

PLENITUDE

The New Economics of True Wealth

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THE PENGUIN PRESS

New York

2010

THE PENGUIN PRESS

Published by the Penguin Group

Penguin Group (USA) Inc., 375 Hudson Street, New York, New York 10014, U.S.A. •
Penguin Group (Canada), 90 Eglinton Avenue East, Suite 700, Toronto, Ontario,
Canada M4P 2Y3 (a division of Pearson Penguin Canada Inc.) • Penguin Books Ltd, 80 Strand,
London WC2R 0RL, England • Penguin Ireland, 25 St. Stephen's Green, Dublin 2, Ireland
(a division of Penguin Books Ltd) • Penguin Books Australia Ltd, 250 Camberwell Road,
Camberwell, Victoria 3124, Australia (a division of Pearson Australia Group Pty Ltd) •
Penguin Books India Pvt Ltd, 11 Community Centre, Panchsheel Park,
New Delhi – 110 017, India • Penguin Group (NZ), 67 Apollo Drive, Rosedale,
North Shore 0632, New Zealand (a division of Pearson New Zealand Ltd) • Penguin Books
(South Africa) (Pty) Ltd, 24 Sturdee Avenue, Rosebank, Johannesburg 2196, South Africa
Penguin Books Ltd, Registered Offices: 80 Strand, London WC2R 0RL, England

First published in 2010 by The Penguin Press,
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LIBRARY OF CONGRESS CATALOGING IN PUBLICATION DATA

Schor, Juliet.

Plenitude : the new economics of true wealth / Juliet B. Schor.
p. cm.

Includes bibliographical references and index.

ISBN 978-1-59420-254-4

1. Wealth. 2. Sustainable development. I. Title.

HC79.W4S35 2010

338.9'27—dc22

2009046474

Printed in the United States of America

1 3 5 7 9 10 8 6 4 2

DESIGNED BY AMANDA DEWEY

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Chapter Five

THE ECONOMICS OF PLENITUDE

Policies that encourage business-as-usual growth have begun to jeopardize planetary survival. It's increasingly apparent that we need to negotiate the transition from the gray (or dirty) economy to a green alternative.

Concretely, this means building a well-designed and expanding clean sector, with the right mechanisms and incentives in place to move people and resources into it. We can't just assume that what worked in the industrial economy is efficient in the green one, because it isn't. But if we manage it right, the plenitude shift will offer not just a richer, more satisfying way of life for the individuals who practice it, but significant new and widespread wealth. It's designed for efficiency, innovation, and fairness.

The plenitude principles of the previous chapter are the building blocks that speed the transition and produce the conditions for a vibrant sustainability. On the production side, these are falling hours

of BAU work, an expanding army of self-provisioners and small businesses, and the reinvigoration of social capital.

Hours reductions serve multiple purposes. As hours fall in the gray sector, labor will flow into the green one. Shorter hours in both sectors also raise hourly productivity and provide livelihoods, by expanding the number of jobs. Throughout the history of capitalism, displaced workers have been absorbed in part through reductions in working hours.

The second component is the spur to self-provisioning and small businesses. This scale of enterprise, networked locally, regionally, and globally, looks more and more like the efficient model of the future. Plenitude gives individuals time to acquire skills and become entrepreneurial. It's a path with low capital requirements, which makes it available to large numbers of people. It also builds social capital, which is necessary for successful networks and local economies. On the consumption side, consumers' demand for low-impact goods and services creates the market for these enterprises.

Investment in social capital and strong economic ties among people make up the third principle, and they make possible the successful management of ecological commons through collective efforts and shared ownership. Regeneration and enhancement of ecosystems creates wealth that can be widely held and enjoyed. And of course sustainability will also require conventional solutions, such as a significant price for carbon and environmentally sound accounting.

But I begin with a dimension of the transition that has largely been ignored in discussions about sustainability: the role of knowledge and its peculiar economics. Accelerating the transition to clean production will require new ways to disseminate ecological know-how. Without getting that piece right, we'll be missing a major source of wealth and an opportunity to restore the planet.

Earth-Smart Design and the Economics of Knowledge

Efficiency is crucial to any successful economy. In the broadest terms, achieving efficient outcomes involves determining which inputs into production are plentiful and which are not, and figuring out how to remove the bottlenecks of the limiting factors. In the industrial era, labor, finance, and physical capital (i.e., machinery) have each been a limiting, or scarce, factor. By contrast, nature was treated as if it were free, that is, consumable without limits. As a result, we got resource-intensive, toxic methods of production.

Now the equation is reversed. We have global surpluses of labor. We know how to create finance through the monetary system and we can easily reproduce machinery. It's healthy ecosystems that are in short supply. This is what the sustainability conversation is mainly about. Green designers are figuring out how to use natural resources sparingly. Economists work on getting prices right, by correctly valuing nature.

The more we know about how ecosystems function, the better able we are to produce in ways that support rather than degrade them. Ecological knowledge includes the expertise to farm in earth-friendly ways, to harness the power of wind, sun, and geothermal energy, to make products without toxins or heavy metals, and to reuse materials over and over. In the industrial era, humans lost touch with much of what they knew about how to tap nature's bounty without destroying it. Moreover, we failed to make much progress in generating sophisticated new ecological knowledge, in comparison with the pace of discovery in other fields. Given the state of the planet, there is now an urgent need to develop and then spread this ecological knowledge as rapidly as possible. The best way to do this will be to

move away from proprietary systems of information and technology toward open-source mechanisms of knowledge transfer. As with other aspects of plenitude, this is a shift that's already under way, because it makes economic sense.

One way to think about it is that we're heading into a world in which much of the cost of production will be the up-front brain work of ecologically driven design. Horticulturist Eric Fleisher, one of the originators of Harvard University's organic overhaul of its extensive lawns and grounds, put it succinctly: "This is not a product-based program, it's knowledge-based." Rather than purchasing fertilizers and pesticides, the caretakers learned about nitrogen cycling and organisms such as fungi and bacteria that nourish plants. The trees are thriving, the grass is lush and green, and water use has been slashed.

Lawn care is just one example. Stabilizing the climate and regenerating ecosystems will require a widespread shift into ways of producing and consuming that minimize resource use, curtail negative pollutants such as carbon dioxide, and manage without toxic substances. As I described in chapter 3, designers, architects, and technological visionaries have been busy inventing these earth-friendly ways of producing, designing, and building. But we're still at the beginning of the process. Today's hybrid vehicles, wind turbines, and organic farming are a huge leap forward from what we had been doing, but they will be seen as primitive in not too many years. Prototypes and pilots of a host of promising technologies and products are in process. Some will succeed. Others will be way stations on the road to something better. Some will just be interesting ideas that failed. We need to proliferate all of these like wildfire.

Economics has mainly been absent from this design discussion, addressing itself instead to policies that shift incentives. Its strategy is to mobilize the power of profit-oriented businesses by using government policies to price natural resources as if they were ordinary as-

sets. Internalize the environmental externalities and let the market work. This will reduce emissions, but will it deliver a closed-loop (zero-waste) system? It seems unlikely. Unless the tax on pollution is prohibitively high, the pricing method doesn't eliminate ecological degradation; it merely results in a lower level of impact, by forcing consumers and producers to bear the costs. It has also been vulnerable to the expansion of dirty production in poorer countries. We need a better plan that does not short-change the creation and spread of ecological knowledge. In addition to funding for research and development, the usual approach, we've got to think about how innovations spread. We're facing a planetary emergency: the cost and speed with which knowledge is shared could literally determine the fate of our species and many others.

That's where the economics of knowledge, or information, comes in. The conditions for efficient production, dissemination, and ownership of knowledge are radically different from those for private goods. The standard efficiency rule for private goods is that their market price should be equal to their marginal cost, that is, the cost of making the last batch. With information, there is zero or minimal cost of producing additional, or "marginal," copies of a blueprint, code, or manual. Therefore, it is inefficient to restrict access, make proprietary, confine to the market, or otherwise establish a price above the cost of replication. New learning can only add, not subtract, from the stock of knowledge and production capability in the world. It must therefore be a net boost to wealth. The implications of this point are obviously far-reaching.

Yet the exclusion of information is widespread, through copyrights, patents, and trademarks. Why do law and public policy allow this inefficiency? One answer is that profit-making, rather than efficiency, drives policy. Companies and individuals reap the benefits of exclusive information, and have had the political power to get patent protection and other laws that maintain their ability to do that, despite

the harms these policies can create. Advocates of exclusiveness have also advanced a counterargument to the standard reasoning. They argue that without restrictions, companies and individuals won't generate new knowledge, or will generate less, so that over time the economy will suffer. The reasoning is that keeping information proprietary provides more incentive for research and innovation. This point of view has dominated for much of the recent past, as copyrights and patents have been extended for longer periods of time over more things.

But exclusion has also been controversial, and it's not hard to see why. It's socially inefficient to restrict the transmission of know-how. Furthermore, the reasoning about innovation, or what is termed dynamic efficiency, goes both ways. Giving wider access to yesterday's discoveries spurs tomorrow's, because past discoveries are the building blocks for further innovation in what's called the "on the shoulders of giants" effect. Keeping market newcomers from standing on those shoulders slows down innovation. There's also the possibility that private companies can buy up and then bury discoveries because they threaten existing lines of business. The stakes are too high to leave urgent public needs to private interests. They don't always coincide. Critics of exclusion note that people invent for a variety of reasons, rather than just money, and that there are less costly ways of promoting research and development than locking up lifesaving drugs, valuable knowledge, and cost-cutting code.

In software, the controversy is partly being settled by practice. The meteoric rise of open-source platforms, with examples such as Linux, Apache, Mozilla, and Wikipedia, is eroding the rationale for costly and exclusionary information. As activity migrates to the open-access and collaboration model, the case for accessibility is strengthening. On a mass scale, individuals are collaborating and making their contributions freely available to others. Harvard University's Yochai Benkler, author of the influential *The Wealth of Networks*, argues

that social sharing and exchange has become common across a wide swath of the economy—in the information, culture, education, computation, and communications sectors.

The desirability of open access is one way the economics of knowledge differs from that of ordinary private goods. Analysts of what is now called the knowledge commons have identified others, such as motivation. Widespread participation in the creation of software, online book reviews, and the posting of YouTube videos is occurring because people enjoy this work, desire peer recognition, and want to contribute to the public good, and not because they expect monetary reward. In its online form, this has been dubbed peer production, but more generally it is referred to as nonmarket, commons, or social production. One of the reasons it happens is that people devote their time off the job to these projects, in small and large chunks.

The shift to a knowledge-intensive economy has implications for the ideal structure of enterprises and how they relate to one another. The emergence of the Internet, with its radically different economic practices, has already dealt a serious blow to the dominance of large corporate ownership with restrictive access. Decentralized, or distributed, production becomes more efficient as individuals and small groups connect through voluntary networks, rather than the large command-and-control enterprises we call corporations. This is how Linux, Wikipedia, and a growing number of extraordinary products have been developed. Belief in the viability of an alternative production model is growing among the technorati, as Benkler argues: "The networked environment makes possible a new modality of organizing production: radically decentralized, collaborative and nonproprietary; based on sharing resources and outputs among widely distributed, locally connected individuals who cooperate with each other without relying on either market signals or managerial comments."

If I am right that knowledge is the scarce resource in the transition to sustainability, then it's a limiting factor in the growth of the

clean sector. Overcoming that scarcity by letting green know-how flow as freely as possible will be wealth-generating and socially efficient. A collectively managed open-source process allows new knowledge to be transmitted rapidly among networked individuals and small groups who are motivated to provide value and save the planet. Innovators can be rewarded through payments for customized applications and support, as well as through public and philanthropic funds. (The competitive prize model is one popular option.) Hybrid structures that incorporate sharing and collaboration will become increasingly attractive and financially viable. There will be enhanced value in a pattern of work and leisure that gives people enough free time to participate. This isn't just a feel-good story. It characterizes a real, growing, and economically intelligent sector.

A teeming knowledge commons also allows for ongoing learning. In the Harvard lawn example, the university would post its techniques online for anyone to use. Networked individuals and firms disseminate the information and add whatever they've figured out as they adapt the methods to local conditions. Improvements are incorporated through a peer-production process that includes review. Permaculturalists and other enthusiasts promulgate the technology in the free time they have recovered by following the plenitude model. It's a parallel economy to the for-profit market. It grows alongside that market, accelerates the speed of transition, and transforms what's happening in BAU firms. After all, IBM did adopt Linux.

Plenitude practitioners have begun to apply these ideas. Factor *e* Farm is a group dedicated to building the "world's first self replicating self-sufficient, open source, decentralized, high-appropriate-tech resilient permaculture ecovillage." (The *e* is a reference to the transcendent mathematical constant *e* and a play on the word *factory*). Working from a converted soybean field outside Kansas City, Factor *e* Farm combines innovations in small-scale manufacturing with knowledge-intensive agriculture. They're using a fab lab to build what they call

a Global Village Construction Set—a step-by-step guide for replicating a self-sufficient, completely sustainable community requiring minimal financial capital. With just scrap metal and plastics, the fab lab technology enables the machines to replicate themselves, obviating the purchase of costly capital equipment. They've already developed and built machines such as the Liberator 2, which makes the compressed earth bricks used to construct the buildings, and the Life Trac, a steam-powered multipurpose tractor. Both can be built at very low cost, and they will be freely replicable by others. Participants are hoping to bring these innovations to market soon, and are working on a number of other high-tech, low-materials inventions such as an egg-hatching system, raised-bed organoponic gardening, and a micro-combine, a multipurpose farming machine that can cut, thresh, and winnow. The basic machinery is highly adaptable, which allows the group to proceed with a variety of inventions. Volunteers on- and off-site take on these projects and work on them through the open-source process. The effort is a combination of high-tech innovation, self-providing, and technological diffusion. The farm's founder, Marcin Jakubowski, uses the term *neocommercialization* to describe the business model: "It means that we can both 'commercialize' a product—make it available for sale at competitive prices to others—and help others replicate the enterprise itself. We are interested not only in production, but also in business replication by others, because it's good for the world."

The Factor *e* Farm may or may not succeed. But it's interesting because it has zeroed in on features that can lead to a rapidly expanding green sector. It relies on open-source plans for constructing novel machinery and techniques, and on an open-dissemination mechanism once the innovations are complete. Second, the capital requirements for the innovations are low. The initial fab lab technology is relatively inexpensive, and production relies on low-cost or free materials such as scrap metal, plastics, and soil. The open source 3-D

“printer” called the RepRap, which makes objects, can almost replicate itself at minimal cost. Low capital requirements are essential, because financing is frequently a barrier, especially with unproven technologies. The fact that these innovations are cheap makes them accessible to small businesses, the unemployed, and low-income communities, as well as appropriate for diffusion in the Global South. Given the recent performance of the centralized financial system, there’s an obvious appeal to solutions that do not depend on significant sums of money from large financial institutions or the government. Finally, the approach relies on small, decentralized units, communicating online. Scale is one of the big questions about an economic system that we’ve also got to address.

Small Is Beautiful, but Is It Efficient?

The twentieth century was unquestionably the era of bigness. The mass production model was pioneered in automobiles, and then expanded across manufacturing. Companies installed dedicated, or single-purpose, machinery capable of churning out enormous numbers of cheap products. As the decades passed, the assembly lines moved faster and the companies got larger. Farms, mines, retail outlets, and other service-sector entities also expanded. Manufacturing eventually shifted to vast factory complexes in Asia.

When mainstream economists have addressed scale, they tended to interpret the growth in the size of production facilities and companies as evidence of superior efficiency, or what are termed economies of scale. This perspective typically ignored environmental impacts, such as the emissions associated with long-distance transport. If there was a worry, it was about such large concentrations of market and political power, one consequence of which is the “too big

to fail” dilemma that has resulted in taxpayer bailouts of reckless financial institutions and failing automobile companies.

Beginning in the late 1970s, a productivity slowdown and squeeze on corporate profitability led to questions about whether the mass production model had outlived its usefulness. Two MIT political economists, Michael Piore and Charles Sabel, began studying small-scale manufacturing, including a group of advanced, design-intensive manufacturing firms in the Emilia Romagna region of Italy that were achieving impressive results. One dimension of their success was computerized, multipurpose machinery that obviated the hugely expensive dedicated-capital equipment of the mass production era. These machines allowed for more flexible responses to market demand than did the industrial behemoths, so the model was termed flexible (rather than mass) production. To overcome some of the drawbacks of small size, the companies formed networks to share functions such as training, research and development, and marketing. Piore and Sabel predicted an industrial future of these small but networked production units. As they envisioned, start-ups and small firms, clustering in geographical proximity, have been remarkably successful in information technology, biomedical, and other fields.

So the era of “bigger is better” may have finally ended. Certainly the presumption in favor of bigness is harder to defend now than it was fifty years ago. There’s a growing constituency for small, including adherents of the network model, a hybrid that transcends the simple large-versus-small dichotomy.

The literature on size and economic performance does not speak with one voice. Results are often industry-specific, and vary by time period, country, and the variable being measured. It’s difficult for researchers to keep up with the pace of technological development as software and multipurpose manufacturing machines revolutionize small-scale production. We do know that small businesses have been at the forefront of innovation and employment growth. In recent

years, nearly two thirds of all jobs have been created by firms with fewer than five hundred employees. And recession-induced job loss has become more prevalent in large than small companies.

This history provides a *prima facie* case that the emerging green sector will be powered by small and medium-size firms, with their agility, dynamism, and entrepreneurial determination. The rising cost of energy will favor more local and regional economies made up of smaller firms. The export-led, fossil-fuel-dependent globalization of the last few decades has relied on artificially cheap long-distance transport, and that is unlikely to continue. The economic collapse of 2008 and its aftermath also highlighted the vulnerabilities associated with centralization. As the system came crashing down, it was apparent how much damage a few institutions could wreak on the whole. If it is true that there will be heightened instability on account of climatic, ecological, and market fluctuations, decentralization should create more resilience and containment of adverse events. Biologists' findings that more diverse systems are more resilient and adaptable are relevant to economies as diversity is nurtured through local adaptation.

The counterargument is that big firms can move expeditiously. When Wal-Mart decided to reduce its footprint, it was able to affect its suppliers' practices quickly. This may be the most compelling argument in favor of large size. When the big actors do decide to move mountains, they bring enormous resources to the table. Conversely, that power can be deployed to block progress, as we have witnessed with ExxonMobil and other large companies regarding climate change.

Whatever the ultimate fate of the large corporations, there's enormous potential in the plenitude model. Practitioners are freed up to start new production, either as individuals or in groups, especially in areas such as energy, food, culture, software, information, and light manufacturing. Over time these entities can become a sizable sector

of low-impact enterprises, which form the basis of animated local communities and provide livelihood on a wide scale. Such a vision of revitalized local economies anchored in a dense network of small and medium-size businesses is at the heart of cutting-edge sustainability thinking.

Will the large corporations absorb, neutralize, or even destroy these upstart competitors? There's no simple answer to that question. If small is more efficient, as I think it can be, that gives it an edge, although there's always the threat of buyout. The political-economic context is also relevant. The giants are favored on account of their enormous political power, which in turn yields government subsidies. It'll be crucial to cut off the flow from that spigot and move policy in the direction of promotion and protection of small firms. The more the small sector can organize itself to push for fair, or even preferential, treatment, the more secure its future will be.

If starting an economic revolution from individuals and small-scale activities sounds unrealistic, it's worth remembering that the first industrial revolution in Britain developed in just this manner. What became the powerhouse companies in textiles, potteries, shoes, and other manufactures began from individual craftspeople working on a small scale, in workshops and homes. Enterprising, strategic, and lucky ones, like Josiah Wedgwood, remain known even today.

Natural Assets and Shared Ownership

As national and global economies attempt to emerge from the slowdown, they are faced with the question of where replacements for disappearing jobs and businesses will come from. In the wealthy countries, much of the thinking centers on alternative energy, services, software, and high tech. But there's another source of jobs and value

that should be front and center in our planning: the restoration of natural assets. Nature is an input into all production, and its degradation raises costs. Less fertile soil leads to less food production. Cleaning up toxins in brownfields and waterways, nourishing depleted forests, replenishing water supplies, and enhancing biodiversity all generate wealth. Pollution-induced asthma, cancers, and birth defects result in expensive health care. Provided climate change doesn't spiral out of control, wreaking havoc on ecosystems in its wake, restoration is a smart strategy. The next economic era needs to be devoted to restoring the capacity of the earth to support humans and other life forms.

Ecological regeneration is also a solution to another of the most pressing economic problems we face: extreme inequality and poverty. More than half the world's population lives on less than \$2.50 a day. As the climate warms, that fraction will rise, due to declining crop yields, further collapse of fish stocks, loss of coastline, water scarcity, and higher energy prices. Even in the wealthy United States, a large portion of the population is without economic assets. In 2004, 30 percent of households had less than twelve thousand dollars in net worth. The bottom 90 percent owned only 29 percent of total net worth, compared with the 34 percent going to just the top 1 percent. (Financial wealth is even more unequally distributed.) Since the downturn, the picture has worsened as millions have been pushed out of the middle class, poverty has accelerated, and households are being stripped of decent livelihoods. Most of the attention has been focused on income, but long-term earning power, financial stability, and well-being depend on access to economic assets.

Some of the most important environmental economic research in the last decade has studied the impacts of regenerating natural assets. Pioneered by researchers such as University of Massachusetts economist James Boyce, Indian environmentalists Anil Agarwal and Sunita Narain, and others, this work has found that income and

human well-being expand when degraded land, water, and ecosystems are cleaned up and repurposed by the people who live on and around them. An array of case studies from around the world show that converting a vacant lot into urban businesses, planting a marketable crop on an abandoned field, installing a water-harvesting system to raise agricultural yields, and reforestation are ways to lift people out of poverty, empower communities, and heal the earth.

Part of the economic potency of this strategy is that it transforms unowned or devalued nature into community-managed, income-producing property. In impoverished tribal areas in India, villages in water-scarce regions have come together for watershed management and rainwater collection, and begun to share water fairly. This in turn has led to higher crop yields, the expansion and harvesting of grasses with cash value, and the chance to enhance animal husbandry. (Some villages have been able to shift from goats to more lucrative milk-producing buffalo.) In other cases, degraded and worthless government-owned land has been transferred to poor villagers who have planted restorative crops that they've then sold. Areas that once resembled moonscapes now support trees.

Boston's pioneering Dudley Street Neighborhood Initiative gained title to unused urban lots through eminent domain and from the city government, and the land was used to revitalize a blighted neighborhood. They began with an intensive community planning process, and have succeeded in converting more than half the abandoned lots to new uses, including housing, community centers, parks, playgrounds, schools, a greenhouse, and an orchard, as well as a town common. They've got a community land trust and are fulfilling their dream of creating a lively urban village.

The case studies reveal that ecological regeneration can create assets that yield ongoing income streams, which can be held by either communities or individuals. Giving community members secure access to land for cultivation creates the potential to produce food and

income. Other elements of success include mobilizing surplus time among the un- and underemployed, a transparent, democratic process for participation, and a legal and policy framework that ensures benefits flow to participants, rather than being siphoned off by private interests or the government. These cases chronicle not just double dividends, but triple wins, lifting people out of poverty, building natural capital, and giving political voice to disenfranchised groups. The natural-assets literature also highlights a new type of ecological property that can be created: shares in the atmospheric commons. If polluters were charged for emissions, and citizens had rights to those revenues, it would be the equivalent of creating a new ecological asset in atmosphere. The Sky Trust proposal put forward by Peter Barnes calls for the revenue collected from greenhouse gas emitters to be returned to citizens, on a per capita basis, like the Alaska Permanent Fund.

Enhancements to natural capital generate returns for decades, even centuries, and can be used to support communities. Ecological historians have found that prior human investments in ecosystems, sometimes mistakenly considered "natural," have yielded long-term benefits. Ancient farmers stirred charcoal residues into soil and created the superrich, superfertile dark earth (*terra preta*) that is believed to cover 10 percent of the Amazon basin. Valuable forest islands within West African savannas were once thought to be remnants of forested areas, but are now known to be nineteenth-century human constructions situated within grasslands to conserve water and provide shade and timber. Today's investments include such examples as the regeneration of prairie in Nebraska, cleanup of the Hudson River, and dam removal in the Pacific Northwest. The shift from monocropping to diversified farming rebuilds a local-food system and provides livelihoods for the farmers and small businesses that connect to it. Enhancing crop diversity improves the soil and can support heirloom varieties with high market value. Remodeling an abandoned factory

or mill provides living space, shops, restaurants, and offices that serve a regional economy.

Natural-asset projects have been centered in low-income communities. But the strategy is more broadly relevant, and can be used to invest in an array of productive ecological assets, including those that are not severely degraded. Plenitude is key to this process. Research on the management of natural assets shows that social capital is a condition for success. Plenitude lifestyles reclaim time, so people can reinvigorate their social connections, build community, and work together on investments in local and regional ecosystems. Sustainability groups operating at the local and regional levels are already part of networked efforts to influence economic development, pushing for community investments with public payoffs.

A commonwealth approach is a departure from the usual debates about inequality, which center on income rather than assets, and redistribution rather than expansion of wealth. After-the-fact taxation that redirects skewed market outcomes was once the dominant approach to inequality, but it has become less popular as its drawbacks surfaced. Neoliberal ideology has predisposed many to view market outcomes as natural or even fair, and has obscured the underlying biases, subsidies, and distortions associated with current market rules and structures. Interventions that create more equality in the initial distribution of assets or restructure flawed rules are more likely to yield fairer market outcomes that need less *ex post facto* tinkering.

These examples also raise issues of how to own and manage commons. History provides sophisticated examples of hybrid property rights regimes, including shared property systems that incorporate elements of both private and collectively held systems, and take us beyond simplistic debates over private versus state ownership. The Boston College economic historian Prasannan Parthasarathi has described how in eighteenth-century South India, agricultural groups shared the risk and bounty of each season, as in a common property system, but

also maintained individual, transferable property rights to future harvests. Similar arrangements can be found in cooperatives, partnerships, and other modern economic enterprises. The beauty of these systems is that on a small enough scale they produce incentives for productivity and sustainable use of resources.

Natural asset regeneration projects can also benefit the knowledge economy. An active open-source process can lead to a great upskilling of green knowledge. New forms of skill acquisition are already under way. Community-based environmental justice groups such as Sustainable South Bronx, Green for All, and Green Worker Cooperatives have begun to train low-income and minority individuals in river restoration, installations of green roofs, home insulation, hazardous-waste removal, and related activities. A National Science Foundation-funded "GreenFab" collaboration between Sustainable South Bronx and New York University has been teaching low-income and minority high school students about fab lab technology and its applications to sustainability.

These initiatives will create pressure within markets for a more equal income distribution, because wages flow in significant part from skill levels. The more widely these new knowledges and skills are dispersed, the less skewed the distribution of wages will be. A green upskilling will begin to reverse the growing inequality that has characterized the labor market over recent decades, and reduce the need for redistributive policies to correct excessive inequality generated by market processes.

An informal education network has developed to foster permaculture, agroforestry, and biodynamic farming; cob, earthen, straw-bale, and other alternative construction; and solar and wind energy, biofuels, and other new ways of creating livelihood and meeting basic needs. Much of the skill transmission happens in short courses and workshops, under the auspices of a growing number of institutes, hands-on classes, and collaborative learning communities.

Master practitioners pass on what they have learned. Skills are also being transmitted by books, videos, and open-source online information. There's a lot of learning by doing, including efforts to get the techniques to more sophisticated levels. Some of the recently founded institutes have begun offering degrees. There is still relatively open access to these emergent skill sets, a feature that it is essential to retain.

It's difficult to overstate the importance of this skill acquisition. It will make possible the expansion of high-productivity self-provisioning and spur novel sources of livelihood that develop into successful businesses. Wider access to nature-complementing skills is also the basis of a fairer distribution of property, income, and, by extension, political and social power.

Jobs and Hours: The Shorter-Hours Imperative

U.S. companies have been shedding labor at a dizzying rate. By October 2009, 8 million jobs had already been destroyed and one in six workers was unemployed or underemployed. To put these people back to work and accommodate a growing population, the economy would have to generate an astounding half million jobs every month for the next two years. That will not happen. With the exception of exports and stimulus funds, there are few bright spots in the employment picture. Anemic consumer demand, ongoing technological change, outsourcing, and global competition will slow job creation.

Even in normal times, the economy must continually reabsorb workers whose jobs are lost due to technological advances. When productivity rises, a given level of production can be achieved with fewer workers. The classic case is agriculture, which now employs only

about 1.4 percent of the American workforce, while it once comprised roughly three quarters. The history of manufacturing is similar. Productivity growth has dramatically reduced the person-hours required to make a car, television, or computer. The auto companies, for all their failures, have shed labor at a rapid rate. In recent years, companies in the service sector have been able to use technology to get rapid productivity growth as well, whether it's in the areas of customer service, data management, or calculation. Since 1973, productivity has almost doubled in the nonfarm business sector. And there are two technological revolutions now in view: continued labor displacement from the use of information technology and the beginnings of the shift to eco-efficiency. Jobs will be lost in outmoded energy sectors, as well as other failing industries and companies. Where will all these people go, and how will they get employment?

For at least 150 years, the market economy has used growth to absorb the labor that it sheds through technological change and industrial decline. Displaced farmhands found jobs in northern auto factories. Out-of-work autoworkers found positions in hospitals and educational institutions. New companies, products, and industries develop and pull in some of the jobless. Existing businesses expand by taking over their failed competitors. More than half a century ago, economists debated whether it would be possible to maintain enough jobs for all who needed them, but over time, the market has displayed a remarkable capacity to draw the unemployed back into its orbit.

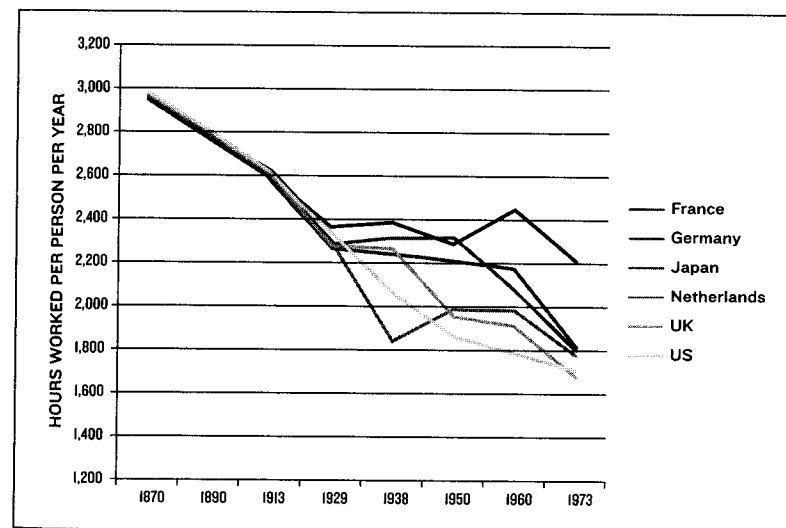
This solution is no longer available in the way that it has been historically. Bumping up against planetary boundaries means that BAU growth as the way out of unemployment, at either the national or the global level, is folly. Much of it would be growth in name only. Furthermore, economic globalization also means that the new job opportunities may not be located where the unemployed live. That's especially likely in the United States, where wages are high. This means the amount of extra GNP needed to create an additional job

is greater than in the past, making growth a less efficient generator of jobs.

So we need to use productivity growth differently and reduce the number of hours associated with each job. This allows businesses to innovate without laying off personnel, cushions declines in sales, and results in more positions when demand expands. Reducing hours per job may sound slightly exotic, but it's what happened in response to the technological change of the nineteenth and twentieth centuries. Hours of work in the United States began to decline after about 1870, at which point they were nearly 3,000 a year. By 1929 hours had fallen by more than 600, to 2,342. In 1973 hours stood at 1,887, 1,077 below where they had been a century earlier. This is the equivalent of a half-time job, on the assumption of a forty-hour week. (Forty hours for a full year is 2,080 hours.) If hours hadn't fallen, structural unemployment would have grown even before the 1930s Depression.

The experience of other wealthy countries was similar. Between 1870 and 1973, the United Kingdom experienced a decline of 1,065

FIGURE 5.1 Historical Changes in Working Hours, 1870 to 1973

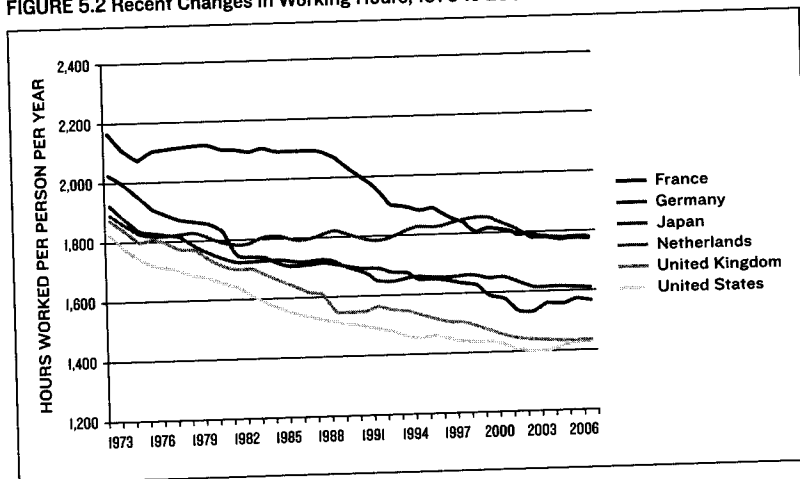


Source: Maddison (1987), "Table A-9: Hours Worked Per Person Per Year," p. 686

hours, France 922, Germany 1,071, the Netherlands 1,141, and Japan 779. Reducing hours in tandem with productivity growth allowed prosperity to be broadly shared and helped build the middle class. The grueling schedules of the nineteenth century undermined health and prevented people from achieving what we now call quality of life. For much of the industrial age, it hasn't only been growth that accounted for the reabsorption of surplus labor. Falling hours have been roughly as important a contributor to employment.

Despite this history, economists' focus is almost solely on growth as a mechanism for job creation. Reductions in hours are usually ignored, or opposed on grounds that they impair competitiveness or are not desired by workers. (According to the conventional model, if people wanted shorter hours, they'd already have gotten them, because markets are assumed to operate "perfectly.") The question of competitiveness is an important one, but it's hourly costs that matter, or more accurately, labor costs per unit of production, not the total number of hours worked by each person. Some of the most efficient and competitive manufacturing sectors in the world, such as Germany,

FIGURE 5.2 Recent Changes in Working Hours, 1973 to 2007



Source: Groningen Total Economy Database (2008), Annual Hours Worked

the Netherlands, and Sweden, have short hours but high productivity per hour worked. In fact, long hours can be a sign of inefficiency. Typically, reductions in daily hours are associated with a rise in productivity per hour, as work is done more intensively and intelligently. So shorter hours are also a wealth-creating, as well as a wealth-sharing, solution.

In the 1970s, the United States veered off its historical trajectory, in contrast to other wealthy nations. According to one widely used data source, between 1973 and 2007, the continental countries of France, Germany, and the Netherlands reduced annual hours in the neighborhood of 400 hours. (The figures are 453, 437, and 389 hours respectively.) The United Kingdom had a decline of 306, Japan 381. Most wealthy countries followed a similar trajectory. But the United States was different. U.S. hours barely fell between 1973 and 2000 (32 hours). They have declined 78 hours since then, due in part to the two downturns of the twenty-first century, yielding a total decline of 110 since 1973. (This data understates the case, in comparison to other sources, such as the household data I presented in the previous chapter. That measure includes multiple job-holding and self-employment, and shows that since 1973 work time has risen by 204 hours.)

In the United States, the hours-reduction process stalled out for a number of reasons, including ballooning health care costs (which are an incentive to keep head count down and hours up), rising inequality, intensified demands from employers, and the erosion of purchasing power among hourly workers. According to the household surveys, in the last half century the only interval in which U.S. hours actually fell was 1967–1973, now a distant memory.

This history makes the task of achieving a viable economy much harder. If we don't reengage the process of reductions in hours, it's likely that unemployment will grow, as the available work is concentrated in too few jobs. One hopeful sign is that many employers

responded to the downturn by reducing hours and instigating furloughs. The key is to maintain a flexible structure of hours, and support shorter schedules as the economy begins to revive. This is the work-sharing dimension of hours reduction. If average hours per job fall, then for any given level of production, more workers will be needed.

The other reason we need to get back on the shorter-hours path is ecological, a point that sustainability advocates increasingly recognize. Along with economic revival will come productivity growth—the ability to produce a given amount of output with fewer inputs. Some of it will be growth in the productivity of natural assets achieved by the switch to clean tech. Labor productivity will also increase, especially in the early phases of the recovery. If the freed-up hours are used to expand output, they'll cause more ecological degradation. The alternative is to produce the same amount in less time, which puts less pressure on the planet. It's a far cry from austerity, because it doesn't involve doing with less, only forgoing additions to income, an important distinction.

Beyond Physophilia

In the last three decades, pressures for economic growth have intensified as a result of what has been called the financialization of the United States economy: the expanding reach and power of Wall Street and other financial entities, relative to the nonfinancial businesses that provide goods and services. When companies borrow money, or become more highly leveraged, they need bigger profits, because they have to use them not only to improve productivity but also to pay off their bankers. As financialization has proceeded, Wall Street has applied more pressure to deliver short-term results and higher profits. It is now widely recognized how detrimental this has

been to the economy, by undermining the ability of companies to invest for the long run, to manage a sustainable rate of growth, and to act in ways that preserve the larger human and natural environments they need to survive. Finance-mandated expansion has been a destructive force that has decimated and bankrupted many once-healthy companies.

The process of financialization raises larger questions about economic policy. Data on the state of planetary ecosystems and the arithmetic of the IPAT formulation that I reviewed in chapter 3 suggests that the imperatives of achieving a safe climate target and a reversal of ecosystem degradation will be hard, if not impossible, to reconcile with current growth aspirations. But there's a widespread belief that a market, or capitalist, economy must grow. It's a point of view that's often held without much thought. However, when we look more closely, the growth imperative is on less solid ground than is generally realized. There's not much in economic theory that actually requires growth. The measure used to determine when growth is occurring is widely acknowledged to be badly flawed. And there's now a voluminous literature casting doubt on the once-sacrosanct link between income growth and well-being. It's time to become far more discriminating, and reframe the debate to figure out what needs to grow and what needs to shrink.

To unpack the growth imperative, we can start by differentiating among households, firms, and the economy as a whole. Households (or individuals) are the easiest case. In its most abstract form, mainstream economic theory centers on the idea that people maximize their well-being, and that they do so through exchanges with others. The influential formulations of Gary Becker and the Chicago school hold that this economic approach to human behavior can be applied to anything. People can decide that what matters most to them is preserving nature, raising children, or having a leisurely work environment. Income growth is in no way integral to or even implied by

the model. Evidence of widespread downshifting, or voluntary trade-offs of money for time, makes clear that maximizing income is by no means a universal desire.

While "human nature" is often invoked as an explanation for maximally acquisitive behavior, the evolutionary psychology literature supporting this position falls short of being convincing. There is strong evidence that humans, like other species, engage in status competitions. However, status markers differ across times and places, and human societies exhibit widespread differences in their predilection to compete over consumer goods and income. The extent of consumption-based competition appears to vary with the distribution of income, for example, which is hardly an evolutionary variable. Decades of research show a decline in materialist values in a range of countries. Indeed, as the maximal growth model is increasingly shown to be courting ecological disaster, one might argue that simplicity has become an evolutionarily superior trait.

The growth imperative is assumed to operate more strongly for firms, and "grow or die" is a common mantra. But here, too, it's worth parsing the logic. In the standard model, which assumes competitive markets, what matters for companies is their productivity and per-unit costs. Efficient companies survive and thrive. Inefficient ones fail. Efficiency and size are related, of course, but not linearly. Some firms are too small to take advantage of the lower unit costs, or economies of scale, they could achieve if they grew. Others get too big and bureaucratic to be wieldy. Bigness can also result in market power that becomes a rip-off of consumers.

It may be difficult to conceive of a company prospering without growing, but consider the situation of a small mom-and-pop operation. Each year it has costs and revenues, and the difference between the two is profit (or loss). The owners can use their profits to upgrade their machinery or software, or lower costs in other ways. But they don't face a growth imperative. If the business is generating a

decent living, it can operate at the same size for years. Productivity improvements, rather than size itself, are the key to success. That logic applies to many kinds of businesses, far more than people realize. While many argue that business expansion is necessary to retain market share, the logic behind that view is not compelling. Leaving aside market power, competitors are successful when they offer better quality for a given price. To keep up, they need to reinvest their profits in order to upgrade operations and reduce costs. Over time, competitive position is mainly a matter of productivity growth and efficiency. Once a business is large enough to achieve economies of scale, the growth imperative dissipates. If I am right that the optimal size of the firm is falling, the economy would be better served with a larger number of smaller firms. Many companies have operated profitably and successfully at a more or less stable size for years and even decades.

There's also a large sector of businesses that are not subject to the profit imperative on account of their ownership structure. The University of Maryland political economist Gar Alperovitz has studied employee-owned companies, cooperatives, and credit unions and notes that in 2003, there were more than 48,000 cooperatives, 11,000 firms with employee stock ownership plans, nearly 4,000 community development corporations, and countless business ventures owned and operated by states, municipalities, and nonprofits.

Not coincidentally, these are entities that are less reliant on Wall Street and big banks. Financialization boosts the required growth rate of an economy, in order to pay both bankers and shareholders. But rather than accept a finance-dominated economy as a natural state, we'd do well to remember that this shift has been relatively recent (post-1980), and it has been a key factor in the hollowing out of much of the manufacturing base of the nation. Popular anger against Wall Street may be partly reflecting this understanding. In any case, returning to a world in which profits fund investment and business

expansion is likely to be not only ecologically beneficial but also a route to a healthier domestic economy.

The dangers of an exaggerated sense of urgency about growth have been recognized by the Slow Money movement. The movement's founder, Woody Tasch, a venture capitalist and entrepreneur, argues that we need to bring our fast financial system "down to earth" in order to reconnect money with soil, sustainable food systems, and local businesses. In a Slow Money regime, people invest where they live, for the long term, and in ways that enrich the soil, communities, and human welfare. Participants in the Slow Money movement are values investors, cousins of the growing number of conscious consumers who seek out and pay a bit more for products that are fair trade, sweat-free, organic, or local.

Will savers really accept lower returns than they can get from large corporations? The socially responsible investment sector provides a real-world affirmative answer. (Although it's also true that socially responsible investing can be more, not less, profitable.) But there's another reason that a shift to slower paybacks could happen. Now that Keynes is back in vogue, we may remember that not only did he believe in deficit financing, but he understood that investors were psychological beings whose expectations of returns were socially adaptable. He anticipated that over time, market economies would gravitate to slower rates of growth, and as a consequence, investors would reduce the returns they were looking for. There is no magic, or "natural," rate of return that must be paid.

The bottom line on firms is that in a market economy, some expand while others do not. If we transition to a smaller scale of production, there will be less pressure to grow for growth's sake. If we transition to a less centralized financial system and the power of Wall Street abates, the mandate to grow, especially in risky ways, will also abate. And if we transition to a Slow Money system, we can mobilize the power of finance to regenerate our food systems, local economies,

and communities. Then we'll be growing with intelligence, expanding the things that truly give us health and benefit, and shifting out of destructive activities.

Finally, do we need what economists call aggregate growth, which is usually defined as the expansion of GDP? GDP itself is a seriously distorted measure, as has been recognized for decades and was reemphasized in late 2009 in a major study led by the Nobel Prize-winning economists Joseph Stiglitz and Amartya Sen. GDP measures only marketed activity. It leaves out reductions in the stocks of natural capital. It ignores changes in leisure time. If air pollution is impairing the health of a population, it counts their medical expenditures as an addition, but fails to add a corresponding negative tally for their deteriorating health status. It's an increasingly antiquated metric, which is why alternatives, such as the Human Development Index, the World Bank's genuine saving estimates, the genuine progress indicator, and the ecological footprint have been developed. If we do need aggregate growth, it has to be measured by something far more defensible.

Measurement aside, there are two reasons aggregate growth might matter. The first is to create jobs to assimilate the unemployed and anticipate increases in population. The second is to improve living standards. Economic logic does not require overall expansion to achieve either of these objectives. An expanding labor force can be accommodated if hours of work fall. And it's productivity growth, rather than the overall size of the economy, that drives improvements in living standards. It may seem counterintuitive, but consider for a moment that productivity is a measure of how much can be produced in an hour of work. The size of the economy is, roughly, that measure times the total number of hours worked. Getting bigger doesn't necessarily yield wealth; improving productivity does. This is one of the fundamental insights of economic thinking that curiously has almost dropped out of the conversation as economists, politicians, and the

public got swept up in the *physophilia*, or love of growth, of the post-World War II era. Productivity-driven improvements in well-being can be attained in a number of ways: by gaining leisure, by changing the mix of products, by saving natural resources. Indeed, if we define aggregate growth in ecological, rather than dollar, terms, the link between expansion and living standards is even more tenuous, and may be negative.

But can we slow down painlessly, without disruption to employment and incomes? That's a question environmentalists and even some economists are beginning to pay attention to. In 2008, the first International DeGrowth Conference was held in Paris under the auspices of the European Society for Ecological Economics. Modeling exercises on this question remain scarce, but the ecological economist Peter Victor used a conventional model of the Canadian economy to figure out whether a planned reduction in growth would be feasible. He found one thing we know already. A simple cessation of growth is a disaster, as unemployment and poverty soar, and income per person falls. That's not too far from what happened in the United States and elsewhere in 2008. But with a modest amount of policy tinkering, much better outcomes emerge. If working hours fall, unemployment declines and free time rises. Poverty can even be reduced, if the government transfers some income to the poor. What may be most surprising is the validation of the point I made above: income per head can improve without expansion of the overall size of the economy, through higher investment. This in turn raises productivity and well-being. It's how efficiently we produce, not how much we produce, that determines how well off we are. Victor also worked through scenarios for taxing carbon, and showed that emissions can fall even as the economy produces rising GDP per person, declining unemployment and poverty, and a reduction in government debt.

Victor's model doesn't incorporate a shift out of polluting energy

and our industrialized food system. If it did, the results would be even stronger, because nature-saving technologies and patterns of consumption open up additional possibilities for achieving well-being without fast growth. The green economy yields more employment per unit of GDP. A recent study finds that investments in alternative energy produce 3.2 times the employment per dollar spent than in the capital-intensive fossil fuel sector. The logic is similar for small-scale and organic agriculture and local businesses, which are more labor-intensive.

While this has been an important conversation, the rhetoric of degrowth or the steady-state economy obscures a key point about the road to sustainability. The nub of the problem is the transition from a dirty to a clean sector. How that plays out on average will change depending on where we are in the journey. At the moment, BAU is so large that aggregate growth is on balance destructive. Over time, as the balance between the two sectors changes, growth *could* have a net positive impact on the environment. But we're a long way from there.

For now, a global perspective trumps the national one. The wealthy countries, and particularly the United States, have an ethical duty to abandon BAU growth. They're the carbon-legacy nations that have created a problem that has the potential to devastate the planet. Between 1750 and 2006, the United States accounted for 28 percent of global carbon emissions. No other nation has had a comparable impact. Not the United Kingdom (6 percent), Japan (4 percent), Russia (8 percent), Germany (7 percent), or even the remainder of Europe (18 percent). China is accountable for only 8 percent. Poor countries deserve what's left of the globe's ecological space to improve their living standards, reduce poverty, and catch up to the wealthy. If that means slowing down in the Global North, while we phase out fossil fuels and destructive production, it's the only fair way to proceed. That may seem harsh, or unachievable. But plenitude

suggests that far from being painful, doing what's right may feel good after all.

Plenitude and Well-being

Debates about sustainability often feature the idea that protecting the planet requires austerity of one kind or another. Trade-off economists warn that there will be lost income and unemployment. Environmentalists get pegged as hair-shirters who want to deny the good life to worthy populations. (It's a charge with a grain of truth—there is a subset who argue for a rhetoric of sacrifice in wealthy countries.)

The counterargument is that protection costs less than degradation. For climate change, we've learned that a vigorous response will reduce emissions and raise income relative to no response. The accumulating data on ecosystems points to a similar conclusion. Natural capital yields benefits that ordinary accounting ignores.

But there's another problem with the sacrifice view. It lags behind social science findings on how income and time use affect well-being. In rich countries, for all but the poor, growth in income yields less value to people than is typically assumed. Trade-off economists make the mistake of overestimating the value of additional income, as, apparently, do people themselves. Similarly, the time-use literature suggests that spending time outside the market is highly satisfying. The idea behind plenitude is that it moves us from a mix of incentives and imperatives that are no longer particularly efficient at delivering well-being (growth, work-and-spend, ecological degradation) to a way of living that a growing body of findings suggests will really make us better off.

The research on income and happiness is now enormous, and

casts considerable doubt on a simple translation of income into well-being, once a certain level of income has been reached. Poor people and poor countries do benefit from higher consumption. But then things get complicated. Studies find the surprising result that a number of wealthy countries, including the United States, the United Kingdom, and Japan, have flatlined in well-being for decades, as income has risen significantly. Survey data suggests that China's rapid growth in material prosperity has led to less, not more, satisfaction among its population.

Within countries, lower-income households are worse off than wealthier ones. But once a household is out of poverty and into the middle class, more income isn't too effective in raising well-being. The British economist Richard Layard found that across the globe, the average happiness score of a country stops rising when its per capita income reaches \$26,000 in today's dollars. Economist Richard Easterlin, who got this debate started in the 1970s, has also found that across a group of people born at roughly the same time, happiness is almost wholly unresponsive to increases in income.

There are a number of explanations for these counterintuitive findings. The first is that people adapt to higher incomes by raising their expectations. Last year's luxury becomes this year's necessity. A few studies have found that between 35 and 60 percent of incremental income falls victim to this adaptation effect. If earnings rise by \$10,000, between \$3,500 and \$6,000 comes to be seen as "required," and no longer a boon to well-being.

A second explanation is social comparison. The more people care about their own position vis-à-vis others, the more general increases in consumption fail to yield additional well-being. There is a growing body of evidence showing that people care a great deal about these positional effects. One study of U.S. localities found that a person's happiness declines when his or her neighbors' incomes rise, and that the drop is large. The well-known treadmill effect occurs when

people try to raise their incomes by working harder, but find that they aren't getting ahead because others are doing the same.

So why don't we learn, and hop off the treadmill? It does happen. Downshifters have figured out that money doesn't buy contentment. But researchers are finding there's a widespread tendency to anticipate that additional income will yield more happiness than it does. The existence of this projection bias leads people to overvalue income and consumption, relative to what will make them feel best. People think money will make them happier, but it mostly fails to deliver.

For many people, earning additional money requires working longer hours. Evidence that longer hours of work are associated with lower happiness is accumulating, as is the more general point that how people spend their time is strongly related to well-being. In a series of studies, the psychologists Tim Kasser and Kennon Sheldon found that being time-affluent is positively associated with well-being, even controlling for income. In some of their studies, time trumped material goods in importance. Kasser and Kirk Brown found that working hours are negatively correlated with life satisfaction. The study on neighbors' incomes cited above had a similar finding. The Nobel laureate Daniel Kahneman and his Princeton colleague Alan Krueger, using a sample of working women in Texas, report that the three activities most likely to elicit a bad mood are the evening commute, work, and the morning commute. A study among European Union countries found that the higher the working hours, the lower the happiness level, again controlling for other variables. Data from a large-scale German survey also found a negative relationship between working hours and happiness. Another notable finding is that income is positional, but leisure time is not. The benefits of more vacation days or shorter hours are durable, remaining even when others also gain free time.

So if it's the case that in wealthy countries, income and long

hours won't yield much additional well-being, what will? No surprises here. Spending more time with family and friends. Spending more time in intimate relations. Spending more time eating and exercising.

Nature itself is also a source of well-being. Environmental psychologists and others have found numerous benefits to humans from contact with the outdoors. Parks and gardens help people relax and restore; proximity to plants and green space reduces stress and promotes emotional balance. Being in nature can reduce blood pressure and improve muscular health. Patients recover faster when they are exposed to plants, flowers, and trees. Workers' productivity and well-being improve with natural light and access to the outdoors. Residential complexes with more greenery yield benefits for dwellers.

Looking back on the experience of the last few decades, an increasing number of people are coming to the conclusion that the same market forces that propel the economy are driving ecological degradation, time poverty, the decline of community, and the collapse of social connection. Measures broader than GDP tell a similar story. The New Economics Foundation's Happy Planet Index incorporates ecological footprint, life satisfaction measures, and life expectancy into a single metric that measures how efficiently nations are using natural resources to produce happy lives (or "happy life years"). Costa Rica tops the list, with its 99 percent renewable energy, life expectancy of 78.5 years, and average satisfaction score of 8.5 out of 10. (It also has one of the lowest poverty rates in the developing world, is reforesting its land, and abolished its army in 1949.) By contrast, the United States clocks in at a dismally inefficient 114th, largely because its ecological footprint is so high relative to "happy life year" results that are about average for wealthy countries.

Plenitude aims to transcend this inefficiency. If we manage it, the question of well-being will begin to solve itself. In addition to, and

perhaps more important than, the question of whether we are better or worse off in a quantitative sense—the issue to which the literature is addressed—we will discover that we are different. We will have brought our way of living into alignment with what most of us care about most, promoting health and well-being for humans, other species, and the planet.

Plenitude Emerging

Many of the elements of plenitude are beginning to take shape as the catalyst of economic collapse has been added to an already expanding sustainability movement. Urban and suburban gardening are burgeoning. Individuals are planting vegetable plots, community gardens are sprouting, and in a number of major cities, efforts to grow healthy organic food for inner-city residents are thriving. Detroit, Milwaukee, and Chicago all have large-scale organizations that are reshaping residents' food habits. Farmers' markets, community-supported agriculture, local sourcing by restaurants, Slow Food chapters, schoolyard gardens, and related initiatives are on the rise. Practices are expanding from simple vegetable plots to urban homesteading. People are growing mushrooms, keeping bees, and raising livestock. A chicken underground has sprung up in cities with laws against backyard poultry, and urban poultry households stretch from Los Angeles to South Portland, Maine. Backyard livestock has become so popular that some locales have even spawned mobile slaughtering businesses, trucks that move through neighborhoods to kill the animals on-site. A similar phenomenon is happening with energy. People are installing solar collectors and corncob and wood pellet stoves. They're opting into green energy sources available from their utilities. Some are going off the grid, or tapping into wind and geothermal power. They're insulat-

ing their homes, installing LEDs, downsizing their spaces, and designing smart buildings that take advantage of free cooling and heating from nature through wind, sun, and shade. They're microgenerators rejecting the inevitability of fossil fuels.

Local to global networks are emerging to solve problems of economics, energy, and ecology. The Transition Town movement, which began in Totnes, England, has spread rapidly to other countries. It has a lot in common with plenitude. It is optimistic, self-reliant, and confident that there is a way forward that is better for humans and the earth. It advocates re-skilling, food sufficiency, renewable energy, and the forging of social bonds at the community level. It's a decentralized movement, without a blueprint other than a process it recommends for communities that take up the challenge.

New ways of living are proliferating in the United States and around the world, both at the household level and, more important, as people come together in community. These centers, or ecovillages, are pioneering earth-friendly ways of growing food, harvesting water, getting energy, healing the body, and making products, as well as democratic and collaborative methods for human interaction. Many are primarily learning, or living and learning, centers. The Farm in Tennessee teaches low-impact, high-satisfaction living, with education in solar building, permaculture, food forestry, rainwater harvesting, water filtration, and many other topics. They manage a wilderness area, operate a forest mushroom-laying ground, and grow temperate bamboo species. In Colorado, the Earth Restoration Corps is spawning trainers who are spreading indigenous knowledge for healing and protecting the earth. A group in Philadelphia associated with the Business Alliance for Local Living Economies is aiming to incubate sustainable businesses, restore urban land, and provide hundreds of new jobs. There are ecovillages from Wisconsin to Georgia.

The Center for Alternative Technologies in Wales is teaching local methods of green woodworking, as well as how to build wind

turbines, solar water heaters, and self-constructed homes. Eco-communities in Italy and Germany teach the healing arts, conflict resolution, and crafts, along with earth-friendly technologies for daily life. Similar endeavors can be found in Australia, throughout Central and South America, and in sub-Saharan Africa. Vandana Shiva's Bija Vidyapeeth (Earth Citizenship) center in northern India combines an innovative organic farm operating in community with nearby villages with courses taught by Indian and international sustainability leaders. Also in India, the eco-city of Auroville hosts people from around the world to learn building techniques, medicinal plant cultivation, alternative technologies, and other subjects. Schumacher College in Devon, England, where I have spent considerable time, offers participants vegetarian meals, a daily routine of classes on cutting-edge practices and analyses, meditation, and training in deep ecology and holistic sciences. The Global Ecovillage Network, to which many of these examples belong, connects thirteen thousand diverse communities around the world. They are dedicated to practicing, teaching, and disseminating not just sustainability, but "sustainability plus," a way of living that gives more back to the earth than it takes.

As we look forward into the future, there is much to be fearful about. Two thousand and nine ended without a meaningful global climate deal. There's a narrow window remaining, but the coal, oil, and fossil fuel lobby launched a sophisticated advertising and lobbying effort that has undermined the political momentum for a solution. The U.S. Senate remains a formidable obstacle to a treaty. Failure could be catastrophic. The recession led to an unprecedented flow of funds to alternative energy and green jobs programs, but its continuing legacy of joblessness, reduced incomes, and insecurity has narrowed the political space for a rise in the price of fossil fuel energy, a necessary step in achieving reductions in greenhouse gas emissions.

Progressive solutions, such as the Sky Trust proposal, which would benefit lower-income households through rebated revenues from polluters, have been kept off the table by powerful corporate interests. Environmental politics hasn't yet escaped the dead end of unpalatable trade-offs.

But there are also hopeful developments. The planet has begun to communicate in ways that more and more of us are understanding. People are responding by planting, growing, saving, sharing, recycling, making, and caring. They are taking responsibility in individualized ways, advocating for their new lifestyles in a language of sustainability. More and more of us are acting at the local level, getting carbon commitments from mayors and state governments, fighting for the right to keep chickens or hang laundry on a clothesline, and teaching others how to garden, can, and preserve. Climate activism and even civil disobedience aimed at stopping the expansion of the coal economy is expanding. A few miles from my home in Newton, Massachusetts, college students are refusing to sleep in dorms, apartments, and houses powered by dirty energy and are camping out in the Boston Common instead. They're demanding that the state pledge to achieve 100 percent clean energy by 2020. They may just get it: they recently earned a meeting with the governor.

Throughout the country and the across the globe, millions are already following the path of plenitude—whatever they call it—creating a twenty-first-century economy that has the potential to restore the earth. They see that it's a smart strategy, which it must be if it is to work. It is attuned to the monumental shifts now taking place in the global economy, to the declining power of the BAU model, and to the rising potential in small-scale, time-abundant, low-impact ways of producing and consuming. In Cleveland, they're building clean, cooperative businesses that offer jobs and long-term wealth creation to local residents. In Worcester, Massachusetts, they're investing in biodiesel. From the

wreckage of the Great Recession, an economically savvy, alternative model is gaining legitimacy and adherents.

But plenitude is not thriving only because it is fiscally intelligent. It is also growing because it repairs our fractured lives, heals our souls, and can make us truly wealthy in ways that have little to do with money and consumption. And as it does, it begins to build, step by step, a better way of human being. In the process, it promises to restore the bounty and beauty of our miraculous planet and all its inhabitants. We should settle for nothing less.