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ANALYSIS

Envisioning shared goals for humanity: a detailed, shared vision of a sustainable and desirable USA in 2100

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Abstract

Economics has been defined as the science of allocation of scarce resources towards alternative ends. This definition implies that the first step in economic analysis is to determine what ends are desirable for society. Most sectors of the society would agree that sustainability is a desirable end, but there is little agreement as to what a sustainable future would look like. The University of Maryland Institute for Ecological Economics sponsored a democratic future search process designed to create a relatively detailed, shared vision of a sustainable and desirable USA in the year 2100. This paper presents the vision developed at that conference, examines the resources required to achieve the vision, and assesses the suitability of market mechanisms for allocating the required resources towards the desired ends. We find that markets are not efficient mechanisms for allocation in this case, and propose the institutions of a 'strong democracy' as a promising alternative.

Keywords: Sustainability; Vision; Human capital; Social capital; Natural capital

If you don't know where you're going, you might not get there (Yogi Berra).

1. Introduction

Economics has frequently been defined as the science of allocation of scarce resources among alternative desirable ends. This implies a specific sequence that should be pursued in economic analysis. First and foremost, the economist must decide what ends are to be pursued. Many economists argue that decisions on ends should be left to democratic processes, suggesting that an essential precursor to economic analysis is in fact a

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democratic process that successfully articulates the desired ends. Only after determining the desired ends can the economist analyze what resources are necessary to achieve them, and which of these resources are the scarcest. The final step is allocation, via whatever institution or mechanism is most appropriate for the resources and ends in question.

By concentrating almost solely on allocation via the market mechanism, conventional economics seems to invert this process. Presumably the neoclassical emphasis on allocation arises from an implicit, shared assumption that the desired end is ever-greater 'utility', and utility is conferred solely by material consumption of excludable and rival market goods. The market therefore serves both to reveal the desired ends through purchase decisions, and to allocate the scarce resources necessary to achieve those ends. The underlying tautology is evident: by definition, markets can reveal preferences only for market goods. Ecological economics improves on this approach. Most ecological economists consider the scarcest resource to be low entropy matter-energy in general, emphasizing the goods and services provided by intact ecosystems (e.g. Georgescu-Roegen, 1971; Costanza, 1980). Many of these goods and services are not effectively allocated by unconstrained market forces (e.g. Bator, 1958; Bromley, 1991; Farnsworth et al., 1983), hence markets often will neither reveal nor attain the desired ends. Ecological economists also recognize that ever-greater material consumption is both undesirable and impossible on a finite planet. Further, pursuit of this unattainable goal deprives us of resources that could be used to attain other desirable ends. However, only a minority of ecological economists (e.g. Costanza, 2000; Daly and Cobb, 1989; Max-Neef, 1992) have focused directly on what the desirable ends are, and the complexity of the issue means that the relevant research is often somewhat abstract and academic.

Yet the importance of determining a desirable end as the first step in economic analysis is becoming increasingly clear as we begin to experience the negative impacts of excessive economic growth. In the face of rapid human-induced environmental change and profound ecological and economic uncertainty, many people are worried about the well-being of their children and their children's children. In response to this concern, governments, institutions and civil society have formed a broad, overlapping consensus around the goal of sustainable development. What is lacking is a clear unified vision of what sustainable development entails. In short, without a coherent, relatively detailed, shared vision of what a sustainable society would look like, economists (and other policy-oriented scientists) lack the clearly defined ends required to guide their efforts. Too often under these circumstances, economists fall back on the inherently unsustainable default vision of ever more rapid increases in material consumption, bringing to mind another Yogi Berra quote: "We may be lost, but we're making great time." Democratic articulation of sustainable and desirable ends requires a shared vision detailing what we as a society want to sustain and incorporating the central shared values that express our hopes for the future. This vision must incorporate a diversity of perspectives and be based on principles of fairness and respect.

Recognizing the necessity of a shared, desirable end as the starting point of policy making and social science analysis, the University of Maryland Institute for Ecological Economics organized a conference entitled "Envisioning a Sustainable and Desirable America."[1] This conference brought together a broad, representative group of Americans[2] for a three-day future search process (see Weisbord and Jannof, 1995, for a detailed description of the methodology); to develop a shared vision of the United States of America, we would want our descendants to live in the year 2100. The group was not as broadly representative as we would have liked. While the original group of invitees was extremely broad, a self-selection process occurred in which those who attended were those who believed in a need for change. We

[1] We mean no arrogance in the use of the word America as shorthand for the United States of America, just as Mexico is shorthand for the United States of Mexico, and Brazil is shorthand for the United States of Brazil.

[2] A list of conference participants is available in Appendix A.

have achieved broader representation since the conference, in the form of hundreds of comments on the vision, many of which have been integrated into the vision description.

We started with a vision for the USA because of the obvious logistical difficulties of bringing together representatives of an even larger area. The USA consumes 25% of the world's fossil fuels (MacKenzie, 2001) and other resources, has enormous influence on the rest of the world, and is one of the leading proponents of free market capitalism, growth for growth's sake, and economic globalization. Achieving a sustainable future in the USA would thus be an important large step towards achieving a sustainable future for the planet. This paper will present the shared vision this group developed during the 3-day conference.[3] We then ask what are the scarce resources necessary to bring about this vision, and what institutions are required to effectively allocate these resources towards these shared ends?

2. The vision

We organized our vision into five separate components: worldviews, built capital, natural capital, human capital and social capital.

2.1. Worldviews

Worldview plays a very important role in creating a sustainable and desirable future. What is worldview? Worldview is a belief system held by an individual, community or society that explains the world around us and our experiences and role in that world. Our worldview tells us who we are and what is the purpose of our existence. It tells us where we are; what kind of world and environment do we live in. It also tells us what is right and wrong about the world, and how to preserve what is right and fix what is wrong. Worldview is determined largely by the culture in which we are raised. The problem is that the world we live in is continually changing, and a worldview that is appropriate under one set of conditions may not be under another. In today's age of rapid technological advance, population growth and resource consumption, the world appears to be changing faster than our worldview. Many components of the worldview we inherited from our parents and grandparents are no longer in harmony with today's physically different world. In many cases, what was once reasonably viewed as a solution to our problems has now become a part of the problem.

The America we envision in 2100 is based on a very different worldview than prevails today—one that is more in harmony with the physical constraints imposed by a finite planet.

Our worldview will no longer divide the planet into humans versus nature. People will recognize that humans are part of nature, one species among many, and must obey the laws imposed by nature. We will recognize that nature is not something to be subjugated, but instead is something we depend upon absolutely to meet both physical and spiritual needs. We will recognize that natural resources are scarce and must be invested in. Our goal will be to create conditions conducive to life in the broadest sense.

For centuries, the worldview of mechanistic physics dominated Western society. Within this worldview, each action has an equal and opposite reaction and only by studying systems at smaller and smaller scales can we come to fully understand these reactions. As more and more people come to understand the inherent complexity of ecosystems and human systems, we will come to realize that results cannot always be predicted and that irreducible uncertainty dominates the provision of life-support services by healthy ecosystems. An ecological worldview of complexity and indeterminacy, inspired by nature as mentor—holistic, integrated and flexible—will replace the worldview of mechanical physics.

[3] The vision is, of course, far from comprehensive for two reasons: first, it was developed over 3 days, and second, it was based on agreement. When the group disagreed on a point, it was set aside. Inevitably, important elements have been left out, and less important elements included. While we cannot dramatically rewrite the vision after the fact, we have tried to weed out less important items, with the help of suggestions from our reviewers. See http://iee.umces.edu/ESDA for a more complete description of the process and the vision.

Individualism is appropriate in a world of vast frontiers and unlimited elbowroom. Individualism will still be extremely important in 2100, but will be far more tempered by a concern for the common good. This will lead to a system where communities promote total individual liberty as long as individual actions do not have a negative impact on the community. Individuals in return will accept that they are a part of society and recognize that it is unfair to impose costs on society for private gain.

Further, ever-increasing consumption will no longer be considered an integral component of human needs as it is today. People will pay attention to their other needs and desires, such as joy, beauty, protection, affection, participation, creativity, freedom, leisure, identity and understanding.[4] Building strong community can help us meet these needs, while working ever harder to pay for more consumption deprives us of the time and energy required to fulfill them.

Thus, high incomes and high consumption (individual ends) will play little role in conferring status, which instead will be conferred by an individual's contribution to civil society (community ends).

With the recognition that consumption beyond limit is not only physically unsustainable but also does little to improve our quality of life, we will understand that a steady-state economy is our goal. A steady-state economy does not mean an end to development. It simply means that we must limit the input of raw materials into our economic system and their inevitable return to the ecosystem as waste to a level compatible with the ecological constraints imposed by a finite planet with finite resources. We must live within the carrying capacity of our planet. We do not know the carrying capacity, and the carrying capacity is subject to change. Therefore, adaptive management must be a guiding principle.

Economic production will focus on quality, not on quantity. Rather than focusing on the production of goods, we will focus on the production of the services provided by goods. We do not need cars; we need transportation. We do not need televisions; we need entertainment. Goods are only a means to an end, and by recognizing this our economy can develop as never before, without growing in physical terms.

An essential step to reach a steady-state economy is full cost accounting. We must recognize that production and consumption decisions incur environmental costs of pollution and resource depletion, as well as social costs such as poverty and misery. At the very least, these costs must be accounted for in prices. The idea of full cost accounting must also be reflected in national accounts. The Gross National Product will be replaced by measures such as the Index of Sustainable Economic Welfare (Daly and Cobb, 1989) or the Genuine Progress Indicator (Cobb et al., 2001). Any effective measure of sustainable economic development must also include indicators of the health of the ecosystems that sustain us.

Finally, values will outweigh technical expertise in the decision-making process. No longer will policymakers pay attention only to economists' mathematical analysis of whether the costs of global warming outweigh the benefits. Instead, people will recognize that complex moral and ethical values cannot be simply boiled down to equations and pure rationality. Emotion will be recognized as a fundamental component of the human psyche and an essential part of the decision-making process. Science will still be respected within its sphere, but people will recognize that sphere does not include moral decisions of right and wrong. Technology will be a servant helping us to meet the moral and ethical ends we decide on together, not an end in itself, not a master.

Though these are some characteristics of the dominant worldview we envision in 2100, we also envision a society robust enough, productive enough and tolerant enough to allow room for a wide range of people with differing worldviews to live together in harmony.

[4] This list of human needs adds joy and beauty (both of which could be considered components of other elements in the list) to a list of human needs proposed by Max-Neef (1992). Most participants in the future search had not read Max-Neef, yet included the satisfaction of identical needs in our vision of a desirable future.

2.2. Built capital

Built capital is the human-made infrastructure used to meet human needs. By 2100, all new infrastructure will be based on principles of ecological design. Though technological advance over the next 100 years will have a large impact on the type of built capital we find, different priorities will have had as much or even greater impact.

2.2.1. Communities

Communities will be dramatically redesigned to integrate living space, community space and work space with recreational needs and nature. Workspace includes the stores that supply our everyday needs, as well as production facilities for most of the goods those stores supply. People will live very close to where they work, where they shop and where they play. Communities in general will be much smaller, though specifics of community size and design will be determined by local ecosystem limits.

In addition to these very practical aspects, communities will be designed as "soul satisfying spaces that resonate with our evolutionary history." In a resurgence of a millennial tradition of settlement patterns, most communities will be surrounded by natural areas and incorporate parks and other green spaces to serve as common space for community members. Communities will foster social interaction and mutual dependence.

With abundant and well-designed community space, private homes will in general be smaller (hence cheaper and easier to care for) though still palatial by world standards. Household gardens will meet a substantial portion of community food needs.

High energy costs will probably provide the initial incentive behind unified, largely self-sufficient communities where walking and bicycle riding will effectively become the dominant forms of transportation, except in the worst weather. However, Americans will quickly discover that there are enormous benefits to such pedestrian communities. Walking to work, to the store, to community meeting places, or to nature preserves on the outskirts of town will bring people into direct contact with the other members of the community. In a community setting, people walking together in the same direction naturally converse, establishing friendships, informing each other of current events, and discussing issues of relevance to the community. In fact, developing community and social capital will become one of many explicit goals for designing built capital.

Modern communities will be very healthy places for humans and other species. The invigoration of exercise and the nurturing of the human need for social interaction will replace the stress of hour-long commutes, road rage, and the pollution of vehicle exhaust, improving both physical and mental health. Air quality will be very high. Many roads and parking lots will become redundant, and in their space will stand parks, streams, and greenways, providing clean air, clean water, and healthy recreation, among numerous other vital ecosystem services. Dramatic reductions in impervious areas will reduce flooding and allow the land and the ecosystems it sustains to filter water, restoring the nation's waterways to health.

The huge cities will not disappear in 100 years, but will be significantly reorganized into aggregations of smaller communities in close physical proximity, but where each community meets the housing, employment, social, recreation, and shopping needs of those who live there. Natural areas will also make a big comeback in urban areas and ecological restoration will play an important role in decontaminating urban brownfields. Huge cities will remain quite different from more isolated smaller communities, with both advantages and disadvantages. Communities within a city will still self-organize, in many cases, on ethnic or cultural lines, preserving their exceptional cultural diversity and richness. Many cities may still need to import agricultural products and raw materials for manufacture.

2.2.2. Transportation

In addition to walking and bicycling, public transportation will be important within communities, and will be designed not just to transport passengers but to transport goods as well, making it convenient for grocery shopping and the like. Buses and taxis powered by fuel cells will also be common. Transportation between communities

will rely primarily on high-speed rail. Because so many people will use public transportation, it will be abundant and extremely convenient. With traffic a thing of the past, public transportation will move people around much more quickly than private vehicles do today and at much lower cost. Fewer vehicles on fewer roads will reduce maintenance costs. Some people will still own private vehicles, perhaps hydrogen-powered hypercars (Lovins, no date), but such vehicles will be luxuries, not necessities.

2.2.3. Energy

Renewable resources will meet virtually all of the nation's energy needs, the conversion from hydrocarbons facilitated by continuous increases in efficiency of energy use. Much of the electricity from wind farms, solar farms (some on urban rooftops) and other renewable energy sources will be used to create hydrogen for fuel cells. Large-scale hydropower will be decreasing in importance as more and more rivers will be restored to their natural states, but low impact mini-turbines will be increasingly common. In spite of the abundance of non-renewable, non-polluting forms of energy, energy efficiency research will still be important.

2.2.4. Industry

Industry will change substantially. Industrial design will be based on closed loop systems in imitation of nature, where the waste product from one industry becomes the feedstock of the next. Wasted heat from industrial processes will be used to heat nearby homes and workspaces. When possible, industrial production will use local materials to meet local needs and will process wastes (the few that are not put to use) locally. Most industries will be locally owned as well. While these characteristics will not always maximize productive 'efficiency', the benefits will outweigh the costs. First, local production will reduce transportation costs, partially compensating for sometimes higher production costs. Second, communities will be directly aware of the environmental impacts of production, consumption and waste disposal. Third, industries will be part of a community, locally owned by the workers they employ and by the people whose needs they meet. Rather than simply trying to maximize returns to shareholders, industries will strive to provide healthy, safe, secure, and fulfilling working conditions for workers. Those who produce goods and those who consume them will know each other, and so workers will take particular pride in the quality of goods they produce. Fourth, decentralization will make the national economy as a whole less susceptible to business cycles, increasing job stability. Fifth, an emphasis on local ownership and production for local markets will reduce the importance of trade secrets and patents, competition will be replaced to some extent by cooperation. Finally, decreased competition will lead to a considerable decrease in the size of the advertising industry. This means that money once spent on convincing people to choose one brand over another will be spent on making those products better, or simply not spent, making those products more affordable.

Markets and competition will still play an important role. Industries will be free to sell to distant communities, although having to pay the full cost of transportation will provide a natural barrier to this. Still, this threat of competition will mean that communities need not rely solely on the good will of local industries to keep prices low. Trade secrets will play less of a role in competition than in the past due to the resurgence of sharing information as a means to address global problems. Green technologies will prove themselves capable of slowing climate change, reducing pollution, and decreasing our demands on scarce ecosystem resources. However, they will only be able to achieve these goals if used on a large scale. Patents on these technologies and the monopoly profits they imply would make them too expensive for much of the world. The global community will come to realize that it cannot afford to have large numbers of people not using these technologies. Free flow of information will stimulate impressive new innovations.

Some industries will retain substantial economies of scale, using fewer resources per unit when produced in enormous factories. This may be the case for solar cells, for example. Large corporations may still exist to produce such goods, but will be subject to government regulation. Corporate

charters will be issued for the short term only, and renewal will be tied to responsible action on the part of the corporation.

3. Natural capital

Natural capital is all the goods and services provided by nature that contribute to the well-being of humans and every other species on the planet. This includes both mineral and biological raw materials, renewable (solar, geothermal and tidal) energy and fossil fuels, waste assimilation capacity, and vital life-support functions (such as global climate regulation) provided by well-functioning ecosystems.

In America 2100, the absolute essentiality of natural capital will be so completely accepted that it is taken for granted that we must protect it if we have to survive and thrive as a species. Even schoolchildren will be aware of the implications of the laws of thermodynamics for the economic process, and the critical ecosystem services upon which we rely for survival.

Natural capital will also be economically important for the insights it provides into the production process. The more we learn about how nature produces, the more we will realize the inefficiency, toxicity, and wastefulness of current production techniques. When seeking to solve a production problem in 2100, it will become a standard approach to examine healthy ecosystems and strive to understand how they 'solve' similar problems.

Intense awareness of the importance of natural capital will lead to major changes in the way it is treated. The negative environmental impacts of non-renewable resource use, even more than their growing scarcity, will have forced us to substitute renewable resources for non-renewables, reversing the trend that began with the industrial revolution and making renewables more valuable than ever. Passive investment in natural capital stocks, i.e., simply letting systems grow through their own reproductive capacity, will be insufficient to meet our needs. Active investment will be required. America will be actively engaged in restoring and rebuilding its natural capital stocks by planting forests, restoring wetlands and increasing soil fertility. The former philosophy of natural capital as free goods provided by nature will have disappeared. This change will have required and inspired significant institutional changes.

For example, notions of property rights to natural capital will change. Most forms of natural capital will be recognized as intergenerational assets. Legislation will explicitly prohibit Americans from extracting renewable resources beyond the rate at which they can replenish themselves, and of leaving future populations dependent for survival on non-renewable resources in danger of exhaustion and for which no substitutes exist. This legislation will extend to imported products as well. Property rights to land will be explicitly extended to future generations, and there will be severe penalties for leaving land in worse condition than when it was purchased. While ecological factors will determine the total amount of natural capital that we can safely deplete, market forces will still determine how that natural capital should be allocated. In addition to these fixed limits on resource use, green taxes will force both consumers and producers to pay for the damage caused by resource depletion and waste emission. When these costs are unknown, those undertaking potentially harmful activities will be forced to provide bonds or insurance that guarantee reimbursement to society for whatever damages do occur.

Such policies will dramatically increase the costs of degrading natural capital. As a result, America will become a global leader in green technology, having undergone a transition from a hydrocarbon to a 'carbohydrate' economy, and from non-renewables to renewables. We will rely on technologies that build non-toxic, biodegradable carbon polymers from CO_2 extracted directly from the atmosphere, supplementing the natural process through which plants achieve this with laboratory production. As this technology comes into its own, we expect that in the long run it will help to stabilize and even reduce atmospheric CO_2. Whether or not we will be able to reduce global warming before many threatened species and ecosystems become extinct or adapt will still be open question, but with growing cause for optimism.

The transition to renewable resources will dramatically facilitate waste disposal problems. Ecosystems have limited ability to break down waste products from mining and industry, concentrated metals, fossil fuels, and synthesized chemicals. By largely removing these from the waste stream, it will be relatively simple to digest the remaining organic wastes into methane and fertilizer, not only reducing the disposal problem but also providing substitutes for fossil hydrocarbon-based fuels and fertilizers.

Our understanding of ecosystem function will have expanded tremendously by 2100, and we will continue to discover new ecosystem services. Yet for every puzzle we solve, we will uncover others. And we will remain unable to accurately predict the impacts of human activities on specific ecosystems, in part because of ongoing changes induced by continued global warming. While the rate of warming will have slowed, ecosystems will still be slowly adapting to its impacts. The precautionary principle, therefore, will play a critical role in deciding how we treat the environment—when there is doubt over the potential impact of resource extraction or waste emissions on ecosystem goods and services, we will choose to err on the side of caution. Nor will we allow optimism with respect to future innovations to affect this position until the innovations actually exist.

Continuing ecological restoration efforts will have begun to reverse the massive degradation of the past. In keeping with the precautionary principle, Americans will consider it an imperative to develop extensive ecological buffers. If global warming leads to dramatic changes in weather patterns and climates, plant and animal communities may only be able to survive if they have uninterrupted wildlife corridors through which to migrate to more favorable climates. Also, almost total reliance on renewable resources will require high sustainable yields of raw materials that can only be provided by vast areas of healthy ecosystems.

And, of course, natural capital will have assumed its place alongside the other three capitals in our national accounting systems, as discussed in Section 2.1.

4. Human capital

Human capital has been defined as the "practical knowledge, acquired skills, and learned abilities of an individual that make him or her potentially productive and thus equip him or her to earn income in exchange for labor" (Brainmarket, no date). In America in the year 2100, the definition of human capital itself will change, no longer will there be an emphasis solely on productivity in terms of income exchanged for labor. The primary emphasis instead will be on knowledge, skills, and abilities that make people productive members of society, i.e. that help people contribute to the goals of society.

Education will be integrated into everyday life, not simply something we do for a few hours a day before we grow up. And it will not be confined to classrooms—schools will be an institution, not a physical place. Nature offers us an amazing laboratory every time we step outside, and every bit as much in urban settings as in rural. This will be even truer in 2100, when our communities are designed to maximize exposure to healthy ecosystems. Education about civic responsibilities and roles will be heavily stressed and will be taught by direct exposure to the decision-making process or hands-on participation in activities that benefit the community. Youth will be schooled in civic responsibility by actively participating in the community. And what better place to learn skills required for economic production than at the workplace? Apprenticeships will be an integral part of the learning process. Technology will also play an important role in education. Virtual learning environments will be used where appropriate, but will by no means replace direct interaction.

Education and science will no longer focus solely on the reductionist approach in which students are only taught to analyze problems by breaking them down into their component parts. The reductionist approach will be complemented by an emphasis on synthesis, how to rebuild the analyzed components of a problem into a holistic picture again. Synthesis is critical for understanding system processes, and system processes dominate our lives. Beyond analysis and synthesis,

learning will emphasize communication. With improved ability for citizens to communicate their knowledge with each other, education, livelihood, family and community will become a seamless whole of lifelong learning and teaching, everyone simultaneously a student and teacher.

Education will also emphasize much more than just pure scientific understanding of the material world. Critical thinking and research will be important, but so will creative expression and curiosity. Knowledge and science will not be portrayed as value-neutral endeavors—students will learn that the very decision of what to study is a moral choice with broad implications for society. The goal of education will be to cultivate wisdom and discernment, and to cultivate the emotional maturity to allow responsible decision making in every type of human endeavor.

The whole notion of work will also change, and the work itself will lose the connotation of an unpleasant chore. Instead of applying technology only to increase production, society will devote some of its technological prowess towards making work itself a pleasurable part of our days that engages both mental and physical skills. A typical job will involve far more variety than one of today, making work more exciting and interesting, and taking advantage of the full range of a person's skills. There will also be less distinction between what today would be considered gainful employment and volunteer work. Everyone will participate in civil society, both in decision making and in maintaining the public space. This will not be an onerous chore, but a pleasurable time for socializing with neighbors and community. Nor will it take time away from our private lives, since the typical workweek in traditional 'jobs' will average only 15 hours.

Education will de-emphasize the existing 'more is better' consumerist mindset, and a greater understanding of the linkages between economic production, nature, human development, and society will make people more aware of the true costs of excessive consumption. With 100 additional years of technological advance and diminished 'needs', society will be able to provide a satisfactory living wage to all who work, and meet the basic needs of those who do not. With work designed as a fulfilling experience, there will be little resentment of those who do not work, but rather a feeling of concern that these people are not developing their potential as humans. Living in more tightly knit communities where social goals are actively discussed, people will understand better the importance of their work and feel greater obligation to contribute to the common good. Remuneration for work will be restructured to provide the greatest awards to those who provide the greatest amount of service to the community, such as teachers, child care providers, etc.

Human capital is also directly related to human populations. The population in America in 2100 will have stabilized at (or be moving towards) a level well within the carrying capacity of our resources and ecosystems.

5. Social capital

"Social capital refers to the institutions, relationship, and norms that shape the quality and quantity of a society's social interactions.... Social capital is not just the sum of the institutions which underpin a society; it is the glue that holds them together" (World Bank, 1999).

Abundant social capital plays a critical role in our vision of a sustainable and desirable America (SDA) in 2100, as has been hinted at in the previous discussions of capital. In America 2001, the dominant form of social capital in the employment and economic sphere is simply the market. The interaction between employer and employee is that of buying and selling labor, and the interaction between producer and consumer is even more market-based. In SDA 2100, worker ownership of many industries and local production for local markets will change much of this. Worker-owned enterprises will logically pay more attention to worker well-being than enterprises driven by the need to generate shareholder profit. Well-being will, of course, include profit-shares, but will be increased by working conditions that are healthy, stimulate creativity, and create feelings of partici

pation and identity. While not all enterprises will be worker-owned, when a significant percentage of enterprises offer these conditions, it will put pressure on others to do so as well. In the absence of strong social capital, local production for local markets could be a disaster. In many cases, it might be inefficient to have a number of firms providing similar products for a small community. This could lead to monopoly provision of certain goods. If the market remained the dominant form of social capital driving interactions between producers and consumers, high profits and poor quality would result. However, if worker/owners also live in the local community, they will have to answer to their neighbors regarding both the price and quality of what they produce. High-quality production will be a source of pride, while low quality and high prices will be perceived as incompetence and laziness, decreasing the individual's social standing in the community, and reducing their social capital.

Local currencies will also contribute to locally based production and consumption. Such systems already exist in many communities such as Ithaca, NY. These currencies are backed only by trust that other members of the community will accept them in exchange for goods and services, and therefore require strong social capital to function. They also build social capital every time a community member accepts the currency. They are virtually immune to national and global economic instability, and provide communities with greater autonomy.

Thus, for our vision of local production for local markets to work, social capital must be strong. As discussed in Section 2.2, the very physical structure of communities will work to create that social capital.

America in 2100 will maintain the ethnic and cultural diversity that currently enriches our nation. Some neighborhoods will coalesce around different ethnicities and cultures, and these too will serve as sources of social capital. 'Different but equal' will be the overwhelmingly dominant view of Americans, replacing the racism, sexism, regionalism and other prejudices that are all too prevalent today.

Americans will have more time for family, and family life will be characterized by more balanced gender roles.

The process of government itself will create social capital. America in 2100 will no longer be a weak representative democracy, but a strong, participatory one. In a participatory democracy, the people must discuss at length the issues that affect them to decide together how they should be resolved. In today's world of high-pressure jobs, little free time and large communities of anonymous strangers, this approach to government seems impractical, unwieldy and too demanding. In our vision of the future, with smaller communities of neighbors, a far shorter work week, and engaged, active citizens, participatory democracy will be perceived as a privilege of citizenship, not extra work. Of course, for this to work presupposes that civic education forms an essential part of the development of human capital from childhood on. This approach to government will be particularly effective at the local level. As citizens come together in regular meetings to discuss issues and work together to resolve them (even when substantial conflict exists), it will create strong bonds of social capital, and will play an essential role in forging a sense of community. Government implies action, and action implies purpose. Purpose must be defined by the people, who in these civic meetings will also forge a shared vision of the future to guide their actions. This vision cannot be static, but must adapt to new information and new conditions as they emerge.

Not all issues can be decided on at the local level. Institutions are required at the scale of the problems they address. It is at the local level where people will feel the consequences of ecosystem change, for example, but the cause may be distant, perhaps in other countries. On the national level, it is not feasible to bring together millions of people to discuss the issues and decide on actions, and so some form of representation will be required. But if representatives are chosen through direct participation by people to whom they have strong social ties and obligations, these representatives are far more likely to truly represent their communities instead of some large corporation that funds their rise to power.

6. America and the world

Finally, while we will have made substantial steps towards sustainable and desirable future by 2100, America will still face serious problems. Perhaps most critical will be the fact that the global ecosystem is inescapably interconnected. Threats to sustainability that remain to be addressed in this vision include global population control, immigration, species migration, cross-border pollution and others too numerous to mention. From a practical viewpoint, a sustainable and desirable America will be impossible in an otherwise unsustainable world; from an ethical viewpoint, America in the year 2100 will still bear responsibility for its current transgressions against the global ecosystem. This suggests that our national vision will depend on global cooperation.

7. The scarce resources necessary for achieving a sustainable and desirable America

If we are to move towards this desirable future, what resources are currently in shortest supply? Throughout this vision of a desirable end, it is obvious that the scarcest resources required to achieve it are not the market goods so emphasized by traditional economic analysis. Of the four categories of capital that people desire in this vision, built capital is the only one in which excludable and rival market goods play a central role. Yet even here, the dominant theme in the vision for built capital is fewer negative externalities associated with its production and use, and a greater emphasis on shared community resources, such as efficient public transportation. The production of built capital also stays far from the currently dominant vision of work as a means to satisfy consumption 'needs', emphasizing instead the goal of deriving satisfaction from the work itself. There is a clear willingness to sacrifice material consumption of market goods in order to achieve these goals.

Not only are market goods not the scarcest resources required to achieve the ends we envision, but production of market goods competes for the resources that are scarcest. Specifically, market goods require natural capital inputs. When the raw material components of natural capital are removed from the ecosystem, it reduces the ability of the ecosystem to provide scarce ecosystem goods and services, ranging from recreation to global life-support systems. The inevitable return of market goods to the ecosystem as waste further erodes the provision of ecosystem services. Second, designing productive systems to maximize market output means that other benefits of production, such as the opportunity it provides for creativity participation, identity and security, are sacrificed. Maximizing market production also leaves little time for leisure, family, community and other commitments. Third, our vision of the future sees human capital not primarily as a means to the end of market production, but as a means to achieve civic goals, such as participation in government through "strong democracy" (Prugh et al., 2000), and as an end in itself to satisfy the human need for understanding. Again, the more resources devoted to training human as labor for production of material goods, the fewer available to develop other capacities. Even when human capital in the form of technological advance is to be used for production of material goods, there will be an emphasis on sharing knowledge that preserves and supplies non-market goods.

Not only is social capital seen primarily as a means for achieving more efficient production, but also as an end in itself, satisfying the human needs for interaction and participation.

Indeed, a common thread running throughout was concern for the negative externalities of market good production, and a willingness to consume fewer market goods in exchange for other amenities. Though very few of the participants had read Manfred Max-Neef's work (e.g. Max-Neef, 1992), the human needs he discusses in that work—subsistence, security, affection, participation, understanding, freedom, idleness, creativity, and identity—emerged as important desirable ends. Very few of these ends are satisfied through the consumption of market goods. Also among the most desired amenities were the environmental services produced by well-functioning ecosystems, many of which are non-rival and non-excludable.

8. Institutions for allocating scarce resources to achieve the desired ends

Determining what system is best for allocating scarce resources towards the goals required for our vision of a sustainable and desirable America is a difficult question. Certainly America in the year 2100 will still require market goods and services, and markets have proven themselves very effective at allocating such goods. It is in part the very success of markets in providing an abundance of market goods that allows us to redirect our focus towards other human needs. After describing why the worldview we envision is incompatible with over-reliance on market allocation, we will show how it fosters other institutions suitable for attaining our desired ends.

An important component of worldview is beliefs about the 'nature' of humans. Conventional economic analysis assumes human are perfectly rational, self-interested utility maximizers (*Homo economicus*). In the worldview we envision, human nature does not fit this description. There are two important points here. First, participants in the envisioning process did not believe that *H. economicus* is an adequate description of human nature in today's world. People do show considerable concern for the well-being of others, including future generations; they have a wide range of non-material needs that are essential to their wellbeing, and they allow emotions to affect their decision-making process. In fact, emotions have been shown to be an essential component of real decision making (Ehrlich, 2000). Second, we believe that as human populations grow and human impacts on the environment increase, people will increasingly recognize that self-interest must be tempered by community interest. Implicit here is the notion that 'human nature' is not a fixed quantity, but is determined in part by culture, and evolves with culture (Ehrlich, 2000).

A second component of worldview is how things function. The conventional market paradigm is built on mechanical physics. Our worldview in the future will instead emphasize inherent complexity, nonlinearities and emergent phenomena. In such a world, the simplifications of conventional economics fail to predict real-world outcomes.

In a linear world of market goods and no externalities, the attributes of *H. economicus* arguably maximize economic efficiency. However, in a complex world of ubiquitous market failures, efficiency may actually be enhanced if people show concern for fairness and community preferences (*H. comunicus*) and sustainability and whole system preferences (*H. naturalis*) (Costanza and Folke, 1997).[5] Further, if human nature has elements of *H. comunicus* and *H. naturalis*, then other institutions besides the market may be suitable for allocating scarce resources towards desired ends. Two such institutions stand out in the vision. First, the political institutions of a strong participatory democracy can play an important role both in determining the desirable ends and in allocating resources towards those ends. Second, social institutions that strengthen community and social capital can help to increase the efficiency of allocation.

Perhaps the most appropriate institution for allocating scarce resources towards the desirable ends as elucidated in this paper is a strong, participatory democracy. Strong democracy is a system that provides a direct voice to the people, a chance to actively participate in the decision-making process. The system is most easily understood at the level of community governance, where all citizens are free (and expected) to participate in all political decisions affecting the community. Interactive discussion plays an important role. Broad participation requires the removal of distorting influences like special interest lobbying and funding of political campaigns. It also requires education in civic duties and responsibilities, and a substantial time commitment. Thus, the process may not be the most efficient way to reach political decisions (a dictatorship, e.g., is obviously more 'efficient' at decision making, however terrible the decisions themselves may be), but it may be an efficient way to ensure that those political deci-

[5] One of our reviewers commented that the major obstacle to achieving this vision is the inexhaustible supply of human stupidity, which suggests yet another name for our species, *H. stultissimus.*

sions meet human needs. In fact, the process itself helps to satisfy myriad human needs, such as enhancing the citizenry's understanding of relevant issues, affirming their sense of belonging and commitment to the community, offering opportunity for expression and cooperation, strengthening the sense of rights and responsibilities, and so on. Strong democracy also helps to build social capital. Historical examples include the town meetings of New England or the system of the ancient Greeks (with the exception that all citizens must be represented, not simply the elite). Prugh et al. (2000) and Barber (1985) offer considerably more detail on strong democracy, and ideas on how the system can be implemented at regional and national levels.

Strong democracy is a critical complement to the market system. The market has functioned reasonably well at the micro-level problem of allocating scarce marketable resources towards the production of market goods, and market goods among people. Markets function poorly, however, in distributing entitlements to market goods (both within and between generations), at allocating non-market goods, and at the macro-level problem of allocating scarce marketable resources between market and non-market goods. Strong democracy provides a forum in which everyone has an equal voice concerning this macro-level allocation problem, which is most fairly determined by a one-person one-vote system, as the market's one-dollar, one-vote system fails with non-market goods.

In an infinite world of only market goods where the only desired end is greater consumption, markets simultaneously reveal people's preferences concerning desired ends and efficiently allocate resources towards those ends. The market fails in both these tasks in the presence of non-market goods, externalities associated with market goods, or when human desire something other than ever-increasing consumption. However, in this messier world of market failures in which we live, strong democracy does succeed both in revealing desired ends and in allocating resources towards those ends. A result of this discussion and interaction essential to strong democracy is the constant dynamic renewal of the shared vision of the future, the ends towards which policy must be directed. Once the ends are known, citizens can decide what scarce resources are required to meet these ends, and how the resources should be allocated. The market, with all its elegant simplicity, will no doubt play an important role in the allocation of market goods, while citizens of a strong democracy practicing adaptive management can work towards increasingly efficient mechanisms for allocating non-market goods towards non-market ends.

While we recognize the efficiency of market competition, our workshop also foresaw the possibility of a future with less abundant energy forcing a reliance on local production for the local community. Obviously, for smaller communities this limits the potential for a large number of competing firms and the efficiencies this provides in a world of *H. economicus*. As an alternative to competition, we envision high levels of social capital created by social institutions that cultivate the inherent traits of *H. comunicus*. Worker-owned industries would provide high-quality goods at low prices not only to serve their communities, but also to build and maintain social capital. In reality, high quality at low prices from local monopolies does not even depend on the concern for fairness characteristic of *H. comunicus*. Producers are not only friends and neighbors of consumers, but are also consumers of products produced by other members of the community. One could view the situation as an iterated prisoner's dilemma. The producer of one good is a consumer of other goods. The best outcome for producer A is to charge a high price for a low-quality product, while all others charge a low price for a high-quality product. High price/low quality is also a dominant strategy if other producers favor high price/low quality. The best outcome for all, however, is low price/high quality, and the worst is low quality/high price. Axelrod (1984) and others have shown that under repeated games with the same players, which is exactly the situation when production is far and by small communities, the tit-for-tat strategy is a winner, and quite robust. Fostering the qualities of *H. comunicus* would

simply help the dominant strategy emerge more rapidly. Transport costs keep industries from competing in production of the same good, but knowledge has very low transport costs. Non-competitive industries are far more likely to share knowledge, and innovation is thus spurred by cooperation for social goals instead of competition for profits. Innovation spurred solely by the profit motive creates only market goods, while innovation spurred by cooperation is more likely to help produce and preserve the myriad non-market goods upon which human well-being depends.

Appendix A: List of conference participants

Audra Abt	Senior, Environmental Studies, Oberlin College
Gar Alperovitz, Lionel R. Bauman	Professor of Political Economy at the University of Maryland, College Park, and President, The National Center for Economic and Security Alternatives
Mary Barber	Executive Director, Sustainable Biosphere Initiative, Ecological Society of America
Seaton Baxter	Professor, University of Dundee
Janine Benyus	Writer
Paul W. Bierman-Lytle	Environmental Architect and Planner
Grace Boggs	Activist, Scholar, Writer, Community Organizer and Speaker
William Browning	Senior Consultant/Research Scholar, Green Development Services, Rocky Mountain Institute
Diana Bustamante	Community Organizing; Executive Director, Colonias Development Council
Warren W. Byrne	Renewable Consultant, Managing Director and Founder, Foresight Energy Company
Mark Clevey	Vice President, Small Business Association of Michigan (SBAM)
Jane Ellen Clougherty	Research Analyst, Community Energy Division Program Manager, Great Lakes Energy Network, Center for Neighborhood Technology
Robert Costanza	Director, Institute for Ecological Economics, University of Maryland
Tanya Dawkins	Senior Vice President, United Way
James Embry	Board President, Boggs Center for Nurturing Community Leadership
Jon Farley	President and CEO, Zarn Enterprises
Josh Farley	Executive Director, IEE
Harold Glasser	Assistant Professor, Environmental Studies Program and Environmental Institute, Western Michigan University
Becky Grella	Founder, Executive Director and President, AIZA BIBY
Elaine Gross	Executive Director, Sustainable America
Gerald Hairston	Urban Gardener
Sarah Karpanty	Co-Director and Secretary, AIZA BIBY
Carol Kuhre	Executive Director, Rural Action
George McQuitty	Law/Environmental Education, Professor, University of St. Andrews
Peter Montague	Co-founder and Director of Environmental Research Foundation
Dondohn Namesling	AIZA BIBY Youth Board Representative and Videographer
David Orr	Professor of Environmental Studies and Politics, Chair of the Environmental Studies Program, Oberlin College

John Petersen	Assistant Professor of Environmental Studies and Biology, Oberlin College
William Prindle	Alliance to Save Energy
Tom Prugh	Writer, Consultant to Energy Information Administration
Jack Santa-Barbara	Community Activist
Claudine Schneider	Co-Chair of the US Committee for the United Nations Development Program, International Consultant
Ben Shepherd	Green Development Services, Rocky Mountain Institute
Megan Snedden	Economic Development Coordinator, Colonias Development Council
Karl Steyaert	The Center for a New American Dream
Theodore Steck, M.D.	Professor of Biochemistry and Molecular Biology, Chair, Undergraduate Program in Environmental Studies, University of Chicago
Harvey Stone	Vice President of Marketing, BizBots
Paul Templet	Professor of Environmental Studies, Louisiana State University
Mary Evelyn Tucker	Professor, The Center for the Study of the World's Religions, Bucknell University
Sarah van Gelder	Executive Editor, YES! Magazine
Rafael Vargas	AIZA BIBY Youth Board Representative and Videographer
Verlene Wilder	Lead Organizer for the Union Cities Program, King County Labor Council

References

Axelrod, R., 1984. The Evolution of Cooperation. Basic Books, New York.

Barber, B.R., 1985. Strong Democracy: Participatory Politics for a New Age. University of California Press.

Bator, F., 1958. The anatomy of market failure. Quart. J. Econ. 72, 351–379.

Brainmarket, no date. Human capital definition. http://www.brainmarket.com/www/capital/cap1.htm.

Bromley, D.W., 1991. Environment and Economy: Property Rights and Public Policy. Blackwell, Oxford.

Cobb, C., Glickman, M., Cheslog, C., 2001. The Genuine Progress Indicator 2000 Update. Redefining Progress Issue Brief. http://www.rprogress.org/publications/2000_gpi_update.pdf.

Costanza, R., 1980. Embodied energy and economic valuation. Science 210, 1219–1224.

Costanza, R., 2000. Visions of alternative (unpredictable) futures and their use in policy analysis. Conservation Ecology 4 (1), 5. http://www.consecol.org/vol4/iss1/art5.

Costanza, R., Folke, C., 1997. Valuing ecosystem services with efficiency, fairness and sustainability as goals. In: Daily, G. (Ed.), Nature's Services: Societal Dependence on Natural Ecosystems. Island Press, Washington, DC, pp. 49–70.

Daly, H.E., Cobb, J., 1989. For the common good: redirecting the economy towards community, the environment, and a sustainable future. Beacon Press, Boston, MA.

Ehrlich, P., 2000. Human Natures: Genes, Cultures and the Human Prospect. Island Press, Shearwater Books, Washington, DC.

Farnsworth, E., Tidrick, T.H., Smathers, W.M., Jordan, C.F., 1983. A synthesis of ecological and economic theory toward more complete valuation of tropical moist forests. Int. J. Environ. Stud. 21, 11–28.

Georgescu-Roegen, N., 1971. The Entropy Law and the Economic Process. Harvard University Press, Cambridge, MA.

Lovins, A.B., no date. Hypercars: The Next Industrial Revolution. The Hypercar Center, Rocky Mountain Institute, Snowmass, CO. www.rmi.org/images/other/HC-NextIndRev.pdf.

MacKenzie, J.J., 2001. Facing The United States' Oil Supply Problems: Would Opening Up the Arctic National Wildlife Refuge (ANWR) Coastal Plain Really Make a Difference?. World Resources Institute, Washington, DC.

Max-Neef, M., 1992. Development and human needs. In: Ekins, P., Max-Neef, M. (Eds.), Real-life Economics: Understanding Wealth Creation. Routledge, London, pp. 97–213.

Prugh, T., Costanza, R., Daly, H., 2000. The Local Politics of Global Sustainability. Island Press, Washington, DC.

Weisbord, M., Jannof, S., 1995. Future Search: An Action Guide to Finding Common Ground in Organizations and Communities. Berrett-Koehler, San Francisco, CA.

World Bank, 1999. What is Social Capital? http://www.worldbank.org/poverty/scapital/whatsc.htm.