THE

1998 U.S. GENUINE PROGRESS INDICATOR (GPI)

Summary Report

by Mark Anielski & Jonathan Rowe

REDEFINING PROGRESS
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This report constitutes the ongoing efforts of many dedicated people and institutions with a common goal of developing a new accounting system and indicators that would empower and facilitate America moving to a more sustainable and socially equitable world for our children and our children’s children. The release of the 1998 U.S. Genuine Progress Indicator (GPI), first developed by Redefining Progress in 1995, represents our ongoing commitment to working towards a more honest accounting of genuine progress and the true well-being of our nation.

We would like to thank a number of individuals who shared their knowledge, wisdom and spirit in updating the Genuine Progress Indicator (GPI) for the year 1998. Most importantly we are indebted to the original pioneers of the GPI, namely Cliff Cobb, Craig Rixford, Ted Halstead and Jonathan Rowe in 1995.

In addition, we are grateful to those who provided input, comments, and wise counsel that made the 1998 GPI update possible, including: Cliff W. Cobb, Craig Rixford, Herman E. Daly, Robert Costanza, Ron Colman, Juliet Schor, Eric Rodenburg, Paul Portney Dan Tunstall, Kirk Hamilton, Eric Neumayer, John Dixon, Christine Real de Azua, John M. Fitzgerald, Laura Leete, Kevin Fearn, Thomas McMullen, Pam Jakes, Chris Aman, Alan AtKisson, Richard Norgaard, Robert Eisner, Jared Bernstein, Joy Hecht, Susan Roxburgh, Suzanne Murphy, Maureen Kennedy, and many others who contributed to this effort.

Our special thanks to those foundations and individuals whose generous financial support of the Genuine Progress Indicator program and Redefining Progress have made this work possible, notably the Ford Foundation.

M.A.

J.R.
“The Gross National Product includes air pollution and advertising for cigarettes, and ambulance to clear our highways of carnage. It counts special locks for our doors, and jails for the people who break them. GNP includes the destruction of the redwoods and the death of Lake Superior. It grows with the production of napalm and missiles and nuclear warheads. And if GNP includes all this, there is much that it does not comprehend. It does not allow for the health of our families, the quality of their education, or the joy of their play. It is indifferent to the decency of our factories and the safety of our streets alike. It does not include the beauty of our poetry or the strength of our marriages, or the intelligence of our public debate or the integrity of our public officials. GNP measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country. It measures everything, in short, except that which makes life worthwhile; and it can tell us everything about America – except whether we are proud to be Americans.”

Robert F. Kennedy
March 18, 1968
"The welfare of a nation can scarcely be inferred from a measurement of national income as defined by the GDP... goals for 'more' growth should specify of what and for what”

Simon Küznets, creator of the GDP, 1962
“Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information.”

T.S. Eliot

The release of the first U.S. GPI (Genuine Progress Indicator) in 1995 enlightened us with knowledge that the GDP, our traditional measure of economic prosperity, was like a faulty calculator that could only add and not subtract. The GDP makes no distinction between economic transactions that add to our nation’s well-being and those which diminish it. GDP completely ignores those values which most people would consider important to their quality of life including the non-monetary contributions of family, volunteerism, communities and our environment. The GDP does not distinguish between spending that adds to well-being and quality of life and spending that merely avoids deterioration or actual degrades our social and environmental infrastructure. Thus, the GDP, as the key yardstick of prosperity, implies that many values important to the well-being of households count for nothing.

The intent of the GPI is to provide a more honest accounting of the well-being of the nation — accounting for real benefits and costs associated with values important to households. The GPI may provide a guidance system to rediscover the knowledge we have lost in information and the wisdom we have lost in knowledge. The GPI is an attempt to address the challenge Simon Kuznets left us with in 1965 when he stated

“investigators interested in quantitative comparisons will have to take greater cognizance of the aspects of economic and social life that do not now enter national income measurement; and that national income concepts will have to be either modified or partly abandoned, in favour of more inclusive measures, less dependent on the appraisals of the market system……The eventual solution would obviously lie in devising a single yardstick”

The GPI is one step towards the creation of a new inclusive measuring stick replacing an old and outmoded yardstick (the GDP) that was originally conceived 60 years ago as a means of helping to finance war efforts.

All decisions are ultimately made for political reasons, including the design of the GDP and national income accounting. Most of us are unaware of the origins of our current national accounting system and the goals which it served. The original GNP was conceived by John Maynard Keynes who in 1939 asked Richard Stone to co-design a national income accounting system that would support the needs of the United Kingdom

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to finance the war effort. Stone would later develop a uniform accounting system that would be adopted by the US and by the United Nations.

A young economist, Simon Kü兹nets was also involved in this effort. Kü兹nets wisely recognized the inherent shortcomings of the new national accounting system. He acknowledged that a system designed to address war fiscal policy was inadequate as a system for measuring the welfare or well-being of a nation. Despite spending his life raising concerns about the shortcomings of the GNP/GDP accounting system, few have heeded his call or took on the challenge of devising a more appropriate and inclusive yardstick in a post-war era. Ironically and sadly after over 50 years virtually every nation on earth still uses the original GNP/GDP national accounting system. The GDP is the yardstick for comparing the economic prosperity of every nation. One must ask, is this accounting system still appropriate as an economic yardstick given that the true meaning of the word economy relates to the management of the household or state? Is not the well-being of the nation’s households more important than simply counting up the expenditures by consumers, government and business?

Most politicians, economists, statisticians and media have forgotten this history and by virtue of inertia and naivete sustain the use of the GDP yardstick to measure progress and prosperity. Undoubtedly, most Americans would agree intuitively that an appropriate accounting system is needed as a tool in managing for the well-being of the nation.

If economic indicators, like the GDP, do not provide a full accounting of the welfare of a nation, then such accounting systems cannot provide the necessary feedback that is required to manage for the improved well-being of the households of the nation and the environment upon which our welfare depends. Using a faulty yardstick, that ignores fundamental social and environmental values, will inevitably lead us down a path of undesirable and possibly irreversible outcomes. What is needed is a new yardstick the resonates with the intuitive sense of well-being held by citizens.

The GDP is synonymous with its colloquial term “growth” and is the sum total of all monetary transactions in the consumption of goods and services in our economy. It includes the personal consumption expenditures of households, government spending and investment by business in the “economy.” Elevated to a stature of theological importance, the GDP, as our primary yardstick of success, implies that by spending more money to consume more goods and services makes us better off. An increasing rate of GDP growth, by definition, requires continual increases in personal consumption even if that consumption becomes both unnecessary and unsustainable, in both financial and environmental terms. While materially richer we may indeed be compromising real wealth of our households, our community and our environment that ultimately provides for real quality of life and well-being.

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2 The two co-authored their concept of national income accounts in a paper titled “National Income and Expenditure of the United Kingdom: How to Pay for the War Effort”
3 See Marilyn Waring (1988) “Counting for Nothing” for an excellent history lesson on the origins of national income accounting and the GDP, as ideas for how to revised these accounting systems.
Many of us feel fatigued trapped in a circular race. Juliet Schor (1997) calls this “capitalism’s squirrel cage” — an insidious cycle of work and spend where families work longer hours to support a material lifestyle that is always slightly beyond their reach. Many families lament spending too much time on the job, too much time commuting to the office, with too little time left for family, friends, parenting, chores, or leisure. Schor (1997) points out that since the 1960s, increasing numbers of American households experience their lives as hectic, rushed and pressured and this subjective reality may be transforming our pattern of civic engagement and indeed social cohesion. The GDP is silent on such issues.

We have become addicted to ‘more’ growth and incapable of accepting slow, negative or zero GDP growth even if an honest account would show that, while consumption has waned, the development of our quality of life has remained steady. Intuitively we know that quality of life and our well-being, by any measure, is more than the sum total of our expenditures on goods and services. As long as we fail to understand that we are using a faulty calculator (the GDP) as a tool to manage the economy we will continue to go blindly along our path of naivete.

In 1995 Redefining Progress offered an alternative approach to measuring changes in the well-being of the nation: the Genuine Progress Indicator (GPI). The GPI captured the attention of the media and average citizens unlike previous efforts of accounting for sustainable economic welfare. The GPI’s intuitive appeal is that it offers an alternative accounting system to address the lament of Robert F. Kennedy and the challenges of Simon Kuznets.

Following from the pioneering work of Zolotas, Nordhaus and Tobin, and Cobb in attempting to measure sustainable economic welfare, the GPI represents an important step towards an inclusive yardstick for measuring genuine progress and the well-being. The GPI follows from the original pioneering work of Cliff Cobb in developing the Index for Sustainable Economic Welfare (ISEW) which appeared in For the Common Good by Daly and Cobb (1994). Numerous efforts are now underway internationally to develop new accounts of economic welfare including the development of a GPI for Australia and Canada and an Index for Sustainable Economic Welfare (ISEW) for the United Kingdom, Germany, Austria, Sweden, Netherlands, Italy, Australia, Chile, and Korea.

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The GPI is an expansion of the original Index of Sustainable Economic Welfare (ISEW) conceived and developed by John B. Cobb, Jr., Clifford Cobb and Herman Daly (see Daly and Cobb, 1989, 1994). An initial draft of the ISEW was reviewed by a number of economists and other analysts and was revised to incorporate many of their suggestions (Cobb and Cobb, 1994). The GPI embodies these earlier pioneering efforts. The GPI has been replicated in Australia (Hamilton and Saddler, 1997) and Canada (Messinger and Tarasofsky, 1997 and Colman, 1998, in the case of the Atlantic Canada GPI). The ISEW has been developed for United Kingdom, Germany, Austria, Sweden, Netherlands, Italy, Australia, Chile, and Korea (Jackson and Marks, 1994; Diefenbacher, 1994; Hochreiter et al., 1995 and Stockhammer et.al. 1997; Jackson and Stymne, 1996 and Tammo and Roseburg, 199X; Guenno and Tiezzi, 1996; Hamilton and Saddler, 1997; Castenada, 1997, and Won and Jeong, 1997).
Our hope in offering the GPI as an alternative to the GDP as well as providing preliminary estimates of genuine well-being, as an average household might account, may inspire politicians, policy advisors, economists and statisticians to take up the challenge. The success of the original GPI (released in 1995) in attracting both positive and negative reaction, is a testament that the basis for our pioneering work resonates intuitively with many people.

As in any pioneering effort the tilling of new ground by estimating, even rhetorically, the social and environmental values that contribute to our well-being is daunting and humbling. We acknowledge the difficulty of the task at hand, yet the pursuit of a better yardstick is certainly as important if not more important today than it was in 1939 when the current GDP war-time yardstick was conceived. For the current and future well-being of the nation, our goal must be to redesign a system that can provide better feedback as to genuine state of the nation.

Mark Anielski
Senior Fellow
Redefining Progress
The GPI – Genuine Progress Indicator, developed in 1994 by Redefining Progress, provides a broader and more intuitive accounting of the state of the nation’s economic well-being. The intent of the GPI is to provide citizens and policy-makers with a more accurate indicator of the overall health of the nation’s households or economy. Indeed, the word economy comes from the Greek *oikonomia* meaning the management of a household or state. The GPI considers the value of those factors which contribute most to the quality of life of American households; like leisure time, crime, housework, air pollution, family breakdown, the state of farmland, natural resources, and environmental degradation. These are the parameters that most intuitively understand contributes to their quality of life, yet which the current national accounting system and the GDP, as a measure of economic well-being, ignores.

For almost 50 years of GDP accounting, the increase in the GDP has been the key and most influential symbol of increased economic prosperity in America and in other nations. With the exception of minor lags due to the odd recession, the GDP growth has been relentless since 1950. The GDP is by most standards the leading economic indicator of the health of an economy. A rising GDP has come to symbolize the prosperity and progress of our post-war economy, suggesting that Americans have become progressively better off. The GDP is arguably the most important instrument on the panel of our nation’s guidance system; the President, Congress, Wall Street, money markets, economists and journalist watch its every move making important decisions that impact upon the real well-being of the nation’s households.

But what is the GDP? It is the sum total of the monetary value of the nation’s domestic annual output of goods and services; the sum total of all monetary transactions for these goods and services. It is a neat, tidy and efficient accounting system where the common unit of measurement is a fiat currency called dollars. The GDP is composed primarily of the personal consumption expenditures by consumers or households on goods and services. Over two-thirds of the GDP is personal consumption expenditures while one-sixth is business investment expenditures and one-sixth is government expenditures on goods and services. Every time the GDP rises this simply means that more money has changed hands for more goods and services bought and sold in the economy. As we expend more and consume more is there any wonder that the GDP continues to grow?

Personal consumption expenditures by America’s households is the key component driving GDP growth which in 1997 contributed $4,913 billion (1992 dollars) to the GDP of $7,270 or 68 percent of GDP. The more we spend the more GDP rises. In 1950 average personal consumption expenditures were roughly $6,800 per capita; by 1997 this figure had risen to roughly $18,360 or a 170 percent increase. How have America’s spending habits changed as personal expenditures have risen. Figure 1 shows the changes in personal consumption expenditure categories comparing 1960 with 1997.
In 1960 food, housing/household operations, medical services, and “other” services (including financial, recreation, education, and religious activities) were the largest expenditure categories. By 1997 other services, which includes a significant expenditure on recreation services, exceeded expenditures on food while medical care expenditures now exceed food and housing expenditures.

The following table shows America’s shopping list in 1997 providing insights into where the households of the nation are spending their money. The most remarkable aspects of this list include:

- medical care expenditures of $804 billion exceed spending on food, alcohol and tobacco ($746 billion) and housing ($717 billion), in 1992 dollars;
- purchased meals and beverages (restaurants and take out food) at $248 billion represents over half the amount spent on food purchased for home cooking;
- recreation expenses at $467 billion exceed clothing expenses, are 63 percent of food expenditures, and are 4.3 times the amount spent on education and research.
# America's Shopping (Expenditures) List in 1997

## 1997 Personal Consumer Expenditure Details

<table>
<thead>
<tr>
<th>Category</th>
<th>Billions of chained 1992 dollars</th>
<th>$ billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, alcohol, and tobacco</td>
<td></td>
<td>746</td>
</tr>
<tr>
<td>Food, groceries and alcohol for home consumption</td>
<td></td>
<td>442</td>
</tr>
<tr>
<td>Purchased meals and beverages (e.g. take out, restaurants)</td>
<td></td>
<td>248</td>
</tr>
<tr>
<td>Tobacco products</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Clothing, accessories, and jewelry</td>
<td></td>
<td>362</td>
</tr>
<tr>
<td>Personal care</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>Housing</td>
<td></td>
<td>717</td>
</tr>
<tr>
<td>Household operations</td>
<td></td>
<td>578</td>
</tr>
<tr>
<td>Medical care</td>
<td></td>
<td>804</td>
</tr>
<tr>
<td>Hospitals and nursing homes</td>
<td></td>
<td>350</td>
</tr>
<tr>
<td>Physicians, dentist, other medical services</td>
<td></td>
<td>319</td>
</tr>
<tr>
<td>Drugs</td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Other medical</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Personal business</td>
<td></td>
<td>377</td>
</tr>
<tr>
<td>Services of financial intermediaries</td>
<td></td>
<td>148</td>
</tr>
<tr>
<td>Expense of handling life insurance</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Brokerage charges</td>
<td></td>
<td>61</td>
</tr>
<tr>
<td>Legal services</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Bank charges</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td>570</td>
</tr>
<tr>
<td>User-operated transportation</td>
<td></td>
<td>525</td>
</tr>
<tr>
<td>Purchased local transportation</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Purchased intercity transportation (rail, bus, air)</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td>467</td>
</tr>
<tr>
<td>Video and audio products and computers</td>
<td></td>
<td>147</td>
</tr>
<tr>
<td>&quot;Other&quot;, including lotteries, pet care, cable TV, and recreation services</td>
<td></td>
<td>91</td>
</tr>
<tr>
<td>Toys and sport supplies</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Books and magazines</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Wheeled sports: boats, planes, of f -road vehic</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Commercial amusements: golf ing, billiard, casinos, shooting</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>Spectator sports, movies and theatre</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Education and research</td>
<td></td>
<td>107</td>
</tr>
<tr>
<td>Religious and welfare activities</td>
<td></td>
<td>140</td>
</tr>
<tr>
<td>Foreign travel and other</td>
<td></td>
<td>(18)</td>
</tr>
<tr>
<td>Residual</td>
<td></td>
<td>(34)</td>
</tr>
<tr>
<td>Total Personal Consumption Expenditures</td>
<td></td>
<td>4,914</td>
</tr>
</tbody>
</table>

Why is it that a complex society could judge economic well-being purely on a single instrument and accounting system that knows only how to add up expenditures? The answer is complex. We stick with the GDP instrument partly because it is familiar and has been accounting for growth for 50 years. Partly because it is easy to count the value of monetary transactions in our market place. Many would point to the practicalities of the GDP and suggest that it is the best measurement instrument for economic growth while acknowledging its shortcomings in accounting for the genuine well-being and quality of life of the nation’s households. Simon Küznets, the creator of the GDP, himself noted that “the welfare of a nation can scarcely be inferred from a measurement of national income as defined by the GDP…goals for ‘more’ growth should specify of what and for what” (1962). Measuring quality of life, the value of the environment and the value of healthy and resilient families and communities is messy and complex for economists and accountants. So we continue to spend millions tracking the circulation of money and the expenditures in the economy focused on the icon of ‘more growth’ while ignoring the genuine well-being of the nation.

The GPI is offered as an alternative if but incomplete accounting system to the GDP providing a more truthful account of the changes in the state of the nation’s overall well-being. The GPI attempts to account for changes in the value of social, human and environmental values (the costs and benefits) that most of us would consider contributes to our well-being and quality of life. Such as income inequality, family health and resiliency, leisure time, crime, air quality, water quality and the state of our forests, agricultural lands and nonrenewable resources. The GPI account reveals some remarkable findings.

As figure 2 illustrates, since 1950 the U.S. GDP has grown from $1.61 trillion in 1950 to $7.26 trillion in 1997 or from $10,582 per capita in 1950 to $27,163 per capita in 1997 (in constant 1992 dollars). A sign, at least, that more money is exchanging hands and expended on more goods and services for every man, woman and child in America.

In stark contrast to the GDP growth since 1950, the GPI (Genuine Progress Indicator) per capita, while growing at the same rate as the GDP through the 1950s and 1960s, peaked in 1976 and has been on the decline ever since. From 1950 to 1997 the GPI rose from $810 billion to $1,745 billion; however on a per capita basis GPI rose only marginally from $5,319 in 1950, peaking in 1976 at $9,236, and then continually declining to $6,521 by 1997 (all in constant 1992 dollars).
The sum total of almost 50 years of consumer, business and government expenditures has resulted in a 157% increase in per capita GDP compared with a marginal increase of 23% increase in per capita GPI between 1950 and 1997. Figure 2 illustrates annual growth rates in both GDP and GPI per capita in each decade. In the 1950s and 1960s GDP and GPI grew at comparable rates; in fact, in the 1950s the GPI grew at a faster rate than GDP due primarily to improved income inequality. In the 1960s the GDP and GPI grew at similar rates. However, in the 1970s genuine progress (GPI) was stagnant compared with a 2.1% annual increase in per capita GDP with the GPI peaking in 1976. In the 1980s the GPI per capita declined at a rate of 1.0% per
annum while GDP per capita rose 1.9% per annum. In the 1990’s while GDP per capita growth rate has slowed to 1.4% per annum, the GPI per capita has declined more rapidly at – 2.7% per annum than at any other time in recent economic history.

This evidence suggests that despite our perception of a healthy and robust economic expansion, as the GDP would indicate, America’s households have witnessed a steady decline in economic health and well-being. In other words, the costs of GDP expansion have begun to exceed the benefits.

Since the first GPI accounting in 1994, the GPI per capita has declined by 1.5% per annum compared with GDP per capita growth of 2.3% per annum, between 1994 and 1997. While 1996 to 1997 was a banner year for the GDP, rising 3.0 % per capita, the U.S. Genuine Progress Indicator (GPI) per capita fell by 4.1 %. Indeed, throughout the recent economic expansionary period 1990 to 1997 the U.S. GDP per capita rose a total of 10.4% while the GPI per capita declined 17.6%.

Using the 1997 GPI account as an example, we illustrate each of the adjustments that are made for genuine progress beginning with personal consumption expenditures, which in 1993 totaled $4,913 billion (expressed in constant 1992 dollars). The following table shows the series of positive and negative adjustments, ranked in order of magnitude, that are then made to account for the value of the annual flows of goods and services from social, human and environmental capital.
The 1997 GPI Account

<table>
<thead>
<tr>
<th></th>
<th>$ Billions (1992 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Consumption</td>
<td>4,913.5</td>
</tr>
<tr>
<td>Personal Consumption Adjusted for Income Inequality (^5)</td>
<td>4,153.5</td>
</tr>
<tr>
<td><strong>Additions (benefits)</strong></td>
<td></td>
</tr>
<tr>
<td>Value of Housework and Parenting</td>
<td>1,886.6</td>
</tr>
<tr>
<td>Services of Household Capital</td>
<td>557.1</td>
</tr>
<tr>
<td>Services of Highways and Streets</td>
<td>90.0</td>
</tr>
<tr>
<td>Value of Volunteer Work</td>
<td>88.7</td>
</tr>
<tr>
<td><strong>Reductions (costs)</strong></td>
<td></td>
</tr>
<tr>
<td>Depletion of Nonrenewable Resources</td>
<td>-1,281.6</td>
</tr>
<tr>
<td>Long-term Environmental Damage</td>
<td>-1,012.0</td>
</tr>
<tr>
<td>Cost of Consumer Durables</td>
<td>-668.6</td>
</tr>
<tr>
<td>Cost of Commuting</td>
<td>-374.5</td>
</tr>
<tr>
<td>Loss of Wetlands</td>
<td>-349.9</td>
</tr>
<tr>
<td>Cost of Ozone Depletion</td>
<td>-306.9</td>
</tr>
<tr>
<td>Loss of Leisure Time</td>
<td>-263.6</td>
</tr>
<tr>
<td>Net Foreign Lending or Borrowing</td>
<td>-146.1</td>
</tr>
<tr>
<td>Loss of Farmland</td>
<td>-127.8</td>
</tr>
<tr>
<td>Cost of Underemployment</td>
<td>-122.3</td>
</tr>
<tr>
<td>Cost of Auto Accidents</td>
<td>-120.5</td>
</tr>
<tr>
<td>Loss of Old Growth Forests</td>
<td>-82.2</td>
</tr>
<tr>
<td>Cost of Family Breakdown</td>
<td>-58.8</td>
</tr>
<tr>
<td>Cost of Air Pollution</td>
<td>-54.2</td>
</tr>
<tr>
<td>Cost of Water Pollution</td>
<td>-50.1</td>
</tr>
<tr>
<td>Net Capital Investment</td>
<td>-44.3</td>
</tr>
<tr>
<td>Cost of Crime</td>
<td>-28.4</td>
</tr>
<tr>
<td>Cost of Noise Pollution</td>
<td>-15.3</td>
</tr>
<tr>
<td>Cost of Household Pollution Abatement</td>
<td>-11.1</td>
</tr>
<tr>
<td><strong>Net Genuine Progress</strong></td>
<td>1,745.3</td>
</tr>
</tbody>
</table>

One of the key factors in the growing gap between the GDP and the GPI over time is the growing inequality of income between rich and poor. The GPI adjusts personal consumption expenditures by changes in income distribution using the Gini coefficient. The Gini coefficient, the standard indicator of income inequality used by the U.S. Department of Commerce and the U.S. Census Bureau, indicates that income inequality has risen dramatically since its all-time low in 1968. According to the U.S. Census Bureau, income inequality has risen dramatically by 18 percent for households and over 23 percent for families since 1968. By 1997 the top 20 percent of households captured almost 50 percent of the share of aggregate national income while the lowest 20

\(^5\) The adjustment of personal consumption to account for the inequality of income distribution is calculated using an index for income inequality. The Gini coefficient, the official index for income inequality, is normalized and converted to another index where 1968, the year with the least inequality, is converted to 100 basis points and subsequent Gini coefficients are made relative to this benchmark year. The higher the Income Inequality Index the greater the degree of inequality. In 1997 the Index was 118.3, the inverse \((100/118.3)\) of which is multiplied by personal consumption expenditures to arrive at an adjusted personal consumption figure.
percent of households shared in only 3.6 percent of the aggregate income. Rising income disparity since 1968 through to 1997 is one of the key factors driving GPI downwards.

As the 1997 GPI account shows, the items contributing most positively to genuine well-being of the nation, after personal consumption expenditures, include the value of housework and parenting, the value of household durables or capital (e.g. the fridge, dishwasher, and other appliances), the value of volunteerism and the value of the services from our highways and streets. Those items which represent depreciation or a cost to our nation’s well-being include the cost of nonrenewable resource use, long-term environmental damage, the cost of commuting, cost of crime, loss of leisure time, and cost of net foreign borrowing. Taken together this genuine progress account is a step towards a more honest, transparent, and intuitive accounting of the genuine well-being of our nation’s households.

The GPI is by no means a full accounting of all possible aspects of a nation’s well-being; only a first step towards constructing a comprehensive well-being account. Numerous other costs and benefits could have been included but were not because data is simply unavailable or no one knows how to count or value them, including:

- **human capital** – the value of the stock of human skills that increase the productivity of workers and our economy;
- **depletion of genetic diversity** – current genetic selection practices that are designed to maximize the output of particular species but which may impose future costs by reducing diversity by creating monocultures and thus creating potential liabilities for the sustained level of future production;
- **environmental damage caused by water projects** – the noncommercial value of the fisheries and other environmental costs destroyed by dams and water diversion projects;\(^6\)
- **value of the workplace environment** – the nonmonetized benefits and hardships associated with working conditions;
- **the underground economy** – the value of products and services exchanged through barter or unreported transactions, as well as illegal transactions.
- **value of premature death and disease** – the value of the loss of longevity or years of life due to environmental pollution and unhealthy and sometimes regrettable lifestyles that lead to unnecessary diseases and premature death.

There are undoubtedly many other categories that could be added to this list. The GPI is only a first step towards development of a new, transparent and honest accounting system that reveals the benefits and costs associated with the total wealth of the nation’s households — human resources, social assets, environmental or natural capital, and produced assets.

\(^6\) Technically, the environmental costs due to water projects (dams) are included in the category “long-term environmental damage” though are not specifically identified as such. These costs are lumped together with estimates of damaging forms of energy consumption (fossil fuels, nuclear power, and hydropower) for the simple reason that actual damage estimates are hard to come by.
We hope that the GPI will provide a catalyst for the federal and state governments to bring their economic statistics up to date and in line with what we, the people and households of the nation, consider makes life worthwhile. We hope that we can look beyond simply personal consumer expenditures and monetary transactions, as if ‘more growth’ is associated with greater well-being.

For fifty years, our economic guidance system has focused exclusively on one instrument: the GDP, the speedometer of growth and consumption. As a result, our country and our households know little about how the workings of our households, the services of our environment, the value of our natural resources, and the nature of communities and social cohesion actually affect the health and well-being of individuals, families and communities. Indeed, our current accounting system has very little to do with accounting for the real meaning of the word economy and thus tells us relatively little about the state of the nation.

Ironically, in conducting this research into the GPI accounting, we were hindered by a lack of data and had to resort to obscure publications for the basis for our accounting exercise. Yet millions are spent each year collecting expenditure and monetary transactions data to derive the GDP account. The GPI reveals how the GDP, originally conceived for war finance policy purposes, has through selective accounting obscured the values of a society and economy that it ought to help define.

The GPI accounting exercise reveals how the GDP has masqueraded as the “growth” indicator hiding behind fundamental accounting shortcomings and ignoring what most of America’s households would define as meaningful and valuable to their lives. Now is the time to reconsider how to revise the U.S. national accounting system that would provide a more meaningful account of the state of the nation’s households.

While the nature of human well-being is varied and subtle, we believe that assigning even our best guess of the value of those issues most important to Americans is worth the effort. Accounting for genuine well-being or progress would not only satisfy our curiosity of whether we are better off but would also empower us with a tool for more effective decision making.

Honest national accounting would inject a dose of accountability and reality to the public discourse and political process. We can begin to assess what we mean by economic growth. More growth and consumer expenditures for what and for whose well-being? How are we spending our money and what are we consuming? Are we achieving greater economic growth at the expense to other quality of life factors – our environment or family time? How do we sustain our material well-being at the same time sustain the integrity of our natural environment that provides us resources and environmental services such as clean air and water? Does expending more money on more ‘stuff’ truly improve our quality of life? These are the kinds of meaningful and relevant questions which a GPI-type accounting system might assist us in answering.
such that we can regain the knowledge we have lost in information and rediscover the wisdom we have lost in knowledge.

To know where we want to go, we first need to understand where we are. Better accounting does not necessarily answer the question of where we want to be in future nor does it guarantee better policy; but such accounts can serve as a weather chart to track our journey towards improved quality of life for all American households.
“Society must cease to look upon ‘progress’ as something desirable. ‘Eternal progress’ is a nonsensical myth. What must be implemented is not a steadily expanding economy but a zero growth economy, a stable economy. Economic growth is not only unnecessary but ruinous.”

Aleksandr I. Solzhenitsyn (1974)

Both Solzhenitsyn and Robert Kennedy present powerful value statements that make us reflect on the most profound issues of what we define as prosperity and progress. Intuitively we know that our lives and our environment exhibit a life cycle of birth, growth, development and death. Yet, we have developed ingenious human systems of economy, stock markets and money markets that behave as if this cycle of life does not apply; as if growth is an eternal phenomenon. We cling to fertile fallacies, like religious doctrine, believing that constant exponential growth is both desirable and possible. Yet, many experience a feeling of emptiness and actual erosion of our quality of life despite expending more on personal consumption than any previous generation.

The Wall Street Journal was warned against the damage done by consumers who might be downshifting in their consumption patterns. Victor Lebow, the post-war retail analyst, notes that “our enormously productive economy, demands that we make consumption our way of life, that we convert the buying and the use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption….We need things consumed, burned up, worn out, replaced and discarded at an ever increasing rate.”

Little has changed since the original Genuine Progress Indicator (GPI) was released in 1995. Our economic prosperity calculator reports that GDP continues to show healthy growth rates with GDP per capita rising at a rate of 1.4% per annum from 1990 to 1997. GDP growth between 1996 and 1997 was a robust 3.0% per capita. Other indicators of economic prosperity, stock market indices and currency markets, also suggest the same rosey picture of the nation’s economic well-being. When we read about rising GDP, DJIA, and a strengthening dollar we might conclude that all is well in the nation.

However, if we examine the economic prosperity calculator we discover a fatal design flaw – it only knows how to add monetary transactions in the consumption of

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7 Quotation is from an article by Vanessa Baird, “Money, markets and madness” in the New Internationalist, October 1998; p. 7-30.
goods and services in the economy. It does not know how to subtract the degradation of our environment, the cost of crime, nor does it know how to account for the value of housework, parenting and free giving of our time. When adjust our calculator to include what most would consider adds to their quality of life, we discover surprising results. The GPI, an adjusted national income account, indicates that instead of a 1.4% per annum GDP per capita growth rate, our Genuine Progress Indicator shows a decrease of 2.7% per annum between 1990 and 1997. Between 1996 and 1997 the GPI per capita declined 4.1% compared with GDP per capita rise of 3.0%.

The success of the original GPI and its predecessor, the ISEW, could be measured by the attention received in the media, political circles, and the barrage of cheers and criticisms from economists, statisticians, social scientists and average citizens. The very fact that a 1998 GPI is now being released is a testament to the success of the GPI in taking even small steps to Kuznets dream of revised national income accounts and a new yardstick for national welfare. The GPI, for many, strikes an intuitive chord in our pysches and in that of the oikonomia or economy (oikonomia is Greek for “the management of a household or state”). Success can be measured by having both critics and supporters, which the GPI has gathered from both camps.

The GPI has apparently begun to address an issue many economists have acknowledge for years, that the GDP has fundamental shortcomings particularly its relevance as a measuring stick in our present post-war economy. As the prominent Yale economists William Nordhaus and James Tobin noted in the 1970s “GNP (the predecessor of GDP) is not a measure of welfare. Maximization of GNP is not a proper objective of policy. Economists all know that, and yet their everyday use of GNP as the standard measure of economic performance apparently conveys the impression that they are evangelistic worshippers of GNP”(Nordhaus and Tobin, 1972, p. 4).

The GDP is simply a gross measure of the market activity, of money changing hands for goods and services bought and sold in the domestic economy, both good and bad. The government developed it primarily as a planning tool to guide and measure the results of a massive production effort for World War II. It was never intended as a measurement stick of economic progress. As Robert Kennedy noted “it measures everything, in short, except that which makes life worthwhile.”

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8 During the 1980s, the United Nations promoted the transition from GNP to GDP, whereby most countries have now adopted the latter. Since GDP has become the official estimate of the total output of the U.S. economy, we refer to it in making a comparison with the Genuine Progress Indicator. The GNP of a country measures national production, that which provides income to the citizens of the country, regardless of where that production occurs. The GDP measures domestic production, that which occurs within the borders of the country, regardless of who owns the units of production. In the United States and other wealthy countries, the effect of the transition has been negligible. But in Brazil, Mexico and other debt-ridden nations of the South, it hides the fact that most of the benefits of growth flow to lenders in the wealthy nations of the North.
WHAT IS THE “THE ECONOMY” ANYWAY?

The word “economy” comes from the Greek word *oikonomia* which means “the management of the household or state” (Webster’s, 1976). Prudent management of our own households would intuitively require careful attention, maintenance, and repair of all parts of the whole in order to sustain the utility, services, and enjoyment we receive over time. There are many real assets that comprise a household including the physical structure of the house, the plumbing, the fixtures, the furniture, the appliances, the surrounding landscape, the water in the tap, the food in the fridge, and the human intellectual/knowledge capacity of the people who live in the house. The proper management of these assets is what leads to the improved well-being of the household.

Prudent management of the state or nation, as a collection of households, requires similar prudent management to maintain the health and viability of the nation’s households. This management extends to measuring the state of the nation’s households and their well-being. In the case of a nation, the complexities of the “household” are greater and extend to the collective well-being of citizens, the market, social cohesion, justice, and the environment. Management of such a complex household requires a holistic accounting of the state of the nation’s well-being. GDP in measuring only one aspect of the nation’s households, the exchange of money for goods and services, is inadequate as a measure of the nation’s performance.

Every activity or relationship that has value in either use or exchange is part of the economy – whether or not money actually changes hands. A parent raising a child or tending to elderly parents or a volunteer given of their time are no less economic activities as a professional care giver in a nursing home or daycare facility. Forests engaged in sequestering carbon dioxide and producing oxygen provide genuine services that contribute to the well-being of our nation’s households. The fact that these real forms of wealth go unvalued in our national accounting system does not mean they are without value. The GDP, by ignoring them, treats these services as free, rendered without a monetary charge. Furthermore, the difficulties in attaching market values to services that are not traded in a market place should not preclude accounting for their contribution in whatever metric of value or relative importance that could be assigned.

The fact that GDP focuses on the exchange of goods and services involving mostly money is perhaps not surprising given that such exchanges are visible and can be readily counted using a common metric – money. The major components of the GDP are readily easy to measure: the amount of money spent by households on consumer items (roughly 2/3 of GDP); the amount spent by businesses on investment (roughly 1/6 of GDP); and the amount spent by federal, state and local governments on products and services (about 1/6 of GDP). To broaden this account to include the benefits and costs of services that do not have obvious dollar or market values makes the computation more difficult.

However, excluding unpriced goods and services that are ultimately important in the management of our individual and collective households, such as the value of
parenting, housework, and volunteer time, leads to a myopia of a more serious nature. Those who use the flawed calculus of the current GDP upon which to base decisions that affect the state of the nation’s households, may be using a flawed instrumentation panel to guide the journey of our good-ship *prosperity*. Our perspective is fundamentally distorted and causes politicians, media commentators, and stock market analysts to lose touch with the real wealth and economic reality of households. They are seeing only part of the economy – the part accounted for by the adding machine of GDP – and mistaking this one instrument on our dashboard as indicator for the whole journey. Any household or business that could only measure its progress but adding up revenues would soon become unhealthy and fail.

When the World Bank imposes a development plan on a country based on boosting GDP, the result can be the erosion of that country’s cultural cohesion and the high-grading of its natural resources and environmental quality. When the IMF imposes financial structural requirements, many countries are forced to sustain their economic well-being by exporting and exploiting their human and natural capital assets beyond sustainable and restorative capacities. Thus real wealth is often exchanged for an illusionary token of wealth; money. The more these economies declines, and a monetized market takes its place, the more the GDP goes up, even though social and environmental structures may be falling apart.

If our indicators of progress treated our social, human and environmental capital as elements of the economy (that is our households), our guidance system would be improved allowing us to chart a more sustainable and socially equitable future for our nation’s households. An accounting system and policy that acknowledged and accounted for the value of work in the home, clean air, clean water, productive agricultural land, forests, the cost of pollution, and income inequality would be viewed as a good tool for the management of the nation’s households. Even if it meant that we could experience lower levels of GDP growth – possibly zero growth as Solzhenitsyn suggested.

**GDP GROWTH DOES NOT EQUAL SOCIETAL WELL-BEING**

There are numerous flaws in our GDP accounting system. Firstly, it includes only that portion of economic activity that involves the exchange of money for goods and services. It leaves out the value of housework, parenting, eldercare, volunteerism, and free time spent with family or in community activities; those values which most of us would describe as contributing to the quality of our lives. GDP leaves out the fundamental basis for our economic well-being; the natural world around us which provides for our water, clean air, food, timber, and protection against the sun’s harmful rays. GDP ignores both the value and the deprecation of the goods and services that are provided to us free by nature.

The GDP makes no distinction between true benefits and costs that contribute to or diminish the welfare of the nation’s households. The GDP is like a calculator that can only add. GDP is also like an income statement that counts only income without
considering the full costs of managing the business or like a faulty balance sheet that fails to account for all the assets and their depreciation that are the fundamental basis for the value of the company. GDP fails to account for depreciation of real wealth or real capital – human, social, environmental. GDP is oblivious to the costs to society from inequalities in income, wealth, and spending power where rising inequality may lead to the erosion of social cohesion. It thus cannot distinguish between real progress and regress, and between real gains and losses. While the GDP is fundamentally neutral or amoral by passing no judgement on whether the production of an economy leads to good or bad consequences or where and how money should be spent, it nonetheless serves as a misleading yardstick to policy decision makers by ignoring the full extent of the costs and benefits associated, but unaccounted for, with growth.

**GDP treats crime, divorce and other forms of family and social breakdown as economic gain yet the value of housework, parenting and volunteering count for nothing.** Divorce affects millions of American adults and children every year fraying social cohesion and resulting in billions of dollars worth of regrettable expenditures on lawyer’s fees, court costs, counseling, and on the establishment of second households. Crime costs billions of dollars in the form of policing, alarm systems, locks, property insurance and medical costs. All of these are count as additions to GDP growth. Yet if you choose to be a stay-at-home parent or volunteer your time in the community, according to the GDP your time has no value since and is thus treated as free. The GDP hero is a chain-smoking guy, who drives to work and is going through a costly divorce. As social cohesion and the well-being of households may be eroding, the GDP rises as people, government and businesses spend more money. It is like a guidance system that views the world through rose-colored glasses oblivious to signs of trouble ahead.

**GDP increases with each environmental calamity, each polluting activity and then again in repairing the damage.** Oil spills, climate change and hurricanes are accounted for as positive events, in terms of GDP, creating an illusion that pollution and global warming are a double benefit to the economy. The costs of cleaning up the Exxon Valdez oil spill or the aftermath of Hurricane Mitch is added rather than subtracted. Government expenditures on Superfund clean-ups of toxic waste sites results in the same accounting errors. In our pursuit of profits, production and consumption, the resulting pollution of ground water, rivers, and air leads to increased health risks and disease with subsequent billions spent on cures to our cancers, heart disease and other ailments. The GDP adds the economic activity that generates the waste, and then adds again the money spent to bury, burn, or detoxify it.

**GDP ignores the liabilities of living on debt and foreign borrowing.** Consumers and governments alike have increased their spending through debt financing.

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9 Some critics might argue that it is unfair to suggest that GDP can be raised by increasing crime, divorce, or calamities since people might otherwise have redirected their purchasing power by spending on other goods or services such as a quality vacation time with family, which would also raise GDP. While there is some validity to this argument it is questionable whether households would redirect their full expenditures on alternative goods and services (increasing GDP through other expenditure categories). Furthermore, some households might choose to save this disposable income, which ironically would dampen GDP growth on the expenditure side of the ledger.
Consumer spending which is financed through debt continues to rise dramatically. It has been estimated that “the average American now retires having earned enormous sums by the world’s standards, but having amassed an average of only $5,000 from all that tumultuous cash flows” (New Internationalist, October 1998). Most troubling is the significant increase in foreign borrowing by the government over the past several years. Such borrowing raises the GDP temporarily; but the need to repay this debt goes unreckoned. Americans are caught in a positive feedback loop borrowing to finance increasing levels of consumption, living beyond their means, and incurring a debt that must eventually be repaid. At the same time, foreign borrowing reduces national autonomy.

**GDP takes no account of the inequality of income, wealth and spending power.** It assumes that a rising GDP lifts all boats, but this is not necessarily so. From 1973 to 1997, for example, the real GDP rose by 86 percent, yet real hourly wages have declined by 12 percent. Paul Krugman (1996) notes that “in 1970 the CEO of a typical Fortune 500 corporation earned 35 times as much as the average manufacturing employee. It would have been unthinkable to pay him 150 times the average (employee), as is now common, and downright outrageous to do so while announcing mass layoffs and cutting real earnings of many of the company’s workers.” Meanwhile, during the 1980s alone, the top 5 percent of households increased their real income by almost 20 percent. Indeed since 1968 the low and middle income groups lost ground to the top 5 and 20 percent of income groups whereby 1997 the top 20 percent of income groups earned almost 50 percent of the aggregate income of the nation. Growth did not benefit all equally, and a true measure of well-being needs to account for this.

**GDP does not account of the depletion or degradation or natural resources and the environment.** GDP gives no account of the long term economic, environmental, and social costs due to the loss of ancient forests, the unsustainable harvest of timber, the loss of prime agricultural land, the loss of wetlands, the pollution of rivers and groundwater, air pollution, the erosion of the ozone layer, and greenhouse gas emissions. Harvesting ancient redwood forest adds to the GDP the market value of the wood. In treating the depletion of natural capital as income rather than as the depreciation of an asset, the GDP violates basic accounting principles and common sense. The Bush administration pointed out, “accounting systems used to estimate GDP do not reflect depletion or degradation of the natural resources used to produce goods and services” (Council on Environmental Quality, 1992).

These shortcomings of GDP point to a fundamental confusion: the GDP treats every transaction in the economy as positive, so long as money changes hands. A car is bought; the GDP goes up. The owner buys gasoline and pollutes the air; the GDP goes up. Additional cars increase traffic and accidents, so more is spent on road maintenance, 10

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10 While real hourly wages have declined some may argue that compensation today includes more benefits than in 1973 that should be added to wages to derive a net compensation (wages plus benefits) that may be keeping up with productivity gains. We have not explored the net compensation issue specifically. We do however observe that the peak in real wages in 1973 and subsequent erosion coincides with the peak in the per capita GPI in 1976 and with the rise in income inequality that began in 1968.
insurance and police; GDP goes up. A car wreck results in large repair bills and medical expenses; GDP goes up. A wrecked car is scrapped and another one bought; GDP goes up again. The GDP spirals ever upward counting every incidence that results in another exchange of money for goods and services, making no distinction between costs and benefits, well-being or decline.

A true indicator of progress, by contrast, would offer a true income statement and balance sheet of the state of the nation showing the NET benefit that results from the flows of benefits and costs from real assets. In the case of the car, it would weigh the services the car provides against the associated downside: the pollution, the increased congestion and accidents, road maintenance and police services, and insurance rates. It would provide a more honest and intuitive assessment of the real state of the economy or the America’s households.

**DEVISING A NEW ACCOUNTING OF GENUINE WELL-BEING**

The GDP has its place in our national accounting system. It is a valid tool for investment planning in business, and setting money supply targets. Unlike a business, a nation does not necessarily need a total income statement; but it does need a balance sheet.

Herman Daly (1996) has advocated the adoption of three accounts that could replace the current GNP/GDP account. We support Daly’s model as intuitively attractive and consistent with generally accepted accounting practices. The first step towards devising a new system of well-being accounts is to develop a total capital account for the nation, providing an inventory of the stock and flow of physical and qualitative dimensions of the nation’s “capital” (including produced/manufactured, natural, environmental/ecosystem, social and human capital). In addition, such a total capital account would contain estimates of the “value” of the inventory and the rate and cost of depreciation. Prudent management of a household, business or nation necessitates such accounting. The evidence that such accounts would reveal would provide a more honest national wealth balance sheet that is necessary to manage effectively the well-being of the nation.

Secondly, a benefit and cost account would be necessary. The benefit account would measure the value of services that are derived or realized from the accumulation of all forms of capital (as Daly notes, “not just those rented during the accounting period, but also those used in production that is enjoyable and self-fulfilling). The cost account would measure the value of depreciation of produced, social, human, environmental and social capital, specifically the cost of depletion, pollution and “disutility of those kinds of labor that are irksome (Daly, 1996). As Daly notes, with both a benefit and cost account we could occasionally ask what the extra benefits or costs of further accumulation of capital or the depletion of capital to fuel growth were worth the extra costs.
Such accounting would bring us closer to the common sense management that most of us would adopt in managing our households, if not in the same language we have used to describe such a system of accounts.

The GPI constitutes an important albeit incomplete step in the developing such an accounting system. Within the GPI accounting framework, lies the evidence required to construct the physical and qualitative inventory of various forms of capital, their estimated service value and estimates of the costs and benefits associated with the use of capital – human, social, environmental/natural and produced. The GPI is by no means complete but does represent an important step towards devising a new accounting system for the well-being of the nation.

National accounting should be at least as realistic as traditional business management accounting, so that revenues and expenses are differentiated. In the case of an economy, the costs and benefits associated with the real wealth of the nation should be accounted for to facilitate prudent management. Such an account should be comprehensive, measuring the physical, qualitative, and monetary value of the stock and flow of total wealth of the nation: economic, social, human and environmental capital. National total national capital wealth accounts would facilitate the reconciliation and harmonization of our economic policies of full employment; monetary policies of money creation, interest rates, and inflation; environmental policies of sustainable resource use and environmental protection, and; social policies of health, education, and social services, instead of pitting policies against one another.

Such a total wealth accounting system would facilitate the development of a new measure of the well-being of the nation; a measure that would include both market and nonmarket products and services in a single index so that gains in one area could be offset by losses in another, and vice versa. For example, it would be useful to compare in a single account the benefits of petroleum use with the costs of depleting it, the health costs from air pollution, and the other various costs of damage that arise from its use. Such accounts could help us determine the costs and benefits of using our natural capital or resources in either a sustainable or unsustainable manner.

This ideal economic accounting systems is much easier to describe than to achieve. However, efforts have been underway by various agencies including the United Nations to develop part of such a new accounting system in the development of environmental and natural capital accounting systems to account for the stock and flow of our nature’s goods and services in our economy. The value of products sold in the market is commonly regarded as whatever people are willing to pay for them. By contrast, the value of nonmarket social and environmental services and scarce natural resources is often difficult to reckon in monetary terms. How to put a price on such things as leisure time, time away from work for family and community activities, lower crime, or the preservation of air quality and benign climate for the next generation? Nevertheless, a physical and qualitative accounting of changes over time is possible to enlighten decision making even in the absence of monetary values.
Complex issues of the environment and social cohesion are difficult to resolve and lack the comfortable certainty that market prices and monetary values provide in our current GDP accounting. While we recognize that the GDP deals with such questions; it does so in misleading and backdoor way. The GDP accounts assigns to social and environmental capital an value of zero simply by not accounting for the value of these capital service flows. To imply, as the GDP does, that time spent by people in households doing housework, parenting, and volunteering as well as the resources and services from our surrounding natural habitat, adds nothing to the well-being of our the households of the nation is simply counter intuitive and foolish. While difficult to assign market values to, this does not justify their absence from our national accounting system.

To use the GDP as a measure of economic prosperity and progress is to lead us to misleading conclusions about the state of our households and our nation; indeed an inappropriate account of the state of our economy according the original Greek meaning of the word. To simply ignore the benefits and costs of real wealth, to regard the value of housework and free time as zero, and to count the destruction of our natural habitat as economic gain is indefensible. Even a preliminary and rough estimate of the contributions of the nonmarket economy and natural habitat would come closer to economic reality which the households of America intuitively understand gives meaning to their quality of life. Such a new accounting stance would provide a more accurate picture of the true state of the nation so as to enlighten public policy decision making. That is what we have attempted with the GPI.
The Genuine Progress Indicator (GPI) was developed in 1995 by Cliff Cobb, Ted Halstead, Craig Rixford and Jonathan Rowe at Redefining Progress as a pilot measure of the well-being of the nation expressed in economic terms. While originally intended to be rhetorically point to the shortcomings of the GDP as a measure of economic progress, it continues to resonate intuitively with a broad audience as a meaningful and relevant means of accounting for genuine progress and well-being of the nation. Sustained media attention following its premier in Atlantic Monthly in 1995 (“If the Economy is Up, Why is America Down”, Atlantic Monthly, October 1995) is a testament to the success of the GPI.

Where the GDP looks only at the flows of expenditures (transactions of goods and services in an economy, most of which are attributed to personal consumption) in a given year, the GPI takes account of the values and depletion of our natural and social capital flows. The GPI includes the values of both market and nonmarket activity within a single, comprehensive framework; and it has a long-term perspective on the sustainability and resiliency of society and economy that the GDP lacks. The GPI provides a basis or tool for accounting for genuine societal well-being and genuine development of a society (versus absolute growth) thus providing a guidance system as to whether our current modes of economic activity can be sustained over the long term.

**SUMMARY OF THE GPI METHODOLOGY**

Like the GDP, the GPI begins with the nation’s personal consumption. Personal consumption expenditures make up the majority of GDP, representing 67.7 percent of U.S. GDP in 1997, relatively unchanged since 1950 when it represented 65.5 percent of GDP (U.S. Department of Commerce, 1998).

The GDP measures all economic activity adding up the monetary value of the transactions, the buying and selling, of goods and services in an economy. GDP proceeds to add up the monetary values of all other elements of national production including business investment and government spending, as well as net exports. GDP simply adds all these transactions together and thus is the primary measure of growth. However, GDP fails in that it does not account or subtract for the depletion or depreciation of several forms of real capital wealth including human, social and environmental capital. It is by

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11 The GPI is an expansion of an earlier formulation, the Index of Sustainable Economic Welfare (ISEW), which was developed by Herman Daly, John B. Cobb, Jr., and Clifford Cobb (see Daly and Cobb, 1989, 1994). An initial draft of the ISEW was reviewed by a number of economists and other analysts and was revised to incorporate many of their suggestions (Cobb and Cobb, 1994). The GPI embodies these earlier pioneering efforts. The GPI has been replicated in Australia and Canada (Messinger and Tarasofsky, 1997). The ISEW has been replicated mostly in England, Germany, Austria, Sweden, Netherlands, Italy, Australia, and Chile (Jackson and Marks, 1994; Diefenbacher, 1994; Hochreiter et al., 1995 and Stockhammer et.al. 1997; Jackson and Stymne, 1996; Guenno and Tiezzi, 1995; Hamilton, 1997; and Castenada, 1997)
definition a “gross” benefit measure as opposed to a “net” benefit measure. Thus it would be misleading to use GDP as a measure of the well-being and indeed progress of societies which ultimately depend on maintaining the integrity of the environment, human and social capital upon which true human development is possible.

The GPI, by contrast, starts with personal consumption expenditures, adjusts for income distribution, and then adds and subtracts a variety of elements that represent social and ecological costs and benefits.

In this respect, the GPI is much closer to a common-sense accounting that any household would do. Indeed the word “economics” comes from the Greek root “oikos” which means household and whereas economy (oikonomía) means “management of a household” (Webster’s New World Dictionary, 1976). A household or a business would not add together its income and expenses to assess its financial condition; nor would it ignore the depreciation of its capital assets (car, house, factory, equipment, computers); nor would it lump together every kind of expense to determine if it were doing better or worse. For example, college tuition and the cost of a burglar alarm system would appear very differently: one a way of getting ahead, the other a necessary defense against falling behind. Yet these are the flaws in our GDP national income accounting which is supposed to account for the collective management of the nation’s households.

Similarly, the GPI adds up the value of services and products consumed in the economy — whether or not money changes hands. GPI includes the value of what most modern households would consider relevant to their management yet which GDP ignores, namely the value of household work, parenting, volunteer work, and services of household capital (like the fridge, stove and washers).

Then it subtracts out three categories related to this consumption:

1) defensive expenditures (which compensate for past costs);

2) social costs; and

3) the depreciation of environmental assets and natural resources.

The following table outlines the components of the GPI.
## COMPONENTS OF THE GPI (Table 1)

<table>
<thead>
<tr>
<th>Column</th>
<th>Item</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Personal Consumption</td>
<td>positive</td>
</tr>
<tr>
<td>B</td>
<td>Income Distribution</td>
<td>(adjusts consumption)</td>
</tr>
<tr>
<td>C</td>
<td>Personal Consumption Weighted for Consumption</td>
<td>$B \div C$</td>
</tr>
<tr>
<td>D</td>
<td>Value of Household Work and Parenting</td>
<td>positive</td>
</tr>
<tr>
<td>E</td>
<td>Value of Volunteer Work</td>
<td>positive</td>
</tr>
<tr>
<td>F</td>
<td>Services of Consumer Durables</td>
<td>positive</td>
</tr>
<tr>
<td>G</td>
<td>Services of Highways and Streets</td>
<td>positive</td>
</tr>
<tr>
<td>H</td>
<td>Cost of Crime</td>
<td>negative</td>
</tr>
<tr>
<td>I</td>
<td>Cost of Family Breakdown</td>
<td>negative</td>
</tr>
<tr>
<td>J</td>
<td>Loss of Leisure Time</td>
<td>negative</td>
</tr>
<tr>
<td>K</td>
<td>Cost of Underemployment</td>
<td>negative</td>
</tr>
<tr>
<td>L</td>
<td>Cost of Consumer Durables</td>
<td>negative</td>
</tr>
<tr>
<td>M</td>
<td>Cost of Commuting</td>
<td>negative</td>
</tr>
<tr>
<td>N</td>
<td>Cost of Household Pollution Abatement</td>
<td>negative</td>
</tr>
<tr>
<td>O</td>
<td>Cost of Automobile Accidents</td>
<td>negative</td>
</tr>
<tr>
<td>P</td>
<td>Cost of Water Pollution</td>
<td>negative</td>
</tr>
<tr>
<td>Q</td>
<td>Cost of Air Pollution</td>
<td>negative</td>
</tr>
<tr>
<td>R</td>
<td>Cost of Noise Pollution</td>
<td>negative</td>
</tr>
<tr>
<td>S</td>
<td>Loss of Wetlands</td>
<td>negative</td>
</tr>
<tr>
<td>T</td>
<td>Loss of Farmlands</td>
<td>negative</td>
</tr>
<tr>
<td>U</td>
<td>Depletion of Nonrenewable Energy Resources</td>
<td>negative</td>
</tr>
<tr>
<td>V</td>
<td>Other Long-term Environmental Damage</td>
<td>negative</td>
</tr>
<tr>
<td>W</td>
<td>Cost of Ozone Depletion</td>
<td>negative</td>
</tr>
<tr>
<td>X</td>
<td>Loss of Old Growth Forests</td>
<td>negative</td>
</tr>
<tr>
<td>Y</td>
<td>Net Capital Investment</td>
<td>positive/negative</td>
</tr>
<tr>
<td>Z</td>
<td>Net Foreign Lending or Borrowing</td>
<td>positive/negative</td>
</tr>
</tbody>
</table>
THE IDOLATRY OF CONSUMPTION

Americans are caught on merry-go-round incapable of seeing through the idolatry of consumption and the fertile falacy that consuming more and newer goods and services leads to a greater sense of well-being than consuming “enough” or less. Indeed, the term “enough” or “sustainable” seems foreign in the language of American households. Only exponential growth is held as the ultimate measure of success.

One of the most basic premises of conventional economic wisdom and which permeates our entire societal psyche is the fundamental belief that more of a product or service is always better than less of it. Higher levels of consumption, we reason, by definition makes a society better off. GDP currently is the ideal measure for accounting for our success in idolizing both consumption and money as a means to purchasing more.

Since personal consumption is the largest component of GDP, this presumed correlation between consumption and well-being is the conceptual starting point for those who use GDP as a measure of economic progress. To be conservative and contemporary, the GPI implicitly accepts that premise. Thus GPI is already strongly biased upwards because personal consumption expenditures have risen at approximately the same rate as the growth of GDP. Indeed much of what we count as personal consumption may indeed not represent genuine development of the quality of the lives of households but account for the circulation of money in an economy chasing goods and services that most households do not actually require beyond some level of “enough.”

There is little doubt that the consumption of many goods and services we purchase does add to the quality of our lives particular for those who lack enough calories, inadequate health care or inadequate shelter. But beyond the level of basic necessities for food, clothing, shelter and health, the question of increasing consumption of cigarettes, toys, gadgets, fast and processed foods becomes more complex and even questionable. Indeed, the potential exists to be consuming manufactured goods and services that are in fact so “developed” and processed that they make actually diminish our physical well-being. So to, much of this excess consumption may in fact to diminishing the natural capacity of our environment and natural resources to sustain our demands for more consumption.

Social factors also enter into the equation, particularly in American society where keeping up with “the Jones” is chronic. Also, questions of the distribution of income and wealth and the issue of whether disparity between rich and poor contributes to social disintegration. For example, if a Mr. Jones buys a more expensive car than what Mrs. Brown can afford, Mrs. Brown feels worse off. The marketing of high priced running shoes and designer clothes simply adds to the idolatry of consumption and breeds a new class of poverty amongst the nation’s youth, many of whom cannot afford these luxuries.

Yet most of us intuitively feel that higher consumption levels do not automatically make our household or our society better off. Most of us are convinced that if we only had more money and more “stuff” we would feel satisfied. Yet, we also know that we are
never satisfied with enough money or enough stuff, convinced that there is always more
to have in order to seek true happiness and well-being.

Convinced that consuming more is better than doing with less than the “Jones” (who
themselves have been convinced to consume more) also leads us to an idolatry and
obsession of money. More money was supposed to buy greater happiness, yet most
American households in the 1990s are working harder than a single-income household of
the 1960s and is doing so with greater debt loads. Thus the belief that more money and
more stuff would bring us increased well-being has indeed led to the opposite outcome of
loss of leisure time, increased stress and less satisfaction with our quality of lives.

Adding to this idolatry of consumption and money is an ongoing worship of
competition where large winnings and many losers are created as a result of the
rationalization of business resulting from mergers and acquisitions, corporate right-sizing
and a myopic trance of profit and shareholder value maximization. This myopia comes
with a price of the erosion of social cohesion and increasing anxiety and stress of the
nation’s households.

In addition, much of our consumption is encouraged by advertising that leaves us
feeling inadequate unless we are consuming a new and improved product or service. We
are left continually distracted and anxious about the next new toy that the “Jones” are apt
to purchase as soon as the product hits the store shelves.

There is an inherent belief that higher consumption levels lead automatically to a
better society. What is lacking is an account or evidence that this is theory holds true.
The GPI is a first step in examination this belief.

Fred Hirsch in Social Limits to Growth observed that part of the value of certain
items, such as second homes and elite private education, lies in the inability of other
people to buy them. Limited access because of scarce financial resources gives them
inherent value. Once everyone can afford such “positional” goods, it losses its original
value as something desirable and distinctive. Indeed many goods are priced in this
fashion to give the impression that they are more valuable than other goods that may be
of equal value in terms of raw inputs. Too many people consuming the same good or
service can also ruin the very value that everyone is seeking.

Once the basic needs of households and society are met, the proportion of these
“positional” goods increases. The people who spend more money on these goods do not
gain as much as they avoid falling behind the Jones. Therefore, we could argue that
much of the increase in consumption, as measured by GDP, adds very little to genuine
development or the well-being of nation’s households nor to genuine increments in
quality of life. More likely is that people convinced of needing more are increasingly
strapped by financial indebtedness to pay for things they do not need.

Another tragedy of the commons is that millions of Americans are in daily battle to
actually reduce the outcome of overconsumption; namely obesity and overweight.
Millions are spent on dieting and low-fat diets while millions of Americans continue to consume fast food and junk food with empty calories that exacerbate the very ills that they are attempting to alleviate. Almost half of Americans consider themselves overweight; they spend $33 billion a year trying to lose weight that results from food they wish they didn’t eat and which is fundamentally unhealthy (Epstein & Thompson, 1994). Some 70 percent of Americans who smoke say they wish they could stop; some 40 percent of drinking exceeds the level of “moderation” (defined as two drinks a day) (Jacobson and Mazur, 1995). The story is the same with gambling, and credit card use.

North American families may be feeling more stressed than parents 50 years ago. In a survey of Canadian families 92 percent of people surveyed said family stress is greater now than it was in the relatively simple, though hard-scrabble, era of half a century ago. Respondents agreed modern families face a variety of stresses, including lack of money, unstable jobs and lack of respect for parenting. Topping the stress list is divorce and family breakdown, followed in descending order by: parents working too hard and for too many hours; insecure job conditions; excessive taxation; and lack of respect for the efforts parents put into raising children (National Foundation for Family Research and Education, 1998).

Many Americans intuitively sense they consume too much, not too little. They say this consumption makes them unhappy, yet they remain convinced of the idolatry of consumption and money. To assume, as economist do and economists measure, that more consumption necessarily equals greater well-being, ignores the daily experience and feelings of American households, the management of which economists study.

In order to reflect genuine development and well-being of the household requires a new accounting system that would adjust gross consumption for such ambiguous, regrettable and indeed unnecessary consumption of goods and services. If we could imagine a new accounting system for genuine well-being of the households of America, the GPI might represents a first prototype. The new index for well-being would subtract the monetary value of the proportion of consumption that people say they wish they rather not consume. In the GPI account we make no estimate of this aspect of personal consumption. We do, however, subtract out the consumption of environmental and social capital which most households do not and cannot (because of our myopic accounting system) appreciate contributes to their well-being and whose integrity must be maintained to sustain future benefits for future generations. As can be shown what does not get counted in our existing national accounts, such as environmental, social and human capital, is effectively ignored by those who use these GDP accounts to guide the economic policies of the nation.

The GPI is a conservative accounting of societal well-being adhering as far as possible to the existing economic paradigms and assumptions. We sought to provide more complete account of the real benefits and costs from real wealth of importance to households. The GPI is a concept of a total capital and benefit/cost accounting system that goes beyond the myopic accounting which is GDP by factoring in the inventory, value and depreciation of human, social, environmental, and produced capital flows that
GDP currently ignores. The GPI is a first albeit incomplete step to a full accounting of the well-being of the nation.

Our hope is that new national accounting systems be developed that can empower decision makers to make policy decisions that contribute to the genuine development of the quality of life of the households, businesses and governments of America. Perhaps we can then be reconciled with the original Greek meaning of the word economy — oikonomos: the management of a household or state.
The following is a column-by-column explanation of the results of the 1998 U.S. Genuine Progress Indicator (GPI) accounting for the genuine well-being of the nation covering the period 1950 to 1997. All values are expressed in constant (inflation-adjusted) chained 1992 dollars. The column references refer to the GPI account, Table 2 (“The GPI: Data by Column”).

The 1997 U.S. GPI account contains some revisions since the original GPI account was constructed in 1995. All parameters of the account were updated for the years 1995, 1996 and 1997, including new physical and qualitative data and new value (cost or benefit) estimates. The major methodological changes in the 1997 GPI include:

- **Price deflator**: The price deflator has been changed to a chained dollar deflator series using the chain-type price deflators recently developed by the U.S. Department of Commerce. All figures are now expressed in 1992 chained dollars versus the original GPI which used 1982 constant dollars using the traditional consumer price and GDP implicit price indices.

- **Income distribution**: The income distribution index has been changed. The Gini coefficient, the conventional index for income inequality used by the U.S. Department of Commerce and other practitioners, is now used as the basis of income inequality measurement. The original GPI used a customized index reflecting the change in the share of national income received by the poorest 20 percent of households. The Gini coefficient measures relative income inequality across all income groups or quintiles.

**Personal Consumption (Column A)**

Personal consumption expenditures on goods and services is the key driver of the GDP. Accounting for roughly two-thirds of the total GDP in the 1990s (largely unchanged since the 1950s), increasing consumer spending contributes more to GDP growth than businesses investment expenditures (roughly 1/6 of GDP) and government (federal, state and local) expenditures on products and services (about 1/6 of GDP).

Expending more money for more goods and services each year is seen as a healthy sign of a prosperous economy and well-to-do society; at least so the GDP account tells us. The fact that GDP has risen relentlessly and personal consumption expenditures per person have almost tripled (see figure 4) since 1950 would suggest that America is become more prosperous. There is little doubt that we have achieved unprecedented material gains and improved living standards. Yet the GPI account indicates that while per capita personal consumption of goods and services continues to rise even, average real hourly wages have declined, personal indebtedness has risen, personal savings rates have fallen, and quality time alone or with family has steadily eroded. Yet, according to the key yardstick of the economy, the GDP, all is well with the households of nation.
Despite expending more per annum on goods and services many Americans may be experiencing a kind of chronic work-consumption fatigue where more material goods and services beyond some level of “enough” leaves us empty and devoid of some greater meaning of life. Fast foods, processed foods, diet foods, weight-loss programs, filtered water, gadgets, knick-knacks, fashion clothing, lawyers fees for our divorce, and advertising that we “consume” (and which businesses buy) are examples of goods and services that many of us might consider both unnecessary and regrettable expenditures. Yet we are urged by relentless advertising to consume unhealthy foods and buy more overpackaged goods and services many of which are unnecessary or are manufactured with intentional obsolescence that requires continual discarding and replacement. The more businesses produce and the more consumers buy the more GDP rises, even if some of these expenditures are regrettable, unnecessary or environmentally unsustainable. More spending and more consumption is necessary to register positive GDP growth and suggests the nation is better off. Zero or negative GDP growth is considered a bad omen even if stagnating consumption led to a qualitative improvement in the collective lives of the nation.

The GPI account for 1998 shows that total U.S. personal consumption expenditures amounted to $4.9 trillion (in constant 1992 chained dollars) compared with $1.0 trillion in 1950; relative to $7.27 trillion in U.S. GDP in 1997 versus $1.6 trillion in 1950. On a per capita basis, personal consumption expenditures have risen steadily

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12 Personal Consumption Expenditures (PCE) were taken directly from the Bureau of Economic Analysis (Department of Commerce) National Income and Product Accounts (NIPAs), which are published on the BEA website (http://www.bea.doc.gov/) and in the Survey of Current Business by the Bureau of Economic Analysis (BEA). They can also be obtained in the Economic Report of the President (ERP) http://www.access.gpo.gov/eop/index.html
from roughly $6,800 per capita in 1950 to $18,360 per capita in 1997, in constant dollars; an increase of 170%.

Americans are spending considerably more money per capita consuming more goods and services than 50 years ago. Certainly by this measure Americans are better off, or so the GDP tells us.

**Income Distribution Index (Column B)**

Economist Paul Krugman noted that “economists who study wages and income in the United States agree about the radical increase in inequality” (1996). As Figure 2 shows, since 1968 (the lowest point of income inequality in the U.S. since 1950) the degree of income inequality between the rich and poor has grown considerably. In fact, 1997 recorded the highest degree of income inequality in over 50 years of measurement.

According to a study by Daniel H. Weinberg (1996) of the U.S. Census Bureau “the most commonly used measure of income inequality, the Gini index (also known as the index of income concentration), indicated a decline in family income inequality of 7.4 percent from 1947 to 1968. Since 1968, there has been an increase in income inequality reaching its 1947 level in 1982 and increasing further since then.” The following graph shows that relative to 1968 (the year with the least income inequality), income inequality for households has risen dramatically by over 18%.

As Paul Krugman (1996) notes, while the gap between the very rich and the poor has increased, the so-called middle class (families and households in the middle of the income spectrum) have also lost a share of the aggregate income to the top income households. This is illustrated in the following graph. In 1997 the top 20 percent of
households earned 49.4% of total income (the top 5 percent of households earned 21.7 percent of aggregate income) while the lowest 20 percent earned only 3.6%. As the graph shows both middle income and the lowest income quintiles have lost a share of their income to the top income quintile. These shifts from both the bottom and middle of income groups to the top as Krugman notes, “the statistical signature of a seismic shift in the character of our society.”

The inequality in wealth distribution is even greater. According to the most recent State of Working America 1998-99 study by economists Lawrence Mishel, Jared Bernstein and John Schmitt for the Economic Policy Institute, the distribution of wealth remains more concentrated at the top than distribution of income, with wealth inequality worsening in the 1990s. Their projections for 1997 indicate “that since 1989 the share of wealth held by the top 1 percent of households grew from 37.4 percent of the national total to 39.1 percent” facilitated in large part by the stock market boom. They estimate that the net worth of the middle-class families (those in the middle fifth of the wealth distribution) fell by 2.9% from 1989 to 1997, due to a rise of indebtedness. In 1995 almost 60 percent of America’s households owned no stocks in any form, while 90 percent of the value of stocks was in the hands of the wealthiest 10 percent of households. Mishel et al. (1998) also found that the wealthiest 1 percent of families has seen their tax bills fall by $36,710 since 1977 as a result of changes in tax law.

The growing gap between the super rich and the very poor is epitomized in the growth in CEO salaries of Fortune 500 companies. Mishel et al (1998) show that the average compensation for CEOs from $999,000 in 1983 to $3,565,000 in 1997 (in constant 1997 dollars) for a 3.5 fold increase. They show that in 1965 the typical CEO made 20 times more than the average production worker; in 1989, the ratio had tripled to 56 times; 1997, relative CEO pay had more than doubled to 116 times the pay of the
average worker. Another estimate shows that CEO pay shows that salary, bonus, and returns from stock plans of the average CEO has grown 100% between 1989 and 1997.

Daniel Weinberg of the U.S. Census Bureau (1996) has suggested that one of the reasons for increasing inequality is that "divorces, separations, births out of wedlock, increasing age at first marriage have led to a shift away from married-couple households and toward single-parent and non-family households, which have typically low incomes." Intuitively, one of the key factors for rising income inequality may be an increase in single-parent female households (as a result of divorce or births out of wedlock) where women typically have lower incomes than two-parent households. While there is no definitive answer to why income inequality has reached unprecedented levels, closer study of the socioeconomic factors driving inequality would enlighten the debate.

We have factored in income distribution on the assumption that inequality of income does relate directly to the economic welfare and social cohesion of a society. By factoring in income inequality into the GPI account we are making an explicit ethical argument that growing income inequality represents a social cost. While economists tend to consider the issue of distributional equity to be important, they regard it as a separate issue from the magnitude of economic welfare (Daly and Cobb, 1994). Yet we must ask ourselves whether or not the rising income inequality and thus rising disparity in purchasing power between the rich and the rest of income groups (both poor and in the middle as the Gini coefficient indicates) does not impose a real cost on societal well-being. There is little doubt that a growing gulf between those who have greater income capacity and purchasing power can and does lead to demoralization of the relatively “poor” by constraining their participation in the fruits of the nation’s prosperity. Ultimately democracy and egalitarianism suffers, although empirical evidence of the cost to democracy is not always easy to discern. From the perspective of neoclassical economics there is no answer to this issue and the GDP and national income accounts simply ignore such potentially significant societal costs. While conceptually challenging, we nevertheless believe that accounting for income inequality is fundamental to an honest accounting of the nation’s economic and societal welfare. Thus we have made a measure of income inequality an integral part of the GPI, estimating the “social cost” of income inequality by using the Gini coefficient of income inequality as a factor to weight personal consumption expenditures.

The revised 1998 GPI makes a departure from the 1995 estimates by adopting the more common measure of income inequality — the Gini coefficient or index. The original GPI developed an index that measured the change in the relative share of the poorest 20 percent of households. The Gini index (also known as the index of income concentration), developed by the U.S. Department of Commerce is one of two methods used to measure income inequality, the other being the share of aggregate income received by households (or families).

The Gini index is the difference between actual distribution of income and equal distribution by income quintiles. The Gini index ranges from 0.0, when every family (household) has the same income, to 1.0, when one family (household) has all the
income. Thus the higher the Gini index the greater the income inequality or the greater the portion of aggregate income earned by the top household (family) income bracket. It incorporates detailed aggregate income shares data into a single statistic, which summarizes the dispersion of income across the entire income distribution. It compares current income distribution with an ideal equal distribution of aggregate income giving equal weight to all income levels by calculating the square root of the sum of the squared differences of each quintile from a 20% share.

While the original GPI adopted the low income quintile index since it gives special weight to the plight of the poorest members in society, the use of the Gini index may be more appropriate since it reflects on the changes in the distribution of income across all income groups. It thus provides a basis for which to reflect on how growing income inequality between not only rich and poor but between the rich and the middle income groups can lead to the erosion of social cohesion in a society. Since one of the goals of the GPI is to assess how changes in equity may affect genuine societal well-being, and indeed social cohesion, the use of the Gini coefficient is attractive.

**Personal Consumption Weighted for Income Distribution (Column C)**

Personal consumption expenditures are adjusted to account for income inequality or the changes in the distribution of the share of aggregate income by household income groups or quintiles. The Income Distribution Index (distributional inequality) is used to weight personal consumption (Column A) by dividing personal consumption figures by the index of distributional inequality multiplied by 100. The reason for dividing rather than multiplying is that larger numbers in Column B indicate greater inequality. Column C becomes the base number (adjusted personal consumption) from which the remaining factors in the GPI are either added or subtracted.

**Value of Household Work and Parenting (Column D)**

Work is performed in households (traditionally, but not always necessarily, by women) is more essential than much of the work done in offices, factories, and stores. Yet most of this work goes unaccounted for in the national income accounts. While the housework and parenting of the stay-at-home mom or dad counts for nothing in the GDP commercial childcare in the monetized “service sector” adds to the GDP. Other unpaid household labor, such as the physical maintenance of the housing stock (from cleaning to light repairs), also constitutes valuable economic activity.

Despite all the “labor saving” devices introduced during the past eighty years, the number of hours spent in housework has remained virtually unchanged. In the second decade of this century, housewives spent an average 56 hours per week doing such work. They were still spending about 53 hours per week in 1956-66 (Cowan, 1983, pp. 63-64, 159). A study in the 1980s showed that women devoted 35 to 43 weekday hours to housework (depending on their employment), which suggests that average weekly hours are probably still in the neighborhood of 50 to 55 (Berk, 1985).
The most recent studies by Colman (1998), using 1992 time use surveys from Statistics Canada, show that full-time (non-employed) housewives in Canada still spend an average 52.5 hours per week at unpaid household work, including childcare. This is almost unchanged since the beginning of the century. The average unpaid household work load for ALL Canadian adults, male and female, with and without children, employed and not employed, has remained steady at about 23 hours per week for the last 35 years, despite the fact that women have doubled their rate of paid labour force participation in that period. Add to these figures an average 11.3 hours per week per parent spent on “child care” suggests that roughly 68 hours per week is devoted to unpaid household work and childcare by two-parent households, virtually unchanged since the beginning of the century. Moreover, Colman notes that modern two-parent working families are actually spending MORE time working for pay and at unpaid housework and childcare than 100 years ago. He estimates that the average two-parent-working (both parents working) household spent roughly 144 hours per week in 1996 at both paid work and unpaid housework and childcare compared to an estimated 114 hours per week in for the typical households in 1901.13

Since hours spent on household work have not decreased as women have joined the paid workforce, they have suffered a decline in leisure, as shown in Column J. In addition Mishell et. al (1998) show that the typical married-couple family is working more hours per week (over six weeks per year more in 1996 than in 1989) thereby eroding their quality leisure and parenting time. This time-constrained and hurried lifestyle also gives rise to increased consumption of take out food, fast food and other conveniences which add to the GDP while the erosion of time available for food preparation, parenting and leisure go unaccounted for. This illustrates why it is essential to take both the household and the market sectors into account to assess how the economy actually affects people’s lives.

Ironically and regrettably, the Bureau of Economic Analysis, which prepares the GDP, does not gather data on the time spent by the households of America in the management of the national households nor does the BEA estimate the economic contribution of this nonmarket time and household services. This would seem to imply that we have forgotten the original meaning of the word economy: the management of the household or state. Private research at the University of Maryland and University of Michigan has, to some extent, filled this accounting gap, at least regarding time spent on such tasks as cooking, cleaning, and child care (Juster and Stafford, 1991 and Robinson, 1986). This work has become a standard reference point for U.S. studies that involve the value of housework.

The calculation of the value of household labor in the GPI is derived from the work of economist Robert Eisner, past president of the American Economics Association. Eisner first derived estimates of the annual hours spent performing relevant household tasks from time-use studies conducted by the Michigan Survey Research Center. He then treated the value of an hour of housework as equivalent to the amount that a family would

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13 In 1901 female labour force participation rate in Canada was roughly 12%, though the vast majority were single women. In 1997, roughly 70% of married mothers were participating in the labour force.
have to pay to hire someone to do equivalent work in their home. This then yields an estimate of the total annual value of household work (Eisner, 1985, p. 30).

The 1998 GPI account estimates the value of housework and parenting at $1,887 billion in 1997 (in constant 1992 chained dollars). The value of housework and parenting represents the single most significant and positive adjustment to personal consumption expenditures. The value of housework and parenting was roughly 38% of personal consumption expenditures in 1997, which was $4,913 billion. In 1950 it was 58% of personal consumption expenditures. Part of the reason for the relative decline in the value of unpaid housework and parenting is the increase in the relative importance of market activities over household activities.

Value of Volunteer Work (Column E)

Most of the most valuable work done in our homes and communities is done on a volunteer basis without financial compensation. This unpaid work represents an invisible investment of human capital that provides the basis of the nation’s safety net which provides benefits of social cohesion which a healthy market economy depends yet does not value. What would the quality of life in our neighborhoods and communities be like if it were not for the undervalued and unpaid services and time provided by a network of community and volunteer organizations — churches and synagogues, civic associations, service clubs, community leagues, and informal neighborly efforts. While there is little question about the worth of a doctor, lawyer, broker, engineer, or advertising executive to our economy, the work of the volunteer sector is work that is desperately needed yet goes unaccounted for in our economic accounts.

The GPI accounts for the omission from GDP of the value of volunteer labour, similar to accounting for the value of parenting and housework.

To calculate the value of volunteer activity, we used various sources of statistics; the U.S. Department of Labour (1967, 1975) for 1965 and 1974 statistics, the Bureau of Labor Statistics (1990) for the 1989 data, the volunteer statistics collected by the Independent Sector, Washington, D.C. 1987 to 1996. The government statistics provided the only consistent time series available over the years. Unfortunately data comparability is hindered by inconsistent survey questions over the three survey periods to 1989. The 1989 data point represented the last statistic available from the BLS. A study by ACTION in 1976 showed a tripling of the value (in constant dollars) of volunteer time in organized services from 1965 to 1974, which is approximately the same as the Department of Labour data (ACTION, 1976).
These statistics show that in 1965, 21.6 million volunteers worked 5.7 hours per week for 17 weeks out of the year for a total of 2,062 million hours. By 1974 an estimated 7,289 million hours were volunteered by 36 million volunteers worked 9 hours per week over 22 weeks per year. And in 1989 there were an estimated 7,669 million hours worked by 38 million volunteers working 8 hours per week over 25 weeks of the year.

Since 1989 was the last volunteer data available from the BLS, we explored other data sources to cover the period 1989 to 1997. The Independent Sector, which studies volunteer activity in the U.S., conducts biannual volunteerism surveys. Because the estimates of the number of volunteers (excluding informal volunteerism) are irreconcilable\(^\text{14}\) with the Department of Labour statistics, we were unable to use the actual Independent Sector estimates to extend our accounting time series. Instead we used the rate of change in volunteerism reported by the Independent Sector from 1987 to 1995 to extrapolate the 1989 Department of Labour statistic. Their surveys indicate volunteerism has grown marginally by 0.77% per annum between 1987 and 1995. In 1987 there were an estimated 60.9 million volunteers (excluding informal volunteerism) who contributed an estimated 14.9 million volunteer hours. In 1989 there were 75.3 million volunteers providing 15.7 million hours. Then the hours decline to 15.2 million in 1991 and 15.0 million in 1993. By 1995 (the last survey data available) volunteerism rebounded to 72.7 million volunteers providing 15.8 million hours (Independent Sector, 1994, 1996, 1998).

Using both the Labour Department and extrapolated volunteer statistics using the Independent Sector statistics, we multiplied the total number of volunteer workers in a week by the average number of hours worked per week by the median weeks worked per year. We then multiplied the total by a wage rate of $11.20 per hour (in 1992 dollars),

\(^{14}\) For example, the Department of Labor estimated 38 million volunteers in 1989 while the Independent Sector estimated 75.3 million volunteers or almost twice as many volunteers. These differences are likely due to sampling methods.
the average real nonfarm wage rate from 1959 to 1997. As in the case of leisure, we assumed that the value of nonwork hours remained constant over time, regardless of changes in the real wage rate.\[15\] Since the median number of weeks worked per year was unavailable for 1965 to 1974, we estimated it at 52 times the ratio of volunteers in one week to volunteers in an entire year. (In 1965, for example, about one-third of the total number of people who volunteered in the entire year were volunteering during the week of the survey. Thus, we assume that any given volunteer works around one-third of the year or 17 weeks).

We assumed that the growth rate of volunteerism from 1950 to 1965 was at the same rate as from 1974 to 1989. After 1989, based on the data from Independent Sector. It is important to note that these estimates are conservative, because they do not include the informal volunteerism, such as neigborliness, that does not involve a volunteer program or agency.

We estimate the value of volunteerism (in constant 1992 dollars) at $21.9 billion in 1950, $81.7 billion in 1975, and marginally higher at $87.7 billion in 1997. These figures are added to the GPI account. The value of volunteer time in 1997 is significantly less than the $1,887 billion value of housework and parenting.

**Services of Consumer Durables (Column F)**

The money households spend on durable goods, such as a car, a refrigerator and other appliances, is not a good measure of the actual value received from the services these goods provide. The GDP does not account for the value of services derived from such household durable goods. It is also important to account for the life span of such durables as a furnace, car, or dishwasher. For example, when we buy such items we do not “consume” them in one year; yet this is how GDP accounts for such purchases. The car or dishwasher provides the household with services for a number of years. If it breaks down, then the durable is repaired or replaced. Both repairs and replacement drive up the GDP. Often durables wear out faster than they probably should requiring more frequent replacement of durables had they been manufactured for longer service life. Thus households would have been better off, getting more value, if the appliance had been engineered for higher quality and a longer service life.\[16\]

The GPI treats the services of durables, such as appliances, as benefits and the initial purchase prices as a cost. The annual services that are derived from the use of these consumer durables are added up, which economic theory defines as the sum of the depreciation rate and the interest rate.

\[15\] This treatment of the value of volunteer hours is debatable. Economists generally use the current wage rate as the opportunity cost of leisure or volunteer work. However, when trying to estimate the value of services performed, it may not be appropriate to assume that the value of volunteer work increases at the same rate as market-based work, given that there is no evidence to our knowledge of productivity increases in volunteer work performed for charities or churches, for example.

\[16\] We have not attempted to estimate the potential cost of built-in obsolescence that some consumer durables may exhibit. Such a study would be a worthwhile albeit a hypothetical inquiry.
For example, if a product’s life is 8 years, it depreciates at 12.5 percent per year and therefore provides that much service each year. At the same time, if the interest rate is 5 percent, the purchaser of the product would have received that much interest by putting the money into bank instead. Economists regard the interest rate as part of the monetary value of the product to the consumer.

Based on the assumed depreciation rate of 15 percent and an average interest rate of 7.5 percent, the value of services of consumer durables are estimated at 22.5 percent of the value of the net stock of cars, appliances, and furniture at the end of each year. To avoid double-counting, we make an adjustment (column L of the GPI) by subtracting out the actual expenditures on consumer durables.

Focusing on the annual service that household appliances and equipment provides, rather than on the purchase price, corrects the way the GDP treats money spent as if it were the same as the value received from the durable good.

The value of services from consumer durables is treated as a positive benefit and is thus a positive addition to the GPI account. In 1997, the benefits from consumer durables amounted to $557.1 billion (in 1992 dollars).

**Services of Highways and Streets (Column G)**

The GPI account excludes most government expenditures since they are considered largely compensatory in nature protecting against the erosion of quality of life. This is particularly true of the government’s largest budgetary item, military spending.

One the other hand, some government expenditures, such as transit systems and sewer or water districts, provide services for a fee in a manner similar to private business. These expenditures already show up in personal consumption figures in the national income accounts and thus are already included in Column A. This leaves other government services, notably highways and streets, that could be sold in theory, but are difficult to price for individual households or citizens. We value and include the services of highways and streets in the GPI.

The annual value of services from highways and streets is derived the Bureau of Economic Analysis figures of the net stock of federal, state and local government streets and highways from 1950 to 1997 (*Fixed Reproducible Tangible Wealth in the United States, 1998* and the BEA website). The annual value of services from streets and highways is estimated by taking 7.5 percent of the net stock value. This is based on the logic that around 10 percent of the net stock (2.5 percent for depreciation and 7.5 percent for average interest rates) is the estimated annual value of all services from streets and highways. However, since we assumed that 25 percent of all vehicle miles are for commuting (a compensatory expenditure), this leaves 75 percent as net benefits. Thus the GPI assumes the net service value of streets and highways is 75 percent of 10 percent or 7.5 percent of net stock.
In 1997 we estimate the value of services from streets and highways at $90.0 billion (in 1992 dollars), a positive addition to the GPI account.

**Cost of Crime (Column H)**

Crime exacts a significant economic toll on the households of America both monetary, such as lost property and medical expenses, but also psychological, such as the effects of trauma from being violated. Other elusive costs include the opportunity cost of foregone activities when people fear the possibility of violence, personal violation or theft.

The GPI uses the Bureau of Justice Statistics (Crime Victim Survey) data, that is, the cost of crime to victims based on the out-of-pocket expenditures by victims or the value of stolen property. Undoubtedly the full cost of crime is underestimated given the absence of estimates of the more elusive opportunity costs.

Another direct cost of crime are defensive expenditures to prevent or avoid the impacts of crime, such as locks, burglar alarms, security devices, and security services. Most of us would not otherwise purchase these personal, household or business security items. In the GPI we subtract these expenditures on crime prevention because they represent personal consumption that does not add to the well-being of our households but merely prevents its deterioration or violation.

Much of the cost of crime is borne by government and business in the form of police services and security guards. We have excluded these expenditures since, in the case of business, such expenses are intermediate costs and thus show up ultimately in the price of consumer products and services. In the case of government expenditures, we leave policing costs out of the GPI since our account does not include government spending items. We only subtract household spending on crime prevention and the direct costs of crime to households.
The cost of crime to households, including direct costs to persons and household spending on crime prevention (security systems, locks), has risen steadily since 1950. In 1994 we estimate the cost of crime peaked at $30.9 billion. Since then a decline in property crime rates has apparently reversed a 45 year trend with a decline in cost of crime to households falling to an estimated $28.4 billion in 1997. This reversal is due to a declining property crime rate according to the Bureau of Justice Statistics.

For estimates of the direct costs of crime on households we draw from previous studies by the Bureau of Justice Statistics (Klaus, 1994, and Shenk and Klaus, 1984). For 1975, the estimated direct costs (in current dollars) to households from crime was $13.9 billion in 1992 dollars. For 1980, it was $17.3 billion; for 1981, $17.1 billion, and for 1992, $17.6 billion. Klaus (1998) estimates that figures of $19.6 billion for 1994; for 1995 $18.3 billion, and for 1996 $17.6 billion. These figures are based on the National Crime Survey, a questionnaire in which citizens are asked if they have been the victim of a crime in the previous 6 months and the extent of associated medical costs, and property theft and damage losses. In the absence of a more complete data set, we interpolated between the 1950 and 1975, assuming constant dollar costs grew at the same rate as they did between 1975 and 1980. We further assumed that the growth rate since 1992 to be the same as the period from 1981 to 1992.

The data reveals that while the direct costs of crime to households was rising throughout the 1970s and 1980s, it peaked at $18.6 billion in 1994 and has since declined to an estimated $14.9 billion in 1997. This decline could be due to a general decline in the incidence of property crime.
For household spending on crime prevention, the annual amount spent on locks, burglar alarms and safe deposit boxes is used. For the combined value of locks and safe deposit boxes we have a single estimate of $4.6 billion for 1985 or $6.1 billion in 1992 dollars (Laband and Sophocleus, 1992). Over half this amount was for safe deposit boxes. We assumed the cost of these protective devices increased by 2.8 percent per year from 1950 to 1994. This is based on our best guess considering the total number of occupied housing units grew by 2 percent per year, the total number of passenger cars grew by 3 percent per year, and the total number of banking offices grew by 3 percent per year (Statistical Abstract).

Expenditures on residential burglar alarms and electronic security systems were taken from Security Distribution and Marketing magazine. According to this source, sales have more than doubled in 10 years growing from $6.3 billion in 1987 to $14.1 billion in 1997, in current dollars. We use these figures estimating the residential market at about 40 percent of the total industry sales. Without specific evidence, we assume that residential security systems constitute the same fraction of the market in later years as from 1982 to 1986. Furthermore, we assumed that the constant dollar value of household spending on electronic security systems rose from 1970 to 1981 at the same annual rate as the average growth rate from 1987 to 1991 (around 7.25 percent). From 1950 to 1970, we have assumed a growth of 5 percent per year. In 1997 we estimate the cost of household security systems and alarms at $5.0 billion in 1992 dollars.

Cost of Family Breakdown (Column I)

Probably the most important asset and “service sector” of the nation is the family. Yet the value of the family to the nation is not valued in economic terms. The traditional role and functions of the family within households, beyond housework and parenting, has increasingly been displaced by other aspects of the market economy: fast food restaurants, take-out foods, shopping malls, the television-babysitter and other aspects of the market. Even vacation get-away expenditures can be viewed as an unnecessary cost to households where people seek to “escape” from the stress and strain of modern living. While increasingly affluent, the basic household or family functions such as meal preparation, parenting, personal counseling, and good relationship building are increasingly provided through monetized commerce rather than through healthy family and neighborly relations. Under the constant stress of a modern society in no-win game of keeping up with the Jones’s, many families find themselves on a relentless treadmill working harder, consuming more, and increasing in debt. This no-win situation ultimately leads to stress and anxiety thereby comprising the quality of time and life that many people lament they are lacking. Many lament the lack of quality time with their spouse, their children, their grandparents or their neighbors. Family bonds begin to fray for the lack of time spent with spouse, children and extended families that would otherwise lead to more resilient and healthy households and national well-being.

The breakdown of marriages and relations that impacts children has an enormous impact on the social cohesion of the nation. When couples divorce the GDP includes the
expenditures on lawyers fees, counseling, and then in setting up separate households. This does not include the opportunity costs of time that is wasted or lost due to the stress, struggle and anguish that results from the dissolution of relationships. The impacts on children involved in divorce is perhaps the most tragic consequence. Yet GDP does not account for the societal costs of divorce in these terms.

The increasing proportion of children with someone other than their biological parent is also on the rise. In 1960, only 25 percent of children faced the prospect of living with someone other than their biological parents; but by 1990, the proportion had risen to 44 percent. “Across every income level, children — especially boys — who grow up without fathers in the home are much more at risk of juvenile delinquency and adult crime than children who grow up in intact families.” (Whitmere, 1995).

The GDP treats this erosion of the quality of life of the family as economic progress, because the functions of the family, that go unpriced in the market, are shifted to the market and more money changes hands. The more family breakdown, the more anxiety, and the more consumerism all add to GDP growth. Every time a fast food meal or take-out meal is purchased instead of preparing the meal at home, GDP goes up. Every time the TV goes on to baby-sit the kids the GDP goes up as more advertising and TV programs are viewed. Ultimately we all pay a huge price for the breakdown of family cohesion and resiliency.

Crime is the most extreme symptom of family breakdown. Broken families often leads to stress, anxiety, emotional disorders and ill health for both parents and children. According to one large-scale study, children living with a single parent or with a parent and a step-parent were more likely than those living with their biological parents to be expelled from school, to receive counseling or other treatment for emotional problems, to have accidents and to suffer from asthma (Dawson, 1991). The long-term societal costs of children growing up in these conditions is undoubtedly enormous yet goes unaccounted for. A society that neglects the well-being and emotional health of children and allows family and community life to erode is a society that faces the prospect of economic decline and social disintegration.

Ideally, we could use the economic values and expenditures in the rising “service” and “entertainment” sectors as a proxy for the value of the displaced and depleted stock and value of “social capital,” similar to the way we estimate the capital depreciation and depletion of natural resources. But there is virtually no data on the “service” parents and other adults provide children in the process of growing up (not to mention the problems of trying to quantify such relationships in the first place). We are thus forced to adopt proxy measures that provide only indirect measures of the real costs of family breakdown.

We use two proxies: 1) divorce and its effects on children; and 2) the amount of time families spend watching television. Clearly this limited perspective grossly underestimates the true cost to the nation from the erosion of social capital resulting from family breakdown.
Divorce can have traumatic impacts on both adults and children who are involved. These emotional and physical impacts translate into significant economic implications. Placing a monetary value on the costs of divorce to the well-being of individuals, households and the nation is complex. Nevertheless, even a preliminary “back-of-the-envelope” assessment of these costs would enlighten us as to what price we as society are paying as a result of the breakdown of relations and family cohesion. Sadly, few such accounts and estimates exist.

We estimate the cost of divorce both in terms of the direct costs to the adults involved and an estimate of the costs to children affected. The direct costs of divorce to the adults is based on an estimate of the out-of-pocket expenses for legal fees, counseling, and establishing separate residences, including appliances for these. We estimate the direct cost of divorce at the rate used in the original GPI estimates, that is $5,000 (in 1982 dollars) per divorce (or $7,269 per divorce in 1992 dollars) which is then multiplied by the total number of divorces.

The cost to divorce to children is estimated at $7,500 (in 1982 dollars) per child affected by divorce, or $10,904 per child in 1992 dollars). These are arbitrary and rough approximations of the lifetime damage incurred, including counseling, health costs, and the difficulties experienced at school, work or in personal relationships. This cost is multiplied by the number of children affected by divorce. While our estimates are arbitrary, we believe they are very conservative.

The second category contributing to family breakdown, is the amount of time spent viewing television.

As the following graph shows, that the number of divorces rose significantly through the 1970s. The number of divorces reached a plateau in the 1980s at roughly 1.1-1.2 million divorces. The early 1990s seemed to show an increase in divorces, however, since 1995 that trend has reversed itself to the point where the number of divorces in 1997 are at level 10 years ago. According to the National Centre for Health Statistics (NCHS) (1998), roughly 43 percent of new marriages in 1988 were likely to end in divorce.
The number of children impacted by divorce generally rises with divorce numbers. Unfortunately since 1991, the NCHS no longer reports the number children impacted by divorce. We had to estimate these figures for 1989 to 1997 based on 1988 ratio of children per divorce or 0.89. The economic costs to children impacted by divorce takes the estimated cost per child times the number of children impacted.

The second category of family breakdown considers the costs of television viewing. The television has been called the “electronic babysitter.” While television viewing may not be harmful per se, viewing violence and sex do undoubtedly have some impact. Even if the programming were more defensible, the amount of time children and adults spend viewing would be a problem itself.

The average household watches 7 hours and 12 minutes of television per day in 1997 (TVB and Nielsen Media Research, 1998). This represents only 5 fewer minutes of TV viewing than the all-time high in 1995. Comparatively, households spent 4 hours and 35 minutes on average viewing TV in 1950, and 5 hours and 29 minutes in 1965. According to a Carnegie Council study in 1992, teenagers spend only 5 minutes per day with their fathers and 20 minutes with their mothers, but 3 hours per day watching television (cited in Vobejda, 1992). Children are being raised more by television than by their parents and teachers.

We estimate the social cost of television viewing at roughly $0.44 per hour in 1992 dollars (converted from the original $0.30 per hour (1982 dollars) estimate used in 1995 GPI). This would derive an estimate that would be about two-thirds as large as the cost of divorce in recent years. Since our concern is television watching in families with children, we value this social cost by taking time spent watching television by families (hours per day per household) times (365 days per year) times (number of households in
the U.S.) times (the proportion of households with children) times ($0.42/hour social costs, 1992 dollars).

Base on these figures we estimate the social cost of TV watching in 1997 at $39.1 billion (in 1992 dollars).

Including the cost of divorce, social cost impact of divorce on children, and the social costs of television watching by children, the estimated cost of family breakdown is estimated at $58.8 billion in 1997 (1992 dollars).

**Loss of Leisure Time (Column J)**

Most Americans find themselves on a treadmill of work and consumption that never seems to slow down. According toe Bluestone and Rose (1997) “since the 1980s people have been saying they work “too hard” – that they are spending too much time on the job, with too little left for family, chores, or leisure.” They also show that while individuals may not be more overworked than before, families certainly are with the husband-wife couples increasing their annual market work by 32 hours per year through the 1970s and 1980s (a total increase of 684 hours or 4 months of full-time work). Intuitively we have a sense that our quality of the most precious commodity, time, is being eroded. Our common lament is that we don’t have “enough time” for all the demands on our life’s energy. We have a sense that we are working harder and that both the quantity and quality of our spare or leisure time has slowly eroded.

Unfortunately, our national accounting systems do not account for the time, our most precious commodity, and particularly the loss of leisure time we are experiencing. The loss of well-being resulting from the erosion of quality leisure time is totally ignored.
in the GDP. Since free time is not traded in the market the way labor time is, leisure time is invisible in our accounting systems. As Zolotas (1981) has noted “it was originally believed that economic growth (GDP and productivity gains) would eventually shorten working time” and free up more leisure time. For most even rudimentary measures of time, this has not materialized. The reason, as Zolotas suggested may be that “the growth in physical product, in the way it takes place in modern economies, is a source of constant stress and compels people to work harder in order to be able to afford the unending stream of “new” goods being supplied by the system.”

The current GDP accounting maintains an illusion that the nation is getting richer when in fact households experience an erosion of quality time (leisure time), with people working harder to produce and buy more and to pay interest on mounting personal indebtedness.

In a comprehensive study of changing living standards of America’s households, *The State of Working America 1998-99*, Lawrence Mishel, Jared Bernstein and John Schmitt found that “the economic realities facing the typical American family over the 1990s include, increased hours of work, stagnant or falling wages, and less secure jobs offering fewer benefits.” They found that the typical married-couple worked 247 more hours (over six weeks) per year in 1996 than in 1989, despite an 8 percent growth in the economy’s productive capacity over the same period. Bluestone and Rose (1997) report that from 1989 to 1996, the average workweek has jumped to 41 hours and average overtime work reached a post-World War II peak of 4.7 hours per week in 1994. As Mishel et al. note, “American families are working harder to stay in the same place and are seeing little of the gains of the overall economy.” Working harder means less quality time available for leisure and family.

The above figure shows the GPI estimates of the loss of leisure time since 1969, the year with the highest leisure time.
A more accurate accounting of genuine progress and well-being would offset leisure that went along with the increase in production or output. Accounting for the well-being of the nation’s households ought to include the value of leisure lost or gained.

But how should we value free time if we accounted for it? We could account for every nonworking hour (including hours spent sleeping), valued at the average wage rate. With 136 million people in the labor force in 1997 and each has 15 hours of potential leisure time per day and 24 hours per day on weekends, that amounts to around 870 billion hours of potential leisure for the working population alone. Valued at an average real wage of $11.20 per hour, their leisure would be worth about $9.7 trillion in 1997. If the leisure time of children, seniors and others not in the labor force were included, the total would amount to at least $20 trillion, which is far greater than the 1997 GDP of $7.2 trillion.

In order to provide a reasonable estimate of leisure time in the GPI, we focus on the loss of leisure time that has occurred since 1969, the year with the greatest leisure during the period of study. The number of leisure hours is taken from a study by Laura Leete-Guy and Juliet Schor which estimates the annual working hours (including housework) of labor force participants (Leete-Guy and Schor, 1992). Estimates from 1969 to 1992 were derived from their figures. For 1950 to 1969, we estimated that annual hours of work declined by 0.3 percent per year. For the period 1993 to 1997 we extrapolated the trend based on the work of Mishel et al. (1996) who estimate that annual hours of work have increase an average 5.2 hours per year between 1989 and 1994.

The number of work hours is then subtracted from 3,650 hours of discretionary time (70 hours per week) to arrive at an estimate of the total discretionary hours of leisure per person per year. (The term “discretionary” simply means time away from work minus time spent sleeping and kindred maintenance activities. We use 70 hours per week as the threshold; thus discretionary time is the amount less than 70 hours per week that people work). The resulting figure for each year is subtracted from the amount in 1969 to derive an estimate hours of leisure per worker. The change in leisure time since 1969 is the basis for estimating the value of the loss of leisure time, which we value at $11.20 per hour in 1992 constant dollars (which is approximately the average real wage rate for the period 1950 to 1997).

The estimated economic cost of lost leisure time in 1997 was $264 billion, in 1992 dollars.

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17 Note that 1968 was the year with the lowest income inequality.
18 According to Schor, 1992, p.2, “In the first two decades after 1948…..worktime did not fall appreciably. Annual hours per labor force participants fell only slightly.”
Cost of Underemployment (Column K)

There is a strange contradiction in America’s labor force between “a group of overworked and a growing segment of underemployed, who experience an abundance of involuntary leisure” (Schor, 1997). While millions of new jobs have been created by the economy since the 1950s, it has not been able to create as much employment (especially full employment) as many members of the labor force would desire. There is a strange contradiction where many people find themselves overworked while others find themselves underemployed. Indeed, many people are forced to choose leisure when they would like to be fully employed. There is some evidence of a long-term rise in the percent of the labor force that would like to work more or are classified as underemployed.

Underemployment is a more inclusive concept than unemployment. It refers to persons who are either unemployed, discouraged (gave up looking for work), involuntary part-time (would prefer full-time work but are unable to find it), or constrained by other factors, such as lack of child care or transportation. The costs of underemployment fall on the discouraged workers and their families. But the community and society also pays a price from frustrated workers when limited work opportunities may lead to frustration, suicide, violence, crime, mental illness, alcoholism and other substance abuse.

The GPI does not deal with the effects on short-term and cyclical unemployment. Although such hardships are not without social consequences and costs, much of the financial hardship is mitigated by unemployment insurance benefits. The social distress and erosion of social cohesion resulting from unemployment is, however, a different order of magnitude. For example, Brenner (1984) found that an increase in the unemployment rate (from 4.9 percent to 5.6 percent) from 1973 to 1974 was associated with an additional 46,000 deaths, 270 suicides, 403 homicides, 7,000 assaults, and 8,400 admissions to mental hospitals, with many of these effects spread over a period of six years. Nevertheless, the GPI does not attempt to account for the value of such secondary effects of changes in the economy.

The GPI takes a more conservative approach treating each hour of underemployment (the number of unprovided hours for constrained workers) as a cost, just as leisure time is considered a benefit. An hour of leisure time is a desirable objective whereas an hour of underemployment is a burden.

The GPI uses the research of Leete-Guy and Schor (1992) who calculated the number of “unprovided hours” of work in 1969 and 1989 by constrained workers — people who want to work more. The years 1969 and 1989 were chosen because they were business cycle peaks or near-peaks. The year 1997 may also become known as another business cycle peak or as Paul Krugman (1998) notes “people may look back and see 1997 as the high-water mark of this global free market economy, in the same way that 1913 was.” There was little increase during that period in the percentage of the workforce that wanted to work but did not work at all (from 0.4 percent to 0.6 percent). But the percentage of workers who ended up in part-time work for at least a part of the
year almost quadrupled (from 1 percent to 3.9 percent), while the percentage of those in part-time work for the whole year grew six-fold (from 0.2 percent to 1.3 percent). The proportion in full-time work for only part of the year grew by more than half (from 5.6 percent to 8.7 percent). This evidence represents an involuntary increase in part time work.

Bluestone and Rose (1997) report that “in 1973, 19 percent of total part-time employment was accounted for by individuals who wanted full-time jobs but could not find them. By 1993, this proportion was up to 29 percent.” The incidence of involuntary part-time work is especially high among men; in 1985 half of all part-time men and a quarter of part-time women reported their part-time status was involuntary (Bluestone and Rose 1997).

Based on the survey by Leete-Guy and Schor, the number of hours of underemployment in the entire labor force rose from 4.2 billion hours in 1969 to 14.6 billion hours in 1989. Schor and Leete-Guy have not updated their estimates of unprovided hours for constrained workers, nor have others reported underemployment on this basis.

Larry Mishel and Jared Bernstein at the Economic Policy Institute, analyzing Bureau of Labor Statistics (BLS), estimate underemployment using the new methods adopted by the Bureau of Labor Statistics (BLS). Since 1994 the BLS has been compiling a new set of alternative measures of unemployment and underemployment that they call “labor force underutilization.” Underemployment figures include the number of potential workers who are unemployed, discouraged, and involuntary part-time, or otherwise constrained by socioeconomic conditions. According to this new accounting approach, the official unemployment rate in 1995 was 5.6 percent (7.4 million failing to find work). Adding “discouraged workers”, “marginally unattached”, and the involuntarily part-time workers brings the “underemployment rate” to roughly 10.6 percent or 13.5 million workers or one in ten of the total labor force. According to their estimates, the underemployment rate declined from 11.4 percent in 1994 to 9.4 percent in 1997. This suggests a decline in the rate of underemployment.

Since we could not reconcile the historical constrained hours estimates of Leete-Guy/Schor with the Mishel estimates of underemployment, we extrapolate the Leete-Schor/Guy figures from 1950 to 1968 and from 1990 to 1997. We assume the number of unprovided hours per constrained worker from 1990 to 1997 continues to increase at the rate of 0.59 percent per year (the rate of increase between 1969 and 1989). Thus we assume a constant growth rate in the number of hours of work that employees and potential employees have not been able to do for lack of opportunity. This approach bypasses changes in unemployment due to business cycles and focuses instead on the effects of long-term trends.

The estimates of unprovided hours per constrained worker is then multiplied by the millions of estimated constrained or underemployed workers and then by an average real wage of $11.20 per hour (1992 dollars). As with leisure, this is the average real
wage during the accounting period 1950 to 1997. These estimates suggest that the cost of underemployment peaked at $173 billion in 1993 and has since declined to $122 billion by 1997 due to the decrease in the underemployment rate.

**Cost of Consumer Durables (Column L)**

The actual expenditures on consumer durables is a negative adjustment in the GPI account to avoid double accounting for the value of the Services of Consumer Durables (Column F). The value of private expenditures on consumer durables in constant 1982 dollars comes from the *National Income and Products Accounts* or the *Economic Report of the President*. The reason we subtract expenditures on consumer durables is explained in the *Services of Consumer Durables* (Column F) section. The estimated cost of consumer durables in 1997 is estimated at $673 billion, in 1992 dollars.

**Cost of Commuting (Column M)**

Most of us bemoan the necessity of commuting to work as an undesirable yet necessary expenditure of our time and money even though we receive little satisfaction from the activity. As car ownership has tripled, with more single-passenger commuting, congestion has increased and Americans must spend more time commuting. While commuting is for most people an unsatisfying and sometimes frustrating experience, the GDP treats commuting expenditures as a benefit to consumers. The more time and money spent commuting, the more these regrettable expenditures contribute to the GDP. Moreover, it does not account for the value of time spent commuting; time that could be spent freely with family, at leisure, sleeping or at work.

Commuting times have steadily increased since the 1950s. According to the U.S. Department of Transportation surveys the average commuting time has increased 13.7 percent between 1983 and 1995. In 1983 the average commute to work took 18.2 minutes (one-way). By 1995 it had increased to 20.7 minutes. Ironically, while the average work trip length increased 36.5 percent from 8.5 miles in 1983 to 11.6 miles in 1995, the average time getting to work did not increase as much because of an increase in the average work trip speed from 28.0 mph in 1983 to 33.6 mph in 1995.

The GPI corrects for the shortcoming of the GDP account by subtracting the cost of commuting. There are two distinct types of costs incurred in commuting. The first is the money spent to pay for the vehicle, or for a bus or train fare; the second is the time lost that might have been spent on other, more enjoyable or productive activities. The direct (out of pocket) costs of commuting were calculated as follows:

\[ C = 0.3 (A - 0.3 A) + 0.3 B \]

\[ = 0.3 (0.7 A) + 0.3 B \]

\[ = 0.21 A + 0.3 B \quad \text{where:} \]
C: is the direct cost of commuting.

0.3: is the estimated portion of total non-commercial vehicle miles used in commuting in 1983 (see Statistical Abstract 1987, table 1033, p. 591).

A: is the cost of user-operated transport (mainly cars) from the *National Income and Product Accounts*.

0.3 A: is the estimated cost of depreciation of private cars (excluded here to avoid double counting since it is already an element in Column F) from the *Statistical Abstract*.

0.3: is the estimated portion of passenger miles on local public transportation used for commuting.

B: is the price of purchased local transportation (*see National Income and Product Accounts*).

The indirect costs of commuting (i.e., the value of the time lost) are calculated as the total number of people employed each year times the estimated annual number of hours per worker spent commuting times a constant value for the time. Because some people regard commuting as part nuisance and part leisure, we assigned a value of $8.72 per hour (rather than the $11.20 per hour for lost leisure). The number of hours per year was derived from survey data on time use by households (Leete-Guy and Schor, 1992, p. 9).\(^\text{19}\)

The estimated cost of commuting in 1997 was $374 billion, in 1992 dollars. The following figure shows the rising economic costs of commuting since 1950.

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\(^{19}\) Leete-Guy and Schor use several sources, including the *Census of Transportation, Vol. 1*, 1963 and *Current Population Reports*, both by the U.S. Department of Commerce. They estimated hours for 1975 and 1985 from Robinson, 1986.
Cost of Household Pollution Abatement (Column N)

One of the costs that pollution imposes on the households of the nation is the expenditures made for equipment such as air and water filters. These so-called defensive expenditures do not improve the well-being of households, but merely compensate for the pollution or externalities imposed upon them as a result of economic activity. Such expenditure merely attempt to restore the quality of water, air or other environmental quality to a baseline level. Since business and government outlays are not included in personal consumption expenditures, we do not subtract their pollution abatement expenditures.

The figures used sourced from the Bureau of Economic Analysis, U.S. Commerce Department for the period 1972 to 1994 (Survey of Current Business, September 1996). For years prior to 1972, we assumed that personal expenditures on pollution abatement and control increased by 20 percent per year according to the trend after 1972. In 1996 the BEA data series was discontinued therefore we extrapolated expenditures based on the average rate of increase from 1991 to 1994.

Cost of Automobile Accidents (Column O)

The damage due and economic loss due to automobile accidents represents a real cost of industrialization and increasing traffic densities. Economic loss estimates are derived from Statistical Abstract and Accident Facts (National Safety Council, 1998), and are derived from Insurance Facts published by Insurance Information Institute, New York, N.Y. Economic loss figures cover only motor vehicle accidents on and off the road and all injuries regardless of length of disability. Economic loss includes wage loss; legal, medical, hospital, and funeral expenses; insurance administration costs; and property damage.

According to the Insurance Information Institute motor vehicle accidents have increased from 24.9 million accidents in 1972 to 34.5 million in 1995, while motor vehicle accident-related injuries have increased from 5.19 million to 6.02 million over the same period.

An interesting aside is the impact of all forms of accidents – traffic, work, home and public. The National Safety Council (Accident Facts) provides estimates of these four classes of accidents. The year 1997 recorded the second lowest unintentional-injury deaths per 100,000 at 35.0 compared to the lowest rate of 34.0 in 1992. Actual unintentional-injury deaths were estimated at 93,800 in 1997, the fifth leading cause of death exceed only by heart disease, cancer, stroke, and chronic pulmonary diseases. Non-fatal injuries, according to the National Safety Council, millions of Americans annually. About one in four, about 60.5 million in 1995, sought medical attention or
In terms of the economic loss due to motorvehicle accidents, 1997 recorded a significant increase of 13.7 percent over 1996 rising from $119.3 billion in 1996 to $135.7 billion in 1997, in current dollars. The GPI estimates for cost of automobile accidents shows a steady increase in the economic loss (in constant 1992 dollars) from $23.7 billion in 1950, $29.5 billion in 1960, $60.3 billion in 1970, $83.7 billion in 1980, $102.2 billion in 1990, and $120.5 billion in 1997.

Cost of Water Pollution (Column P)

Water is the one of the most precious of all environmental assets yet the national income accounts provide neither an inventory of the quantity or quality of water resources nor an account for the value and cost of damage to water quality. The cost of water pollution as estimated in the GPI is not the money spent to clean up polluted water. Sewage treatment and water treatment plants do not improve the quality of water but rather prevent the condition of a river, lake or groundwater from deteriorating. More pollution simply means more treatment is required to bring the quality of the water to a benchmark level. If treatment expenses were counted as positive that would indirectly mean that pollution adds to the well-being of America. On the other hand, treatment costs are not subtracted here as defensive expenditures because those are mainly government and corporate expenditures and therefore are not directly related to the GPI baseline, which is based only on personal (household) consumer expenditures (Column A).
The costs of water pollution arise from: 1) damage to water quality and 2) damage from siltation which reduces the life-span of water impoundments or channels. Although this may involve some double counting (insofar as siltation also damages water quality), on the whole the estimates in this column understate damage because of the lack of data on non-point sources of pollution.

Ironically, despite the importance of water to human existence, studies of the economic costs of damage to water quality, whether surface (river) or groundwater, are rare.

**Damage to water quality**: The cost of damage from water pollution in 1972 was estimated as $12.0 billion or $39.3 billion in 1992 chained dollars. This is based on the upper range of estimates in three studies of point source damage to recreation, aesthetics, ecology, property values, and household and industrial water supplies (Freeman, 1982, chapter 9). The less conservative figures were used because data was not available for nonpoint sources (urban and farmland runoff). These at least double the total pollutant load in many river basins and increase it several-fold in others. As of the late 1970s, non-point sources contributed 57 percent of biological oxygen demand, 98 percent of suspended solids, 83 percent of dissolved solids, 87 percent of phosphorous, and 88 percent of nitrogen discharged into U.S. waterways. (See Giannessi and Peskin, 1981, p. 804, Table 1).

According to the Conservation Foundation, “the years 1974 to 1981 saw little change in water quality with respect to the conventional pollution indicators” (Conservation Foundation, 1985). This overall lack of improvement means that regulatory efforts were offset by the growth of population and polluting activities. In contrast to the relative stability of the 1970s and 1980s, water quality is assumed to have declined during the 1950s and 1960s at 3 percent per year, before the concerted national effort to address the issue.

A recent U.S. Department of Agriculture report *Agricultural Resources and Environmental Indicators 1996-1997* (1998) noted that “the Great Lakes continue to suffer serious pollution, even though progress has been made in reducing the worst cases of nutrient enrichment (particularly in Lake Erie). Only 3 percent of the assessed shoreline miles fully support designated uses (EPA, 1995). Most of the Great Lakes shoreline is polluted with organic chemicals, primarily PCB’s and DDT.”

The USDA reports that with respect to the largest estuary in the world, Chesapeake Bay, “while an aggressive program has reduced phosphorous, nitrogen concentrations remain high, leaving the bay overenriched” with the water quality being degraded by agricultural development, population growth and sewage treatment plant emissions.

In terms of groundwater quality, a recent survey of 38 States found that overall groundwater quality in 1992 for 29 of the 38 States was judged to be good or excellent (EPA, 1994). The EPA’s National Survey of Pesticides in Drinking Water Wells,
conducted in 1988-1990, found a low proportion of wells containing particular pesticide or pesticide degrade. Agriculture was cited as a major source of groundwater contamination.

In the absence of more current economic analysis of the cost of water pollution to surface water and groundwater in the U.S., we continue to apply Freeman’s 1982 estimates of $12.0 billion for 1972 which converts to of $39.3 billion in 1992 dollars. In the absence of more current estimates we assume that the economic cost from damage to water quality remains constant from 1972 to 1997 at $39.3 billion.

**Damage from siltation**: Erosion from farmland, streambanks, roadbanks, and construction sites imposes costs in the form of reduced river navigability, siltation of water impoundments, sediment-related flooding, and other off-stream effects. The Conservation Foundation estimated that this damage was in the range of $3.2 to $13.0 billion in 1980. The geometric mean was thus around $6.5 billion.

There are no definitive estimates of the changes in siltation over the years the GPI includes. The National Resources Inventory, conducted by the Soil Conservation Service in conjunction with Iowa State University in 1977 and 1982, estimated total erosion at a constant level of 6.5 billion tons of soil loss per year. Our calculations assume that this 5-year trend has continued to the present, and that it began in 1972. From 1950 to 1972, we estimate that erosion increased by an average of 1 percent per year. Even if farmland erosion remained constant before 1972, other causes of sedimentation presumably increased due to urban growth, construction and the development of the interstate highway system.

As with the damage to water quality, we assume cost of water pollution due to siltation to remain constant at 1972 levels, namely at $10.8 billion per year in 1992 dollars.

Combining the damage to water quality and the damage due to siltation, the total cost of water pollution used in the GPI account is estimated at $50.1 billion in 1997.

**Cost of Air Pollution (Column Q)**

The annual economic costs of air pollution to households, infrastructure, the environment, and human health is a typical example of environmental costs which lie outside the production boundary of the traditional national accounts and represents a significant omission from conventional economic indicators such as GDP. Unfortunately such economic cost estimates are rare.

Following Myrick Freeman’s analysis (as with water pollution), we divided the costs of air pollution into 6 categories (Freeman, 1982). The estimated cost in 1970 (in 1992 chained dollars) for each of these categories was:
1) damage to agricultural vegetation  $12.1 billion  
2) materials damage (paint, metals, rubber)  18.1 billion  
3) costs of cleaning soiled goods  14.9 billion  
4) acid rain damage (aquatic and forest)  4.5 billion  
5) urban disamenities (reduced property values and wage differentials)  26.9 billion  
6) aesthetics  13.5 billion  
TOTAL  $90.0 billion  

This $90.0 billion estimate is conservative because it excludes damages to health, except those that show up indirectly in the estimate of wage differentials. It also excludes increased mortality. These two items alone would add perhaps $40 to $60 billion to the 1970 cost estimate.

Professor Ralph Estes of the American University has devoted several years to an analysis of the external costs that corporations impose upon customers, employees, communities, and society, costs that never show up in profit loss statements (which only list internalized costs). His 1995 peer-reviewed study, based upon numerous related research documents, estimates the total costs to be in excess of $2.6 trillion dollars yearly. Estes estimates that health costs associated with air pollution amount to $226 billion. Estes concludes, that "a scorecard that ignores social costs presents a distorted picture of performance that can influence policymakers to be excessively generous with taxpayer-funded corporate benefits and overly lax in enforcing corporate regulations."

According to Chilton and Huebner (1997) the American Lung Association estimates that, on average, particulate air pollution reduces life expectancy by two years.

Notwithstanding these other estimates, we use Freeman’s figure of $30 billion in 1972 converted to $90.0 billion 1992 chained dollars. This figure is used in the estimates of air pollution costs over the time series.

The figures for changes in air pollution damage over time are based on EPA’s estimates of ambient air pollution. Beginning in 1975 the EPA gathered data on ambient air pollution. We used these estimates to construct an index of ambient air pollution in order to estimate the costs of air pollution during this period. Starting in 1975, indexes were constructed (with 1975 = 100) for ambient levels of particulates, sulfur dioxide and nitrogen dioxide (U.S. EPA 199X, table XX, EPA National Air Pollutant Emissions Trends, 1970-1996). (The figures for changes in air pollution damage over time are based on EPA’s estimates of ambient air pollution. Beginning in 1975 the EPA gathered data on ambient air pollution. We used these estimates to construct an index of ambient air pollution in order to estimate the costs of air pollution during this period.)

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20 Estes $2.6 trillion estimate is broken down as follows: Price-fixing conspiracies, monopolies, and deceptive advertising ($1.16 trillion); Deaths from workplace cancer ($278 billion); Health costs-air pollution ($226 billion); Discrimination ($165 billion); Workplace injuries and accidents ($141 billion); Unsafe vehicles ($136 billion); White collar crime including income tax fraud, bribery, extortion, kickbacks and federal regulation violations ($165 billion).
on are also summarized in the *Statistical Abstract*.) These indexes were in turn combined to create a single index number for each year. We use the annual change in the index number to extrapolate the costs of air pollution during a given year, using the 1972 estimate of $69.3 billion as the base.

At the time of the last GPI revision data were available only from 1975 to 1991. For earlier years, ambient air conditions are assumed to have deteriorated by 1 percent per year in the 1950s and by 2.4 percent per year in the 1960s, and to have improved by 3.0 percent per year from 1971 to 1977 (as a result of the Clean Air Act of 1970). All 1997 figures for NOx, SO2 and particulates are projected based on the trend 1990-1996.

First, an ambient air pollution index is calculated based on the absolute emissions figures reported by the EPA 1975-1997. The year 1975=100 is used as the benchmark year against which historical and future indexes are estimated. 1975 is the year in which the EPA began to gather ambient air pollution emission data. The index is created by taking the absolute emissions of SO2, NOx and particulates, weighting them equally and then setting 1975=100. Future indexes are constructed in a like manner comparing with the 1975 benchmark. A index greater than 100 implies an increase in air pollution while an index less than 100 signifies a decline in air pollution.

To calculate the cost of air pollution, we take the ambient air pollution index multiplied by the 1992 chained dollar estimate of pollution costs ($90.0 billion), divided by the pollution index number for 1970. This value goes into the GPI.

![Ambient Air Pollution Index](Image)

*Figure 14*

(Sulphur Dioxide, Nitrogen Dioxide, Particulates)

The application of an air quality index (using relative changes in air quality since 1975, the benchmark year) to the estimated costs would appear to be a reasonable approach given that it reflects changes in air pollution (i.e. emissions) while assuming a constant economic cost of those emissions. Since 1975 the decline in absolute emissions of sulfur dioxide and particulates (which outweigh the small increase in nitrogen dioxide
emissions) suggests a declining economic cost of air pollution for these three emissions. The figure above shows the improvement in the ambient air quality (using sulfur dioxide, nitrogen dioxide and particulate matter levels of emissions converted to an index where 1975 levels equal 100).

The air pollution damages accounted for in the U.S. GPI deal primarily with damages associated with acid emissions, namely sulfur dioxide (SO$_2$) and nitrogen dioxide (NOx), as well as particulates. The U.S. Environmental Protection Agency (EPA), however, reports on five air quality parameters that affect long-term air quality: carbon monoxide, lead, nitrogen dioxide, ozone, particulates (PM10)$^{21}$, and sulfur dioxide. Also excluded in our analysis is VOC (volatile organics). Ideally, the damages due to carbon monoxide and ozone should also be considered in an expanded air pollution cost accounting. Indeed as Neumayer (1998, http://www.foe.co.uk:8070/ServletISEW) notes in the case of the UK ISEW, a better way to account for costs would be to account separately for the costs of each type of emission and then sum up the costs. In the absence of separate cost accounting for each emission we continue to use Freeman’s original estimates, with the caveat that these exclude undoubtedly significant health costs associated with air pollution.

The most recent and definitive studies of air pollution costs are by McCubbin and Delucchi (1996, Tables 11-A-1 and 11-A-2). They estimate the annual cost of emissions from gasoline-powered vehicles ranges from $19 billion to $330 billion per year for health damage (which includes a statistical value of life) plus $3 billion to $8 billion for esthetic and crop damage (in 1995 dollars). They break down air pollution costs by type of emission as follows (in 1995 dollars):

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$^{21}$ The EPA changed their accounting for particulate matter beginning in 1985. Prior to 1985 only PM-10 particulate emissions were inventoried. Beginning with 1985, substantial refinements in methodology were instituted, and the scope of the inventory was expanded to include PM-10 from agricultural activities, and so-called fugitive dust. Fugitive dust contributes a significant portion of the new total particulate matter emission (e.g. in 1985 4.09 billion tons of PM10 emitted compared with roughly 36 billion tons of fugitive dust for a total particulate emission of 40.889 billion tons). The 1975-85 figures use the 1995 GPI data estimates for both PM10 and fugitive dust emissions. 1985-1996 figures are from EPA National Air Pollutant Emissions Trends, 1970-1996.
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO (carbon monoxide)</td>
<td>$1.1 to $9.3 billion</td>
</tr>
<tr>
<td>NOx (nitrogen oxide)</td>
<td>$1.0 to $5.3 billion</td>
</tr>
<tr>
<td>O3 (ozone)</td>
<td>$0.2 to $1.9 billion</td>
</tr>
<tr>
<td>PM10 (particulates)</td>
<td>$17 to $314 billion</td>
</tr>
</tbody>
</table>

Their studies show that most of the health costs associated with air pollution come from particulates, a fact that was not known when Freeman did his study in the 1970s. We have not used the McCubbin and Deluchi estimates given the wide range of their cost estimates and their inclusion of the value of life, which we have chosen not to include.

Recent estimates for some European countries suggest a range of cost estimates. While it is difficult to compare air pollution cost estimates across nations, a recent study for Germany estimated total air pollution damages in 1985 to amount to around U.S. $19 billion in 1985 dollars (roughly $24 billion in 1992 dollars) (Schulz, 1986). A Dutch study estimated annual air pollution damages in the Netherlands in 1986 to amount to between U.S. $0.5 and $0.8 billion. While these disparities from the U.S. estimates seem large, relative absolute levels of emissions and population must be considered in a meaningful comparison.

Furthermore, Neumayer (1998) suggests that future studies might distinguish between control cost methods of estimated economic costs versus damage costs estimates.

Future estimates may be forthcoming from Resources for the Future (Washington, D.C.) from their air pollution research studies. RFF is studying the ancillary benefits and the net costs of climate policies. This entails the development of a modeling infrastructure for assessment of the ancillary benefits (and costs) of climate policies, and evaluating several leading policies addressing emissions of greenhouse gases for their ancillary benefits, primarily resulting from changes in emissions of criteria air pollutants. The infrastructure for this evaluation is derived from the Tracking and Analysis Framework (TAF), which the U.S. Department of Energy has helped to fund on behalf of the National Acid Precipitation Assessment Program (NAPAP). TAF is an integrated assessment model used to track changes in sulfur dioxide (SO2) and nitrogen oxides (NOX) emissions from electric utilities, the secondary formation of sulfates and nitrates, the deposition of sulfur and nitrogen, the environmental and public health impacts and economic benefits of such changes, and control costs. In this project, researchers will extend TAF to include representations of other criteria air pollutants as well as emissions of mercury, carbon dioxide (CO2), and methane from electric utility sources, industrial sources, area sources and mobile sources.

The GPI account estimates the cost of air pollution has been steadily declining due to an improvement in overall air quality resulting in an estimated cost of $54.2 billion in 1997 (in 1992 dollars) compared with an all-time high cost of $90.0 billion in 1972.
Cost of Noise Pollution (Column R)

The damage caused by noise pollution in the U.S. in 1972 was estimated at $4 billion (and $12.0 billion in 1992 chained dollars) by the World Health Organization (see 1972 Congressional Quarterly Almanac, p. 980). The original $4 billion figure is restated in 1992 chained dollars using the GDP chain-type deflator for 1972.

While there are considerable articles about noise pollution as well as standards for noise levels, there are no official inventories of noise pollution conducted in the U.S. We therefore continue to assume, as per the 1995 GPI, a 1% rate of decline in the auditory environment per annum.

For future estimates, it may be possible to assess trends in the auditory environment by looking at the major contributors to noise pollution and thereby estimating trends based on the increases in the physical numbers of these contributors. For example, the aircraft flights, truck transport miles, and automobile miles driven could be used. Generally auditory environmental quality indicators are not collected, though noise level standards are set.

Starting with an estimate of $12.0 billion in 1972, the cost of noise pollution was assumed to have grown by 3% per year before that year and by 1% per year in later years. We assumed that the quality of the auditory environment declined by 3 percent per year from 1950 to 1972, based on industrialization and increased noise emissions from motor vehicles and airplanes. From 1972 to 1994, noise abatement regulations are assumed to have reduced the rate of deterioration to 1 percent per year, but not to have improved it. With no new noise pollution data since the 1994 GPI estimates, we assume a constant rate of decline in the auditory environment at 1% per annum. There may be other approaches to assessing increasing noise pollution based on increasing numbers of aircraft flights and automobile miles driven, though this was not done for the 1998 GPI update. Generally auditory environmental quality indicators are not collected, though noise level standards are set.

The GPI account estimates the cost of noise pollution in 1997 at $15.3 billion, in 1992 dollars.

Loss of Wetlands (Column S)

Wetlands contain some of the most productive habitat in the world. Yet the value of wetlands are not represented in economic accounts because the benefits -- such as regulating and purifying water, and providing habitat for fish and waterfowl -- are generally "public goods," for which there is no overt price. When a farmer drains and fills a marsh, the GDP rises by the increased output of the farm. However, the loss of services from the wetland goes uncounted. The GPI rectifies that by estimating the value of the services that are given up when wetlands acreage is converted to other purposes.
According to the latest U.S. Fish and Wildlife Study (1997) the United States is continuing to lose wetlands but the loss has slowed to a rate 60 percent below that experienced in the 1970s and 1980s according to a new U.S. Fish and Wildlife Service report released today. While wetland restoration and creation activities have contributed to the national wetland base, the study showed a net loss of 117,000 acres per year between 1985 and 1995, much of which occurred in highly productive freshwater forested wetlands. For the first time in the Nation's history, there are fewer than 50 million acres of freshwater forested wetlands in the conterminous United States.

"Wetlands are crucial to the health of our environment," said Jamie Rappaport Clark, Director of the Fish and Wildlife Service. "This study shows that our Nation's efforts to restore and protect wetlands are making a difference."

According to the study, the factors contributing to the marked decline in the loss rate include implementation of the Section 404 wetlands permitting program of the Clean Water Act; state and local wetland regulatory programs; increased public awareness and support for conservation; expansion of Federal, state, local, and private-sector restoration programs that have contributed 78,000 acres a year to the national wetlands base; enactment of Swampbuster measures in the Farm Bills since 1985; and a decline in the profitability of converting wetlands due to the tax reform of 1986.

The U.S. Fish and Wildlife Service's National Wetlands Inventory measures wetland loss, which occurs when a wetland ceases to be a wetland. A wetland gain occurs only when a non-wetland becomes a wetland. Those changes are measured and reported in terms of acres. Between the 1780s and 1980s, what eventually became the 48 contiguous United States lost 54 percent of the estimated original 221 million acres of wetlands--a loss amounting to about 60 acres an hour for 200 years.

Between the 1950s and 1970s, the Lower 48 States lost an estimated 458,000 acres of wetlands each year; from the 1970s to the 1980s, the annual loss amounted to about 290,000 acres. The report, "Status and Trends of Wetlands in the Conterminous United States," is required by Congress at 10-year intervals.

Wetlands catch and hold floodwaters and snow melt, recharge groundwater, and act as natural filters to cleanse water of impurities. While wetlands comprise only about 5 percent of the land area in the conterminous United States, they vary widely in location, size, and type. They include: saltwater habitats, freshwater habitats, and upland land use.

Loss of wetlands due to agricultural activity has abated somewhat but was still 924,000 acres from 1985 to 1995 (around 92,000 acres per year. Losses due to agricultural activity accounted for 79 percent of the 1985 to 1995 total loss. Urban and other development accounted for the remaining 21 percent of the total loss recorded for the same period.
The loss of wetlands is estimated at 462,000 acres per year (458,000 in the Lower 48 States and roughly 4,000 in Alaska) through 1975; 294,000 acres per year (290,000 in the Lower 48 States) from 1976-1984, and; 121,000 acres per year (117,000 in the Lower 48 States) in subsequent years 1985-1995. 1996 and 1997 loss figures are extrapolated at the same rate of 121,000 acres per year that is a reasonable assumption based on contact with U. S. Fish and Wildlife Service officials. All figures are from the most recent U.S. Fish and Wildlife Service’s National Inventory and from the report, “Status and Trends of Wetlands in the Conterminous United States.” The next report will be prepared for Congress in 2000. The Alaska figures are based on an average annual figure using opening and closing stock estimates from U.S. Fish and Wildlife Services.

In terms of total acreage of wetlands, we estimated that a total of approximately 136 million acres of wetlands were filled in North America from the colonial period to 1950. Acreage declined from an original 395 million (including the contiguous lower 48 states and Alaska) in the 1780s to about 259 million acres in 1950 – a loss amounting to 60 acres an hour for 200 years, according to Status and Trends of Wetlands in the Conterminous United States, Fish and Wildlife Service (1997). U.S. Fish and Wildlife studies estimate that between the 1950s and 1970s, the Lower 48 States and Alaska lost an estimated 462,000 acres of wetlands (458,000 acres in the Lower 48) each year; from the 1970s to the 1980s, the annual loss amounted to about 294,000 acres (290,000 acres in the Lower 48). A recent report Status and Trends of Wetlands in the Conterminous United States by Fish and Wildlife found that the loss of wetlands has slowed to a rate of 60 percent below that experienced in the 1970s and 1980s for a net loss of 121,000 acres per year (117,000 acres in the Lower 48) between 1985 and 1995 (much of which occurred in highly productive freshwater forested wetlands of which there are now fewer than 50 million acres remaining in the conterminous United States).

The value per acre (in 1992 dollars) of the flow of services from an acre of wetland is estimated at $1,973 per acre per year in 1950. This is lower than other estimates by Costanza, d’Arge, de Groot et al. (1997) who estimated the average global value of ecological services from global wetlands in 1997 ranging from $25,000/ac/yr for coastal wetlands to $48,000/ac/yr for swamps and floodplains in 1996. However, if we estimate the value of ecological services of the accumulated loss of wetlands up to 1997, our per acre per year value amounts to an estimated $19,543 (in 1992 dollars) which compares with the coastal wetlands figure of Costanza et al. (1997).22 Compared with other studies, our estimate is a relatively conservative figure since calculations of the value of salt water wetlands have arrived at estimates 3 to 20 times as high. (See Lugo and Brinson, 1979). However, our figure exceeds another estimate by Gupta and Foster (1975) by about one-third the median.

The loss of benefits from wetlands is a cumulative process. For example, if 462,000 acres of wetlands were filled or drained in each of two successive years, at the end of the second year the loss would equal the benefits from 924,000 acres of wetlands.

22 The figure of $19,543 per acre is derived as follows: $19,543 = $1,973 * 1.05 to the 47th power.
We begin the calculation with an initial value of $44.6 billion for the annual value of ecological services for all wetlands lost through 1949. Our figure of $44.6 billion for 1950 is based on the following calculations: an average value of $327.87 (chained 1992$) an acre of services from wetlands, multiplied by 136 million acres lost, yields $44.6 billion as a plausible estimate of the cumulative loss through 1949. The value of each of the initial tens of millions of acres was lower than the marginal value of more recently filled acres. Starting in 1950, the value per acre of the flow of services from an acre of wetland was $1973 (in 1992 dollars) per acre per year. (That may seem like a sudden jump from $328, but that figure is an average of very low values for the first acres lost in the distant past with values close to $1973 in years through 1949.) In 1951 and following years, we assume that the value of wetland services rises by 5% per year, due to increasing scarcity. Thus the cost per lost acre in 1951 was $2072 ($1973 times 1.05), $2175 ($2072 times 1.05) in 1952, and so on. The acreage of wetlands to which this cost figure is applied also grew cumulatively since 1950: by 460,000 acres per year from 1950 to 1975, by 294,000 from 1976 to 1984 and by 121,000 from 1985 to the present.

The GPI account estimates the value of ecological services lost due to the accumulated loss of wetland in 1997 at roughly $350 billion, in 1992 dollars. Figure 11 shows this progress increase in the annual cost to the U.S. economy from the accumulated loss of wetlands since 1950.
Loss of Farmland (Column T)

Sustaining the productive capacity of farmland is fundamental to sustaining the basic need of food for American households. The productive capacity of farmland has been reduced in two ways. On one hand, urban expansion permanently removes land from production by paving it over. On the other hand, poor land management destroys the soil: erosion, compaction, and decomposition of organic matter all remove land from production gradually by lowering its productivity. The decline in soil quality over the past forty years has been masked by higher inputs of fuel and fertilizer. In addition, soil depletion is not necessarily linear. It may not show up gradually in yield reductions, but rather in a sudden and irreversible decline.

The contention that we can compensate for paving or mismanaging farmland by bringing new land into production is misguided. Most of the land that economists point to in this regard is now idle because it is “dangerously erodible when in crop production” (Healy, 1982, p. 115).

Another contention is that the costs of losing farmland can be safely ignored because the resulting losses will occur in the distant future when people will be far richer than today, and technology far more advanced. This is a reductio ad absurdum of conventional economic theory, which suggests that future gains and losses should be “discounted” at the prevailing interest rate to determine the “present value” of an action: in this case, the loss of soil. A century or so from now, Americans are not likely to be impressed at our foresight and wisdom in discounting their needs and well-being to zero.

Production should be regarded as genuine progress only to the extent that it is sustainable. Otherwise, it is simply the conversion of capital to current income. The GPI therefore subtracts the cumulative damage to long-term productivity of land that results from urbanization and poor land management (deteriorating soil).

According to the 1997 National Resources Inventory by the U.S. Department of Agriculture, there were 380.5 million acres of cropland in the United States. Of this area, roughly 108.9 million acres were considered "highly erodible." According to the U.S. Department of Agriculture (1997), total erosion on all cropland, between 1982 and 1997, decreased by 42 percent. In 1982, erosion totaled 3.4 billion tons; by 1997 it had been reduced to 2 billion tons. Total erosion on highly erodible cropland declined by 38 percent between 1982 and 1997. In 1982 there were 1.9 billion tons of erosion occurring on highly erodible land. By 1997, erosion fell to 1 billion tons on this land. Despite substantial changes from 1982 to 1995, there was virtually no change in the total amount of erosion or in the rate of erosion from 1995 to 1997.

According to the U.S. Department of Agriculture, despite gains in the fight against soil erosion, agricultural producers continue to face the challenge brought about by changing weather and market conditions of managing, maintaining, and enhancing the productivity of their lands. Soil erosion is a problem that must be continuously addressed through the enhanced development and application of conservation practices.
**Losses due to urbanization.** Approximately 40 million acres of farmland had been urbanized or transformed into highways and rights-of-way, by 1950 (Economic Research Service (ERS), 1982). At present, urbanization destroys approximately 300,000 acres of cropland per year. This is a conservative estimate, based on the 1981 National Agricultural Lands Study.

The value of an average acre of converted cropland, based on its productivity without high applications of fertilizers and other energy-intensive inputs, is estimated to be $329 per acre per year in 1992 dollars. To estimate the accumulated annual loss of services from farmland that had already yielded to urbanization by 1950, we used an average annual value of $71 per acre, in 1992 dollars (As in the case of wetlands, the marginal utility (or value) of the first acres removed from agriculture is lower than the value of the land most recently urbanized.)

According to the USDA 1997 State of the Land inventory, between 1992 and 1997, total U.S. cropland - both cultivated and noncultivated - declined from 382.3 million acres to 380.5 million acres. Of this 1.8 million-acre net reduction, 1.1 million acres came out of production between 1995 and 1997. This land was converted to other uses such as pastureland and some urban development. The 1.8 million-acre net reduction would amount to 360,000 acres per year from 1992 to 1997; how much of this total is urban development not available in the report). Thus our original 300,000 acres per year loss estimates may still be reasonable.

The cumulative cost of urbanization up to 1950 is estimated at $2.85 billion. This is based on an average value of $71 per acre for the approximately 40 million acres that have been urbanized or transformed into highways and rights-of-way. (Economic Research Service (1982). As in the case of wetlands, the marginal utility (or value) of the first acres removed from agriculture is lower than the value of the land most recently urbanized.

Urbanization thus removes annually from the cropland base, the biological services worth $2.85 billion in 1950, plus $98.7 million (300,000 acres times $329 per) acre for each subsequent year. These costs are cumulative. For 1997 we estimate the economic costs due to urbanization at $7.5 billion, in 1992 dollars.

**Losses due to deteriorating soil condition.** Urbanization removes the productive potential of farmland in a highly visible way. But it may not be as serious in the long run as the deterioration of soil due to poor management. The decline of soil quality over the past forty years has been masked by higher inputs of fertilizer, pesticides, and fuel. In addition, soil depletion is not necessarily linear. It may not show up gradually in yield reductions, but rather in a sudden and irreversible decline. Agricultural productivity losses from erosion have been estimated at $1.3 billion, or $2.15 billion in 1992 dollars (Soil Conservation Service, 1980).

This series actually starts in 1949, with cumulative damage or lost productivity due to erosion equal to $14.5 billion (in 1992 chained dollars). The rate of erosion is
assumed to have grown by one percent per year from 1950 to 1972. According to the recent 1997 State of the Land Report (USDA) the rate of erosion has declined from 8.0 tons/ac/yr in 1982 to 5.2 tons/ac/yr in 1995, then levels off. This amounts to a net reduction in erosion rates of 2.7% per annum through to 1995 which we use to extrapolate through to 1995, then assume no change in erosion rates from 1995 to 1997. We assume that the annual value of the cumulative damage prior to 1950 was $14.5 billion, with further costs added to that. By 1997 the estimated total cost due to soil erosion was $112.1 billion, in 1992 dollars.

The damage to soil from compaction by heavy machinery in 1980 was estimated at $3.0 billion in 1980 dollars (Sampson, 1981) or $4.97 billion in 1992 chained dollars. The above estimate converted to 1992 chained dollars using 1992 GDP chain-type price index yielding $4.97 billion. We assumed a 3 percent increase in the losses due to compaction for years prior to and following 1980. We were unable to find newer estimates of the cost of soil compaction. The 1997 estimate of the cost of soil compaction is $8.2 billion, in 1992 dollars.

The total economic costs of the loss of farmland to urbanization, soil erosion and soil compaction in the GPI is estimated at $127.8 billion in 1997 (in 1992 dollars) having risen steadily from an estimated $21.1 billion in 1950 (in 1992 dollars).

Depletion of Nonrenewable Energy Resources (Column U)

The depletion of nonrenewable resources is a cost shifted to future generations that should be borne in the present. Nonrenewable natural capital cannot be increased, it can only be diminished. As Herman Daly notes (1996) in Beyond Economic Growth for nonrenewable capital the question is not how to invest, but how best to liquidate the inventory and what to do with the net wealth (financial) realized from that liquidation. Our current accounting system counts this liquidation of natural capital wealth as income “which is clearly wrong, because it is not a permanent or sustainable source of consumption” (Daly, 1997). A prudent approach to sustaining the income and well-being of America’s households would require investment of a portion of the net rents derived from mining the nonrenewable natural capital into sustainable renewable energy and productivity or energy efficiency gains. A general rule would be liquidate the nonrenewables at a rate equal to the rate of developing substitute renewable resources. Ultimately, an economy in order to sustain a level of well-being and national income must ensure that the annual stream of benefits (income) derived from all forms of wealth, including renewable and nonrenewable natural capital, can be sustained. Living beyond the sustainable income stream of its capital base (whether renewable or nonrenewable) simply means that while current generations benefit, future generations will be worse off.

There can be no question that the nonrenewable reserves are finite at least within the time constraints of our own lifespans. There is also little doubt that the reserve life of nonrenewable natural capital wealth is declining both in North America and globally as we deplete an ultimately finite physical supply of these resources. The only question is
how long we can either prolong the reserve life of petroleum resources, limit its decline or forestall an ultimate peak in global demand. Perhaps the best indication regarding energy is the declining amount of energy outputs produced from a given amount of energy inputs. In the United States, the output/input ratio for oil -- the amount of new energy actually produced from a given energy expenditure for exploration, extraction, and processing -- declined from about 100 in the 1940s to 23 in the 1970s, and to about 8 for new discoveries in the 1990s (Gever et al., 1986, p. 70).

Americans are still highly dependent on nonrenewable energy resources for their energy requirements. According to U.S. Department of Energy, the of a total consumption of 94.21 quadrillion Btus of energy to the U.S. economy in 1997, 80.36 quadrillion Btus or 85.2 percent came from fossil fuels (21.44 quadrillion Btus from coal, 22.59 from natural gas, and 36.31 from petroleum). Of the fossil fuel total, 58.76 quadrillion Btus or 73 percent came from domestic production while the remainder was imported. Nuclear energy contributed 6.69 quadrillion Btus or 7 percent to total consumption. Only 7.14 quadrillion Btus or 8.2 percent of total energy consumed was in the form of renewable energy.

In terms of production, renewable energy’s share of U.S. total energy production has more than doubled since the 1950s from roughly 4 percent of total production to 9.6 percent by 1997. The majority or 54 percent of the renewable energy production comes from conventional followed by biofuels at 39 percent, geothermal at 5 percent, solar at 1 percent and wind at less than 1 percent of total renewable energy production. The GPI focuses on biofuels from biomass as the sustainable substitute energy resource. Of all renewable energy resources, biofuels have seen the greatest increase of the renewable energy resource pie rising from less than 1 percent in 1950 to almost 50 percent of total renewable energy production. It is the most important renewable energy resource after conventional hydroelectric power. However, biofuels still constitute only 3.8 percent of the total U.S. energy production in 1997.

Many economists argue that physical depletion of resources is irrelevant because technology will always come to the rescue. Resources will become more abundant rather than scarcer. The evidence for this view lies primarily in the historic decline in prices of nonrenewable resources, particularly oil and other energy sources. (If demand for a commodity stays the same or increases and its price declines, that is generally evidence that the supply has increased, at least in the short term.) As a result, economists tend to claim that there is no reason to be concerned; or at least that any depletion account should be offset by an accumulation account.

Basically, there are two reasons for believing that economic theory is misleading on this issue. First, the depletion of petroleum reserves in any given country is economically significant even if the world supply -- and thus world price -- remains steady.

Increasingly, that country will have to give up other products to pay for imports as its own supply of oil runs out. Thus, since the U.S. has already depleted much of its oil,
and has now turned to imports, the present generation must pay for that previous consumption in one way or another. Similarly, petroleum production in the U.S. today means that our nation will simply have to import more in the future, with all the additional costs and vulnerabilities that entails.

Second, on a global level, the current price of oil and other resources is not necessarily a good indicator of its long-term scarcity. Economic theory says it is; but the underlying argument is circular. The way producers of a resource supposedly know of future scarcity is through the current price. In effect a resource is deemed not scarce today if enough people believe, based on its price, that it will not be scarce in the future. (This is a simplification of an argument made by Richard Norgaard, 1990.) An overly optimistic world can effectively deplete its supply of oil just as easily as it can wipe out the passenger pigeon.

If current price is not an unfailing indicator of scarcity, what price should be used to reflect the true cost of nonrenewable resource depletion? The GPI uses estimates of renewable energy replacement costs as an approximation. It estimates the amount of money that would have to be invested to substitute for the energy that is extracted. Specifically, it considers the cost of producing close substitutes such as “gasohol” from sugar cane or other organic material. Of course there are numerous other forms of renewable energy, including wind, solar, and other biomass. There are also new technologies, such as fuel cells, that could provide a technological fix that would forestall the ultimate depletion of nonrenewable resources.

The GPI focuses on energy resources because they account for 75 percent to 80 percent of the value of raw materials produced in the United States and because a physical measure of energy can be used to aggregate various sources (coal, oil, natural gas, and nuclear power) into a single number, which is not possible for other minerals. Moreover, cheap energy can mitigate the costs of extracting minerals from low-grade ores; but high-grade zinc or copper ores can do little to provide more energy.

We base our estimates of replacement cost of nonrenewable energy resources on the estimated costs of biomass fuel production. While this approach is debatable we believe it is both intuitive and reasonable. Since, biomass fuel currently constitutes the second largest share of the renewable energy market (38 percent), after conventional hydro and that it amounts to roughly 3 percent of total energy consumption in 1997. Our estimates would benefit from scenario analyses that consider the economies of scale for solar, wind and other renewable energy sources.

Our estimate of $75 per barrel, as the nominal replacement cost in 1988, is based on the assumed marginal cost of producing a barrel-equivalent of energy from biomass if a large proportion of fuel needs were being met from that source. According to a study by the U.S. Department of Agriculture, ethanol would cost around $40 per barrel if biomass conversion were not receiving a subsidy, and if the corn used to make ethanol cost $2.00 per bushel (ERS, 1988). If the price of corn were $4.00 per bushel, the cost of producing ethanol would rise to $50 per barrel.
However, if the U.S. tried to double or triple production (from the current level of around one-half of 1 percent of national gasoline consumption,) that “would begin to place strong upward pressure on corn and other grain prices, thereby increasing the production cost of ethanol and reducing its competitiveness with alternative energy sources” (ERS, 1988). Increasing the production of ethanol to 50 percent of the energy content of gasoline used in the U.S. might drive the price of corn as high as $15 to $20 per bushel, which would push the cost of producing ethanol up over $100 per barrel.

In addition, erosion (resulting from removal of crop residues from the land) could increase by up to nine times (Council for Agriculture Science and Technology, 1984). The energy cost of counteracting those effects could be high enough to eliminate any net energy given from ethanol production. According to Hopkinson and Day (1980), the net energy derived from sugar cane that is transformed into alcohol ranges from 0.8 to 1.7. If the processing plant uses petroleum as its own source of energy the process would produce 8 units of energy for every 10 units consumed. If the process uses bagasse (the sugar cane stalk) for part of its energy needs, it produces 17 units of energy for every 10 units consumed.

Even the latter figure overstates net energy by excluding the cost of transporting the ethanol to its end use. Thus, a more plausible estimate of the replacement cost might be one or two hundred dollars per barrel. Calculations of this magnitude might seem absurd -- except that the United States was already paying out the equivalent of over $468 per barrel of oil on military expenditures in the Persian Gulf, before the Gulf War (Lovins and Lovins, 1987, pp. 26-27).

Of course focusing our hope on biofuels may itself have limits given the relatively scarcity of land and conflicting demands for alternative land use, including food production. This why we estimate a 3 percent annual growth of the real replacement cost of energy based on increasing demands for land in alternative uses (e.g. food exports) and the rising cost of energy which is used in the manufacture of ethanol. It is reasonable to expect that, as the limits of a resource are approached, the cost of extracting the next unit is more costly than the previous unit.

We have also not considered the issue of reinvesting a portion of the resource rents from nonrenewable energy use into substitute renewable energy resources to provide a sustainable benefit for the well-being of future generations. The fact that, after almost fifty years of nonrenewable energy liquidation, renewable energy makes up less than 10 percent of total energy production in 1997 suggests insufficient investment of nonrenewable resource rents into sustainable energy substitutes for the well-being of future Americans.

The GPI results for 1997 estimate that the cost of replacing nonrenewable energy production at $1,281 billion, in 1992 dollars. This adjustment represents the most significant negative adjustment in the GPI account. The consequences of not investing an adequate amount of current income in renewable energy resources are undoubtedly significant. Figure 12 shows the increasing cost associated with replacing nonrenewable
energy resource as fossil fuel production rises from 1950 to 1997. The longer we differ investment in renewable energy resources the greater the economic impact on the well-being of current and future American households.

**Figure 16**

**RISING COST OF NONRENEWABLE ENERGY USE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Nonrenewable Energy Production (billion barrels of oil equivalent)</th>
<th>Nonrenewable Replacement Cost (billion 1992 dollars)</th>
</tr>
</thead>
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<tr>
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<td>95</td>
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</tr>
</tbody>
</table>

**Long-term Environmental Damage (Column V)**

The integrity and carrying capacity of natural and biological ecosystems is perhaps the single most important element contributing to the well-being of our nation and its households. Without the services of our surrounding natural environment, which provides clean air, water, arable land and natural capital resources, the entire basis of production of households and industry could not exist. While modern economies and societies have devised ingenious rose-colored glasses that include myopic systems of commerce and technology, these systems seem to ignore the basic laws of physics and that ecosystems exhibit carrying capacities. To ignore sustainable stewardship and the integrity of the “garden” in which we live for short-term financial and economic gains, may lead to the collapse of the natural systems upon which human well-being ultimately depends.

Modern industrial civilization has been highly successful in extracting resources from nature. However, the price of that success has been the accumulation of waste products with long-term effects such as carbon dioxide and nuclear wastes. In the case of nuclear power, the costs imposed on future generations through decommissioning atomic reactors would be large, even apart from the difficulties of managing high-level wastes. These costs may eventually amount to several tens of billions of dollars per year.
As large as the costs of radioactive waste management may be, however, they pale beside the potential ones of climate change due to carbon dioxide, chlorofluorocarbons (CFCs), nitrous oxide, and methane emissions (“greenhouse gases”).

The impacts of climate change are increasingly been felt around the world, whether or not we can definitely point to the burning of fossil fuels as the reason. The economic impacts are real and amount to billions of dollars in damages in our households, infrastructure and natural capital. As incidence of severe weather conditions seems to escalate the costs in insurance payouts and replacing lost or damaged homes, buildings, livestock and other household resources mount. Ironically, these nature disturbances result in a positive feedback loop whereby increasing frequency and intensity of storms and severe weather leads to increasing use of natural capital resources as we rebuild shattered homes and infrastructure after the storm. Yet neither the cost of our impacts on the earth’s climate, or the increasing costs of cleaning up after the storm, or the increased depletion of nature’s capital is accounted from in the GDP of nations.

Economist William R. Cline has estimated the likely costs of global warming. Based on the Intergovernmental Panel on Climate Change (IPCC), which indicates that a 2.5 degree Centigrade warming is probable by 2025, Cline calculates this would generate around $60 billion (1990 dollars) in annual tangible losses and perhaps another $60 billion annually in intangible losses, particularly species loss (Cline, 1992). Cline recognizes that the IPCC may have underestimated the amount of warming by ignoring the short-term “masking” of potential warming by sulfates from urban pollution. Other positive feedback mechanisms may have been underestimated by the IPCC, such as the release of methane from peat deposits and increased trapping of heat by clouds in the upper atmosphere as warming causes a redistribution of clouds from the lower to the upper atmosphere.

Not everyone agrees that the greenhouse effect will be economically damaging. William Nordhaus, for example, has argued that people who live in industrialized countries do not have to be concerned about the buildup of carbon dioxide in the atmosphere, in this respect.

Nordhaus argues that climate change has little economic impact upon advanced industrial societies. Cities are increasingly becoming climate proofed by technological changes like air-conditioning and shopping malls. Greenhouse warming would have little effect on America’s national output. About 3 percent of American GNP originates in climate-sensitive sectors such as farming and forestry. Another 10 percent comes from sectors only modestly sensitive—energy, water systems, property and construction. Far the largest sector, 87 per cent, comes from sectors, including most services, that are negligibly affected by climate change (Nordhaus, 1990).

He concludes that “the impacts of climatic change on developed countries...are likely to be small, amounting to less than 1 per cent of national income over the next half-century.”
In anticipation of critics like Nordhaus, Cline understates temperature change projections and assigns too much weight to conservative damage estimates. For example, he focuses on the fertilization effects on food crops of increased carbon dioxide, despite the caveat that laboratory results showing this result are biased by the presence of adequate water and fertilizer. He also ignores the fact that weeds will also have access to increased carbon dioxide and that increased temperatures are likely to oxidize the humus in soil that is essential for plant growth.

Cline introduces the important principle that future costs of global warming should be discounted at a very low rate of interest. In that way, the present value of future costs becomes a significant factor in accounts that balance costs and benefits of energy consumption. Thus, his conservative estimates are of the same order of magnitude as ours. Since we are estimating the total cost of long-term environmental damage, including the cost of managing radioactive waste, it is not surprising that our estimate is several times higher than Cline’s.

In order to relate current behavior to future damages, the GPI treats the amount of long-term damage to the climate and the environment as directly proportional to the cumulative consumption of fossil fuels and nuclear energy -- in effect to non-renewable energy consumption. Data on energy consumption were taken from U.S. Department of Energy, *Annual Energy Review 1997* (1998). The total barrel-equivalents of energy consumed each year from 1900 to 1997 were calculated, then multiplied by a $1.45 per barrel “tax”, an estimate of long-term environmental damage from cumulative nonrenewable energy consumption\(^{23}\). The values could be thought of as the amount of money that would have been accumulated to compensate future generations for the long-term costs of energy consumption if a $1.45 per barrel tax had been levied on each barrel used.

While some may criticize the arbitrary choice of a “tax” (Neumayer, 1998) we feel that it is nevertheless an intuitive approach. We challenge others to estimate more appropriate costs. The billions of dollars in increased insurance payouts to replace and repair of property losses due to severe weather and the insurance industry’s increasing interest in assessing risk associated with climate change provides some evidence that the economic costs of climate change are both real and significant. We believe our estimates are indeed conservative. Indeed, if you believe there is a finite probability of a disaster or non-linear catastrophic event on a global scale due to climate change caused, even in part, by human activity, then even our estimates of “costs” are both inappropriate and insufficient.

The GPI account estimates that in 1997 the cost of long-term environmental damage amounted to $1,012 billion, in 1992 dollars, the second largest adjustment in the GPI account.

\(^{23}\) Nonrenewable energy excludes solar and wind energy but includes hydropower that we assume also causes long-term environment damage.
In the 1995 GPI report we referred to scientist who in 1993 determined that the rapid decline of frog populations throughout the world was a result of increased levels of ultraviolet radiation reaching the earth’s surface. That, in turn, was caused by the reduction of the stratospheric ozone layer, due to the release of millions of metric tons of chlorofluorocarbons (CFCs) and other ozone-depleting chemicals during the past few decades.

From November 1978 to October 1986, the amount of ozone in the stratosphere above the mid-northern hemisphere declined by somewhere between 4.4 percent and 7.4 percent (David Health of NASA’s Goddard Space Flight Center, testimony in Ozone Layer Depletion, p. 32). The resulting increase in ultraviolet radiation will cause a higher incidence of skin cancer, particularly among fair-skinned people. The risk of malignant melanoma is already rising: from a lifetime risk factor of 1 in 600 in 1950 to 1 in 135 in 1987 (Darrel Rigel, testimony in Ozone Layer Depletion, pp. 70-80). Yet, human skin cancer represents the least ecologically significant effect of increased UV radiation. Unlike humans, plants and animals (such as frogs) cannot readily protect themselves from these higher levels. The ecological effects could be catastrophic.

Significant progress has been made in reducing the production CFCs since the peak year 1988. CFC production has continued to decline and is now down to the production levels of 40 years ago. According to Alternative Fluorocarbons Environmental Acceptability Study (AFEAS), the sum of all CFCs voluntarily reported\(^ {24}\) to AFEAS by the chemical industry in 1996 were only 7 percent of the peak production levels of 1988. When reported production is weighted by the global warming potential (GWP) for each compound, the total CFC production has declined by over 80% from 1988, the peak year.

While annual production of CFCs may have declined dramatically the cumulative impacts on the depletion of the earth’s ozone layer continues with the largest Antarctic ozone hole ever observed. According to NASA and the National Oceanic and Atmospheric Administration (see the Washington Post, October 7, 1998 “Hole in Ozone Layer is Biggest Ever”), the total area of ozone depletion over Antarctica reached an all-time record of 10.5 million square miles or larger than all of North America. The 1998 ozone hole is one third larger than in 1997 and unusually deep, extending nearly 15 miles into the stratosphere. Near the center of the hole the ozone is gone, destroyed by industrial chemicals, including now-banned CFCs. A revised assessment by the World Meteorological Organization, to be released next year, is expected to predict another 10 to 20 years of severe ozone depletion until recovery begins resulting from current reductions in CFC production.

There are no definitive studies showing the combined health and ecological consequences of ozone depletion over the next half century. However, scientists warned

\(^{24}\) The chemical industry voluntarily reports the production and sales of fluorocarbons through a survey compiled by an independent accountant, Grant Thornton LLP for AFEAS.
that the ozone loss could result in increased exposure to harmful solar radiation that can destroy plants and cause cataracts and skin cancer in humans. Given the potentially catastrophic effects on all forms of life, we made an estimate reflecting our expectation of the order of magnitude of the problems that will be used by this long-term problem.

The calculation for the cost of ozone depletion involves multiplying the cumulative world production of CFC-11 and CFC-12 by $15 per kilogram. We estimated that one-third of world-wide CFC use is in the United States, so we multiply total production of CFCs by $5 (one-third of $15) in 1972 dollars or $15.26 in 1992 dollars. Cumulative world-wide production of CFC-11 and CFC-12 (in metric tons) for 1950 to 1986 come from Ozone Layer Depletion, p. 435-436. Data for 1987 to 1989 come from AFEAS, 1995. Data for the period 1989-1996 CFC-11 and CFC-12 annual production figures are from the AFEAS 1997 report Production Sales and Atmospheric Release of Fluorocarbons. The 1997 accumulated production figures for both CFC-11 and CFC-12 are estimated based on the past 5 year trend 1991-1996 in annual production. Annual production rates have fallen dramatically and thus the annual increase in cumulative production of CFCs has slowed dramatically, averaging 1.17% per annum from 1991 to1995.

The GPI account estimates the cost of ozone depletion in 1997 at $307 billion, in 1992 dollars.

**Loss of Forests (Column X)**

Whenever forest land is cut for timber or to build a road, a range of ecological values are lost, at least until the forest is regenerated to the same age as the stand that has been cut. Even if successful forest management results in full restocking of the same species of timber, the original forest ecosystem may never be renewed. Forest management, that focuses primarily on the timber capital, may preclude the species complexity and thus the ecosystem services of the original forest. If the forest is cut or regenerated improperly, or if the size of the total cut is sufficient to drive unique species into extinction, the damage from roadbuilding, cutting, and reforestation can be effectively permanent.

In theory, an account of value of forest ecosystems should account for the loss of forest ecosystem integrity and ecological services and the cost of unsustainable forest management practices. Conceptually, we focus on two distinct, though interrelated, types of costs associated with roadbuilding and timber harvesting. One is resource loss: the reduction in the amount of timber that can be harvested in the future. The other is ecological: the destruction in species of both plants and animals. Our analysis, however, only focuses on the old growth forest of the Pacific Northwest thus precluding analysis of the loss of ecological services that may have been realized on vast areas of other U.S. forest lands, most of which are now managed and thus no longer in their original or old growth state. We believe our estimates of the loss of forests are conservative. Future accounts should account for the value of sustainable or unsustainable timber capital.
which is under managed conditions as well as the economic losses of ecological services due to loss of forest ecosystem integrity and biodiversity.

Replacing complex, old-growth forests with monoculture tree farms creates the impression that the first cost can be easily managed. In fact, the net growing stock of softwoods in the United States has remained approximately constant since the 1950s; and the stock of hardwoods has increased (Powell, 1988, p. 50). (Softwood volume grew from 432 billion cubic feet in 1952 to 467 billion in 1977, then fell to 450 billion in 1992. The net stock of hardwood has increased significantly from 1952 to 1992: from 185 billion to 336 billion cubic feet.)

Yet the forests or tree farms that have replaced old-growth forests are not biologically equivalent. Tree farms are productive and profitable, at least for one or two rotations of the timber stock; but they do not support the range of wildlife that can be found in old-growth forests. In addition, commercial silviculture makes demands on soil that are not sustainable. In the Pacific Northwest, 80-year-rotation tree harvesting removes around 1000 pounds of nitrogen per acre from the soil, whereas old-growth forests tend to add 2,000 to 4,000 pounds of nitrogen per acre (Norse, 1988). Thus, even when the accounts show an increase in total volume of wood, the living resource is likely to have been diminished.

Our estimate of nonmarket or environmental values is based largely on the changing stock of old-growth forest. Much of the debate over the amount of remaining old-growth forest hinges on definition. Old-growth forest in the Pacific Northwest has been defined by the U.S. Forest Service since 1986 as stands with at least 8 trees per acre over 200 years old or 32 inches in diameter, a specific density of conifer snags, and two or more tree species (Old-Growth Definition Task Group, 1986 and Peter Morrison, 1988). Some studies have used less restrictive definitions based entirely on the age of stands.

However, even the most restrictive definitions may understate the ecological losses from edge effects: ten isolated 100-acre stands have far less ecological value than a single 1,000-acre stand. As a result of such factors, any numerical estimate of loss will be imprecise.

The discrepancy in the definition of old growth forest is epitomized by these two examples: The U.S. Forest Service estimates that of an estimated 16.4 million acres in their Pacific Northwest (PNW) plan area 52 percent is estimated to be currently in a large-tree or old-growth condition. Their plan projects an increase to 73 percent over the long-term. They also not that “the PNW plan anticipates that forests of young trees will continuously occupy about 20 to 40 percent of these lands. In areas of scheduled timber management, the plan would maintain about 50 percent of the forest in a large-tree or old-growth condition.”

In a second study by Bolsinger and Waddell (1993) estimate that old-growth forests in California, Oregon, and Washington cover about 10.3 million acres. Estimates
were obtained for National Forests, national parks, state parks, state forests, Bureau of Land Management land, U.S. Fish and Wildlife Service land, Native American land, and private ownership. Oregon has almost half of the old-growth acres with about 5 million acres in seven different ownership’s. More than 80 percent of the old-growth is on Federal land, primarily National Forests. Old-growth occupied about half of the forest area when the first comprehensive forest surveys were made in the 1930s and 1940s. The conclude that less than 20 percent of the original forest area is now old-growth.

In order to estimate the cost of losing old-growth forests, we assume that the foregone benefits are directly related to the cumulative erosion of the ecosystems comprised by these forests. Although a few secondary forests in the Northeast, Midwest, or Southeast may have been regrowing long enough to qualify as old-growth, we have assumed that the remaining old-growth of consequence is limited to the Pacific Northwest. Furthermore, since most of the old-growth forest on private lands appears to have been cut by 1950, we focus exclusively on that remaining in National Forests.

From 1950 to 1997, we used rates of reduction of old-growth forests in the Pacific Northwest to estimate the additional cumulative cost of forest decline. This is based on the premise that the value of a diminishing resource for which there is increasing demand (in this case ecological amenities) increases at a growing rate as the supply declines. Each year, we added the loss of value to the cumulative loss up to that point because the erosion of ecological services from cutting an old-growth forest does not occur in the initial year alone but over a period of decades.

The rate of decline in old growth forest from 1991 to 1997 from the 2.0 million assumed stock in 1990 is based on the growth rate of total roads in National Forests at 0.878% per annum. This is a purely arbitrary projection given that no official U.S. Forest Service Statistics exist for old growth forests. The rate of depletion while undoubtedly slowing may indeed be higher than our extrapolations suggest. This extrapolation of course assumes that road construction is uniformly distributed across all National Forests including old growth forests. A more accurate picture would require road miles estimates for the Pacific Northwest region which contains the majority of old growth forest.

The initial estimated cost of the ecological services lost due to accumulated loss of old growth forest in 1950 is estimated at $42.6 billion (1992 dollars). We assumed that the ecological value of the remaining old-growth in National Forests in 1950 (beyond their value for timber or pulp) was $1,419 per acre ($1000/acre in 1982$ in the 1995 GPI). We assume that their value increased by 5 percent per year until only 5 million acres remained in 1967; by 8 percent per year from 1968 to 1979; and by 10 percent per year from 1980 until the present. This reflects the increasing marginal value of old-growth forest as it declines. By 1994, an acre of old-growth forest is valued at $28,000 per acre (in 1992 dollars) -- not as timber, but as a source of ecological and recreational values. By 1997, the estimated cost of old-growth forest loss is estimated at $78.2 billion, in 1992 dollars.
In addition to the loss of old-growth forests, the existence of roads in National Forests reduces the population of sensitive species that are affected by noise and traffic, erosion and sedimentation, and the increased presence of humans. These costs are especially pronounced during the construction period, but they persist through the life of the road to a lesser degree.

It might be argued that roads have nonmarket benefits because they increase access to forests. The evidence for this is the rise in visitor-days at various federal and state recreation areas, including National Forests. However, there is a certain irony in defining forest roads as a benefit in this respect. The elimination of most forests in the vicinity of urban areas over the past two centuries now forces urban dwellers to drive considerable distances to experience what at one time could have been enjoyed nearby. In some sense, recreational visits to the islands of “nature” in the midst of human artifacts have become another form of defensive expenditure to counteract the negative effects of urbanization. Thus, we have not treated those visits as a benefit.

The calculation of losses due to roads in the National Forests are based on the total stock of roads in any given year. A mile of forest road with a 60 foot right-of-way covers approximately 7 acres of land. If the impacts such as noise, edge effects, and runoff are included, a mile of road affects at least 500 acres of land. This provides a very rough estimate of the environmental costs because the damage caused by roads depends on many factors including age, location, and slope, the quality of construction and the frequency of maintenance. Nevertheless, even the best roads cause some continuing ecological disruption by breaking up the landscape, raising erosion levels, disturbing downstream fisheries, and generally increasing the level of human activity.


We assume that the cost of damages to the forest from roads from 1950 to 1959 is $14,194 per mile (1992 dollars) (based on the 1995 GPI estimates of $10,000 per mile in 1982 dollars). From 1960 to 1979, the cost per mile is assumed to decline on a straight-line basis from $14,194 to $10,645 and to remain at $10,645 after that, in 1992 dollars. We estimate the cost of ecological damage due to roads at $4 billion in 1997.

The GPI estimates for the loss of old-growth forest due to resource loss and ecological service losses is $82.2 billion in the year 1997, in 1992 dollars.

**Net Capital Investment (Column Y)**

For an economy to prosper over time, the supply of capital (buildings, machinery, and other infrastructure) must be maintained and increased to meet the demands of...
increased population. If this does not occur, the society is consuming its capital as income. Thus, one element of economic sustainability is constant or increasing quantities of capital available for each worker. The GPI calculates changes in the stock of capital (or net capital growth) by adding the amount of new capital stock (increases in private, nonresidential fixed reproducible capital) and subtracting the capital requirement, which is the amount necessary to maintain the same level of capital per worker.

The aim of this column is to estimate increases in the stock of capital available per worker. The capital requirement is estimated by multiplying the percent change in the labor force by the stock of capital from the previous year. (This is analogous to creating an index number for the ratio of capital stock to the labor force with 1949 = 100.) A five year rolling average of changes in labor force and capital is used to smooth out year to year fluctuations.


The GPI considers the net capital stock (or net capital growth) available to workers or households as a positive adjustment in the GPI account. In 1997 the net capital stock or growth was $44.3 billion, in 1992 dollars representing a slight improvement over 1996 levels of $41.3 billion. However, net capital stock has been declining since its peak in 1985 at $85.8 billion (see Figure 13).

Net Foreign Lending or Borrowing (Column Z)

The economic sustainability of a nation is also affected by the extent to which it relies on foreign funding to finance its current consumption. A nation that borrows from abroad to pay for a spending spree will feel rich for a short time. The illusion of wealth will vanish when the debt comes due or when the value of the currency drops as foreign investors lose confidence in that nation’s ability to repay its loans.

The U.S. net international position measures the amount that Americans invest overseas minus the amount foreigners invest in the United States. The annual change in the net international position indicates whether the U.S. is moving in the direction of net lending (if positive) or net borrowing (if negative). If the change is positive, the U.S. has in effect increased its capital assets. If it is negative, part of U.S. capital formation is in fact based on wealth borrowed from foreign interests that must eventually be repaid with interest. We have thus included annual changes in the net international position as a measure of the long-term viability of our economy.
The interaction of Net Capital Investment (Column Y) and Net Foreign Lending or Borrowing (Column Z) measures the net borrowing to finance current consumption. If net borrowing in Column Z exceeds net capital formation in Column Y, then borrowing from overseas is for consumption purposes. If borrowed money is used for investment purposes, the negative effects of borrowing are neutralized by the positive effects of investment; but if the borrowed money is used for consumption, that causes GPI to decline.

The premise is that a household cannot live forever on borrowed income, so borrowed income should be subtracted from current expenditures to derive the sustainable level of expenditure. They can actually borrow year after year in a growing economy and never cut into current consumption to pay off the loans.

As the United States went deeper into debt in the 1980s and its net international investment position deteriorated, Robert Eisner and other economists criticized the method of calculating this measure. They pointed out that by valuing American assets held abroad at their historic purchase price rather than current market value, the methodology underestimated the net U.S. position. (American assets overseas are older and thus more likely to be undervalued than foreign-owned assets in the U.S. that generally have been acquired more recently).

The Bureau of Economic Analysis (BEA) has developed estimates for 1983 to 1997 of the net international position with assets at market value, which provides a more useful estimate of net investment than historic cost estimates (Bureau of Economic Analysis, Table 3.—International Investment Position of the United States at Year end, 1983-97 Survey of Current Business, (July & September), 1998; and Economic Report of the President, 1998). We use new statistics for the period 1983 to 1997. For the historical period 1950 to 1982, we use the BEA’s historic cost estimates (derived from Statistical Abstract (1988, table 1330, p. 758)) for net international position, however, the difference between historic costs and market value are small and would not have altered the net international position substantially. The BEA periodically updates and revises historical net international investment figures, with the latest revisions for the period 1983 to 1997 showing significant changes compared to the figures used in the 1995 GPI account. The BEA publishes these statistics annually, but they also modify estimates for previous years, so it is very difficult to maintain a consistent time series.

The annual figures for the U.S. net international investment position (market value) show a rapid deterioration through the 1990s (see Figure 13). From a net lending position of $349 billion (1992 dollars) in 1983, the U.S. net international position in 1997 had slipped to a net borrowing position of -$1,185 billion, in 1992 constant dollars.
As with the estimates of Net Capital Investment, we adjust the annual net international position values for inflation and then use a five year rolling average of these values to smooth out year-to-year fluctuations. This tends to dampen the impact of the actual and sometimes extreme annual net international positions. For example, the GPI account for 1997 shows a -$146 billion net borrowing position (using a five year rolling average) compared with the 1997 actual figure of -$1,185 billion.

**The Genuine Progress Indicator (GPI) (Column AA)**

The Genuine Progress Indicator (GPI) starts with “Personal Consumption Weighted for Income Distribution” (Column C), adds four columns (D through G), subtracts seventeen columns (H through X! and adds two columns (Y and Z). The result is a more honest account of the genuine economic progress of the U.S. economy (the state of the households of the nation) by accounting for the value of a number of elements that represent social and ecological costs or benefits. While undoubtedly incomplete, this account demonstrates the value of services derived from real wealth and assets that are probably at least if not more meaningful in defining the state of the nation’s households than the current GDP account of the monetary value of goods and services bought and sold in the market places of the nation. The GPI accounting exercise demonstrates the complexity of accounting for real and total wealth. If as many economists and statisticians were devoted to this more complete accounting of the state of the economy, we might be empowered with better information to more prudently manage the households and state of the nation.

**Per Capita GPI (Column AB)**

Per capita GPI is calculated by dividing the GPI by the population (from the Economic Report of the President, 1998).
Gross Domestic Product (GDP) (Column AC)


Per Capita GDP (Column AD)

Per capita GDP is GDP divided by the population.
Insert GPI Data by Column Table 1.1
Insert GPI Data by Column Table 1.2
Sources

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