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# STATE OF THE WORLD

*Transforming Cultures*

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*From Consumerism to Sustainability*

**THE  
WORLDWATCH  
INSTITUTE**

2010

# STATE OF THE WORLD

## *Transforming Cultures*

*From Consumerism to Sustainability*

Advance Praise for *State of the World 2010*:

**“If we continue to think of ourselves mostly as consumers, it’s going to be very hard to bring our environmental troubles under control. But it’s also going to be very hard to live the rounded and joyful lives that could be ours. This is a subversive volume in all the best ways!”**

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**“Worldwatch has taken on an ambitious agenda in this volume. No generation in history has achieved a cultural transformation as sweeping as the one called for here...it is hard not to be impressed with the book’s boldness.”**

—**Muhammad Yunus**, founder of the *Grameen Bank*

**“This year’s *State of the World* report is a cultural mindbomb exploding with devastating force. I hope it wakes a few people up.”**

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Like a tsunami, consumerism has engulfed human cultures and Earth’s ecosystems. Left unaddressed, we risk global disaster. But if we channel this wave, intentionally transforming our cultures to center on sustainability, we will not only prevent catastrophe but may usher in an era of sustainability—one that allows all people to thrive while protecting, even restoring, Earth.

In this year’s *State of the World* report, 50+ renowned researchers and practitioners describe how we can harness the world’s leading institutions—education, the media, business, governments, traditions, and social movements—to reorient cultures toward sustainability.



full image



extreme close-up

Several million pounds of plastic enter the world’s oceans every hour, portrayed on the cover by the 2.4 million bits of plastic that make up *Gyre*, Chris Jordan’s 8- by 11-foot reincarnation of the famous 1820s woodblock print, *The Great Wave Off Kanagawa*, by the Japanese artist Katsushika Hokusai.

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# Traditions Old and New

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Countless choices in human lives are reinforced, driven by, or stem from traditions, whether religious traditions, rituals, cultural taboos, or what people learn from elders and their families. Taking advantage of these traditions and in some cases reorienting them to reinforce sustainable ways of life could help make human societies a restorative element of broader ecological systems. As many cultures throughout history have found, traditional ways can often help enhance rather than undermine sustainable life choices.

This section considers several important traditions in people's lives and in society. Gary Gardner of Worldwatch suggests that religious organizations, which cultivate many of humanity's deepest held beliefs, could play a central role in cultivating sustainability and deterring consumerism. Considering the financial resources of these bodies, their moral authority, and the fact that 86 percent of the people in the world say they belong to an organized religion, getting religions involved in spreading cultures of sustainability will unquestionably be essential.<sup>1</sup>

Rituals and taboos play an important role in human lives and help reinforce norms, behaviors, and relationships. So Gary Gardner also looks at rites of passage, holidays, political rit-

uals, and even daily actions that can be redirected from moments that stimulate consumption to those that reconnect people with the planet and remind them of their dependence on Earth for continued well-being.

Traditions shape not just day-to-day activities but major life choices, such as how many children to have. Tapping into traditions—families' influence, religious teachings, and social pressures—to shift family size norms to more sustainable levels will be essential in global efforts to stabilize population growth. Robert Engelman of Worldwatch points out that the prerequisite of this will be to ensure that women have the ability to control their reproductive choices and that their families and governments let them make these choices in ways that respect their decisions.

Another important and unfortunately diminishing force for sustainability is the wisdom of elders. Through their long lives and breadth of experience, elders traditionally held a place of respect in communities and served as knowledge keepers, religious leaders, and shapers of community norms. These roles, however, have weakened as consumerism and its subsequent celebration of youth and rejection of tradition have spread across the planet. Recognizing the power of elders and taking advantage of all they know, as Judi Aubel of the

Grandmother Project describes, can be an important tool in cultivating traditions that reinforce sustainable practices.

Finally, one long-lived tradition that has been dramatically altered in the past several generations is farming. Albert Bates of *The Farm* and Toby Hemenway of Pacific University describe how sustainable societies will depend on sustainable agricultural practices—systems in which farming methods no longer deplete soils and pollute the planet but actually help to replenish soils and heal scarred landscapes while providing healthy food and livelihoods.

Several Boxes in these articles also discuss important traditions, including the need for ethical systems to internalize humanity's dependence on Earth's systems, the value of rekindling an understanding of geologic-scale time, and the importance of reorienting dietary norms to encourage healthy and sustainable food choices.

These are just some of the many traditions that need to be critically examined and recal-

ibrated to reflect a changing reality—one in which 6.8 billion people live on Earth, another 2.3 billion are projected to join by 2050, and the ecological systems on which humanity depends are under serious strain. Cultures in the past have also faced ecological crises. Some, like the Rapanui of Easter Island, failed to alter their traditions. The Rapanui continued, for example, to dedicate too many resources to their ritual building of Moai statues—until their society buckled under the strain and Easter Island's population collapsed. Others have been more like the Tikopians, who live on a small island in the southwestern Pacific Ocean. When they saw the dangers they faced as ecological systems became strained, they made dramatic changes in social roles, family planning strategies, and even their diet. Recognizing the resource-intensive nature of raising pigs, for instance, they stopped raising them altogether. As a result, Tikopia's population stayed stable and continues to thrive today.<sup>2</sup>

—*Erik Assadourian*

# Engaging Religions to Shape Worldviews

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*Gary Gardner*

When Pan Yue, Vice-Minister of China's Ministry of Environmental Protection, wants to advance environmentalism these days, he often reaches for an unusual tool: China's spiritual heritage. Confucianism, Taoism, and Buddhism, says Pan, can be powerful weapons in "preventing an environmental crisis" because of each tradition's respect for nature. Mary Evelyn Tucker, a Confucian scholar at Yale University, elaborates: "Pan realizes that the ecological crisis is also a crisis of culture and of the human spirit. It is a moment of re-conceptualizing the role of the human in nature."<sup>1</sup>

Religious groups have responded with interest to Pan's overtures. In October 2008, a group of Taoist masters met to formulate a formal response to climate change, with initiatives ranging from solar-powered temples to a Taoist environmental network. Inspiration came from the Taoist concept of yin and yang, the interplay of opposites to create a balanced whole, which infuses the climate crisis with transcendent meaning. "The carbon balance between Earth and Sky is off-kilter," explains a U.N. official who attended the meeting, interpreting the Taoist view. "It is...significant that the current masters of Taoism in China have started to communicate precisely through this ancient

yet new vocabulary."<sup>2</sup>

The Chinese Taoists are not alone in their activism. Bahá'ís, Christians, Hindus, Jews, and Muslims—encouraged by a partnership of the United Nations and the Alliance for Religions and Conservation (a U.K. non-profit)—developed seven-year climate and environment plans that were announced in November 2009, just before the start of the U.N. climate conference in Copenhagen. The plans are the latest religious efforts to address the sustainability crises of our time, including climate change, deforestation, water scarcity, and species loss. By greening their activities and uncovering or re-emphasizing the green dimensions of sacred texts, religious and spiritual groups are helping to create sustainable cultures.<sup>3</sup>

How influential such efforts will be is unclear—in most faiths, environmental activism generally involves a small minority. But in principle, religious people—four out of every five people alive today identify themselves as this—could become a major factor in forging new cultures of sustainability. There is plenty of precedent. The anti-apartheid and U.S. civil rights movements, the Sandinista revolution in Nicaragua, the Jubilee 2000

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debt-reduction initiative, the nuclear-freeze initiative in the United States in the 1980s—all these featured significant input and support from religious people and institutions. And indigenous peoples, drawing on an intimate and reciprocal relationship with nature, help people of all cultures to reconnect, often in a spiritual way, with the natural world that supports all human activity.<sup>4</sup>

## The Greening of Religion

Over the past two decades, the indicators of engagement on environmental issues by religions and spiritual traditions have grown markedly. And opinion polls reveal increased interest in such developments. The World Values Survey, a poll of people in dozens of countries undertaken five times since the early 1980s, reports that some 62 percent of people worldwide feel it is appropriate for religious leaders to speak up about environmental issues, sug-

gesting broad latitude for religious activism.<sup>5</sup>

More specific data from the United States suggest that faith communities are potentially an influential gateway to discussions about environmental protection. A 2009 poll found that 72 percent of Americans say that religious beliefs play at least a “somewhat important” role in their thinking about the stewardship of the environment and climate change.<sup>6</sup>

Another marker of the cultural influence of religious and spiritual traditions is the emergence of major reference works on religion and sustainability, giving the topic added legitimacy. Over the past decade, an encyclopedia, two journals, and a major research project on the environmental dimensions of 10 world religions have documented the growth of religions in the environmental field. (See Table 4.) Dozens of universities now offer courses on the religion/sustainability nexus, and the 2009 Parliament of the World’s Religions had major panels on the topic.<sup>7</sup>

**Table 4. Reference Works on Religion and Nature**

Initiative	Date Appeared	Description
“Religions of the World and Ecology” Project	1995–2005	A Harvard-based research project that produced 10 volumes, each devoted to the relationship between a major world religion and the environment
<i>Encyclopedia of Religion and Nature</i>	2005	A 1,000-entry reference work that explores relationships among humans, the environment, and religious dimensions of life
<i>The Spirit of Sustainability</i>	2009	One volume in the 10-volume <i>Berkshire Encyclopedia of Sustainability</i> , examining the values dimension of sustainability through the lens of religions
<i>Green Bible</i>	2008	The New Revised Standard Version, with environmentally oriented verses in green and with essays from religious leaders about environmental topics; printed on recycled paper using soy-based ink
<i>Worldviews: Global Religions, Culture, and Ecology</i> and <i>Journal for the Study of Religion, Nature, and Culture</i>	1995, 1996	Journals devoted to the linkages among the spheres of nature, spirit, and culture

Source: See endnote 7.

Religious activism on behalf of the environment is now common—in some cases, to the point of becoming widespread, organized, and institutionalized. Three examples from the realms of water conservation, forest conservation, and energy and climate illustrate this broad-based impact.

First, His All Holiness, Patriarch Bartholomew, ecumenical leader of more than 300 million Orthodox Christians, founded Religion, Science and the Environment (RSE) in 1995 to advance religious and scientific dialogue around the environmental problems of major rivers and seas. RSE has organized shipboard symposia for scientists, religious leaders, scholars, journalists, and policymakers to study the problems of the Aegean, Black, Adriatic, and Baltic Seas; the Danube, Amazon, and Mississippi Rivers; and the Arctic Ocean.<sup>8</sup>

In addition to raising awareness about the problems of specific waterways, the symposia have generated initiatives for education, cooperation, and network-building among local communities and policymakers. Sponsors have included the Prince of Wales; attendees include policymakers from the United Nations and World Bank; and collaborators have included Pope John Paul II, who signed a joint declaration with Patriarch Bartholomew on humanity's need to protect the planet.<sup>9</sup>

Second, “ecology monks”—Buddhist advocates for the environment in Thailand—have taken stands against deforestation, shrimp farming, and the cultivation of cash crops. In several cases they have used a Buddhist ordination ritual to “ordain” a tree in an endangered forest, giving it sacred status in the eyes of villagers and spawning a forest conservation effort. One monk involved in tree ordinations has created a nongovernmental organization to leverage the monks' efforts by coordinating environmental activities of local village groups, government agencies, and other interested organizations.<sup>10</sup>

Third, Interfaith Power and Light (IPL), an

initiative of the San Francisco-based Regeneration Project, helps U.S. faith communities green their buildings, conserve energy, educate about energy and climate, and advocate for climate and energy policies at the state and federal level. Led by Reverend Sally Bingham, an Episcopal priest, IPL is now active in 29 states and works with 10,000 congregations. It has developed a range of innovative programs to help faith communities green their work and worship, including Cool Congregations, which features an online carbon calculator and which in 2008 awarded \$5,000 prizes to both the congregation with the lowest emissions per congregant and the congregation that reduced emissions by the greatest amount.<sup>11</sup>

These and other institutionalized initiatives, along with the thousands of individual grassroots religious projects at congregations worldwide—from Bahá'í environmental and solar technology education among rural women in India to Appalachian faith groups' efforts to stop mountaintop mining and the varied environmental efforts of “Green nuns”—suggest that religious and spiritual traditions are ready partners, and often leaders, in the effort to build sustainable cultures.<sup>12</sup>

## Silence on False Gods?

In contrast to their active involvement in environmental matters, the world's religious traditions seem to hold a paradoxical position on consumerism: while they are well equipped to address the issue, and their help is sorely needed, religious involvement in consumerism is largely limited to occasional statements from religious leaders.

Religious warnings about excess and about excessive attachment to the material world are legion and date back millennia. (See Table 5.) Wealth and possessiveness—key features of a consumer society—have long been linked by religious traditions to greed, corruption, selfishness, and other character flaws. Moreover,

Table 5. Selected Religious Perspectives on Consumption

Faith	Perspective
Bahá'í Faith	"In all matters moderation is desirable. If a thing is carried to excess, it will prove a source of evil." (Bahá'u'lláh, <i>Tablets of Bahá'u'lláh</i> )
Buddhism	"Whoever in this world overcomes his selfish cravings, his sorrow fall away from him, like drops of water from a lotus flower." ( <i>Dhammapada</i> , 336)
Christianity	"No one can be the slave of two masters....You cannot be the slave both of God and money." (Matthew, 6:24)
Confucianism	"Excess and deficiency are equally at fault." ( <i>Confucius</i> , XI.15)
Hinduism	"That person who lives completely free from desires, without longing...attains peace." ( <i>Bhagavad Gita</i> , II.71)
Islam	"Eat and drink, but waste not by excess: He loves not the excessive." ( <i>Qur'an</i> , 7.31)
Judaism	"Give me neither poverty nor riches." (Proverbs, 30:8)
Taoism	"He who knows he has enough is rich." ( <i>Tao Te Ching</i> )

Source: See endnote 13.

faith groups have spiritual and moral tools that can address the spiritual roots of consumerism—including moral suasion, sacred writings, ritual, and liturgical practices—in addition to the environmental arguments used by secular groups. And local congregations, temples, parishes, and ashrams are often tight-knit communities that are potential models and support groups for members interested in changing their consumption patterns.<sup>13</sup>

Moreover, of the three drivers of environmental impact—population, affluence, and technology—affluence, a proxy for consumption, is the arena in which secular institutions have been least successful in promoting restraint. Personal consumption continues upward even in wealthy countries, and consumer lifestyles are spreading rapidly to newly prospering nations. Few institutions exist in most societies to promote simpler living, and those that do have little influence. So sustainability advocates have looked to religions for help, such as in the landmark 1990 statement "Preserving and Cherishing the Earth: An Appeal for Joint Commitment in Science and

Religion" led by Carl Sagan and signed by 32 Nobel Laureates.<sup>14</sup>

Despite the logic for engagement, religious intervention on this issue is sporadic and rhetorical rather than sustained and programmatic. It is difficult to find religious initiatives that promote simpler living or that help congregants challenge the consumerist orientation of most modern economies. (Indeed, an extreme counterexample, the "gospel of prosperity," encourages Christians to see great wealth and consumption as signs of God's favor.) Simplicity and anti-consumerism are largely limited to teachings that get little sustained attention, such as Pope Benedict's July 2009 encyclical, *Charity in Truth*, a strong statement on the inequities engendered by capitalism and the harm inflicted on both people and the planet. Or simplicity is practiced by those who have taken religious vows, whose commitment to this lifestyle—while often respected by other people—is rarely put forth as a model for followers.<sup>15</sup>

Advocating a mindful approach to consumption could well alienate some of the faith-

ful in many traditions. But it would also address directly one of the greatest modern threats to religions and to spiritual health: the insidious message that the purpose of human life is to consume and that consumption is the path to happiness. Tackling these heresies could nudge many faiths back to their spiritual and scriptural roots—their true source of power and legitimacy—and arguably could attract more followers over the long run.

## Contributions to a Culture of Sustainability

Most religious and spiritual traditions have a great deal to offer in creating cultures of sustainability.

**Educate about the environment.** As religious traditions embrace the importance of the natural environment, it makes sense to include ecological instruction in religious education—just as many Sunday Schools include a social justice dimension in their curricula. Teaching nature as “the book of Creation,” and environmental degradation as a sin, for example—positions adopted by various denominations in recent years—is key to moving people beyond an instrumentalist understanding of the natural world.<sup>16</sup>

**Educate about consumption.** In an increasingly “full world” in which human numbers and appetites press against natural limits, introducing an ethic of limited consumption is an urgent task. Religions can make a difference here: University of Vermont scholar Stephanie Kaza reports, for example, that some 43 percent of Buddhists surveyed at Buddhist retreat centers were vegetarians, compared with 3 percent of Americans overall. Such ethical influence over consumption, extended to all wisdom traditions and over multiple realms in addition to food, could be pivotal in creating cultures of sustainability. (See Box 3.)<sup>17</sup>

**Educate about investments.** Many religious institutions avoid investments in weapons, cig-

arettes, or alcohol. Why not also steer funds toward sustainability initiatives, such as solar power and microfinance (the *via positiva*, in the words of the Archbishop of Canterbury)? This is what the International Interfaith Investment Group seeks to do with institutional religious investments. In addition, why not stress the need for personal portfolios (not just institutional ones) to be guided ethically as well? In the United States alone the value of investment portfolios under professional management was more than \$24 trillion in 2007, only 11 percent of which was socially responsible investment.<sup>18</sup>

**Express the sacredness of the natural world in liturgies and rituals.** The most important assets of a faith tradition are arguably the intangible ones. Rituals, customs, and liturgical expressions speak to the heart in a profound way that cognitive knowledge cannot. Consider the power of the Taoist yin and yang framing of climate change, or of Christian “carbon fasts” at Lent, or of the Buddhist, Hindu, and Jain understanding of *ahimsa* (non-harming) as a rationale for vegetarianism. How else might religious and spiritual traditions express sustainability concerns ritualistically and liturgically?

**Reclaim forgotten assets.** Religious traditions have a long list of little-emphasized economic teachings that could be helpful for building sustainable economies. These include prohibitions against the overuse of farmland and pursuit of wealth as an end in itself, advocacy of broad risk-sharing, critiques of consumption, and economies designed to serve the common good. (See Table 6.) Much of this wisdom would be especially helpful now, as economies are being restructured and as people seem open to new rules of economic action and a new understanding of ecological economics.<sup>19</sup>

## Coming Home

Often painted as conservative and unchanging institutions, many religions are in fact rapidly embracing the modern cause of environmen-

### Box 3. A Global Ecological Ethic

The modern global ecocrisis is a strong signal that “environmentally at least, all established ethics are inadequate,” in the words of ethicists Richard Sylvan and David Bennett. Most ethical systems today are indifferent to the steady degradation of natural systems and need to be reformed or replaced. Ecological ethics is a complementary ethical system that gives the natural world a voice in ethical discourse.

A specifically ecological ethic is “ecocentric” (perceiving and protecting value in all of nature), not “anthropocentric” (restricting value to humanity alone). It recognizes that humans are only a part of life on Earth, that humans need the rest of the planet and its inhabitants vastly more than they need humans, and that there is an ethical dimension to all human relationships with the planet. Indeed, a truly ecocentric ethic recognizes that in certain situations, the needs or rights of Earth or its other inhabitants take precedence over purely or narrowly human ones.

An ecological ethic is distinct from ethics rooted in enlightened human self-interest, the basis for virtually all ethical philosophies until now. Anthropocentric ethics encourages rather than counters the human inclination toward short-termism, greed, and limited sympathies. It also denies any responsibility for the effects of human behavior on the millions of other species and living individuals on this planet.

Suppose, for example, that a company wants to cut down a forest of old-growth hardwood trees and convert them into paper products. Company officials argue that local jobs depend on the logging, that the public needs the logs for paper and wood products, that the old-growth trees can be replaced by purpose-grown ones that are just as good, and so on. This is anthropocentric ethics at work.

An argument based on ecological ethics would assert that undisturbed trees are more useful to society because of their ecological

value—they stabilize the climate, air, and soil upon which people ultimately depend. Furthermore, it would show that an old-growth forest is vastly richer (in terms of biodiversity) than a planted monoculture and can never, as such, be replaced; that it has value in and of itself regardless of its use-value to humans; and that its conversion into, say, cardboard and toilet paper would be despicable or even mad. When this full toolbox of arguments is given standing, the ecological point of view has a decent chance of prevailing. The paradox is that ecological ethics, though infused with nonhuman dimensions, greatly increases the likelihood of humanity’s survival.

The prospects for institutionalizing ecological ethics may be growing as humanity recognizes its radical dependence on the environment. To advance the cause will require work on many fronts. To begin, it will be necessary to replace the sense of self as consumer with a sense of self as green citizen. This implies developing some limits to consumption—fewer disposable items, for example.

It will also require appreciating and adopting many of the principles emerging from “traditional ecological knowledge”—local or bioregional ecological wisdom, spiritual values, ritual practices, and ethics—that has sustained traditional peoples for millennia. Where such knowledge survives, it must be protected and encouraged; where it does not, it must be rediscovered and re-embodied in “invented traditions” that re-root humans in the natural world.

Finally, developing an ecological ethics will require the help of the world’s spiritual and religious traditions, which are highly influential in shaping the ethical sensibilities of a large share of humanity.

—Patrick Curry  
University of Kent, Canterbury, U.K.  
Source: See endnote 17.

**Table 6. Economic Precepts of Selected Religious and Spiritual Traditions**

<b>Economic Teaching or Principle</b>	<b>Description</b>
Buddhist economics	Whereas market economies aim to produce the highest levels of production and consumption, “Buddhist economics” as espoused by E. F. Schumacher focuses on a spiritual goal: to achieve enlightenment. This requires freedom from desire, a core driver of consumerist economies but for Buddhists the source of all suffering. From this perspective, consumption for its own sake is irrational. In fact, the rational person aims to achieve the highest level of well-being with the least consumption. In this view, collecting material goods, generating mountains of refuse, and designing goods to wear out—all characteristics of a consumer economy—are absurd inefficiencies.
Catholic economic teachings	At least a half-dozen papal encyclicals and countless bishops’ documents argue that economies should be designed to serve the common good and are critical of unrestrained capitalism that emphasizes profit at any cost. The July 2009 encyclical <i>Charity in Truth</i> is a good recent example.
Indigenous economic practices	Because indigenous peoples’ interactions with nature are relational rather than instrumental, resource use is something done with the world rather than to the world. So indigenous economic activities are typically characterized by interdependence, reciprocity, and responsibility. For example, the Tlingit people of southern Alaska, before harvesting the bark of cedar trees (a key economic resource), make a ritual apology to the spirits of the trees and promise to use only as much as needed. This approach creates a mindful and minimalist ethic of resource consumption.
Islamic finance	Islamic finance is guided by rules designed to promote the social good. Because money is intrinsically unproductive, Islamic finance deems it ethically wrong to earn money from money (that is, to charge interest), which places greater economic emphasis on the “real” economy of goods and services. Islamic finance reduces investment risk—and promotes financial stability—by pooling risk broadly and sharing rewards broadly. And it prohibits investment in casinos, pornography, and weapons of mass destruction.
Sabbath economics	The biblical books of Deuteronomy and Exodus declare that every seventh (“Sabbath”) year, debts are to be forgiven, prisoners set free, and cropland fallowed as a way to give a fresh start to the poor and the imprisoned and to depleted land. Underlying these economic, social, and environmental obligations are three principles: extremes of consumption should be avoided; surplus wealth should circulate, not concentrate; and believers should rest regularly and thank God for their blessings.

Source: See endnote 19.

tal protection. Yet consumerism—the opposite side of the environmental coin, and traditionally an area of religious strength—has received relatively little attention thus far. Ironically, the greatest contribution the world’s religions could make to the sustainability challenge may be to take seriously their own ancient wisdom on materialism. Their special gift—the millennia-old paradoxical insight

that happiness is found in self-emptying, that satisfaction is found more in relationships than in things, and that simplicity can lead to a fuller life—is urgently needed today. Combined with the newfound passion of many religions for healing the environment, this ancient wisdom could help create new and sustainable civilizations.

# Ritual and Taboo as Ecological Guardians

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Gary Gardner

“Keeping kosher,” the ancient Jewish practice of observing dietary laws, has great practical and symbolic value for many Jews. It promotes awareness of the abundant generosity of the divine and prescribes a particular, respectful relationship with the fruits of God’s creation. Some observant Jews are now working to establish an “eco-kosher” tradition: right eating and right consumption to preserve environmental health. Eco-kosher would infuse Jewish commandments with modern meaning: *Bal Tashchit*, the injunction not to waste, might apply to excessive or non-recycled food packaging; *Tzaar Baalei Chayyim*, the commandment to avoid cruelty to animals, could speak to confined livestock operations; and *Shmirat Haguf*, the requirement that people take care of their bodies, might prohibit foods that have been sprayed with pesticides. The environmental framing of ancient kosher rituals and prohibitions adds a powerful transcendent dimension to environmental protection.<sup>1</sup>

Transforming cultures of consumerism into cultures of sustainability will require a broad set of tools, including, perhaps surprisingly, ritual and taboo. Rituals—defined here as formal acts, repeated regularly, that have deep meaning for a community of people—help people

to internalize and communicate deep-seated values. And taboos—the cultural prohibition of specific acts and products—might also help to proscribe human activities in an environmentally degraded world.<sup>2</sup>

Although commonly associated with spiritual practices, rituals and taboos are as much a secular as a religious phenomenon. A prime minister or president singing the national anthem, hand over heart, is engaged in a powerful ritualistic behavior that speaks deeply to compatriots, for example. And disrespecting a flag or other national symbol is a common taboo in many countries.

Whether secular or religious, political or personal, rituals and taboos in a consumer culture often reinforce that culture and the environmental problems it brings. But increasingly these practices are being used to bring mindfulness to modern habits of consumption, as the example of eco-kosher suggests. Ritual and taboo could become powerful, if largely intangible, tools for building cultures of sustainability.

## The Power of Ritual

Ritual communication has long had an important role in protecting the natural environ-

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ment. Cultural ecologist E. N. Anderson observes that in indigenous societies that have managed resources well for sustained periods, the credit often goes to “religious or ritual representation of resource management.” This is in part because of the nature of ritual. Anthropologist Roy Rappaport and others suggest that ritual is a more powerful form of communication than even language and that this advantage is useful for environmental protection, especially in cultures like indigenous ones that are deeply embedded in the natural environment. Rituals express deep, culturally accepted truths in ways that language, which is easily manipulated and often used in service of falsehoods, cannot.<sup>3</sup>

As an example of the power of ritual, Swedish historian of religions Anne-Christine Hornborg cites the effort by the Mi’kmaq people on Cape Breton Island, Nova Scotia, to stop development of a quarry proposed for a Mi’kmaq sacred mountain in the early 1990s. While a range of groups, including environmentalists, stepped up to oppose the project, most of them used data, analysis, and rhetoric to highlight environmental and other impacts of the quarry. The quarry company easily parried these arguments with its own statistics and analyses.<sup>4</sup>

The Mi’kmaq, however, took a different approach, relying on ritual, including a sweat lodge, drumming, and pow-wows, as their “argument,” and documenting that the mountain was a traditional Mi’kmaq sacred site. The company had a difficult time countering the Mi’kmaq rituals because, as Hornborg explains it, rituals are “immune to bureaucratic control.” Or, as another scholar eloquently summarized it, “You cannot argue with a song.” In the end, the company dropped its bid. While many reasons are given by different parties for the company’s decision, the Mi’kmaq rituals, says Hornborg, were a powerful and possibly decisive influence.<sup>5</sup>

Rappaport and other scholars cite many

examples of cultures that use ritual and taboo for environmental protection. The Tsembaga people of New Guinea, for instance, use elaborate pig festivals that include ritual slaughters and pig-eating rituals to achieve ecological balance. Ritual pig slaughtering, which occurs when pig populations have grown too large, lowers ecological pressures, redistributes land and pigs among people, and ensures that the neediest are the first to receive limited supplies of pork.<sup>6</sup>

Ethnographers tell similar stories. In Ghana, the traditional beliefs and taboos of the Ningo people protect turtles, which are viewed as gods, and mollusks, whose habitat is found in a sacred lagoon. Harvesting each species is forbidden, but no such taboos exist in neighboring Ghanaian coastal cultures. As a result, some 80 percent of turtle nesting areas along the Ghanaian coast are found in Ningo protected areas, and mollusks are up to seven times more prevalent in areas protected by taboo than in neighboring areas.<sup>7</sup>

These examples are not isolated cases of conservation. A 1997 analysis of species-specific taboos found strong overlap between taboos and official assessments of species endangerment: some 62 percent of reptiles and 44 percent of mammals protected by indigenous rituals and taboos were also identified as threatened in the World Conservation Union’s *Red List* of endangered species, suggesting that indigenous peoples are skilled monitors of species endangerment. And as the examples just cited suggest, indigenous peoples have also developed strategies for protecting species, perhaps through co-evolutionary processes whereby human practices, including taboos, change in step with threats to the well-being of various species.<sup>8</sup>

## Rituals of Consumerism

Rituals in consumer cultures may be powerful carriers of meaning, just as they are in indigenous cultures, but many also help to spread



McKay Savage

*Less toxic than most: In Chennai, India, a statue of Ganesh is made almost entirely of fruits and vegetables.*

consumerist values. Consider modern rites of passage—weddings, funerals, bar/bat mitzvahs, and *quinceañeras*, for example—which in many cases have become events marked by heavy consumption, compared with their old-fashioned predecessors.

The Wedding Report, a market research firm, says that weddings are a \$60-billion industry in the United States, with the average celebration in 2008 costing nearly \$22,000. The expenditures cover a range of goods and services—invitations, gifts, meals, paper goods, flowers, rings, guest travel, and attire, to name a few—each with its own ecological footprint. Guests who fly in for the event, for instance, have an extraordinary carbon footprint. The reception can have a large impact as well, especially if meat is served and if the food was not grown locally. And the two new gold rings that the celebrants exchange required the removal of tons of ore and earth, along with toxic flows of chemicals to extract the gold.<sup>9</sup>

Modern funerals, too, can carry an unnecessary ecological footprint. Today funerals in western countries typically involve an elaborate casket, embalming, flowers, and a cemetery plot with a concrete liner and marble headstone. The materials requirements for funerals in the United States—some 1.5 million tons of concrete and 14,000 tons of steel for funeral vaults, and 90,000 tons of steel and nearly 3,000 tons of copper and bronze for caskets—is not huge as a share of all concrete and metals used in the country. But many of the features of modern funerals are recent innovations that are entirely unnecessary. After all, just a few generations ago, even in industrial countries, the body

of the deceased was prepared at home—wrapped in a shroud or placed in a simple wooden box. And in some cultures today the ritual has scarcely any environmental impact: in the Tibetan “sky burial” the body of the deceased, believed to be an empty vessel now devoid of a soul, is cut up and left for vultures to feed on. However unpalatable to the western mind, this ritual is environmentally restorative and does not spread consumerist values.<sup>10</sup>

Traditional holidays and feasts can be occasions of heavy consumption and environmental impact. Christmas is a commonly cited example, but other holidays make the point as well. In India the festival of Ganesh Chathauri—which honors Ganesh, the god that is half-elephant, half-man—typically involves the use of thousands of large idols painted in bright colors. At the festival’s end, these are immersed in rivers, lakes, and the sea, where the paints and other materials contaminate the water. In the Bangalore area,

where an estimated 25,000–30,000 idols have been used in festivals in recent years, a test of four lakes found increased acidification, a doubling of dissolved solids, a tenfold increase in iron content, and a 200–300 percent increase in copper in sediments. Many observers have called for alternative ways of marking Ganesh Chathauri—using biodegradable materials for the idols, for example, or ritually sprinkling them in lieu of immersing them in water bodies.<sup>11</sup>

Shopping itself has become a major ritual around some holidays. In the United States, “Black Friday”—the day after Thanksgiving and a non-working day for most people—is a shopping extravaganza that marks the opening of the Christmas shopping season. A Web site promoting Black Friday deals is up months before the day arrives, and people line up outside of malls and major stores, many of which open their doors before dawn. Black Friday has become a popular shopping ritual in itself, with extensive media coverage. And it now stands as a symbol of excess, with some stores experiencing violence, injuries, and even death as shoppers rush the doors at opening time.<sup>12</sup>

## Rituals and Taboos for Sustainable Consumption

Modern rituals for sustainability can be developed out of virtually any dimension of the human experience. “Green funerals” are increasingly common, in which families can choose an environmentally benign end-of-life ritual that foregoes embalming, uses a simple wooden box or even a shroud for the deceased, avoids use of a burial vault, and in some cases marks the grave with shrubs, trees, or a stone native to the area, leaving the burial field or forest in an entirely natural state. According to the Centre for Green Burial in the United Kingdom, green burials are now available in Australia, Canada, Europe, and the United States.<sup>13</sup>

Holidays are another opportunity to green

common rituals. New Year’s Day, for instance, is celebrated in many cultures, whether on the Gregorian, Chinese, Hebrew, Islamic, or other calendar. For many people, entering a new year is foremost about marking the passage of time. And in this era of civilizational transition—an epoch akin to the shift from hunter-gatherers to farmers, or from agrarian to industrial societies—the new year may be a time to reflect in a long-term sense. (See Box 4.)<sup>14</sup>

But New Year’s Day is also a time to set a new direction. In Peru and other Latin American countries, for example, people make effigies to represent all that was bad in the year past, then burn them at midnight. In Japan, *Bonenkai* or “forget-the-year parties” are held in December to prepare for the new year by bidding farewell to the concerns of the past year. Would annual cleansing rituals be an appropriate time to review personal and community failures to respect and preserve the natural world—and to vow to do better in the new year?

Earth Day is a relatively new calendar-based ritual that was established specifically to promote environmental awareness and care for the planet. Since its founding in 1970, Earth Day has become a global celebration, with more than a billion people participating, according to the Earth Day Network. The group claims to work with more than 15,000 organizations in 174 countries to create “the only event celebrated simultaneously around the globe by people of all backgrounds, faiths and nationalities.” Such a global platform could become a powerful place from which to lead the entire human family in ritual appreciation of the planet.<sup>15</sup>

Fasting, a ritual discipline practiced in many religions, is being used by many people to raise consciousness about personal practices that might be used for a more sustainable world. In 2009 the bishops of Liverpool and London called on Christians to undertake a

### Box 4. Deepening Perceptions of Time

The Long Now Foundation was founded in 2002 to help change long-term thinking from being difficult and rare to common and easy. (The foundation uses five-digit dates; the extra zero is to solve the deca-millennium bug that will come into effect in about 8,000 years.) It started with an idea from Danny Hillis, who pioneered the massive parallel logic of today's fastest super-computers. Hillis wanted to build an all-mechanical 10,000-year clock as an icon to long-term thinking.

Hillis was inspired by a story relayed to him by *Whole Earth Catalog* editor Stewart Brand: "I think of the oak beams in the ceiling of College Hall at New College, Oxford. Last century, when the beams needed replacing, carpenters used oak trees that had been planted in 1386 when the dining hall was first built. The 14th-century builder had planted the trees in anticipation of the time, hundreds of years in the future, when the beams would need replacing."

Over the last 14 years, several prototypes and material studies have been completed of the clock, and the monument-scale version is now being built. It will be located at one of the foundation's high desert sites and stretch out through several hundred feet of underground caverns. Hillis hopes that a clock "that ticks once a year, bongs once a century, and the cuckoo comes out once a millennium" will help reframe the way people look at the future. Since that first inspiration, the foundation has embarked on several projects to promote long-term thinking.

Long Bets is an online wagering site where anyone can make bets and predictions of social and scientific consequence. All the proceeds plus half the interest go to the charity of the winner's choice; the rest of the interest goes to Long Bets to maintain the service.

Since its inception in 2002, bets have covered a diverse set of topics, from when the human population will peak to when solar electricity will become cheaper than fossil fuels.

The Rosetta Project is a compendium of all the world's documented languages micro-etched as readable text onto a three-inch wafer of pure nickel. The disk was designed to last for millennia and act as a key to languages that may become lost or extinct. In 2009, one of the disks was accepted into the Smithsonian's National Anthropological Archive. Just as discovery of the original Rosetta Stone allowed researchers to decipher ancient Egyptian hieroglyphics in the 1800s, this modern version could provide the same service for future civilizations.

All these projects, as well as a monthly seminar series about long-term thinking hosted by Stewart Brand, are attempts to change the conversation. If society only works on problems that can be solved in a four- to eight-year election cycle, then none of the truly large issues can be tackled. Solving problems in education, hunger, health care, macrofinance, population, and the environment all require a diligence and responsibility over decades, if not centuries. If the right time frame is used to solve these issues, what was once intractable can become possible.

Humans are a tenacious species. Chances are that 10,000 years from now, just like 10,000 years ago, there will be people walking on Earth. Just what kind of Earth, and just what kind of life those people may be living, will likely depend on the acorns we sow today that grow into the great oaks of our future.

Alexander Rose  
Long Now Foundation  
Source: See endnote 14.

carbon fast as a way to demonstrate restraint in consumption and solidarity with people affected by climate change. The call was sup-

ported by Ed Milliband, the Minister of Energy and Climate Change in the United Kingdom, and promoted by a development agency, Tear-

fund, which had enlisted more than 2,000 people for the 2008 fast. Similarly, Muslims in Chicago are being asked to “green Ramadan” by expanding their understanding of the annual ritual fast to include eating locally grown food, reducing their household ecological footprint by 25 percent, switching to cleaner sources of energy, and stepping up the practices of recycling and walking.<sup>16</sup>

Fasting can be conceived more broadly to include a wide range of activities in modern consumer societies. Many possibilities for setting aside consumerist habits already exist. World Carfree Day, for example, established in 2000 to help people experience life without an automobile, is now celebrated in more than 40 countries. Bike to Work day is a similar effort. Earth Hour, which involves turning off lights at a designated time, has become a worldwide phenomenon in the past few years. And TV Turnoff Week encourages families to watch less television and spend more time together.<sup>17</sup>

Meanwhile, in the United States, Buy Nothing Day now stands as a counteroffer to Black Friday, and Take Back Your Time Day offers people the chance to say no to overwork and overscheduling and instead reclaim their time for meaningful activities. Any of these “fasts” could conceivably become ritualized by religious or secular groups to give them deep meaning and impact.<sup>18</sup>

At a personal level, there are many opportunities to ritualize consumption and increase mindfulness about consumption habits. Indigenous practices could be a useful model here, especially the ritual of offering a small act of repentance or gratitude before using a resource. The Tlingit people of Alaska, for example, who use the bark of cedar trees to make clothing and other items, ask permission of the spirits of the tree before harvesting the bark and promise to use only as much as they need. Imagine saying a silent prayer of thanks

and a vow not to waste before every act of modern consumption. Such a private ritual would likely bring mindfulness to a person’s use of resources.<sup>19</sup>

One example of a more mindful approach to personal consumption comes from Peter Sawtell, a minister in Colorado who explores the link between spirituality and environmentalism. He has proposed that long-distance travel, especially flying, become a ritualized experience, with the Muslim ritual of the Hajj—the once-in-a-lifetime pilgrimage to Mecca—being the gold-standard model. Acknowledging that travel is enlightening, broadening, and even life-changing, Sawtell nevertheless suggests that because of the high environmental impact of trips by air, travel may need to be intentional and sacred now. And while a once-in-a-lifetime trip may be too strict a standard for most people, Sawtell suggests that once a decade or “once a life-stage” (adolescence, adulthood, retirement) might be helpful in thinking about long-distance travel. In the process, he suggests, people may find that less is more: they might appreciate travel and use it more meaningfully than when it was cheap and the environmental impact was ignored. Moreover, intentional travel could easily be ritualized, says Sawtell. “Imagine what it would be like in our churches if we celebrated the value of exceptional trips with special blessings for those who are embarking on this sort of once-in-a-lifetime pilgrimage.”<sup>20</sup>

In sum, ritual and taboo figure into many aspects of any human life and help to transmit and shape cultural values. While resistant to cynical manipulation, these ancient human practices will likely find a place in development of new cultures of sustainability. In this epoch that cries out for rapid and comprehensive cultural transformation, human societies need to use every tool in the cultural toolbox.

# Environmentally Sustainable Childbearing

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*Robert Engelman*

Although the idea seems pessimistic and is little discussed, it is possible that world population—at 6.8 billion people today and growing by 216,000 a day—has already surpassed sustainable levels, even if everyone on Earth achieved merely modest European rather than lavish North American consumption levels.<sup>1</sup>

Estimates of what could be an environmentally “optimal” population are speculative and contentious. It could even be risky to venture a number, since some people might take it as a target worth aiming at by any means necessary, voluntary or not. Nonetheless, it is clear that with its current range of behavior patterns, humanity is hazardously raising the heat-trapping capacity of the atmosphere, decimating the planet’s biological diversity, and risking future food scarcity by depleting freshwater supplies and degrading soils.

What if today’s widely varying per capita consumption rates worldwide met in some narrow and modest range—but climate change and environmental deterioration continued anyway? Might it then be time, or is it time already, to evolve cultures that actively promote an average number of children born to each woman so low that world population

shrinks in the near future? And if so, how could that be accomplished in ethical and acceptable ways?

The influence of modern culture on childbearing varies widely. The range of modern human fertility suggests this diversity, with women in Bosnia and Herzegovina and in the Republic of Korea having barely more than one child each on average while women in Afghanistan and Uganda average more than six. Women around the world also vary greatly, however, in their access to family planning, which can help them decide whether any given sex act should or should not be open to conception and pregnancy.<sup>2</sup>

So it is not clear which is the larger determinant of fertility: culture and women’s (and men’s) response to its influence or simply the accumulation of chance pregnancies that result from sexual activity not effectively protected against the risk of pregnancy. Yet with the notable exception of China, where shortages of natural resources are sometimes invoked to justify the government’s one-child policy, it would be hard to identify a significant culture in which very small families are promoted to assure environmental sustainability.

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Paradoxically, according to United Nations surveys, many developing-country governments believe population growth is too rapid in their countries. And out of 41 National Adaptation Programmes of Action submitted by developing countries to the secretariat of the United Nations Framework Convention on Climate Change in recent years, 37 mentioned population density or pressure as hindering the success of adaptation to the impacts of climate change. Outside of China, Viet Nam, and some individual states in India, however, such governmental concerns do not translate into actual pressure on individuals to limit their procreation.<sup>3</sup>

For the people who work most closely with population and reproduction—especially health care providers who help women and their partners prevent pregnancy or enjoy it in good health when they want a child—this is as it should be. In fact, if there is any dominant global cultural paradigm around childbearing, it centers on reproductive health and rights—a social recognition that it is women and their partners, and no one else, who should choose when to bear a child and should do so in good health.

The closest thing to consensus on the perpetually divisive topic of human population is a principle first put in writing at a U.N. conference on human rights in Tehran in 1968 that “parents have a basic human right to determine freely and responsibly the number and spacing of their children.” The adverb “responsibly” has sparked some debate, though not much in recent years. It could, nonetheless, become the basis for discussion of what the word might mean in a world where environmental sustainability is challenged by human activities.<sup>4</sup>

Twenty-six years after the Tehran conference, in 1994, another U.N. gathering expanded on reproductive rights when representatives of almost all the world’s nations agreed that encouraging healthy and effective reproductive decisionmaking by women and their partners was the sole legitimate basis for governments to try to influence fertility levels and family size within their borders.<sup>5</sup>



USAID

*Afghan girls get a meal along with their education.*

Abuses of reproductive rights have been more the exception than the rule in six decades or so of global family planning experience. But those abuses—from incentive payments for sterilization to forced abortion documented in India and China and a handful of other countries—have soured policymakers and health care providers on population policies, programs, or media messages aimed at convincing women and couples to have fewer children than they would otherwise choose to have. Absent momentous changes in culture and politics around the world, it is difficult to imagine substantial professional or public support evolving for aggressive promotion of fam-

ilies of just one child or at most two children. The scope for new cultural efforts aimed at convincing couples to forego a wanted second, third, or fourth child for the sake of the environment seems small.<sup>6</sup>



© 2006 Helen Hawking, courtesy Photoshare

*A young family visits a mobile health clinic offering family planning services and basic health care to members of marginalized rural communities in the Dominican Republic.*

Does this mean that no conceivable cultural transformation could help shrink the world's population through lower birth rates? Not at all. (And, given the misunderstanding that accompanies this topic, it's worth stating the obvious: population shrinkage based on higher death rates is not something to hope for.) There is much in today's culture that promotes pregnancies that individual women do not seek or want, and these cultural aspects are an easy immediate target for elimination or reversal. Similarly, there is scope for cultural change that might lead couples to change their views about family size, though this

route to lower fertility requires vigilance so that the ultimate childbearing choice remains with women and their partners, not with other family members, the government, or the broader society.

Surprisingly, it is likely that global fertility levels would fall low enough to shrink world population if unintended pregnancies could be eliminated, although the reversal of growth would take some time to occur. By the best available estimate, nearly two out of five pregnancies worldwide are not planned or sought by the women who become pregnant. The figures are generally somewhat higher in low-fertility industrial countries than in high-fertility developing ones.<sup>7</sup>

Current average human fertility (2.5 children per woman) is only slightly above the fertility that would yield a stable human population size. (This is currently just above 2.3 children; stubbornly high death rates among the young in many developing countries push the global average above the usually cited figure of 2.1.) Moreover, all countries that offer women and their partners a range of choices of contraception, backed up by access to safe abortion, have fertility rates low enough to end or reverse population growth in the absence of net immigration. A world of fully intentional childbearing might begin to lose population within two or three decades, perhaps sooner.<sup>8</sup>

Moreover, demographic research over several decades makes clear a strong correlation between levels of education and fertility. The number of children women have in fact falls roughly in proportion to their advancement through school. According to calculations by demographers at the International Institute for Applied Systems Analysis, women with no schooling worldwide have on average 4.5 children each. Those with some primary school average 3 children, while those who complete at least one year of secondary school average 1.9 children. And after just one or two years of college, fertility drops to 1.7 children per

woman—a rate well below population-maintaining “replacement” fertility.<sup>9</sup>

Given the force with which access to contraception and education for girls reduces fertility, it seems obvious that any cultural constraints on these should be given first priority in any move for reform. Unfortunately, such constraints are deeply rooted in human unease with both sexuality and the idea of gender equality. Cultural transformation must tackle these and advance the principle that all women should have control over their own bodies and fertility and that all should have opportunities equal to those of men—through education, media messages, and the work of policymakers at all levels. Limitations on access to contraception, such as requirements for parental permission or physician prescriptions for routinely safe options, are open to public pressure for legislative or regulatory change.

The use of sex and women’s bodies for advertising or easy laughs in television situation comedies fortifies the lower status of women and makes it even more likely that unintended pregnancies will boost population growth rates—not to mention complicate the lives and undermine the aspirations of young people. One study found that the level of exposure to sexual content on television strongly predicted subsequent teen pregnancy, with the 10 percent of teenagers most exposed to television sex more than twice as likely to become pregnant within three years of the exposure as the 10 percent with the lowest exposure.<sup>10</sup>

Such findings illustrate the power of culture—and of media culture in particular—to boost fertility or at least accelerate sexual initiation and subsequent childbearing. Combating such cultural influences thus can play an important role in lowering fertility and contributing to slower population growth. Moreover, there is evidence that media such as television and radio may contribute to lower fertility just as easily as to higher.<sup>11</sup>

Where soap operas designed to model con-

traceptive use and small family norms are introduced, perceptions on ideal family sizes can fall. For example, after the radio soap opera *Apwe Plezi* (derived from a Creole saying, “after the pleasure comes the pain”) was aired in St. Lucia, of the 35 percent of the surveyed population who had heard it, listeners were more likely to trust family planning workers, view extramarital sex as less acceptable, and favor families that averaged 2.5 children as opposed to 2.9 children for those who had not heard the show. While of course other factors also contributed to this shifting norm—such as parallel increases in access to family planning resources—it is clear that the media can play an important role in shaping family size norms.<sup>12</sup>

Another area ripe for cultural transformation is the dominant political view that any jurisdiction in which population stops growing is headed, in the words of a recent *Washington Post* news story, for “slow-motion demographic disaster.” A national election in late 2008 in Japan, for example, seemed to revolve in large part on a proposed payment of \$276 per month to parents for each child younger than high school age. In Russia, politicians have urged citizens to skip work to have sex and have offered prizes—from refrigerators to a Jeep—to women who have a baby on Russia Day, June 12th. Both countries have declining populations.<sup>13</sup>

There is some evidence that incentives like these can modestly boost a country’s fertility, with a greater effect among women with lower incomes. Tax benefits targeted at parents on a per child basis, such as those in the United States, may have a similar impact—and, in fact, U.S. fertility has risen modestly in recent years, as has that in other wealthy countries. (In the case of the United States, fertility has recently risen to roughly the replacement value, which for that country is 2.1 children per woman.)<sup>14</sup>

Politicians justifiably worry that extremely low birth rates will ultimately make it more

challenging to support aging populations. But these and similar risks are manageable social challenges that pale in comparison to those the world faces in addressing human-caused climate change, the depletion of renewable freshwater supplies, and the loss of the planet's biological diversity. Anyone who takes these environmental problems seriously has good reason to oppose the efforts of politicians, economists, and the media to promote higher birth rates—as well as those of religious leaders, members of extended families, and others who urge pregnancy on women who have not chosen it for themselves.

Finally, there is the constructive role that education and open discussion about the changing environment and the relation of population to its sustainability can play in shaping reproductive decisionmaking. Studying a lobster-fishing village in Quintana Roo, Mexico, geographer David Carr of the University of California, Santa Barbara, found that cultural attitudes about childbearing had changed as the lobster resource declined. The use of contraception was universal, and the community's birth rates were comparable to those of such low-fertility countries as Italy, Estonia, and Russia. The villagers Carr interviewed explicitly tied their modest family size intentions, so different from those of their parents and grandparents, to the importance of preserving the fishing resource for their children.<sup>15</sup>

Perhaps significantly, many villagers also

mentioned the influence on their own reproductive ambitions of television soap operas depicting small North American families. While satellite television may not be considered by many as a positive agent of cultural transformation, in this case it may play a constructive role by spreading an idea—a small family norm—that contributes to environmental sustainability more powerfully than the messages about wealth and consumption might undermine it.

The sharp fall of fertility around the world in recent decades is proof that culturally influenced reproductive behaviors can change surprisingly fast. A family with roughly two children is already a cultural ideal in most industrial countries, albeit no doubt mostly for reasons unrelated to environmental sustainability. If nations soon reach a point where greenhouse gas emissions are actually capped and food and energy prices are high due to a rising mismatch of supply and demand, there is no telling how cultural norms about childbearing and family size might evolve. It is nonetheless hard to imagine that environmentally concerned citizens seeking curbs in human population growth will ever gain much public support for limiting reproductive rights. But the potential for cultural change that would slow and eventually reverse population growth—supporting or at least not undermining individual reproductive choice—is significant and worth pursuing.

# Elders: A Cultural Resource for Promoting Sustainable Development

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*Judi Aubel*

There is considerable discussion in western industrialized societies of the need to reexamine the predominant global cultural paradigm of consumerism, which is clearly unsustainable. In efforts to address current challenges to survival, the focus has been on halting environmental degradation and promoting the economic survival of communities around the globe. Unfortunately, the degradation of the social environment and the breakdown in social connectedness have received much less attention.<sup>1</sup>

Another less frequently considered issue is the relevance of the global cultural model of consumerism for other societies that face not only environmental and economic challenges but also problems specific to their history and cultural worldviews. Non-westernized and unindustrialized societies in Africa, Asia, Latin America, and the Pacific are threatened by less tangible forces that are undermining cultural identities and decreasing social cohesion.

One negative consequence of globalization is that western individualistic, consumer-oriented, youth-focused values—communicated through multiple international and national media and institutional channels—are under-

mining positive traditions and values of more collectivist sociocultural systems. In many cases, these traditions and values provide the basis for the society's sustainable use and development of both natural and human resources.

## Respecting the Wisdom of Elders

A community elder in southern Senegal recently lamented the fact that development programs rarely pay attention to local cultural values: “There have been so many programs carried out in our community: to build more school classrooms; to construct a health center; to teach us how to grow more vegetables, how to prevent disease, about the importance of sending girls to school, and of planting trees.” His testimony reflects the trend toward carefully targeted development programs that aim to produce “tangible and quantifiable results” corresponding to donor and government priorities but that may fail to address other less tangible cultural parameters that may be equally important for the survival of the communities the programs aim to support. In spite of rhetoric about the need for “culturally adapted” approaches, development policies

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Judith Auhel

*Elder and infant in a village in Rajasthan, India.*

and programs often unknowingly convey a set of western values that may be counterproductive to the long-term social development and survival of non-western societies.<sup>2</sup>

One specific and decisive facet of non-western cultures that is rarely even dealt with in discussions on culture and development is the central role played by elders in socializing younger generations, passing on indigenous knowledge and cultural values, and ensuring the stability and survival of their societies. The late Andreas Fuglesang, a well-known leader in development communication, referred to the essential role played by elder community members in more traditional societies as the “information processing unit” of a community. As Malian philosopher Amadou Hampâté Bâ notes, “When an elder person dies in Africa, it is as though a whole library had burned down.”<sup>3</sup>

There is clearly incongruity between the centrality of elders in non-western societies and the centrality of young people in development programs—a problem that has gone largely unnoticed. There is a growing clash of cultures between younger members of society, who embrace more global values, and older

community members who are holding on to more traditional ones. The tension between the two cultural orientations is seen in the decreased communications and learning between young people and elders. In the past, for example, throughout Africa members of different generations would sit under a large tree in the community to discuss the past, the present, and the future. In French, the designated tree was referred to as “l’arbre à palabres.” Today in many communities, while elders still sit and discuss under such trees, young people are more

likely to gather around a radio or television to look at images and hear stories of other places.

Yet continuing respect for the wisdom of elders is reflected in a proverb heard widely across Africa, “What an elder sees sitting on the ground, a younger person cannot see even if he/she is up in a tree.” In a study in Senegal, community respondents of various ages stated that knowledge is related to age and, consequently, elders are viewed as “knowledge providers” in key domains such as agriculture and health. And in India, Narender Chadha of the University of Delhi finds that, in spite of vast economic and social changes, elders continue to command high respect as “they are considered as the storehouses of knowledge and wisdom within the family and community contexts.” This respect for traditional wisdom is similarly found in other collectivist, non-western societies in the Pacific and Latin America.<sup>4</sup>

Respect for the wisdom of elders is also evident in a new effort at the international level to help find solutions to global problems that was initiated in 2007 by Nelson Mandela. He brought together a small number of distinguished world leaders and established a group called The Elders. Mandela’s idea was

inspired by the role of elders in traditional societies: to bring people together, to encourage dialogue, to provide guidance based on their experience. The Elders are currently working on helping to solve several complex and conflict-ridden problems, including the Israeli-Palestinian situation.<sup>5</sup>

In western individualist societies, however, attitudes toward elders are generally tainted by negative images of aging. With the globalization of culture, increasingly ageist attitudes are being disseminated and slowly permeating non-western cultures as well. And it has been observed that older women suffer from ageist biases even more than men do: they are said to be a bad influence on children and families, illiterate and therefore unintelligent, or too old to learn and to change.<sup>6</sup>

## Threats to Intergenerational Relationships

Globalization involves a virtually one-way dissemination of western cultural images and values toward non-western societies. Only recently has there been some concern at the international level about globalization's role in spreading consumerist cultural images and values and the resulting breakdown in intergenerational relationships in non-western societies.

The 2005 *World Youth Report* from the United Nations cautioned, "Young people are increasingly incorporating aspects of other cultures from around the world into their own identities. This trend...is likely to widen the cultural gap between the younger and older generations." Similarly, an analysis of the impact of globalization by the Youth Commission on Globalisation calls attention to an alarming situation: "The youth of the developing world are attracted, lured or forced into non-traditional ways of being by a great many factors...and alienated from their traditional communities. Such cultural disintegration is the primary cause of problems such as

the loss of linguistic, historical and spiritual traditions, the break down of family support structures and the loss of a locally organised political voice."<sup>7</sup>

Similar concern about the negative effects of globalization on young people in particular are expressed by Akopvire Oduaran of the University of Botswana, who laments the loss of "the rich African tradition of intergenerational relationships...daily being weakened by the increasing change in our value systems as our communities are opened up to cultural globalization." He argues that with consumerism has come the loss of cultural traditions and weakened bonds and cooperation between family and community members—all disturbing signs of diminished social cohesion.<sup>8</sup>

Yet there is some evidence that young people perceive the dangers of globalization. Members of a Ghanaian youth club noted that "globalisation has brought us a life surrounded by mass-production and mass-consumption....We see our own cultures giving way to a consumerist monoculture. There is an urgent need to revisit, appreciate and participate in the evolution of our own cultures, which are community-oriented, non-materialistic, eco-friendly and holistic in their worldview." Mamadou, a 20-year-old Senegalese man, stated: "I am part of a whole generation of young people who are lost. We play soccer and watch television but we don't really belong to the western world. Our parents sent us to school but there we didn't learn about our culture and our parents didn't teach us where we came from either. We are lost between two worlds."<sup>9</sup>

How are consumerist values communicated to society at large and specifically to young people in developing countries? Three major institutions are responsible: the mass media and advertising, development organizations and programs, and formal schools.

Mass media and advertising are the major vehicles for diffusion of western values into non-western societies. While there is increased

national production of television programs, and even greater local radio programming that integrates local opinions and values, the predominant force remains the global media beamed into the tiniest of villages. The Youth Commission on Globalisation report notes the media's prevalent role in spreading individualist and consumerist values, stimulated by transnational corporations: "Youth are bombarded by advertisements, programming and other media that invite them to seek happiness through the accumulation of wealth and commodities."<sup>10</sup>

Development programs aim to make a positive contribution to communities. But program planners are not always aware of the underlying western values that such programs are inadvertently conveying. A older Malian woman and leader in her community described what happens: "Before the development agents get out of their four-wheel-drive vehicles, we know who they want to talk to, those who have gone to school and who know how to write, i.e. the youth. They almost never ask to see us." While working to improve hygiene or schooling, the attitudes of local development agents like these are inadvertently communicating culturally foreign values regarding who is valued (young people) and who is not (elders). Maternal and child health programs, for instance, invariably focus on women of reproductive age and rarely involve their culturally designated advisors: the senior women (or grandmothers).<sup>11</sup>

Schools are also key institutions in passing on cultural values in society. In a World Bank report, Deepa Srikantaiah maintains that in many countries school curricula do not reflect the cultural values and knowledge of local communities. In Botswana, for example, Pat Pridmore of the University of London analyzed the child-to-child approach used in many developing countries, in which schoolchildren are expected to learn and then teach their parents about "modern" health and hygiene prac-

tices. This notion is diametrically opposed to the attitude of hierarchical and collectivist non-western cultures, in which young people are expected to learn from their elders, and it undermines their culturally designated role.<sup>12</sup>

## Programs Involving Elders Promote Intergenerational Learning

Numerous intergenerational preschool programs across the United States and Canada involve older adult community members who share their knowledge and provide social support to young children on a volunteer basis. The results include increased self-confidence on the part of children and an increased sense of self-worth on the part of older adults, many of whom are retired but who have extensive knowledge and compassion to share.<sup>13</sup>

In British Columbia, the Elders in Residence program at the Lelum'uy'lh Child Development Centre has helped integrate cultural values and traditions of the Cowichan Tribes into the curriculum with the support of elders through activities such as storytelling, language teaching, and basket-weaving. The program has contributed to greater appreciation of Cowichan culture and to respect for elders' knowledge of Cowichan traditions.<sup>14</sup>

But in Africa, Asia, Latin America, and the Pacific, few organizations or programs explicitly involve elders and promote intergenerational communication. Some that do take this approach are described here.

In Ghana, in a program supported by the United Nations Population Fund entitled "Time with Grandma," grandparents serve as resource persons in educational activities with adolescents dealing with HIV/AIDS prevention and teenage pregnancy. Both young people and elders find these intergenerational activities beneficial as they build on the traditional role of elders as teachers and promote positive cultural values, including

abstaining from sex before marriage and respecting elders.<sup>15</sup>

In Malawi, the Ekwendeni Hospital trains grandparents to promote improved family practices related to prenatal care for women and care of newborns. A project review showed that the elder-inclusive strategy has contributed to improved family health-related practices while at the same time improving communication between younger and older community members. This is the first program in which elders have been actively involved, and they say that it has restored their place in society as “teachers of the younger generations.”<sup>16</sup>

In Australian Aboriginal communities, building on the traditional teaching role of elders, senior women leaders in the Yolngu tribe work with alcoholic and drug-addicted teens to increase their pride in their cultural identity by teaching them about Yolngu history and practices, such as hunting and weaving.<sup>17</sup>

Over the past 10 years, grandmother-inclusive and intergenerational approaches have been developed by the Grandmother Project (GMP), a small U.S. nonprofit, and implemented in various countries, including Laos, Uzbekistan, Djibouti, Senegal, Mali, and Mauritania. The programs have dealt with various aspects of women’s and children’s health and development that older women, or grandmothers, are heavily involved in, including nutrition, newborn care, home care for sick children, early childhood development, and female genital mutilation (FGM). GMP has developed an approach in which multigenerational groups analyze community problems and identify collective actions that can lead to positive and sustainable changes within their



Judith Aubel

*An elder of the village Olo Ologa, Mauritania, shares a story.*

own cultural systems.<sup>18</sup>

In Mali (with Helen Keller International) and Senegal (with the Christian Children’s Fund), GMP guided development of grandmother-inclusive non-formal health education activities. In both cases these led to improvements in the advice older women gave to pregnant women regarding diet and rest during pregnancy and infant feeding practices. In Mauritania, in both rural and peri-urban areas, GMP in collaboration with World Vision has trained informal grandmother leaders to promote positive nutrition and health practices in their communities.<sup>19</sup>

In Senegal, in a program with World Vision to discourage FGM, participatory educational activities with grandmothers and intergenerational dialogue are key elements of an approach to promote holistic development of young girls. Most programs aimed at decreasing female genital mutilation focus on young people and do not involve grandmothers, who are usually those who do the cutting. In GMP’s

approach, grandmothers are key actors in promoting abandonment of this practice, while recognizing their positive role within the family as guardians of tradition and a stabilizing factor within the community. One leader in Senegal noted at the end of a two-day workshop that “we never practiced cutting maliciously but rather to educate the girls. Now we understand that as grandmothers we have a responsibility to put an end to this practice.”<sup>20</sup>

Even in rural villages in Senegal, western values related to consumerism and sexuality are felt through western-produced television, films, and the Internet. GMP activities have encouraged the use of traditional communication media, such as story-telling, music, and dance in schools and communities in activities that bring young people and elders together. Recognition of grandmothers’ story-telling skills has greatly increased this after-dinner activity, and it is reported that children’s knowledge of traditional stories has increased while their television watching has declined. Broadcasts of grandmothers’ telling stories on the local radio station have also increased the women’s self-esteem and young people’s interest in traditional knowledge. A young girl named Fatoumata said, “We are happy because now we are learning the traditional stories. If we don’t spend time with our grandmas, when

we become adults we will be empty inside.”<sup>21</sup>

As the urgency to deal with global challenges increases, UNESCO has called for giving more attention to existing cultural realities and resources: “When development recognizes culture it produces change rooted in a community’s own values, knowledge and lifestyle and thus tends to be more successful. When development imposes external cultural values it damages the operating system by devaluing indigenous knowledge, and local capacity on which the community is built...the challenge is to find ways of unlocking the cultural resources and assets of the community, to connect with people’s own ways of being and enable them to use these creative capacities as a route out of poverty, exclusion and dependency.”<sup>22</sup>

Programs that explicitly involve elders and that promote intergenerational learning capitalize on two valuable assets of non-western societies. As the few efforts in developing countries just described have shown, programs that have built on these cultural resources have contributed to positive and sustainable changes in nutrition, health, and education practices while at the same time curbing the spread of consumerism and strengthening the cultural identities and social cohesion of families and communities.

# From Agriculture to Permaculture

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*Albert Bates and Toby Hemenway*

Above the door lintels of the cultural museum of Tlaxcala, Mexico's oldest state capital, are murals depicting the rise of civilization. First there appear the hunters, clad in furs, with bows and spears. A woman discovers a small grassy plant and begins to cultivate it. After a time, everyone is planting it, and the newly domesticated plants grow as tall as a person. Special tools appear to prepare the ground, plant, harvest, and process the grain. In the wall panels that follow, civilization arrives, in all its complexity.

Something similar to this story is told in most, if not all, cultures. In the Fertile Crescent of the upper Tigris and Euphrates Rivers there are ancient coins bearing images of a plow drawn by oxen. Images of planters and plows appear on pottery from Egypt and Anatolia and on rice paper from Japan and China, some of it more than 14,000 years old.<sup>1</sup>

As the ice retreated and the climate warmed 20,000 years ago, the area of fertile soil and suitable growing seasons expanded, even as wild game retreated and mammoths and other large animals went extinct. About 8,000 years ago, animal husbandry began to be augmented

by the domestication of emmer wheat, einkorn, barley, flax, chick pea, pea, lentil, and bitter vetch. Humans had begun to alter their landscapes in profound ways, clearing forests for fields, building larger villages and cities, and redirecting rivers for irrigation and flood control. By 7,000 years ago, many, if not most, people in the world were farmers.<sup>2</sup>

This might have continued until humanity entered the next Ice Age—a world of cold deserts, land bridges, and massive mountains of ice. But civilization changed that trajectory by harnessing the coal, gas, and oil that fueled the Industrial Revolution. Once more, people altered the planet's rhythms in ways they could not fully grasp.

In the span of a single century—the present one—Earth's climate may warm more rapidly and to a greater degree than in the previous 20,000 years. Agricultural systems will be profoundly challenged, beset by a perfect storm of diminishing fuel supply for tractors, fertilizer, and transportation; by crop-destroying heat waves, expanding pestilences, and declining water supplies for irrigation; by growing and migrating populations clamoring for food,

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especially for meat and processed foods (see Box 5); and by the financial instability borne of exceeding Earth's limits and having to retrench to an earlier stage of industrial development.<sup>3</sup>

Before the mid-twentieth century, most crops were produced largely without the use of chemicals. Insect pests and weeds were controlled by crop rotations, destruction of crop refuse, timing of planting to avoid high pest population periods, mechanical weed control, and other time-tested and regionally specific farming practices. While these are still in use, changes in technology, prices, cultural norms, and government policies have led to today's industrially intensive agriculture. The dominant system of agriculture now practiced throughout the world, referred to as "conventional agriculture," is characterized by mechanization, monocultures, the use of synthetic chemical fertilizers and pesticides, and an emphasis on maximizing productivity and profitability.

This type of agriculture is unsustainable because it destroys the resources it depends on. Soil fertility is declining due to erosion, compaction, and destruction of organic matter; water supplies are being depleted and polluted; finite fossil energy supplies are being exhausted; and the economies of rural communities are left in shambles as agricultural outputs are shipped to distant markets. The shortage of productive cropland, decreasing soil fertility, and the enormous waste and imprecise management associated with industrial-scale food economics are responsible for the world's recurrent and accelerating food and water shortages, malnutrition, mass starvation, and loss of biodiversity. In addition, agriculture accounts for about 14 percent of greenhouse gas emissions, and from 1990 to 2005 global agricultural emissions increased by 14 percent.<sup>4</sup>

Humanity now confronts a critical challenge: to develop methods of agriculture that sequester carbon, enhance soil fertility, preserve ecosystem services, use less water, and hold more water in

the landscape—all while productively using a steadily compounding supply of human labor. In short, a sustainable agriculture.

## Defining Sustainable Agriculture

Fortunately, for the past half-century some pioneers have been preparing the agriculture of the future, and their ideas are now moving to center stage. Organic no-till, permaculture, agroforestry, perennial polycultures, aquaponics, and biointensive and biodynamic farming—long considered fringe ideas—are now converging as serious components of a sustainable agriculture.<sup>5</sup>

One of the foundation stones was laid early in the twentieth century, when Franklin Hiram King journeyed to China, Korea, and Japan to learn how farms there had been worked for thousands of years without destroying fertility or applying artificial fertilizer. In 1911 King published *Farmers of Forty Centuries: or Permanent Agriculture in China, Korea and Japan*, which described composting, crop rotation, green manuring, intertillage, irrigation, drought-resistant crops, aquaculture and wetlands farming, and the transport of human manure from cities to rural farms.<sup>6</sup>

King's work was inspiration for many, including Sir Albert Howard. In 1943 he published *An Agricultural Testament*, which described building compost piles, recycling waste materials, and creating soil humus as a "living bridge" between soil life, such as mycorrhizae and bacteria, and healthy crops, livestock, and people. At the heart of Howard's work was the idea that soils, nutritious crops, and organisms in general are not just arrays of minerals but are parts of a complex ecology of cycling organic matter, and that these life-supporting cycles are critical for a self-regenerative agriculture.<sup>7</sup>

Howard became embroiled in a mid-twentieth century conflict. On one side were disciples of chemists such as Carl Sprengel and

### Box 5. Dietary Norms That Heal People and the Planet

While many different combinations of foods will meet a person's dietary needs, dietary norms are for the most part shaped by the individual's culture, typically very early in life. Traditionally, these preferences were in large part shaped by the foods that were available to people in their bioregion.

In today's globalized world, however, more people can choose from a wide array of foods. While increased choice is theoretically a good thing—giving people variety and the opportunity to choose diets that are healthy and have little ecological impact—dietary norms have been reshaped in an increasingly unhealthy and unsustainable manner. Easy access to high-fat, high-sugar foods combined with billions of dollars spent annually on marketing have dramatically shifted what is considered a “normal” diet—from the number of calories per meal to the amount of meat, sugar, and refined flour consumed. All of these in turn have contributed to rising obesity levels and have had significant ecological impacts.

Today 1.6 billion people are either overweight or obese, and 18 percent of greenhouse gases are produced by livestock that are raised to feed humanity's growing demand for meat. In 2007, people ate 275 million tons of meat, about 42 kilograms per person worldwide and 82 kilograms in industrial countries (2.7 servings every day).

By cultivating new dietary norms, food can contribute to good health and possibly even help heal the planet. A study of several of the longest-lived peoples in the world found that they ate just 1,800–1,900 calories a day, no processed foods, and minimal amounts of animal products. By comparison, the average American consumes 3,830 calories a day.

Food writer Michael Pollan explains succinctly what a healthy, restorative diet could look like: “Eat food, not too much, mostly plants.” By food, Pollan means that people

should avoid food-like products with so many additives, preservatives, flavors, and fillers that their nutritional value may be compromised.

And by eating fewer calories (while ensuring those calories are high in nutrients), overall health and longevity can be increased—a finding that has been borne out in several different animal species, including humans. Moreover, eating fewer calories means having a smaller ecological impact. For example, if a person starts adhering to an 1,800-calorie-a-day diet at age 30, he could live to the age of 81 before consuming the same amount of calories as a person who follows the typically recommended 2,600-calorie diet would by the age of 65.

Eating “mostly plants”—not necessarily completely vegetarian but, as in many cultures throughout history, eating meat infrequently or perhaps even just ritually—will have significant ecological benefits. According to agricultural researcher David Pimentel, a vegetarian diet needs one third fewer fossil fuels than a meat-based diet. Another study found that producing just 1 kilogram of beef involves as much carbon dioxide emissions as the average European car being driven 250 kilometers.

Unfortunately, today the dietary norm that is spreading around much of the world—driven by the media, government subsidies, advertising, and even by parents—is the consumer diet of high quantities of meat, processed foods, refined flours, and sugar.

What is needed is the intentional cultivation of sustainable dietary norms—an effort that is getting started, thanks to books like *In Defense of Food*, documentaries like *Food Inc.*, government programs that promote healthier eating, social enterprises selling healthier food, and movements like “Slow Food” that encourage people to consider carefully what they eat.

—Erik Assadourian and Eddie Kasner

Source: See endnote 3.

Justus von Liebig, who advocated fertilizing principally with nitrogen, phosphorus, and potassium minerals and promoted a mechanical approach, arguing that plant growth is boosted by adding the scarcest, or limiting, mineral. This soon became a widely accepted agronomic principle and the basis for the Green Revolution. On the other side were the organic advocates, adhering to Howard's view that crop health depends on maintaining soil ecology by returning to the soil not just the minerals lost in farming but also the organic matter that supports the nutrient cycles of soil life. Howard's position was, in the words of biologist Janine Benyus, that it is life that best creates the conditions conducive to life.<sup>8</sup>

world energy production. The style called "conventional" depends for nearly all of its workings on a dwindling and increasingly expensive supply of fossil fuels.<sup>10</sup>

Sustainable agriculture, in contrast, can be pursued indefinitely because it does not degrade or deplete the resources that it needs to continue. Since most of Earth's arable land is already under cultivation and human populations are continuing to expand, an even better goal would be to actually improve the capacity of the land to produce.

Some net gain approaches are coming into view, but they are not magic elixirs. While optimized farming practices can increase the capacity of the land to produce over the long term, they cannot be considered in isolation; a robust solution to humanity's continued existence on this planet must include adopting sustainable lifestyles and maintaining human population at sustainable numbers.

## Organic Agriculture: An Overview

Key features of organic agriculture are the use of biologically produced fertilizers such as carbon-enhanced manures instead of manufactured inorganic nitrates and phosphates, infrequent use of biologically derived pesticides rather than routine application of synthetic and systemically toxic compounds, and—most critically—maintenance of soil ecology and organic matter through cover crops, green manures, crop rotation, and composting.<sup>11</sup>

A long-term comparison done by the Rodale Institute from 1981 to 2002 found that organic systems provided crop yields equivalent to those of conventional methods. The trials showed that when rainfall was 30 percent less than normal—typical drought levels—organic methods yielded 24–34 percent more than standard methods. The researchers attribute the increased yields to better water retention due to higher soil carbon levels.<sup>12</sup>

Data gathered from the trial have revealed



Courtesy Maya Mountain Research Farm

*The face of agroforestry at the Maya Mountain Research Farm, Belize.*

Howard lost that battle but may yet have won the war, as it becomes apparent that many aspects of industrial agriculture are unsustainable, from the topsoil loss that approaches 75 billion tons annually to the looming depletion of the critical fertilizer phosphorus and the negative returns typified by crops that use 10 calories of fuel energy to produce one calorie of food energy.<sup>9</sup>

Twentieth-century agriculture has badly degraded nearly every ecosystem it has encountered while consuming roughly 20 percent of

that soil under organic agriculture management can accumulate about 1,000 pounds of carbon per acre-foot each year. This is equal to about 3,667 pounds of carbon dioxide per acre (4,118 kilograms per hectare per year) taken from the air and sequestered into soil organic matter. Also, organic methods used 28–32 percent less energy and were more profitable than industrial methods. These results suggest that organic methods offer great promise for reducing fossil fuel use and greenhouse gas emissions. The study suggested that converting the 64 million hectares of U.S. cropland currently planted in corn and soybeans to organic methods would sequester 264 million tons of carbon dioxide; this is the equivalent of shutting down 207 (225-megawatt) coal-fired power plants, about 14 percent of the installed coal electric capacity in either the United States or China.<sup>13</sup>

## Perennial Polycultures

Wes Jackson and his colleagues at The Land Institute in Salina, Kansas, have been developing new perennial crops to replace annual grains that must be replanted every year. These grains are grown in polycultures, mixed with other perennial species that fix nitrogen for fertility, and produce seed oil for food, fuel, and lubricants. These polycultures mimic the plant communities that make up wild prairie.<sup>14</sup>

“Here’s where we have to be thinking deeply,” Jackson says. “Agriculture had its beginning 10,000 years ago. What were the ecosystems like 10,000 years ago, after the retreat of the ice? Those ecosystems featured material recycling and they ran on contemporary sunlight. Humans have yet to build societies like that. Is it possible that embedded in nature’s economy are suggestions for a human economy in which conservation is a consequence of production?” Ecological wealth, Jackson argues, is a more reliable sponsor of human food systems than fossil fuels, bank

loans, or government subsidies are.<sup>15</sup>

Land Institute research shows that compared with annuals, perennial food plants provide more protection against soil erosion, manage water and nutrients more effectively, sequester more carbon, are more resilient to pests and stresses, and require less energy, labor, and fertilizer. Yields are currently low compared with annual crops, but they are rising. Studies performed in Africa suggest that many grains, fruits, and vegetables now farmed in annual monocultures will produce similar results when farmed in perennial polycultures.<sup>16</sup>

## Agroforestry

Agroforestry combines trees and shrubs with annual crops and livestock in ways that amplify and integrate the yields and benefits beyond what each component offers separately. Like other methods of sustainable agriculture, it is based on observing productive natural ecosystems and mimicking the processes and relationships that make them more resilient and regenerative.

In one form of agroforestry, called alley cropping, grains or other non-woody crops are planted in strips between rows of nut, fruit, timber, or fodder trees. Cattle, poultry, or other livestock can be pastured in the alleys or fed from the crop yields.

Near the town of San Pedro Columbia, in Southern Belize, Christopher Nesbitt has been growing food crops in this traditional forest style at his Mayan Mountain Research Farm for the past 20 years. He mixes some fast-growing native tree species, some annual crops, and some intermediate and long-term tree crops to build soil and produce continuous harvests. Some of his trees are leguminous and hold nitrogen by the microbial attraction of their roots. Some are pollinator-friendly and attract bees and hummingbirds to transfer the fertile pollen of important food plants. Understory trees like coffee, cacao, cassava, allspice, noni,

ginger, and papaya benefit from intercropping with high canopy trees like breadfruit, açai and coconut palm, cashew, and mango. Fast-yielding crops such as avocado, citrus, banana, bamboo, yams, vanilla, and climbing squashes provide an income for the farm while waiting for the slower harvest of samwood, cedar, teak, chestnut, and mahogany to mature.<sup>17</sup>

The World Agroforestry Centre reports that methods like these can double or triple crop yields while reducing the need for commercial fertilizers. A U.N. Environment Programme report estimates that if best management practices were widely used, by 2030 up to 6 gigatons of CO<sub>2</sub> equivalent could be sequestered each year using agroforestry, which equals the current emissions from agriculture as a whole.<sup>18</sup>

### No-till and Low-till

Some of the nutrient-accumulating and -conserving features that allow natural ecosystems to build and sustain soil fertility include minimum soil disturbance, the presence of a protective layer of plant residues covering the soil surface with no large bare areas for any length of time, and a constant covering of living plants to take up and store any nutrients that become available through decomposition. These nutrient-building and -conserving features can be incorporated into cropping systems by converting to no-till or low-till methods, such as reducing the period of bare fallow, planting cover crops, reincorporating stubble and plant residues, keyline plowing, and reducing aeration of the soil.<sup>19</sup>

On his 2,000-hectare farm near Wellington, New South Wales, in Australia, Angus Maurice is convinced that permanent pasture and what he calls “no kill” cropping systems will be the future of grain production. “We have seen significant recruitment of perennial grasses in the past five years, which is encouraging,” he says, “but we realize to reach the system’s full potential we would have to eliminate the use of her-

bicides altogether, which is something we can achieve through fine-tuning and successful recruitment of the right grasses.”<sup>20</sup>

Long-term research studies reveal average losses of 328 pounds of organic matter per acre per year with plowing, whereas no-till studies report an average increase of 956 pounds of organic matter per acre per year. Erosion from a conventionally tilled watershed has been found to be 700 times greater than that from a no-till watershed. No-till systems that use high-residue cover crops build soil organic matter content and slow the movement of water over the soil surface, allowing more of it to penetrate. In New South Wales, Maurice reports his most interesting finding: soil carbon levels were significantly higher in areas of perennial grass in the remnant vegetation—about 4 percent, compared with 1.5 percent in paddocks coming out of the old continuous-cropping system.<sup>21</sup>

### Permaculture

The term permaculture, a contraction of “permanent agriculture,” was coined by Australians Bill Mollison and David Holmgren and refers to a systems approach for designing human ecologies, from farms to houses to cities, that mimics the relationships found in natural biomes. It integrates concepts from organic farming, sustainable forestry, no-till management, and the village-design techniques of indigenous peoples. It applies ecological theory to understand the characteristics of and potential relationships among different design elements.<sup>22</sup>

The discipline uses a set of principles adopted from ecosystems science. One principle is to use the cradle-to-cradle model of recycling all resources and producing no waste. Another is to promote interactions between components so that needs and yields are integrated within the design. For example, a chicken needs food, water, safe habitat, and other chickens, and it produces eggs, feathers, meat, and manure, as

well as services such as weed-eating and insect control. A design that integrates chickens would meet their needs from on-farm resources and allow the chickens' outputs to meet the needs of other elements in the design, such as crops or an aquaculture system.

Once set in motion, permaculture designs evolve naturally, capture synergies, and produce a high density of food and other products with diminishing labor and energy inputs over time. One example of a permacultural strategy is the combining of crops in synergistic alliances called guilds, such as the traditional blending of corn, beans, and squash. Researchers have found that these combinations can increase total yields two- to threefold over monocultures of single crops.<sup>23</sup>

One of the better known examples of successful permaculture is found in one of the least hospitable places on Earth for farming. In the Kafrin area of the Jordan valley, 10 kilometers from the Dead Sea, the nearly flat desert receives only two or three light rainfalls in winter. The fine-grained silt is salty, and even the wells in the area are too saline to be used for irrigation.

It was there that Geoff Lawton and his team of permaculturists set up a small, 5-hectare farm and in 2001 began digging swales—2-meter-wide mounds and shallow trenches that crossed the farm in wavy lines on contour. They planted leguminous forest trees in the mounds to fix nitrogen and make leaf fodder. Each tree was given a drip-node from an irrigation line coming from a water dam built to capture road runoff; the lake formed by the dam was stocked with tilapia and geese, which contributed organic fertilizers for the trees.<sup>24</sup>

In the moist trenches, they planted olive, fig, guava, date palm, pomegranate, grape, citrus, carob, mulberry, cactus, and a wide range of vegetables. Barley and alfalfa were planted as legumes and forages for farm animals between the swales. Tree and vegetable plantings were mulched with old newspapers and cotton rags,

and animal manure was added before and after planting. Animals raised on the farm included chickens, pigeons, turkey, geese, ducks, rabbits, sheep, and a dairy cow. They were fed from the farm once there were enough trees and plants growing to harvest regularly without overtaxing the system.

Within the first year the soil and well-water began showing a marked decline in salinity, and the garden areas had significant increases in growth. Pests were minor and largely controlled by the farm animals. The combining of plants and animals brought about the integration of farm inputs and outputs into a managed ecosystem of continuous production, water conservation, and soil improvement. In less than a decade a permacultural balance had been achieved, with lessening inputs and improving outputs.

## Transitional Agriculture

The early corn-growers depicted in the murals in Tlaxcala would not have imagined they were transforming humans' relationship with Earth's ecology. Although it might be inspiring to have a grand mission like restoring the balance of nature, most farmers who venture into sustainable agriculture are simply interested in improving crop yields or saving labor or money. While tradable credits for sequestering carbon could soon provide another farm revenue stream, many farmers will likely go into sustainable agriculture simply because gas-and-oil-dependant agriculture is becoming more expensive.<sup>25</sup>

As Angus Maurice's family farm in Australia demonstrates, sustainable agriculture is not an either/or proposition, and there will necessarily be a period of transition from the current system to a more sustainable one. Even if most farmers do not go all-organic or apply permaculture principles, they can still improve their fortunes—and that of the planet—by adopting bits and pieces, a little at a time.