in the System for Rice Intensification, where farmers used the Internet to share their insights into better farming methods, which over time helped develop a new system of rice farming and an ongoing collaborative community. How

meaningful is the conceptual divide between commons based on finite natural resources and those based on infinite digital knowledge? The many varieties of "eco-digital" commons, which "mash up" digital technologies with ecological management, suggest that digital technologies are enabling some very new sorts of eco-commons design.

4. The Solar Commons example presents a rare example of a local commons that is enframed within the legal authority and structures of municipal government, yet independent of it. It uses the public rights of way to build its solar energy systems, yet the revenues generated and distributed flow through a commons structure, the Solar Commons Community Trust. This example illustrates how the category, "the public" is not entirely the same as "the commoners." Can you identify some key differences in the locus of authority, the type of "law" each embodies, and the ways in which people participate in managing the resource in question?

D. THE FUTURE OF THE COMMONS AND ECOLOGICAL GOVERNANCE

It is now clear that humankind's destruction and defilement of the natural environment is seriously endangering the survival of life on the planet. One can approach this problem from many perspectives, but at bottom the deterioration of our natural environment is a failure of proper governance. Governments and laws have failed to prevent the over-exploitation and abuse of the finite, fragile gifts of nature. It is no exaggeration to say that our natural ecosystems will continue to degrade—and jeopardize civilization as we know it—unless we can devise new forms of ecological governance: new legal instruments prescribing ethically grounded environmental norms, new legal institutions embracing environmentally friendly social practices, and new legal procedures up to the challenge of environmental justice for present and future generations alike.

Such is the aspiration of a fledgling commons movement now popping up in many different corners of the globe. It seeks to bring about a paradigm shift in ecological governance—and, necessarily, the cultural, economic, political, and moral premises that inform such governance. A range of self-identified commoners see natural systems not as mere bio-physical entities, but, rather, as living systems that must be integrated into human culture and governance. Such diverse organizations as the World Social Forum, the Supreme Court of India, the German-based Heinrich Böll Foundation (associated with the Green Party), the hundreds of scholars who belong to the International Association for the Study of the Commons (IASC), and scores of citizen groups such as Council of Canadians and the Foundation for Ecological Security (India), see the commons as a vital socio-ecological model for regenerating the organic interconnections between humankind and the Earth. While each has somewhat different approaches, there is a shared understanding

that present regulatory systems are failing the ecological challenge and therefore also a shared interest in developing new forms of governance and social practices that respect the biophysical integrity and sustainability of ecosystems.

The history of the commons is highly instructive in confronting these challenges because it is a paradigm that has aspired to integrate people's needs with ecological realities. The readings in this Chapter 14 sketch the arc of this history, from Roman times and the medieval commons to the modern-day public trust doctrine and the use of digital technologies as "commoning tools." Taken together, the commons-based mechanisms and practices described in the preceding pages represent the lineaments of an alternative vision, one that offers feasible solutions to the ecological and other governance *problématiques* of our time.

Commons models have proven their efficacy, versatility, social appeal and resilience in many specific domains: water, land, fisheries, and forests, not to mention a variety of digital realms. Much of their success has stemmed from their character as decentralized, participatory, self-organized systems. Commons regimes tend to understand their resources better than centralized bureaucracies, be they corporate or governmental. Yet a commons model is no magic bullet, particularly because many if not most commons tend to be inscribed midst larger systems of institutional and power relationships that may or may not support them. They cannot be assessed in total isolation from their economic and political contexts, which always will be historically and culturally contingent.

It is fair to wonder if commons can be the basis of a larger, macro-solution without some policy architecture that can recognize and support a diverse array of commons-based "micro-solutions." Professor Ostrom, *supra* Section A(2), has argued persuasively for "polycentrism" in governance—the artful nesting of different types of authority and functions at different levels of government. She stresses that there are no panaceas. That said, there is clearly a need to devise better governmental policies and institutions to support innovations such as the Sky Trust (cap and dividend), the Solar Commons, the Potato Park in Peru, and participatory sensing and data-aggregation. But one should always bear in mind that policies and institutions represent only an enabling architecture; the most robust commons models will be animated through "bottom up" participation and engagement. It helps to remember that most of the contemporary models of commons governance described in Section C were ventures into uncharted territory, each a creative venture requiring considerable ingenuity and invention.

So it must be for law and policy at the "higher" levels. New types of

policy structures and legal mechanisms are likely to be needed to leverage the capabilities of commons-based solutions at local and regional levels. Familiar legal principles such as the public trust doctrine must be given a more muscular interpretation and application. We must revisit legal landmarks like the Magna Carta and the near-forgotten Charter of the Forest to glean new insights into how commoners' rights might be protected. We must explore how existing models of commons-based governance, such as those briefly considered in Section C, *supra*, have succeeded or failed, and especially how those that have succeeded have endured and even flourished.

For law and public policy to take the commons seriously means, in other words, that they must find better ways to honor the particularity of the local as a means of assuring effective stewardship of environmental resources in more comprehensive jurisdictional settings. That means honoring the rich knowledge, passion and ingenuity that commoners themselves can bring to the management of their resources, if given the chance. It means honoring the power of historical memory, culture, and customary practice. Commons-based policy solutions may also mean recognizing the limits of credentialed expertise, scientific knowledge, large corporations, centralized bureaucracies, and the market system. All may play useful roles yet be unable to promote the participatory commitment, self-policing, native innovation and committed stewardship that a successful commons can contribute.

And so, in imagining new sorts of public policies that can legally authorize and facilitate the growth of a Commons Sector, we must begin to see the "market state" in a new light. Government typically promotes the growth of markets because it sees markets as the primary vector of "wealth creation" in the public interest. But the commons offers its own distinctive (non-monetized) value proposition – of social equity, human rights, ecological sustainability -- that government should strive to support. State governments charter corporations as vehicles to serve the public good. Why not new forms of commons charters that advance the public good in their own ways? One can imagine state-sanctioned charters and ones instigated and enacted by commoners themselves, each having different objectives and governance regimes.

Promoting the commons requires us also to explore new ways to promote "subsidiarity," the devolution of authority and resources to the lowest feasible level. The 20th Century models of centralized scientific and bureaucratic management that have not succeeded in solving environmental problems over the past forty years are giving way to more distributed, locally tailored, and network-driven solutions, as exemplified by the Internet—a superstructure of shared protocols at the policy level that in turn enables a multitude of self-organized, diversified solutions originating from the commoners themselves.

Our challenge, then, is to imagine the different policy structures and protocols at all levels of governance that can affirmatively support the formation and flourishing of commons. How can they be allowed to unleash their constructive energies, innovation, and attention to ecological limits while assuring minimal performance standards and accountability to the larger (hopefully democratic) polity? What are the means by which governing institutions can foster, for example, local commons for, say, agriculture (such as community supported agriculture, or CSAs), water resources, or forests? How can they begin to legally recognize the value of commons-based governance?

For a democratic polity on the national or subnational plane, and especially one based on individual rights and entitlements, recognizing indivisible collective interests through law poses serious challenges. The tradition is under-developed and there is political resistance to such approaches. Yet there are also many existing legal precedents and practical models that can be studied and emulated. They include community land trusts, cooperatives, national parks, municipal utilities, land grant colleges, and the Alaska Permanent Fund, which distributes a portion of royalties from oil drilled on state lands to all Alaskan households.[pp]

But devising commons-based solutions at the local, regional and even federal level is quite different from doing so at the planetary level, where the field of action is dominated by sovereign nation-states and a complicated array of multilateral institutions and treaties. How can the commons be the basis for effective solutions at the planetary level, for management of the atmosphere, stratosphere, and space; the hydrosphere (including the oceans, seas, glaciers, fresh water basins and flows, lakes, aquifers, wetlands,); the lithosphere (including deserts, mountains, flatlands, minerals, inorganic energy, soils); and the biosphere (including fisheries, forests, prairies, pastures, parks, gardens, seeds, food crops, genetic life forms and species, living flora and fauna)?

Fortunately there are, as already noted, important local precedents that can be built upon. Additionally, on the global-universal plane, a cooperative regime to manage Antarctica as a scientific commons was adopted in the late 1950s,[qq] and soon thereafter as well an evolving regime to place limits on national sovereignty in outer space.[rr] But as the struggle to achieve international agreement on limiting atmospheric carbon emissions and the pollution of oceans and other critical water systems has shown, planetary commons are of a fundamentally different character than local or regional commons and will require entirely new types of multilateral policy innovation. This task is likely to be assisted, however, by the rise of new transnational

constituencies of commoners of the sort that are now pressing governments to take action against greenhouse gas emissions, the despoliation of the oceans, and the privatization of fresh water systems. Indeed, given the widespread demand for human rights and democratic governance which at this writing is seeming to transform the Arab world fundamentally, it is not unreasonable to imagine new *national* constituencies that, once fully cognizant of the ecological plight brought upon them by their leaderships both public and private, might rise up to demand a paradigm shift in the way in which we manage Earth's precious ecosystems.

If commons are to take root and grow in our society and beyond, then we must be willing to raise basic questions about the future of the nation-state, multilateral institutions, and preferred public policy relative to each. Naturally, these sorts of big, complex questions are not normally considered in established international policy fora—nor, for that matter, in the business and law schools that, typically, serve as training grounds for the established order. Yet given the failures of existing multilateral governance structures and the demonstrated promise of commons-based systems, we ought not to shy away from imagining possible alternatives. In an innovative 2009 essay, long-time international analyst and policy adviser James Bernard Quilligan describes the failures of postwar multilateral institutions, the enormous potential of the commons, and a sweeping vision for a new commons-based system of governance at many levels.[ss] He writes: "We have begun to see that the benefits of perpetual economic growth are not compensating for the vast damages and risks they create from energy insecurity, global warming, ecological degradation and species loss to hunger, poverty, debt and financial meltdown."[tt] He then adds: "We're also realizing that neither the *private sphere of property and trade* nor the *public sphere of government provision and distribution*—which created these problems to begin with—are capable of solving them."[uu]

The structures of nation-states and multilateral institutions have made it difficult for governments even to recognize the reality of global common goods, Quilligan writes, because societies have a "pervasive commitment to free markets in driving global economic integration and sovereign reciprocity in making global decisions."[vv] As a result, all sorts of global common pool resources that are regarded as neither private nor public goods are not managed responsibly, fairly, or sustainably. Fisheries and forests, oceans and fresh water systems, minerals and soils, genetic life forms and species, seeds, climate and atmosphere, not to mention the airwaves, Internet, cultural traditions, ethno-botanical knowledge, and much else—all of these resources should arguably be treated as *common goods* because they are either gifts of nature, the creations of social communities, or legacies from earlier generations.

Quilligan proposes new forms of property management for these commons through what he calls "co-governance" and "co-production." Co-governance means that commoners at the lowest possible level of authority (subsidiarity) take over decision-making activities that historically have been performed by the state. Co-production brings together resource users and resource producers and providers through open social networks, not as "sellers" and "buyers" but as co-producers. By establishing self-governing communities of co-production, the commons "formalizes the process of just governance and democratic oversight by closing the gap between resource users and resource managers, producers and providers."[ww]

It is easy to scoff at visionary scenarios such as this, and there is no doubt that many bold ideas fail to work as envisioned or capture sufficient public support. Yet there is little question that the distinct interests of the commoners have gone generally unrepresented or under-represented within existing nation-states and multilateral institutions. This imbalance of power will have to change before any qualitatively different sort of global commons institutions can emerge; and to this end commoners themselves (the general public and distinct communities) will have to become more organized as a political constituency with their own moral vision and tactical resources. This is a real possibility. As noted above, transnational networks of commoners are already beginning to forge working relationships with each other as a means to bypass or pressure their (corrupt, non-transparent, unrepresentative) governments. Self-organized networks of commoners are also recognizing the great potential of Internet platforms to help them self-organize campaigns to change the face of governance, much as digital innovators and activists have used the Internet to challenge stodgy, concentrated industries such as music, film, and newspapers.

Given the demonstrable promise of the commons and the trend lines of digital culture, it is, we believe, imperative that we at least begin to imagine what a law of the ecological commons could look like at global, regional, national, and local levels. This challenge has less to do with some wise oracle propounding a brilliant new body of law, than with an opening up of the governance process itself so that commoners can play a more meaningful role in shaping policy and institutions as if people and their environments really mattered. Such is the significance, for example, of the Pachamama (Goddess Earth) movement that has sprung up in the past few years first in Ecuador (where nature itself has been constitutionally accorded legal standing, with the help of commoner proxies, to defend its interests) and later in Bolivia.[xx] Thinking and acting in courageous, venturesome ways is what it takes.

Of course, opening up new spaces for such governance would seriously

disrupt the regnant system and would be stoutly resisted by the established powers. Innovation in governance and recognition of the commons would likely be seen as politically repellent because it would be seen as limiting national sovereignty and corporate power. It would also be seen as a turning away from the neoliberal market order and its myths of progress through consumerism, technology, and economic growth.

This, then, is what lies at the nub of the problem: *Can such core cultural premises and commitments of the present international (i.e., state-centric) and corporate order be effectively challenged or altered?*

History is not usually kind to disruptive visions. However, the commons has a few strong, pragmatic advantages of its own. Many commons models work well and are more efficient from an holistic perspective. Many of them have broad social appeal because they invite participation, enjoy greater moral legitimacy than governments, honor transparency much more than governments, and provide more socially equitable outcomes. In the face of a troubled neoliberal economic policy order that depends upon ongoing subsidies from taxpayers and the commons on top of rigid, centralized hierarchies that impede flexible evolution, feed savage inequalities, and require shrouds of secrecy to survive, the commons has much to offer. It has the singular virtue of setting forth some compelling if under-developed alternatives to the grave structural crises of neoliberal economics that might arrest the deterioration of the planet's ecosystems and put them under sustainable, intergenerational management.

If the status quo is untenable as the basis for the future, and many believe it is, then it is imperative that we begin to imagine and refine what commons governance solutions might look like. This is the province of law and lawyers, among others; and for this reason this chapter provides a conceptual framework, some key legal principles, and practical models for inventing a more coherent commons sector.

Of course, the law can accomplish only so much on its own. Likewise government. Any realistic solutions to our multiple environmental crises must be able to enlist broad social support and be translated into cultural norms and vernacular practice: arguably the most powerful and stable form of governance. That is the ultimate aspiration of the commons as a paradigm. The key test will be whether the viability of this vision will resonate with large groups of people who are willing to take on the urgent challenges at hand, whether it can be embraced and socially enacted by the commoners themselves. "Action springs not from knowledge but from a readiness for responsibility," the great German cleric Dietrich Bonhoeffer once wrote. That is the critical question—whether

each of us is prepared to step up and assume responsibility for the ecological future of our planet.

DISCUSSION NOTES/QUESTIONS

1. One of the great virtues of successful commons is their ability to constrain the over-exploitation of shared resources, or to put enforceable "stints" upon usage. This is a function that traditional markets, left to their own devices, have not done well; nor have nation-states or international bodies, if only because they tend to be focused on maximizing global investment and trade. If a planetary commons were established for a given element of the planet's ecosystem—say, the atmosphere—how might this alter the conventional workings of global markets? What would nation-states need to do to empower such a planetary commons?

2. Imagine that you have been appointed by the President of the United States as her or his special envoy to a high-level commission constituted and convened by the UN Secretary General in cooperation with the Executive Director of the United Nations Environment Programme (UNEP), the Administrator of the United Nations Development Programme (UNDP), and the UN High Commissioner for Human Rights (UNHCHR) to assist, first, in the drafting of general principles that should guide the governance of such global commons as the atmosphere, the oceans, and fresh water systems; and, second, in the recommendation of specific institutions and procedures through which these general principles could be operationalized. Your deadline for this "law of the ecological commons" assignment is as directed by your instructor.

3. Do you believe that the aforementioned tasks are appropriate ones for lawyers to take on? Why? Why not? Alone? Together with representatives of other disciplines, talents, skills? If so, which ones and in what order of priority? Indeed, where in your priority list would you place or rank lawyers and why? What do lawyers know about commons? Are they naturally predisposed to a rights-based and commons-driven paradigm shift in the way we govern our planetary environment?

4. Are you persuaded that a commons paradigm for ecological governance is a useful idea to pursue? Why? Why not? At the local, national, and global levels? All three? Some? None? If you are in any way skeptical, what concrete alternative or alternatives would you propose?

5. Who, ultimately, is responsible for the ecological future of our planet?