

Alberta

Sustainability Trends 2000

The Genuine Progress Indicators Report
1961 to 1999

April 2001

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About the Pembina Institute

The Pembina Institute is an independent, citizen-based organization involved in environmental education, research, public policy development and corporate environmental management services. Its mandate is to research, develop, and promote policies and programs that lead to environmental protection, resource conservation, and environmentally sound and sustainable resource management. Incorporated in 1985, the Institute's main office is in Drayton Valley, Alberta with additional offices in Calgary and Ottawa, and research associates in Edmonton, Toronto, Saskatoon, Vancouver and other locations across Canada. The Institute's mission is to implement holistic and practical solutions for a sustainable world.

The Green Economics Program is dedicated to designing and implementing practical, street-smart economic tools that would reorient society back to the original meaning of the word "economy"—the care and management of the wealth of the household. By developing new tools for measuring the true wealth or well-being of nations, we can help guide Canadians and Albertans to a sustainable future.

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About this Report

The Genuine Progress Indicators (GPI) and the sustainable well-being accounting system developed by researchers at the Pembina Institute, track roughly 40 years (1961 to 1999) of progress in using over 50 key indicators of the sustainability of human, social, natural, produced and financial capital. Applied for the first time to Alberta, this comprehensive reporting system could be used by nations, provinces, states and communities to measure and monitor the sustainable well-being of societies and the environment.

This report provides a high-level overview of the Alberta GPI Project, which was begun in mid-2000 and completed early in 2001. It presents the sustainability trends that emerged from a detailed examination of 51 indicators in three main areas: economic, personal-social and environmental. While considerable data analysis was undertaken, interpretation and explanation of the results were outside the scope of the study.

The report summarizes over 700 pages of material prepared as part of the Alberta GPI project. This includes a two-page summary of each indicator, 29 background reports, and a "primer" that describes in more detail the methodology and concepts behind the GPI accounting system. The two-page summaries as well as this report can be downloaded at no cost from the Pembina Institute's website at www.pembina.org. The primer and background reports will be released during 2001.

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Acknowledgements

The Pembina Institute is grateful to Western Economic Diversification for their generous support for *Alberta Sustainability Trends 2000*, the first comprehensive sustainability report on the trends in the conditions of Alberta's economy, society and environment.

The Alberta Genuine Progress Indicator accounts were developed using an array of data from Statistics Canada, the Alberta Government and several other sources. We would like to acknowledge the contribution of Statistics Canada, whose wealth of data and talented staff made such a massive accounting exercise possible. Without their ongoing commitment to data collection and practical analysis, the construction of the Alberta GPI accounts would not have been possible.

We are also deeply grateful to the many experts who generously shared their knowledge and insights, offering constructive and thoughtful comments that improved the quality of our work.

However, the contents of this report are the responsibility of the Pembina Institute and do not necessarily reflect the views and opinions of those who provided information and comments, or the opinions or positions of Western Economic Diversification.

We have made every effort to ensure the accuracy of the information contained in this document at the time of writing. However, the authors advise that they cannot guarantee that the information provided is complete or accurate and that any person relying on this publication does so at their own risk. Given the broad scope of the project and time constraints, it has not been possible to submit the entire report for peer review. The material should thus be viewed as preliminary and we welcome suggestions for improvements that can be incorporated in any later edition of the work.

About the Author

While the Pembina Institute assembled a team of analysts and economists to undertake the GPI project, Mark Anielski, the project leader, wrote this summary report.

Mark Anielski is Director of the Pembina Institute's Green Economics program. He also serves as Senior Fellow to the U.S. economic policy think-tank Redefining Progress in Oakland, California and co-authored the 1999 U.S. GPI report. Mark currently advises the National Round Table on the Environment and the Economy's Sustainable Development Indicator Steering Committee on the development of indicators for measuring sustainability in Canada. Mark is also Adjunct Professor in the University of Alberta's School of Business. He has considerable experience in public policy analysis including natural resource, energy, royalty and fiscal policy issues in both the public and private sectors. His expertise includes accounting for sustainable development, natural resource accounting, public policy analysis, business planning and performance measurement. Mark pioneered the development of natural capital accounts for Alberta's timber, oil, gas, coal and other natural capital. He holds a Masters degree in forest economics, plus bachelor degrees in economics and forestry.



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April 23, 2001

Dear Reader:

The document *Alberta Sustainability Trends 2000: The Genuine Progress Indicators Report 1961 to 1999* is in my judgement a landmark effort in the literature about sustainability. As such, it will be open to debate, discussion, misinterpretation—even sensationalism. While any misinterpretation or sensationalism would be regrettable, the debate and discussion are most welcome because the issues which this report raises are of profound importance to all Albertans and, more generally, to Canadian and international society.

Let me tell you what excites me about this report and why I think it so significant. Let me also indicate where I think further research and discussion are needed and how I think the report ought **not** to be used or interpreted.

Governments and societies traditionally have measured growth and financial transactions far more often and in much greater detail than they have ever tried to measure the carrying capacity of the biosphere—the support system for all economic and social activity. In an age when resources were seen to be infinite, sustainability was never considered and social well-being was equated with economic growth. It is therefore far past time to draw attention to the biases and limitations of Gross Domestic Product as the key index by which we assess societal progress.

This report does something fundamentally important: it presents a great deal of statistical data, and it identifies 51 indicators used to build an index that considers wider societal well-being and sustainability.

“This report is not objective,” is a claim that some will make. Necessarily not. All indices reflect the choices of variables. Our selected variables are explicit and transparent but further public discussion may suggest that new factors be included or others excluded. Overall, however, we are confident that Albertans and Canadians will agree that much of substance is included in our index. Could others have chosen to view tax increases positively in the index rather than negatively because they would like to see more governmental expenditures? That is possible. But we have made interpretations that we think, for the most part, reflect a societal vision of well-being which has a strong underlying logic to it. Is it possible that not all data are totally accurate or that a peculiar spike in activity occurred in the year we selected for our starting point? Absolutely. Do we think, nevertheless, that the overall picture tells an important story and that Albertans and Canadians are intelligent enough not to draw sensationalist conclusions from our introductory research? Assuredly yes.

Measurement and indices research of the sort described in this report have behind them social values and assessments of what is important in any discussion of sustainability. Precisely for that reason we invite others to debate and discuss this document and its approach with us. To the limit of our resources we would like to collect, collate and publish criticism, suggestions and comments so that

future studies may be improved. This future discussion notwithstanding, the critical message is this: ***we cannot take our sustainability as a society for granted and, in some cases, serious policy discussion and policy revision are warranted.***

New tools to measure and keep visible our progress are essential contributions to this process. It would be unfortunate indeed if either the press or government officials were to suggest that Alberta's track record is the key issue in this report. For one thing, we have not yet been able to undertake similar studies in other provinces so we do not know what those results would look like. What is more important, in my judgement, than any track record is the discussion around policy issues that this report might spark. For example, government officials will legitimately point to the fact that our calculations subtract depletion of non-renewable resources, while government policy is to derive the greatest possible economic value from those resources. Throwing these differences into relief and bringing them to public awareness is exactly what a good set of sustainability indicators accomplishes. At what rate should such resources be used and how much royalty money should be set aside to increase flexibility and to pursue renewable alternatives for the future are the kind of important policy questions that flow from an examination of our study.

We would like all Albertans to engage in much greater discussion and reflection around what kind of development and society they would like to have to ensure a sustainable, healthy and satisfying future. Our study suggests places where orange lights might flash where previously there were only "Growth Green Lights."

We invite you all to join the discussion, to review policy approaches in light of societal well-being and sustainability issues, and to assist us with the refinements, improvements and corrections that such innovative and visionary work always requires.

Finally, I should like to acknowledge that we stand on the shoulders of those who have gone down this road before. Personally I will be forever indebted to Herman Daly and John Cobb, Jr. for their 1989 groundbreaking book, *For the Common Good*. We think the study presented here moves us further forward. I believe it is a first for Alberta and in many ways a first for Canada. We look forward to hearing from you.

Sincerely,

J. David Pollock
Executive Director

Foreword

Alberta is seen as one of the wealthiest provinces in Canada. According to the traditional measure of economic growth—the Gross Domestic Product, or GDP—Alberta’s economy has grown over 400 percent in the last 40 years. More growth is assumed to imply a better life. But, as Robert Kennedy observed, “The GDP measures everything except that which makes life worthwhile.” While common measures of wealth and prosperity, like the GDP or stock market indices, suggest we are better off, a closer look at the condition of the things that make life worthwhile provides a much more holistic picture of our well-being and quality of life.

Interestingly, the word “wealth” means the “condition of well-being,” and does not apply solely to economic riches. This suggests that if we want to gauge the true well-being of society and the things that matter most in our lives, we need an alternative to traditional money-based measures of prosperity and wealth. The Genuine Progress Indicator (GPI) system of accounting offers such an alternative because it measures the conditions of **all** living and produced capital, not just the condition of economic assets. (Living capital includes human, social and natural capital.)

Using a traditional accounting framework, the GPI accounts include balance sheets and income statements. But the difference is that this new system tracks the changes in things like the quality of our air and water, crime, and the amount of free time we have, in addition to economic aspects such as taxes and debt. The GPI accounts show us how the things we value in life have changed over a particular period of time, giving us the information to challenge current paradigms about economic growth. They are like a mirror, reflecting who, what and where we are today and leaving us to ponder where we might want to be tomorrow in terms of our well-being and that of future generations.

In this, the first, GPI report on Alberta titled *Alberta Sustainability Trends 2000*, we examine two fundamental questions: Is Alberta’s economic progress sustainable? and How solid is the foundation we are laying now for the future? To answer these and other questions about sustainable well-being, 40 years of raw data from various sources, including Statistics Canada and the Alberta Government, were used to construct more than 50 key indicators of economic, social, and environmental well-being. We call this the GPI System of Sustainable Well-being Accounts for Alberta.

Alberta Sustainability Trends 2000 provides a “state of the province” report to Albertans including facts, figures and trends of the most important issues that are shaping our quality of life and future well-being. While a rising GDP may suggest a healthy exchange of money for goods and services in the marketplace, the things that contribute to genuine well-being and sustainability for individuals, households, communities and the environment may be showing signs of stress and failing health. Unless these factors are integrated into the way we measure our progress, we will never achieve our overall sustainability goals.

The GPI accounting system holds enormous potential for measuring real progress as a society and as a nation. We hope it will soon be adopted and applied across this country to help Canadians navigate the challenges of sustainability in the 21st century.

Mark Anielski
Director, Green Economics Program
Pembina Institute for Appropriate Development

Addendum

Since its initial release on April 23, 2001, the following changes have been identified and should be made to this document; new or revised text is in italics.

page 17: Suicide epidemic

- sentence 2, change 18.3 to 18.0; the correct wording is: “Since 1961, the rate of suicide has increased almost 30 percent, reaching an all-time high of *18.0* suicides per 100,000 population in 1993.”
- sentence 3, change 127 percent to 117 percent; the correct wording is: “Alberta’s suicide rate is about *117* percent of the Canadian average.”

page 18: Youths on drugs

- sentence 2 should read: “Less than one percent of Alberta’s youth have a drug problem, *based on the percentage of youth who have had drug-related criminal offences.*”

page 20: Gambling bonanza

- sentence 3 should read: “While nearly 90 percent of Albertans engage in some form of gambling, an estimated 112,000 Albertans (4.8 percent of the *adult Alberta* population) are considered to be problem or pathological gamblers and contributed...”

page 54: The line of raw data for the Suicide indicator should be changed as noted below.

	1960s	1970s	1980s	1990s	1999
previous	11.5	15.5	16.3	16.2	14.4
<i>correct</i>	<i>9.9</i>	<i>14.5</i>	<i>15.7</i>	<i>16.1</i>	14.4 (no change)

April 30, 2001

1.0 What is the GPI Accounting Project?

The GPI (Genuine Progress Indicators) accounting project is a pioneering research effort to develop a new system for measuring the total well-being and sustainability of nations or states. This project, led by the Pembina Institute for Appropriate Development with research funding from Western Economic Diversification, selected Alberta as the first region in the world to construct a full set of GPI accounts using the new GPI System of Well-being Accounting architecture.

The development of this new system is presented as an alternative to the current measures of economic progress like the GDP (Gross Domestic Product). Simon Kuznets, one of the principal architects of the international System of National Accounts¹ warned the U.S. Congress in 1934 that “the welfare of a nation can scarcely be inferred from a measurement of national income as defined” by the GDP. He argued that when using money measures like the GDP, a distinction must be made between “quantity and quality of growth” and that decision makers should specify growth “of what and for what.”

Both Kuznets and Robert Kennedy, whose famous comment about the GDP measuring everything except the things that make life worthwhile, have been largely ignored, as the world continues to measure progress according to the GDP and other money measures. The Alberta GPI project addresses these long-standing concerns by explicitly measuring the quantity and quality of all living capital or real wealth. Real stewardship is about carefully managing the wealth of our households and nature, as well as our money.

GPI accounting gets to the roots of the **real** economy, a word that comes from the Greek *oikos* meaning “household” and *nomia* meaning “management.” The word *ecology* has the same root, *oikos*, combined with *logia* meaning “knowledge” or “logic.” The word *wealth* comes from the Old English meaning the “condition” (*þ*) of “well-being” (*weal*). Therefore in principle, economists should be concerned with measuring the condition of the well-being of living capital assets, including the household and the environment. Instead, much of economics is focused on measuring monetary expressions of wealth and cash flows – income, expenditures, costs, benefits, profits, taxes, and debt. Aristotle defined the study of wealth in the form of money as *chrematistics*, a word virtually forgotten in our modern language.

In the Spring 2000 federal budget, Finance Minister Paul Martin committed \$9 million over three years to research and design a national set of environmental and sustainable development indicators to guide decision making. In his budget speech, Mr. Martin noted:

“In the years ahead, these environmental indicators could well have a greater impact on public policy than any other single measure we might introduce.”

The GPI sustainable well-being accounting system is currently being considered along with several other alternative approaches for measuring and monitoring sustainability for Canada.

¹ The UN System of National Accounts was established in all nations following WWII as the basis for measuring economic performance, principally through the Gross Domestic Product (then called the Gross National Product). It was first introduced by John Maynard Keynes in Britain, then advanced by Simon Kuznets in the United States.

1.1 Street-smart Economics

GPI accounting is street-smart, common sense sustainability measurement that challenges traditional economics. It goes beyond conventional assessments of progress that simply calculate how much money is flowing in an economy. Instead, GPI accounting measures how sustainably we manage our personal health, households, communities and the environment in the short and long term. The GPI accounts give citizens and policy makers a wide-angle perspective on economic, social and environmental well-being. They show the trends that are shaping our future and enable us to measure the things that truly make our lives worthwhile.

1.2 Measuring Genuine Progress

Current measures of economic growth and prosperity, such as the GDP, simply measure the flow of money in an economy. The more goods and services exchanged for cash in the market place, the more the GDP rises. According to the GDP and the System of National Accounts (from which the GDP is derived), the more auto accidents, the more oil and gas extracted, the more environmental disasters, the more divorce and the more crime, the more the GDP grows. Why? Because GDP only measures the cash that changes hands to pay for each of these activities. The GDP makes no distinction between expenditures that contribute to genuine well-being and those that many might view as regrettable costs associated with environmental or social degradation. The GDP and the UN System of National Accounts in fact violate basic financial accounting principles by treating the liquidation of assets, such as oil and gas, coal and timber, as income rather than as a reduction in the inventory of natural capital.

The GDP may thus give the illusion of prosperity even while living capital is being eroded. These shortcomings of the GDP have persisted for over 50 years since the international System of National Accounts was first introduced. Virtually every nation still uses the GDP to measure economic prosperity. It is also used by the World Bank, the International Monetary Fund (IMF) and other financial institutions to judge the health of economies, balance of payments and loan requirements. While useful for banks, the World Bank and the IMF as a way to track money flows, it is relatively meaningless to the average manager, farmer or government policy maker.

The GPI pilot for Alberta is a significant step towards providing an alternative to an outmoded system of accounting for economic well-being. The GPI accounts for Alberta show how the province is doing in relation to its sustainable development objectives—development that embraces social and environmental objectives as well as economic ones. As a starting point, this requires an adjustment in our perspective—how we define and measure wealth, equality and progress—and a return to the origins of the words “economy” and “wealth.”

The GPI accounting system is a principled approach to economics, measuring societal and environmental well-being, real progress and real stewardship. Genuine and sustainable progress means improving the conditions for present generations while managing living capital in a way that will benefit future generations. Genuine progress also means looking beyond making money and increasing cash flow to the care of our health, families, our social fabric and the environment.

2.0 What is GPI Accounting?

The GPI accounting system is built on the traditional application of common bookkeeping systems, including ledgers, a balance sheet and a net sustainable income statement that can be used to prepare a sustainability report to citizens. The GPI accounts measure progress and changes in the condition of all living and built assets, similar to the way in which a business measures its financial health. The main features include:

- **GPI Balance Sheet.** The GPI Balance Sheet is a set of measures or indicators that describe the many facets (physical, qualitative, monetary) of the state of well-being of individuals, communities and the environment over a specified period of time. The GPI balance sheet is similar to a traditional accounting framework in that it shows assets, liabilities and shareholder (citizen) equity of all capital or wealth.
- **GPI Net Sustainable Income Statement.** This is a national or provincial income statement that differs fundamentally from the GDP in that it subtracts from our gross output (i.e., GDP) the human, social, ecological and natural resource costs that were incurred to generate that income. It also recognizes the positive contributions of unpaid work, such as volunteering, childcare and housework that lie outside the market yet contribute to well-being. Finally, it recognizes that not all expenditures in the economy represent positive contributions to our well-being; some things like automobile crashes and suicide should be treated as costs, not revenues as they are in current national income accounts and GDP.

The GPI accounts for Alberta consist of an integrated set of 51 indicators of well-being based on raw data drawn from various statistical sources including Statistics Canada, the Alberta Government and other sources (see Appendix A). The Genuine Progress Indicators (see Table 1 below) track the changes in the condition of all capital for roughly 40 years, from 1961 to 1999. In constructing the GPI accounting system we reviewed a number of the best sustainability, quality of life and performance indicator frameworks available, including the Alberta Government's *Measuring Up* performance reporting system, the United Nations Human Development Index, the World Bank's Total Wealth accounts and many others.

This benchmarking exercise enabled us to integrate the best features of several models, resulting in the GPI System of Sustainable Well-being Accounts for Alberta. Because we attempted to construct the accounts and indicators to align with the quality of life values most important to Albertans and Canadians, we believe the GPI accounts will inform citizens about the condition of many of the values they hold most dear. Moreover, the accounts are flexible and transparent, allowing for customization as values change.

The GPI System of Sustainable Well-being Accounts, which includes both physical and monetary measures of well-being, are structured along the following capital themes:

- **Time-use accounts:** measures of how individuals and households allocate their time for paid work, parenting, eldercare, commuting, housework, volunteerism and free time.
- **Social capital accounts:** measures of the condition of households and communities, including measures of poverty, inequality, family breakdown, crime, democracy and social cohesion.

- **Human health and wellness accounts:** measures of the condition of our health and wellness, including life expectancy, premature mortality, suicide, obesity, and lifestyles.
- **Natural resource and environment accounts:** measures of the condition of natural capital, natural ecosystems, and the environment, including ecological footprints, forests, agriculture, peatland, wetlands, non-renewable energy, energy efficiency, fish, wildlife, parks and wilderness, air quality, water quality, carbon budgets, hazardous waste, and landfill waste.
- **Economic accounts:** measures of traditional financial and built capital conditions including the GDP, trade, disposable income, weekly wages, consumption expenditures, taxes, savings, debt, and public and private infrastructure service values.

The time-use, social capital and human health and wellness accounts were clustered into a personal-societal well-being account from which a composite GPI societal well-being index could be derived. Natural resource and environmental accounts were consolidated to derive a GPI environmental well-being index, and the economic accounts were used to derive a GPI economic well-being index. See Table 1 for the indicators in each of the three categories.

Table 1: The Alberta GPI Indicators for Economic, Personal-Societal and Environmental Well-being

Economic	Personal-Societal	Environmental
<ul style="list-style-type: none"> • Economic growth • Economic diversity • Trade • Disposable income • Weekly wage rate • Personal expenditures • Transportation expenditures • Taxes • Savings rate • Household debt • Public infrastructure • Household infrastructure 	<ul style="list-style-type: none"> • Poverty • Income distribution • Unemployment • Underemployment • Paid work time • Household work • Parenting and eldercare • Free time • Volunteerism • Commuting time • Life expectancy • Premature mortality • Infant mortality • Obesity • Suicide • Drug use (youth) • Auto crashes • Divorce (family breakdown) • Crime • Problem gambling • Voter participation • Educational attainment 	<ul style="list-style-type: none"> • Oil and gas reserve life • Oilsands reserve life • Energy use intensity • Agricultural sustainability • Timber sustainability • Forest fragmentation • Parks and wilderness • Fish and wildlife • Wetlands • Peatlands • Water quality • Air quality-related emissions • Greenhouse gas emissions • Carbon budget deficit • Hazardous waste • Landfill waste • Ecological footprint

The aggregation of GPI indicators of economic, social, human health and environmental sustainable well-being into composite indices is similar to the Dow Jones Industrial Average Index or the United Nations' Human Development Index. Indicators were aggregated using an equal weighting formula for the economy, society and the environment indicators whose indices could then be compared directly with the GDP and other monetary measures of economic progress, such as stock market indices. Individual Genuine Progress Indicators can also be compared directly with trends in the GDP, which may provide important visual and statistical correlations between economic growth and changes in the conditions of personal well-being, societal and environmental conditions.

The GPI accounts also include a revised national or provincial net sustainable income statement that accounts for the full monetary costs and benefits, which are currently treated as additions to economic growth (i.e., GDP), or not included as either benefits or regrettable costs. The GPI net sustainable income line starts by adjusting the GDP² for changes in income inequality, then adding estimates of the value of unpaid work. Next, various social and environmental costs, seen as either regrettable expenditures or depreciation costs of living capital, are deducted from the GDP. This includes the depreciation costs of depleting natural resource stocks and degrading the environment. The resulting GPI income statement is a common-sense measure of the net beneficial output of a society.

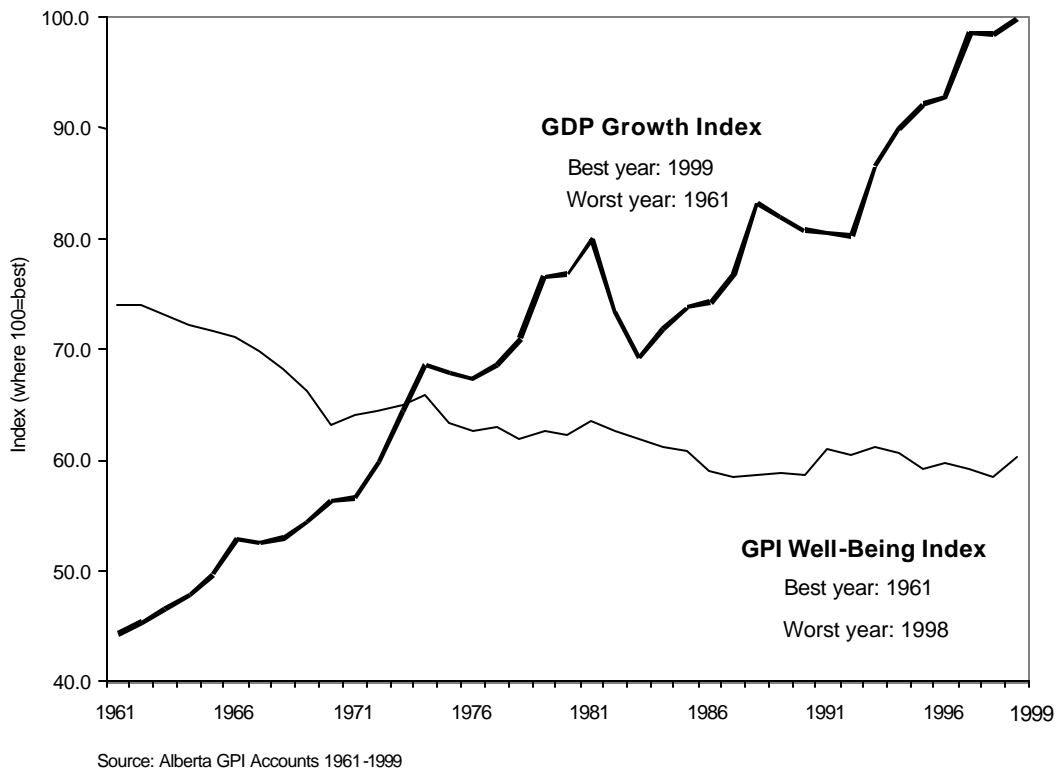
² Specifically, the personal consumption expenditure component of the GDP is adjusted, as was done in the U.S. GPI and the Australian GPI.

3.0 The Alberta GPI Results

The Alberta GPI accounts tell a different story from the more familiar one we hear about a booming economy, government surpluses, and other Alberta advantages. By combining all 51 Genuine Progress Indicators, we derived a composite index—the GPI Well-being Index.

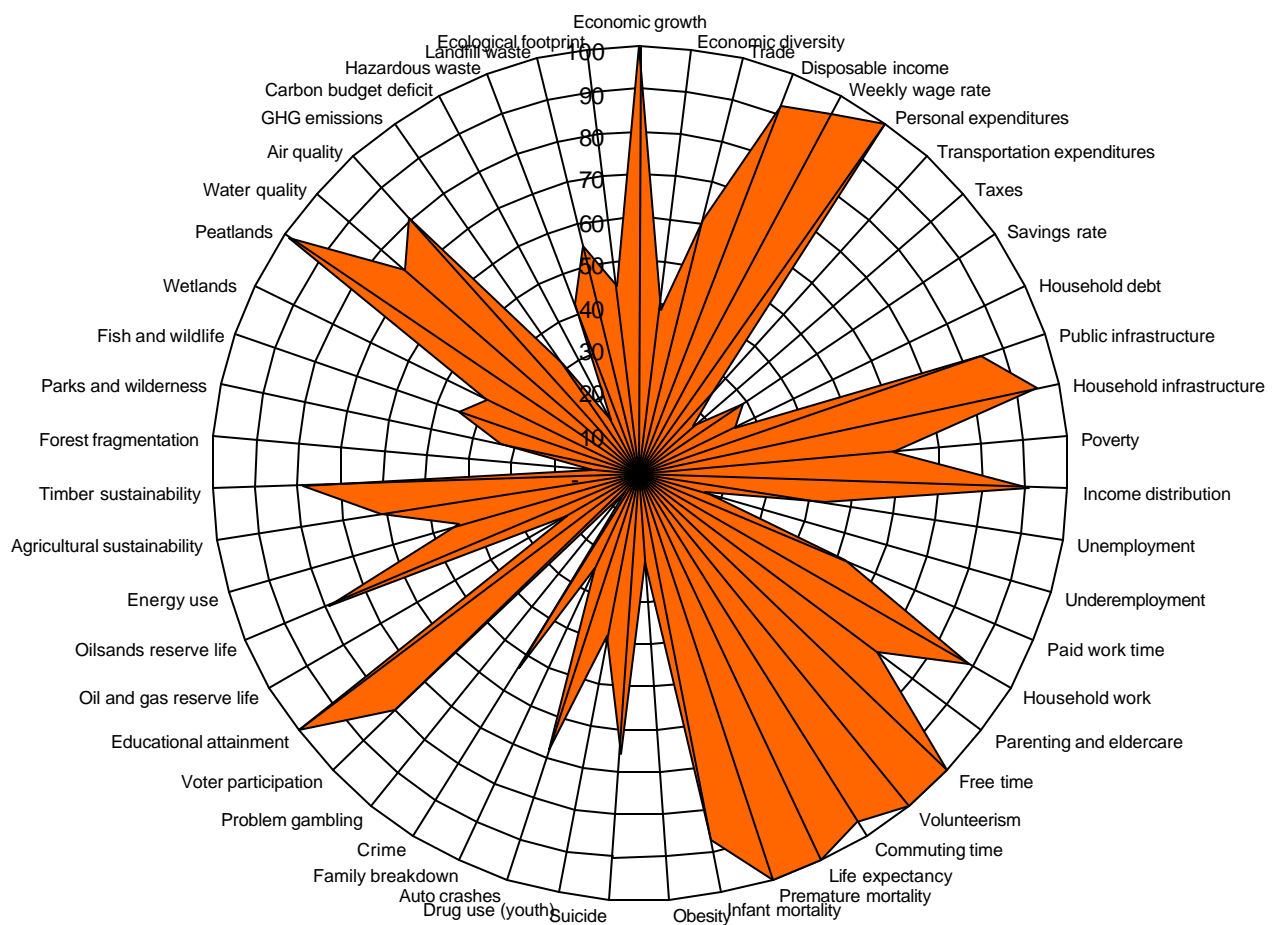
Figure 1 compares Alberta’s GDP per capita as an index with the composite GPI index of 51 indicators. From 1961 to 1999, Alberta’s GDP (in constant 1998 dollars) increased by over 400 percent, or 4.4 percent per annum, while the Alberta GPI Well-being Index declined at an annual rate of 0.5 percent per year. The GPI Index was highest in the 1960s then declined to reach a plateau in the 1990s despite continued economic growth. Our study indicates that the best GPI Index was recorded in 1961 and the lowest in 1998. In the 1990s, the GDP per capita grew at an annual rate of 2.4 percent while the GPI per capita was virtually stagnant, growing a mere 0.43 percent per year, on average.

Figure 1: The Alberta GPI Well-being Index versus Alberta GDP Index, 1961 to 1999



We can also present an integrated portrait of sustainability and well-being by showing the 51 Genuine Progress Indicators in a Sustainable Well-Being Circle Index (Figure 2). The GPI Sustainable Well-being Circle Index for 1999 could be compared to a balance sheet for a company where the condition of each type of living and produced capital is reported as an index score relative to historical conditions. The figure shows the condition of all capital in Alberta in 1999, with each indicator having a score. The scores were derived by converting the original raw data for each indicator to an index using a scale from 0 to 100, with 100 set as the best condition of the indicator during the time period for the study—that is, 1961 to 1999. Deviations from that year were measured as movement toward zero. In Figure 2, the higher the score, the closer its point is to the outside edge of the circle. For example, in the years between 1961 and 1999, GDP per capita was highest in 1999; thus the score for economic growth in that year was 100, and this point is at the outside edge of the circle. In contrast, suicide rates were high in 1999 compared with 1964, which had the lowest rate and was thus assigned the “best” or “target” score of 100. Therefore, relative to the best year in the study, the 1999 score for this indicator was lower and its point on the circle is closer to the centre.

Figure 2: The Alberta GPI Sustainable Well-being Circle Index for 1999



The GPI Circle Index is a powerful visual image of the overall condition of economy, society and environment that could be applied at the local, provincial or national level. It provides an alternative to trend lines and shows clearly the contrast between the condition of the factors that contribute to quality of life. For example, health indicators such as life expectancy, premature mortality and infant mortality are in good condition—that is, their scores are close to 100 points. Many social and environmental indicators, on the other hand, were in an unhealthy condition in 1999 compared with the previous 40 years. While individual indexed Genuine Progress Indicators shown on the GPI Circle Index cannot be compared directly with each other (for example, timber sustainability cannot be compared with agricultural sustainability), they do show relative conditions for any point in time. Moreover, each indicator can be shown as a trend in condition using either indexed data or raw data.

The results of the GPI accounts can be presented in a number of different ways, including in the form of a “Sustainable Well-being Condition Report Card” (see Appendix B). The report card shows the current condition of well-being for each indicator in 1999, the best and worst performing year for each index, and the long-term (40-year) trend in the indicator. The highest composite GPI Index occurred in 1961, with 74.0 points out of a possible 100.0, while the lowest index of 58.4 was recorded in 1998. However, in 1961, only 42 indicators were available, as opposed to 51 for 1998. The GPI Sustainability Circle for 1961 is thus more “full” than the one for 1998 (see Figures 12 and 13 in Appendix C). We can also compare the top performing indicators with the lowest. Appendix D shows the Alberta GPI indicators clustered from top performers (80-100 points) to poorest performers (0-40).

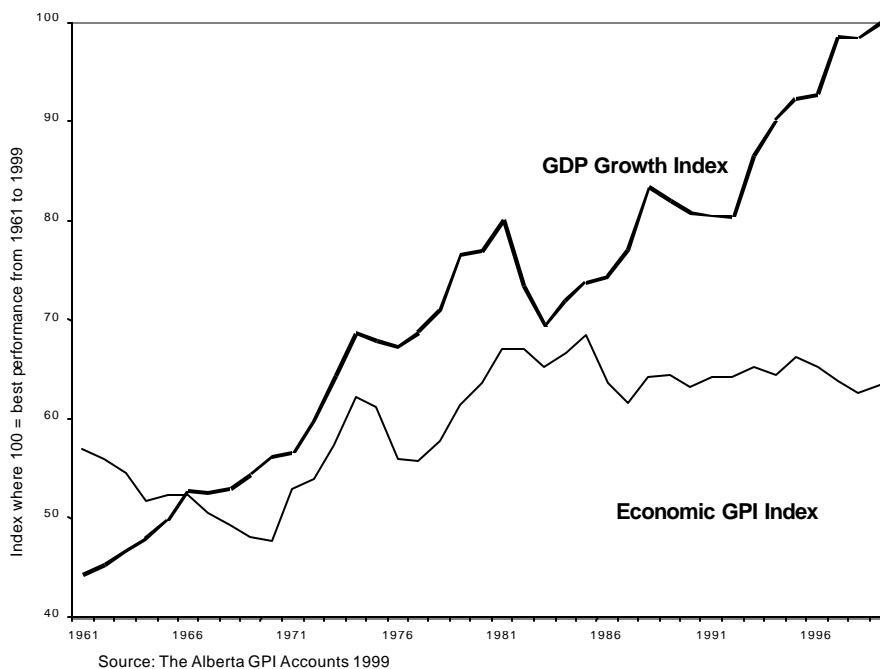
Results for the economic, personal-social and environmental indicators for Alberta are discussed in the following sections.

3.1 Trends in Economic Well-Being

From 1961 to 1999, Alberta’s GDP grew by 401 percent (in constant 1998 dollars). This growth was fueled by exports of oil, gas, coal, timber products and agricultural products, and equates to an economic growth rate per Albertan of 2.2 percent per year over 40 years. In 1961, real GDP was only \$21.9 billion (in 1998 dollars) while in 1999 it was \$109.7 billion (1998 dollars). The GDP per Albertan has more than doubled from \$16,395 (1998 dollars) in 1961 to \$37,005 (1998 dollars) in 1999. According to these figures, Alberta’s economy is bigger than ever and Albertans are supposedly more prosperous than ever, with more money changing hands for the trade of natural and human capital. But were Alberta households, society and the environment really better off in 1999?

Figure 3 suggests that a rising tide of economic growth has not necessarily improved the economic well-being of the average Alberta household. While GDP rose steadily from 1961 to 1999, the GPI Economic Well-being Index—a composite of the 12 economic indicators noted in Table 1, including GDP per capita—rose along with the GDP until 1982 but has remained virtually stagnant since then. Overall, GDP growth of 2.2 percent per year per Albertan can be compared with an average annual growth in the GPI Economic Well-being Index of only 0.40 percent.

Figure 3: Alberta GPI Economic Well - being Index Compared with GDP Growth, 1961 to 1999



One of the bigger surprises in the GPI accounts related to the diversity of Alberta’s economy. Our estimated Economic Diversity Index (EDI) compares the share of Alberta’s GDP by sector with that of the Canadian economy. The EDI shows that despite growing exports of both raw and “value-added” natural capital products (oil, gas, forest and agricultural products), Alberta’s economy was less diversified in 1999 than in 1971, before the province’s oil

bonanza began. For example, the EDI for 1971 stood at 0.59 (where a score of 1.00 suggests an economy as diversified as the Canadian economy), compared with 0.23 by 1999. This decline in economic diversity occurred despite growth in the service and knowledge-based economy in Alberta, which was 60.4 percent of Alberta's GDP in 1999. Despite diversification, resource-based industries still contributed 25.9 percent to Alberta's GDP in 1999.

Alberta's balance of trade (the market value of exports less imports) has improved, reaching a trade surplus of \$10.0 billion (1998 dollars) by 1999. This surplus is largely due to the importance of oil and gas exports which, according to statistics from the Canadian Association of Petroleum Producers, totaled some \$28.8 billion in value of sales in 1999, with natural gas sales contributing nearly half, or \$12.5 billion, of this total.

Notwithstanding this growth in exports, rising imports have virtually cancelled the gain in export value. Paradoxically, while we may be exporting more of our natural capital stocks for cash, we are exchanging this revenue for more imports, consuming more material goods in the process and increasing our ecological footprint—the amount of land and resources required to meet the demands of our personal lifestyles.

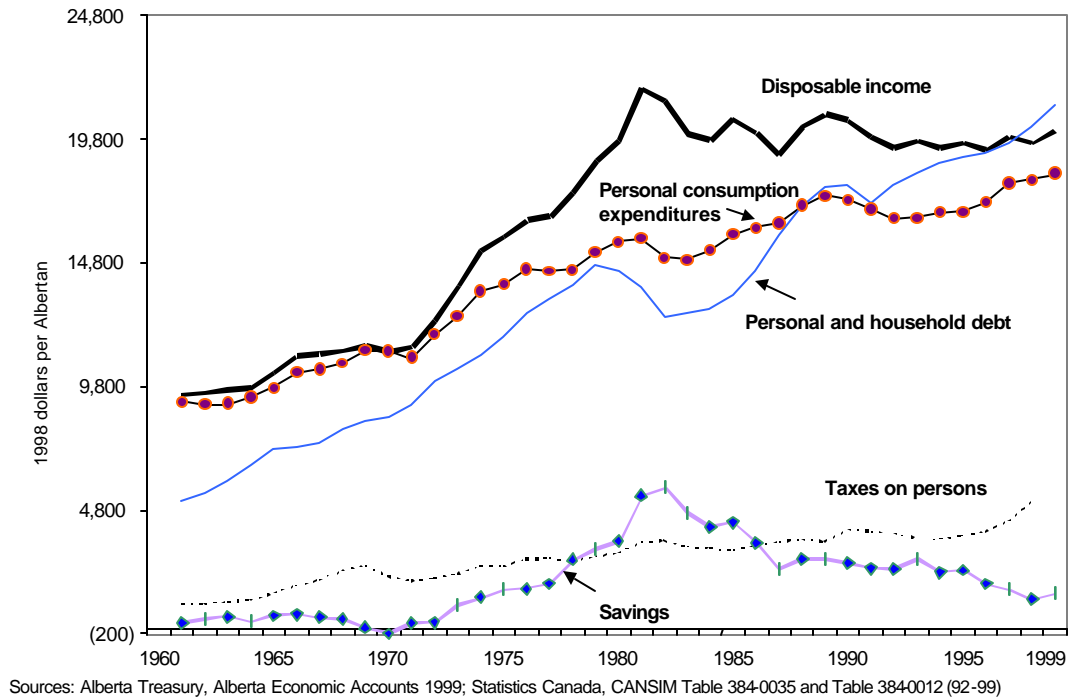
NOTE TO READERS: Headings in bold italic text in the following sections summarize Genuine Progress Indicators for this project. More details on each indicator are provided in a two-page summary, available from the Pembina Institute's website at <http://www.pembina.org/green/gpi/>. Background reports on these indicators are in production and will be released during 2001.

GDP rises, but Albertans are no better off

While Alberta's GDP continued to increase after the recession of 1982, the economic well-being of Albertans (measured in terms of income, taxes, debt and savings) has remained virtually unchanged for almost 20 years. What was holding the GPI Economic Well-being Index relatively constant? While the real GDP per capita rose 36 percent between 1982 and 1999, Figure 4 shows that:

- 1) Disposable income (adjusted for inflation) and real weekly wages per average Albertan have still not recovered to the highs reached in 1982.
- 2) Personal consumption expenditures per Albertan have continued to rise although more slowly than GDP growth, and are increasingly financed through debt rather than through income.
- 3) Personal and household debt has increased significantly since 1982 and, for the first time in history, surpassed real disposable income in 1997, sitting at 109 percent of disposable income in 1999.
- 4) Savings have fallen from their peak in 1982 and are exceeded by the total of all government taxes and fees paid per Albertan.

Figure 4: Real Disposable Income, Personal Consumption Expenditures, Personal and Household Debt, Savings, and Taxes Paid per Albertan (1998\$), 1961 to 1999



The big story is that while more money changed hands between 1982 and 1999 (i.e., the GDP was increasing), not all Albertans benefited equally from the increased cash flow that was resulting from more economic output and more exports. The GPI accounts suggest that in 1999, average Albertans struggled to keep their households afloat against a growing debt and higher levels of total taxes (paid by persons), while their disposable income remained in the doldrums, thus eroding their capacity to save for things like retirement and their children’s needs.

For better or worse in 1999?

Figure 5 shows how Albertans spent their time and money in 1961 compared with 1999. While we had more disposable income in 1999 and were spending more money than ever on the basics of life, we were also spending more on debt, taxes, and recreational goods and services.

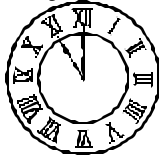
Figure 5: The Way We Lived in 1961 and the Way We Lived in 1999

The way we lived in 1961...



Employment

- Hours of paid work: 2,821 per worker per year
- Unemployment rate: 2.5%
- Underemployment rate: 0.55%



Where does the time go?

- (hours per Albertan per year)
- Paid work (per person in labour force): 2,821
 - Commuting time (minutes per day): 24.0
 - Household work: 957
 - Parenting and eldercare: 198
 - Free time: 1,829
 - Volunteering: 68

The Household



Income and Spending

(1998\$ per year per Albertan)

- Disposable income: \$9,466
- Personal consumption expenditures: \$8,747
- Taxes: \$870
- Household debt: \$5,204
- Savings rate: 3.7%



Where did the money go in 1961?

(spending in 1998 dollars per Albertan)

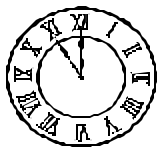
- Housing and utilities: \$1,508
- Food and tobacco: \$2,173
- Clothing: \$772
- Personal goods: \$1,129
- Household operations: \$973
- Recreation and entertainment: \$562
- Health care: \$339
- Transportation: \$1,254
- Taxes: \$1,928
- Household debt service costs: \$75

...and the way we lived in 1999



Employment

- Hours of paid work: 1,463 per worker per year
- Unemployment rate: 5.7%
- Underemployment rate: 3.45%



Where does the time go?

- (hours per Albertan)
- Paid work (per person in labour force): 1,463
 - Commuting time (minutes per day): 25.0
 - Household work: 1,032
 - Parenting and eldercare: 137
 - Free time: 2,106
 - Volunteering: 75

The Household



Income and Spending

(1998\$ per year per Albertan)

- Disposable income: \$19,762
- Personal consumption expenditures: \$17,112
- Taxes: \$4,099
- Household debt: \$21,172
- Savings rate: 6.8%



Where did the money go in 1999?

(spending in 1998 dollars per Albertan and % increase since 1961)

- Housing and utilities: \$3,869 (+256%)
- Food and tobacco: \$2,432 (+12%)
- Clothing: \$838 (+9%)
- Personal goods: \$3,654 (224%)
- Household operations: \$1,482 (+52%)
- Recreation and entertainment: \$2,029 (+261%)
- Health care: \$805 (+137%)
- Transportation: \$3,330 (+166%)
- Taxes: \$5,172 (+494%)
- Household debt servicing costs: \$2,257 (+2905%)

In 1961, out of his or her total income, the average Albertan spent:

- 56.0 percent on food, shelter and clothing;
- 11.6 percent on personal goods and services;
- 12.9 percent on transportation and communications;
- 5.8 percent on recreation, entertainment, education and cultural services;
- 3.5 percent on medical care and health services;
- roughly 0.8 percent on household and personal debt servicing (interest on consumer loans), and;
- 9.0 percent on taxes.

By 1999, the average Albertan's income was spent this way:

- 33.4 percent on food, shelter and clothing;
- 14.2 percent on personal goods and services;
- 12.9 percent on transportation and communications;
- 7.9 percent on recreation, entertainment, education and cultural services;
- 3.1 percent for medical care and health services;
- 8.7 percent for household and personal debt servicing; and
- 20.0 percent on taxes.

Real income stagnant

From 1961 to 1999, personal disposable income rose 113 percent and real weekly wages increased 61 percent; however, both have remained virtually unchanged since they peaked in 1981 despite continued economic growth. Had real disposable income grown at the same rate as the GDP since 1982, real disposable income would have stood at \$29,065 per Albertan in 1999 versus the actual figure of \$20,147. Had average incomes increased to this level with the rising GDP, then the 17 percent of Alberta households that we estimate are now living below a living wage (\$24,322 per average household) would no longer live in constrained economic conditions.

Real weekly wages per worker have also remained virtually unchanged for nearly 20 years. In 1982, real weekly wages peaked at \$754.18 (in 1998 dollars) then declined throughout the 1980s and into the 1990s. While recovering slightly in the latter part of the 1990s, real weekly wages in 1999 were still lower than their 1982 peak at an average of \$718.15 per Alberta worker.

Spending more than ever

Albertans, on average, spent 110 percent more in 1999 than in 1961 on the basics of life, and spent significantly more on taxes, debt servicing, personal goods and services, and housing and utilities. Real expenditures per Albertan on food, tobacco and alcohol (1998 dollars) have increased only 12 percent since 1961 and spending on clothing increased only nine percent. At the same time, the biggest increases in expenditures were on household debt servicing costs (up 2,905 percent), taxes (up 494 percent), recreation and entertainment (up 261 percent), and housing and utilities (up 256 percent). Much of this spending is being financed by higher levels of debt. Also, while a rising tide of GDP is supposed to raise all boats, we found evidence that the average Albertan has not benefited in proportion to GDP growth since 1982 (see "Real income stagnant" above). Personal consumption spending per Albertan has increased at an annual rate of 2.0 percent. But consuming more doesn't necessarily translate to improved quality of life.

Another day older and deeper in debt

While Albertans are living longer than ever, they are also deeper in debt. For the first time in Alberta's history, personal and household debt exceeded real disposable income by 109 percent in 1999. The estimated costs to service household debt have increased an astronomical 2,905 percent since 1961, with an average debt load of \$21,172 per Albertan. The estimated average household debt servicing costs of \$2,257 (1998 dollars per Albertan) now exceed all single household expenditures except taxes. Debt is also a serious concern of farmers and students who find themselves financing operations and their education with rising debt burdens. Indeed, Albertans report feeling the most financially stressed of all Canadians. According to a 1999 poll by the Canadian Council for Social Development, 23 percent of Albertans reported that they would not have enough savings to last beyond one month of expenditures.

While net worth (assets minus debt) per Canadian has increased to an average of \$231,000 per household, all of this improvement has been due to the rising value of stock market shares and pensions, according to the Vanier Institute for the Family's most recent study.

Taxes are sky high!

While Alberta may have one of the lowest provincial tax regimes in Canada, data from the Alberta Economic Accounts and from Statistics Canada reveal that the total of all government taxes paid by Albertans has increased 494 percent since 1961 (in constant 1998 dollars)—from \$870 per capita in 1961 to \$5,172 per capita in 1999. Albertans paid more in taxes in 1999 than they spent on housing, utilities, food, and clothing combined.

Rising levels of underemployment and lower unemployment

In 1961, Alberta's unemployment rate stood at 2.5 percent while in 1999, it averaged 6.0 percent. While higher than in 1961, Alberta's unemployment rate did fall through the 1990s. The GPI accounts estimate that the cost of unemployment in 1999 was roughly \$3.3 billion (1998 dollars) or 3.0 percent of Alberta's GDP in 1999. By contrast, the rate of underemployment (i.e., those seeking full time, meaningful employment but are unable to find it) has risen steadily from 0.55 percent of employable workers in 1961 to 3.45 percent in 1999. Underemployed women outnumber underemployed men. This trend is occurring at the same time that many Albertans are "over-employed" and working long hours. We estimated the cost of underemployment at \$503 million in 1999.

Less work for the same pay

The average Alberta worker spent 48 percent fewer hours, working for pay in 1999 compared to 1961. In 1999, the average Albertan worked 1,463 hours (about a 6.1 hour work day) for pay compared to 2,821 hours (about an 11.9 hour work day) in 1961. This decline in hours is largely the result of an increasing number of workers moving into retirement in Alberta.

When the trends in hours of paid labour per household are estimated, there has also been a steady decline over 40 years even though more women were in the workforce in 1999 compared to 1961. In 1961, members of the average household worked an estimated 3,318 hours per year compared with 2,301 hours in 1999, for a 31-percent reduction in hours of paid work. At the same time, household real disposable income rose an estimated 58 percent from 1961 to 1999. In the 1990s, the hours of paid work by households continued to decline while real average household disposable incomes have remained relatively stagnant. When

these two trends are combined, we see that the average hourly household real income per hour of paid work remained virtually unchanged in the 1990s averaging \$24.57 per hour (1998 dollars); this is still more than 2.3 times the \$10.57 per hour rate in 1961 per Alberta household. This suggests that the average Alberta household in 1999 made about the same amount of money as it did in 1990 while putting in fewer hours at paid work.

However, this trend does not apply to all Albertans. Some Albertans find themselves underemployed while others are overworked and feeling the stress and strain of everyday life. Many working mothers report being under extreme stress, because they are caught juggling the responsibilities of raising children, managing a home and doing paid work for income. According to Statistics Canada, one out of three full-time-employed married mothers suffer from extreme stress and 70 percent feel rushed on a daily basis. While some Albertans experience underemployment, others are working too many hours. Between 1976 and 1999, the number of workers in Alberta working more than 40 hours per week in their main job increased from 223,400 to 427,900. That is an increase of 92 percent. As a percent of employed workers, overemployment increased from 26 percent in 1976 to 38 percent in 1999. A recent study by the Vanier Institute for the Family found that Canadian families in 1999 had higher family incomes but this was because more workers in the household were working longer days.

More value from public and household infrastructure

The GPI accounts estimate that the per capita monetary value of services derived from Alberta's stock of public and private infrastructure (houses, appliances, roads, buildings) increased 25 percent and 125 percent respectively from 1961 to 1999. However, the net capital stock value of Alberta's public infrastructure has remained virtually unchanged since 1992, although it rose steadily before then.

Where does the time go?

The GPI time-use accounts show some important trends in how Albertans invest their time (see Figure 5). Since 1961, the hours of paid work per adult Albertan have declined, average hours of unpaid household work have increased, free (leisure) time has increased, and time with children and elders has decreased. While time spent commuting increased by only 4.2 percent between 1961 and 1999, time spent in transit related to parenting (driving children to school, for example), volunteering or shopping per person in Alberta increased by 27 percent. Time spent volunteering increased only slightly to an average of 75 hours per year per adult Albertan.

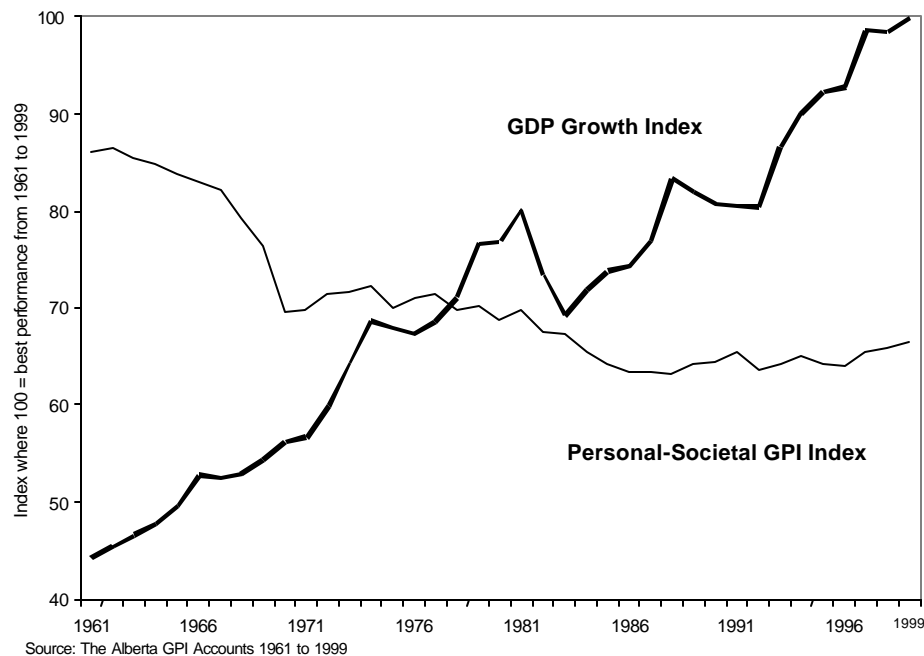
In 1999, Albertans spent eight percent more time at housework than in 1961. Although they enjoyed 19 percent more leisure time, they were spending 31 percent less time with their children and parents.

In 1961, each person in the labour force was averaging 2,821 hours of paid work per year, which declined to an average of 1,463 hours in 1999. While this may seem like a positive trend given the rise in real disposable income since 1961, the reality is that more women are now in the labour force, some of whom work only part-time or are underemployed, which helps to reduce the hours of paid work per eligible worker.

3.2 Social Cohesion, Personal Health and Community Well-being

Indicators of societal well-being are part of the GPI accounts. These include proxies for social cohesion, the health of the democracy, and the health of families, as well as indicators of personal health and wellness. When the 22 indicators of societal and personal health noted in Table 1 are combined into a GPI Societal Well-being index, we can compare this Index with the trend in GDP growth (Figure 6).

Figure 6: Alberta GPI Personal - Societal Well - being Index Compared with GDP Growth, 1961 to 1999



While the economy was expanding, the overall composite GPI Societal Well-being Index fell at an annual rate of 0.50 percent from 1961 to 1999, although it has stabilized since the mid-1980s. The key trends that dragged the Index down to low levels in 1999 were underemployment, obesity, suicide, youth drug use, divorce, crime, and problem gambling. Other troubling trends include stubborn levels of poverty, rising levels of market income inequality, reduced voter participation, reduced number of hours spent with children and elderly parents, and increased levels of household work. The most positive contributions to the Index in 1999 (relative to 1961) were increased hours of free time, reduced hours of paid work, falling unemployment rates, increased volunteerism, reduced commuting time, increasing life expectancy and premature mortality, reduced infant mortality, high levels of educational attainment, and the reduced number of auto crashes.

Some of the key highlights of the GPI societal and personal well-being indicators are noted below.

Gap between market incomes of the rich and poor is growing, while income is more evenly distributed

While income was more evenly distributed in 1999 than in 1961, the gap between the earned (or market) incomes of the rich and poor is increasing. Between 1980 and 1998, the gap between the earned income of the top 20 percent of Albertans and the lowest 20 percent increased by 63 percent, a rate of growth much higher than the Canadian average increase of 35 percent. In 1999, the top 20 percent of Albertans earned 14.5 times more than the lowest 20 percent. In 1998, Alberta also had the highest gap in after-tax income of any other province. We have estimated that the 1999 net worth of the eight wealthiest Albertans could have earned them an income of \$33,307 per hour or roughly 5,645 times Alberta's 1999 minimum wage of \$5.90 per hour. While the earned income gap has risen, the distribution of after-tax income across all income groups is more evenly spread in 1999 than in the 1960s, suggesting that progressive income taxes and government transfers have been effective in reducing inequality.

Poverty up

Poverty has increased and food bank usage is now common across Alberta. The rate of poverty (measured by the percentage of Albertans living below the low-income-cutoff line estimated by Statistics Canada) increased 37 percent from 1961 to 1999, from 11.3 percent of Albertans in 1961 to a high of 19.4 percent in 1992 then falling to an estimated 15.5 percent by 1999. We estimate that in 1999, roughly 20 percent of Albertans used some 74 food banks across the province—a support service that didn't even exist here prior to 1981. We have estimated a “living wage” threshold³ in Alberta for a family of two adults and two children to be \$24,332 per year, which means that an estimated 17 percent of Alberta households are living below this threshold.

Albertans are living longer

The average life expectancy of Alberta males is now 76.8 years (third highest in the world) while women can expect to live to 81.8 years (second highest in the world). Most Albertans rate their lifestyles and personal health as excellent or very good. The average life expectancy for both men and women has increased by 10 percent since 1961.

Premature and infant mortality continue to decline

All causes of premature mortality (cancer, heart disease, accidental deaths and respiratory disease) have declined, with the average person-years-of-life-lost measure of premature mortality down an average 37 percent from 1961. Rates of premature mortality from cancer have decreased roughly 12 percent since 1961 while the rate for heart disease has dropped 55 percent. The only exception is an increase in suicides. Infant mortality has declined dramatically, down by 71 percent since 1961.

Suicide epidemic

Suicide has increased steadily over the past 40 years—a virtual mirror image of the increase in economic prosperity and rising GDP. Since 1961, the rate of suicide has increased almost 30 percent, reaching an all-time high of 18.3 suicides per 100,000 population in 1993. Alberta's suicide rate is about 127 percent of the Canadian average. More Calgary males

³ A “living wage” is the amount of income necessary for a healthy lifestyle.

between 10 and 49 years of age die from suicide than from any other cause of premature death. In 1999, 427 Albertans took their own lives compared with 119 in 1961. For every successful suicide there are estimated 125 attempts.

Youths on drugs

Youth drug use rose and fell between 1971 and 1995, the last year for which statistics are available, with no apparent trend. Less than one percent of Alberta's youth have a drug problem. The Alberta Alcohol and Drug Abuse Commission (AADAC) estimates the economic and social costs of illicit drug use by Albertans to be roughly \$135 million; a Canadian study of the cost of drug abuse estimated the cost at \$18.45 billion or 2.7 percent of Canada's GDP. An estimated six percent of deaths in Alberta in 1995 were drug-related according to Alberta's Chief Medical Examiner.

Auto crash!

Compared with 1961, there were more auto crashes per capita in the 1990s. Although fatalities are decreasing, injuries have increased. The number of auto crashes per capita has increased 47 percent since 1961, from 278 per 10,000 Alberta adults (15 years and older) in 1961 to 408 per 10,000 Alberta adults in 1999. The highest recorded number of auto crashes occurred in 1981 at the height of Alberta's economic boom. Auto crashes contribute to Alberta's rising GDP; the GPI accounts estimate that the direct costs of auto crashes were roughly 2.8 percent of GDP or \$3.0 billion (1998 dollars) in 1999 (see Appendix E).

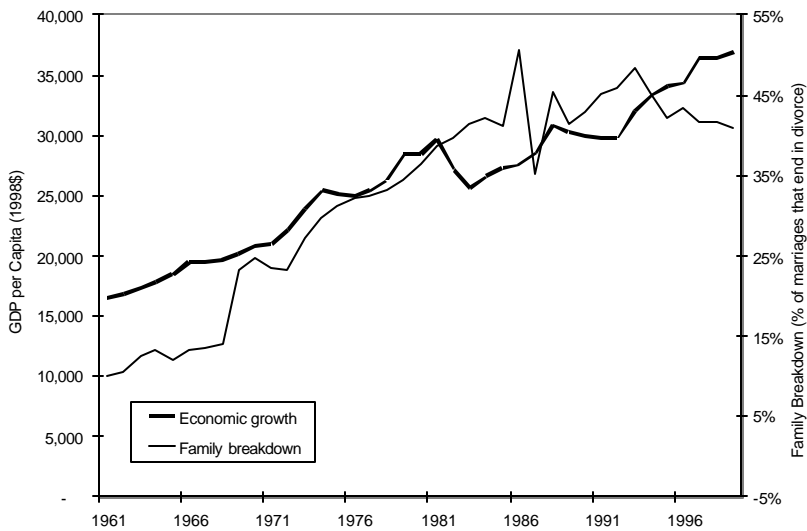
Obesity rising

The number of heavy Albertans is on the rise with more than 32 percent of Albertans considered overweight or obese in 1999 compared with 14 percent in 1985. In Canada, the number of overweight or obese young people has increased dramatically, with an estimated 29 percent of teenage boys and 24 percent of teenage girls considered overweight.

More family breakdown

In 1961, 10 percent of marriages ended in divorce, increasing to a high of 51 percent in 1986 then falling to 41 percent by 1999. A key feature of the GPI accounts is the ability to compare trends in various indicators over time. Figure 7 compares Alberta's GDP growth with the trend in marriages ending in divorce. The rate of divorce rose at 4.6 percent per year—virtually the same rate as Alberta's GDP growth of 4.4 percent per year. While there is no apparent correlation between GDP growth and divorce rates, the trends are similar.

Figure 7: Alberta's Divorce Rate versus GDP Growth, 1961 to 1999

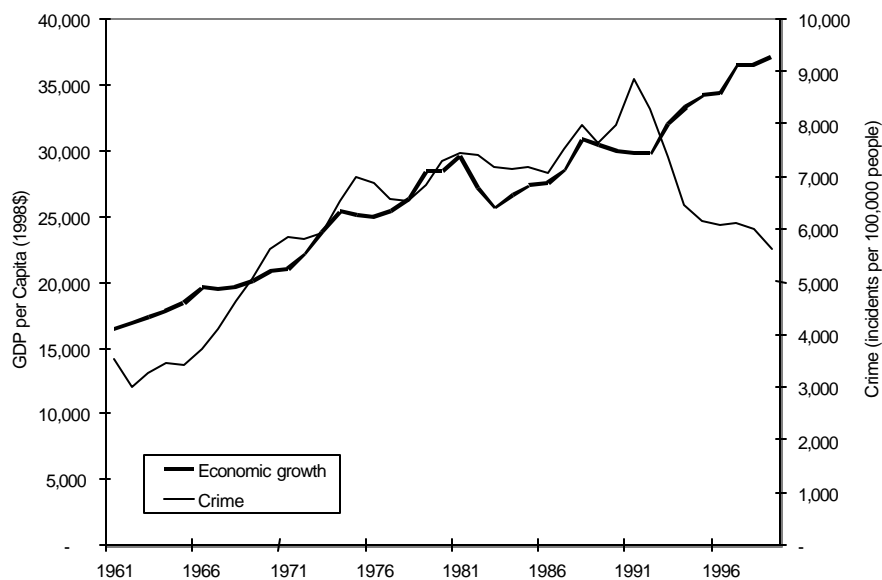


Source: Statistics Canada, CANSIM special retrieval and Alberta Economic Accounts 1999

Crime rises with GDP until the 1990s

Crime rates appear to have kept pace with economic growth until 1991 when they turned around and have been falling sharply since then. However, in 1999 the rate of crime was still 59 percent higher than in 1961. Between 1961 and 1999, there was a 230 percent increase in the incidence of property crimes and a 576-percent increase in violent crimes. Paradoxically, the more crime, the more the GDP grows, as more money is spent on policing, courts, and other costs related to crime. The GPI accounts estimated the cost of crime (based on direct expenditures) at \$1.8 billion (1998 dollars) in 1999, or roughly 1.7 percent of Alberta's GDP.

Figure 8: Alberta's Crime Rate versus GDP Growth, 1961 to 1999



Source: Alberta GPI Accounts 1961-1999

Gambling bonanza

Gambling is the fastest growing segment of the Alberta and Canadian economies. In 1999, Albertans wagered a staggering \$13 billion on gambling activities (video lottery terminals, casinos, bingos, lottery tickets, and others) compared with a mere \$110 million wagered in 1973. While nearly 90 percent of Albertans engage in some form of gambling, an estimated 112,000 Albertans (4.8 percent of the gambling population) are considered to be problem or pathological gamblers and contributed an estimated 17 percent to the Alberta government's gambling revenues of \$857 million in 1999. We estimate that these gamblers wagered an average of \$19,360 each in 1999, or roughly 96 percent of the average Albertan's real disposable income. While gambling contributes to Alberta's rising GDP and government revenues, the estimated personal and societal costs of problem gambling are increasing.

Democracy in decline

The average participation rate of Albertans voting in federal, provincial and municipal elections fell by 8.7 percent from 1961 to 1999. The most recent elections show that this downward trend in participation in the democratic process continues. Also, Alberta ranked last in Canada in 1996-1997 for the number of days a government sat in the legislature—a mere 38 days compared with Ontario's 134 days. In addition, the Klein government used closure on legislative debate 21 times between 1993 and 1997 compared with the single use of closure by the Lougheed government during its 14-year tenure.

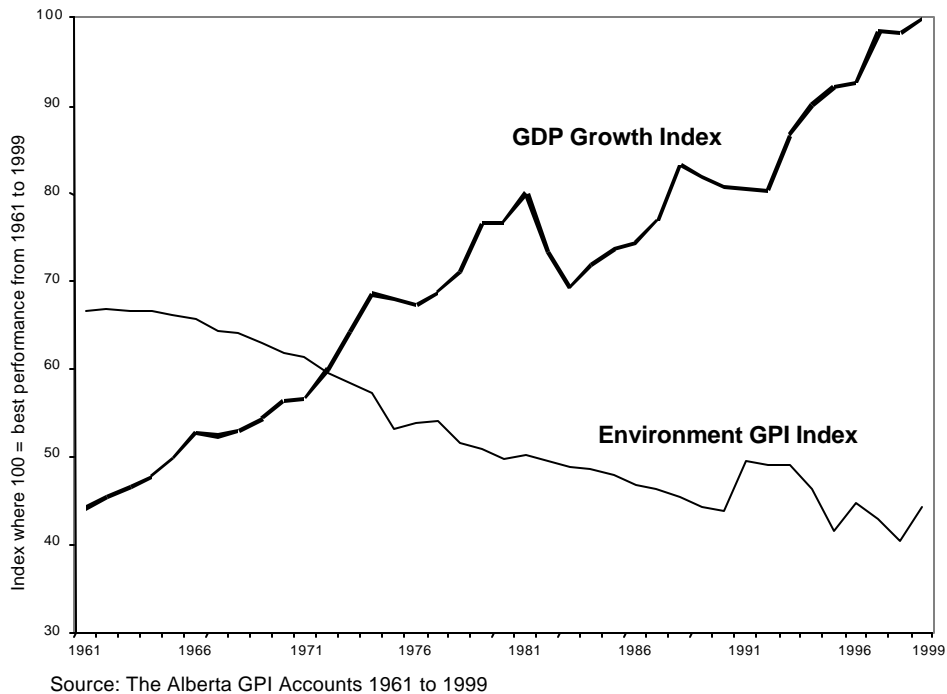
Smarter than ever

Albertans are more educated than at any time in history. Over 53 percent of adult Albertans have attained some form of post-secondary education, the highest level in Canada. While our intellectual capital has increased substantially, the fact that real disposable income and real weekly wages have been stagnant for almost 20 years suggests that the financial returns on more intellectual capital have not necessarily been forthcoming. At the same time, there are concerns about large class sizes in grade schools and soaring university tuition fees—up 209 percent since 1990 for Alberta's undergraduate arts students compared with a 126-percent average increase across Canada. High tuition fees are also contributing to rising levels of student debt, imposing a financial burden and added stress on young Albertans both during their education years and after graduation.

3.3 Environmental Sustainability

While the GDP has risen steadily since 1961, Alberta's natural resources and ecological integrity have been going in the other direction (Figure 9). While the GDP growth per capita averaged 2.2 percent per year, the GPI Environmental Sustainability Index declined at an annual rate of 1.0 percent over the study period 1961 to 1999.

Figure 9: Alberta GPI Environmental Sustainability Index Compared with GDP Growth, 1961 to 1999



The GPI Environmental Sustainability Index is a composite of the 17 indicators of natural resource sustainability and environmental quality listed in Table 1. Combining these indicators into a composite index, assuming equal weighting of each indicator, we can compare the trend in overall environmental sustainability and ecological well-being with the growth in the economy (GDP growth index). Figure 9 shows a growing gap between economic output and environmental sustainability.

A decline in conventional crude oil and natural gas reserve life, increasingly extreme fragmentation of Alberta's forest ecosystems, a rising ecological footprint, increasing intensity of energy use, falling timber sustainability, declining fish and wildlife populations, shrinking wetlands, a growing carbon budget deficit fueled by rising greenhouse gas emissions, and an increase in the production of hazardous waste are contributing to a decline in the GPI Environmental Sustainability Index. On the positive side of the equation, agricultural sustainability appears to be improving, oilsands reserves are abundant, air quality has improved, overall water quality downstream of major urban centres has improved (though groundwater conditions are uncertain) and more municipal waste is being diverted from landfills through recycling programs.

However, the overall trend suggests the steady erosion of nature's capital and integrity as economic prosperity continues. It is becoming clear that Albertans are not living off the interest of their natural capital and are, therefore, not living sustainably. Alberta's advantage—namely the extraction, processing, and export of our natural capital—cannot continue at current rates without further losses to the province's natural assets, in some cases, and without further degradation to ecological integrity and services in other cases. No one really knows if ecological thresholds or critical turning points will suddenly emerge and jeopardize ecosystem health and its sustenance of economic prosperity.

Bigger ecological footprints and growing ecological deficits

Albertans' average ecological footprint—the amount of land and resources required to meet our lifestyles—is large and growing. The GPI Ecological Footprint analysis found that Albertans consume more resources to feed their lifestyles than most of the Earth's citizens. At 10.7 hectares per person, the ecological footprint of Albertans is fourth largest in the world, after the United Arab Emirates, Singapore and the U.S. The ecological footprint per Albertan has increased 66 percent since 1961, due primarily to the consumption of oil, gas and coal for energy, travel, transportation, imported food, and consumption of goods and services. A large and growing footprint means that Albertans are living beyond the Earth's carrying capacity. If the entire world had an ecological footprint as large as the average Albertan, another five planets would be needed to meet global consumption demands.

Dwindling conventional oil and gas reserves but plenty of oilsands

Based on the most recent industry statistics from the Canadian Association of Petroleum Producers, the GPI natural resource account for oil and gas shows that Alberta is running out of natural gas and conventional crude oil. In 1999, Alberta had roughly 9.3 years of natural gas production and 7.5 years of conventional crude oil production remaining, based on the ratio of current stocks of economic reserves to production volumes. While this does not imply that Alberta will run out of oil or gas in less than ten years, the downward trend in reserve life is clear. Most importantly, the rate of production and export of natural gas continues to rise, and has exceeded new discoveries for more than ten years; the result is that natural gas reserve life continues to fall. Since 1989, the rate of new additions and discoveries of natural gas has averaged only 72 percent of the depletion rate, which is insufficient to maintain a steady reserve life. Alberta's most strategic energy resource, natural gas, is becoming scarce and will likely result in even more pressure on natural gas prices in the future.

While conventional non-renewable energy may be diminishing, Alberta's oilsands contain an estimated 300 billion barrels of bitumen and synthetic oil that rival Saudi Arabia's reported reserves of 264 billion barrels. Oil from oilsands could last hundreds of years and will undoubtedly be North America's strategic oil supply in the years ahead. But production of oil from oilsands comes with significant ecological impacts and environmental costs that will affect land, water and air. Alberta has a coal reserve life in excess of 1,000 years for sub-bituminous coal used in electrical generation. While Alberta may not run out of coal and oilsands, the degradation of the environment, greenhouse gas emissions, and the contribution to Alberta's growing carbon deficit will continue to increase. This decline should be a concern for all Albertans.

What about renewable energy?

While Albertans enjoy a bonanza of oil and gas revenues when demand and prices are high, more could be done to invest some of these royalties into alternative and renewable forms of

energy. Investing now in the development of a more diversified energy base would be prudent resource and fiscal management. Yet, very little renewable energy capacity (wind, solar, small hydro) exists in a province that has considerable potential.

More energy use

Albertans consume vast amounts of fossil fuel for energy. Fossil fuel combustion increased by 108 percent between 1978 and 1999. Primary energy demand⁴ increased from an estimated 338 gigajoules (GJ)⁵ per person in 1961 to 754 GJ in 1999, an increase of 123 percent. Total primary energy use peaked in 1999 at 2,234 petajoules. Alberta's per capita secondary energy use (the portion of primary energy consumed by domestic end users) increased from 432 GJ per Albertan in 1990 to 457 GJ per person in 1998, an increase of six percent. The greatest increase in per capita secondary energy use was in the industrial sector, rising 14 percent, and increasing four percent in the transportation sector. Secondary energy use declined by three percent in the agriculture sector, 12 percent in the commercial sector, and one percent in the residential sector.

Carbon budget deficits soar with rising greenhouse gas emissions

With Alberta's growing petroleum sector come higher levels of greenhouse gas emissions, including carbon dioxide emissions that are contributing to global climate change. Between 1990 and 1998, Alberta's greenhouse gas emissions from primary energy use increased 123 percent and are expected to continue rising as more oil and gas development occurs. At the same time the natural capacity of Alberta's forests and other ecosystems to store carbon has been slightly diminished over time with land use development. This trend of rising levels of emissions and declining carbon storage capacity has resulted in Alberta going from a carbon surplus (the ratio of the carbon absorption rate of ecosystems to total human-related emissions) in the 1960s to a massive carbon deficit in 1999, when emissions exceeded absorption rates by 338 percent.

Ecosystem integrity in decline?

No simple measures of ecological integrity presently exist. However, the condition of ecosystems, described in terms of their state of disturbance from industrial development, could serve as a proxy for ecological integrity. Alberta's forest ecosystems are highly fragmented by seismic lines, pipelines, powerlines and other linear disturbances. Global Forest Watch, a recent project of the World Resources Institute, has revealed that almost 90 percent of Alberta's productive forest⁶ is fragmented and considered to be in a non-wilderness condition. Using the GPI accounts for forests, we estimate that if industrial development and timber harvesting continue, Alberta's old-growth trees will be gone by 2042. Some researchers have compared Alberta's rate of deforestation due to industrial development with the deforestation of the Amazon rainforests. The long-term consequences to ecological well-being are largely unknown.

⁴ Primary energy use includes energy used by the residential, industrial, agricultural and transportation sectors.

⁵ A gigajoule (GJ) equals 10^9 joules of energy; it is equivalent to 0.95 thousand cubic feet of natural gas at 1,000 Btu (British Thermal Units) per cubic foot, or 0.165 barrels of oil, or 0.28 megawatts of electricity (see <http://www.neb.gc.ca/stats/metric.htm>). A petajoule (PJ) is 10^{15} joules of energy.

⁶ "Productive" forest refers to the area of forested land in Alberta that is designated for timber harvesting and other industrial and multiple uses.

Timber sustainability in question

The GPI timber accounts provide evidence that Alberta's timber capital may have reached or crossed a sustainability threshold for Alberta's productive forest land base. When the rate of tree growth and reforestation keeps up with timber depletion, the Timber Sustainability Index⁷ is equal to 1.00. In 1999, this Index was 0.87, indicating that for the first time in 40 years, the rate of timber depletion through harvesting, burning or bulldozing for industrial development exceeded the rate of growth and reforestation needed to sustain the current volume in perpetuity. If the critical threshold of a provincial sustainable wood supply has been crossed, it means some Alberta forestry companies may have shortfalls in their medium to long-term sustainable timber supplies. Confounding this situation is the risk of catastrophic events like fires or insect outbreaks combined with the cumulative impact of ongoing oil and gas development. However, the timber account only considers the sustainable flow of timber based on timber cutting rates, annual allowable cut, and regeneration. To achieve true sustainability of forest ecosystems and the forest industry, economic, ecological and social measures of forest and community values must also be considered.

Fish and wildlife habitat and populations at risk

Wildlife habitat and populations have diminished as a result of industrial development in Alberta's forests and other ecosystems. Forest fragmentation has affected many keystone species like the grizzly bear and woodland caribou, which serve as indicator species of ecosystem health. One-quarter of Alberta wildlife species (mammals, amphibians, reptiles and birds) are on the provincial government's "red", "blue" or "yellow" lists, which means they are at risk or may require special management or habitat protection to prevent their long-term decline. The number of woodland caribou in Alberta has declined by an estimated 40 percent since 1950 and it is listed as a threatened species, while grizzly bears are considered vulnerable. Meanwhile, over-fishing has caused commercial and sport-fishing catches to decline by half in less than two decades, and one-quarter of Alberta's fish species are at risk. In addition, roughly 50 percent of Alberta's amphibians and 38 percent of reptiles are on the red or blue endangered species list.

Slightly more parks and wilderness preserved but is it enough?

Most of Alberta's designated parks and protected areas are in national parks. Alberta remains shy of its goal to give protected area status to 12.2 percent of the total land base by 2000. By 1999, 8.2 percent of Alberta was protected in national parks and wildlife areas, and two percent in provincial parks, natural areas and other reserves. By the end of 2000, another one percent of the land base had been designated for protection, leaving the province just one percent short of its overall target. While the area nominally protected has been increasing, wildlife experts think that both the amount of land and the level of protection are insufficient to ensure the long-term sustainability of some species whose habitat is still declining or being fragmented by human activity.

Wetlands in decline

Roughly 60 percent of Alberta's original wetland ecosystems had disappeared by 1996 due to agricultural and other industrial development. An estimated 93 percent of wetlands are degraded at the margins due to agricultural practices.

⁷ The Timber Sustainability Index is the ratio of timber growth to total timber depletion.

Peatland status uncertain

Peatlands cover more than 16 percent of Alberta's land base and are most extensive in the northern two-thirds of the province. Peatlands are critical to the carbon cycle and as a filtration system for water. Some peatland areas have been cleared to improve the productivity of agricultural land or have been mined for horticultural uses. Unfortunately, the Alberta government does not monitor the volume of peat removed on agricultural land so long-term trends in provincial peatland area are not available.

Is agriculture sustainable?

Assessing the sustainability of agriculture in Alberta is complicated. Our GPI accounts show that while the average yield per hectare of farmed land has been increasing over the last 40 years, the rate of pesticide and herbicide use has increased at virtually the same rate in the last two decades. Whether this level of chemical inputs to agricultural production can be maintained without compromising the integrity and vitality of the soil and possibly polluting groundwater aquifers has not been well monitored. The other concern is that farm debt is very high and rising, leaving many farmers vulnerable and stressed and compounding an already difficult situation with stagnant agriculture commodity prices. The good news is that organic farming is on the rise but so too is the use of genetically modified crops, which is controversial in much of the world.

Water raises many questions

While Alberta seems to have an abundance of water, there is some uncertainty about long-term flows and quality of both surface water and groundwater. About 75 percent of Alberta's municipal population now has tertiary sewage treatment, resulting in a general improvement in water quality downstream of major urban centres. However, urban runoff still contains nutrients, metals and pesticides due to commercial, industrial, vehicular and residential sources. There are also concerns about the impact of agriculture and the energy industry on the province's surface waters and groundwater. An Alberta study monitoring 27 streams and 25 lakes in agricultural areas found that nutrients and bacteria concentrations often exceeded water quality guidelines; pesticides were detected frequently, sometimes exceeding guidelines; and fecal coliform bacteria exceeded human and livestock drinking water guidelines more than 90 percent of the time. In addition, predictions are that global climate change will affect the province's water resources. Much of the water in Alberta's rivers originates in the Rocky Mountains, where the impact of increases in average annual temperature is already affecting glaciers. The Athabasca Glacier, for example, receded over 1.5 kilometres in the last century and its volume is declining by over 16 million cubic metres each year. Groundwater could become one of the critical issues for future generations, but very little is known about the condition, stocks and flow rates of groundwater, partly because of difficulty in monitoring.

Air quality improving but emissions increasing

Reviews of air quality and emissions are mixed. Sulphur dioxide emissions increased from 1980 to the early 1990s but have stabilized since then. At the same time, carbon dioxide and nitrogen oxides have increased, while volatile organic compounds and particulate matter have decreased. Both coarse particulates (PM₁₀) and fine particulates (PM_{2.5}) are a health concern. In Edmonton and Calgary, levels of coarse particulates have generally been similar to the national urban mean concentrations, although annual average levels were sometimes above the national urban mean between 1985 and 1996. Yet the number of good air days reported by Environment Canada remained relatively unchanged over the study period.

More toxic waste produced and stored

Alberta's total production of hazardous waste rose between 1991 and 1999. Nearly 47,000 tonnes of hazardous waste were moved off site for disposal or treatment in 1999. About one-fifth went to the Alberta Special Waste Treatment Centre at Swan Hills for destruction, although that Centre has itself caused some environmental pollution. A much larger volume of hazardous waste was recycled—nearly 113,000 tonnes. Alberta ranked third highest among Canadian provinces for releases of pollutants to the air, water, landfill and underground in 1997. In 1998, over 14,000 tonnes of industrial chemical waste and 40,000 cubic metres of oilfield waste were injected into deep wells in the Edmonton area and at several other locations, accounting for 90 percent of all deep well injection of waste in Canada. The long-term environmental and health risks of such storage practices are unknown. Conservative estimates suggest the environmental liability costs associated with hazardous waste increased from \$1.7 million in 1991 to \$4.7 million in 1999.

Less municipal landfill waste but still the highest in Canada

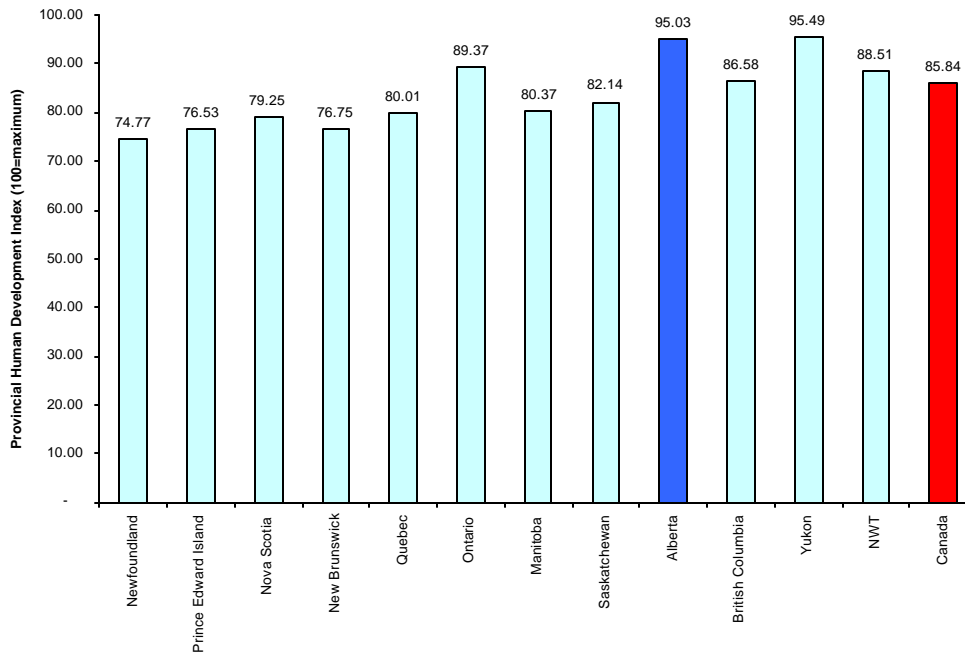
The amount of municipal waste sent to Alberta landfills fell from 1.03 tonnes per person to 0.75 tonnes between 1988 and 1999. However, this put Alberta just slightly past the halfway point to its provincial target of a 50-percent reduction in per capita waste from 1988 levels by 1999. While Albertans have adopted recycling practices, we still recycle or reuse only 17 percent of municipal waste, the lowest rate in Canada; the Canadian average is 30 percent. The non-market environmental costs due to Alberta's municipal waste were estimated at between \$128 million and \$212 million in 1999.

4.0 Alberta, The Best Place in the World?

If Canada ranks #1 in the world in terms of quality of life according to the UN Human Development Index (HDI), how would Alberta rank among provinces? The HDI is a rather narrow indicator of human well-being that uses GDP per capita, life expectancy and educational attainment (percentage of citizens with post-secondary education) as proxies for well-being. Using information contained in the Alberta GPI accounts and drawing from Statistics Canada information for the provinces we have estimated that Alberta would be first among the provinces and second in Canada, only after Yukon. Figure 10 shows the results of our analysis comparing provincial HDIs for 1997, based on Statistics Canada data.⁸ Alberta's HDI would be 95.03 in 1997, slightly lower (0.5 lower) than Yukon's 95.49 and higher than Ontario's 89.37. The higher the HDI score, the higher the human development of a state or province.

⁸ These estimates may not be entirely comparable with the UN's HDI, as data sources may vary. These estimates are provided to illustrate the potential of developing HDIs by province or region in Canada.

Figure 10: Provincial UN Human Development Index Rankings for 1997



Alberta ranked #1 in terms of GDP per capita in 1999 at \$39,033, ahead of Ontario’s \$34,001. The average life expectancy of Alberta men and women is 79.0 years—third after Prince Edward Island (79.4) and British Columbia (79.3) and tied with Ontario (79.0). In educational attainment, Alberta is second behind Yukon but ahead of British Columbia and Ontario. Just over half of adult Albertans (51.3 percent) have post-secondary education compared with 60.0 percent of Yukoners and 51.0 percent of British Columbians.

The bottom line is that Alberta would rank as one of the best places to live in the world. While the HDI is a narrow measure of well-being with only three indicators comprising this composite index, it does provide a basis for comparing the quality of life of nations. The GPI System of Well-being Accounts, developed by the Pembina Institute and applied to Alberta, gives a more comprehensive accounting that considers 50 indicators of economic, social and environmental well-being. In future, the United Nations HDI might be expanded to include more measures of well-being along the lines of the Alberta GPI accounts.

5.0 A GPI Net Sustainable Income Statement

The Alberta GPI accounts contain a full benefit-cost assessment of economic growth by accounting for the costs or benefits associated with several components of living and produced capital. The original U.S. GPI (Cobb, Halstead and Rowe, 1995) and, more recently, the Australian GPI (Hamilton and Denniss, 2000) both use a full cost approach to measuring sustainable economic welfare. Such analysis allows decision makers to identify the costs (or expenditures) of, for example, crime, auto crashes, oil and gas depreciation, climate change, and unsustainable agricultural or forestry practices that either count as contributions to GDP or are ignored as potential regrettable costs of economic growth. Benefits such as the value of unpaid housework, parenting and volunteer time can also be estimated then added to or compared with the GDP.

The notion of sustainable income is the bottom line being estimated in the Alberta GPI net sustainable income statement. British economist John Hicks used the term “Hicksian income” to mean the maximum amount that a person or a nation could consume over some period of time and still be as well off at the end of the period as at the beginning (Hicks, 1946).⁹ Thus income is synonymous with maximum *sustainable* consumption; that is, sustaining consumption over a given period by maintaining the productive potential of all capital stocks that generate the flow of goods and services needed for consumption.

Sustainable economic well-being can be estimated by adjusting gross output (GDP) for unaccounted benefits and for social, human and natural capital depreciation costs. This gives us, in effect, a full benefit-cost statement of genuine progress for the nation or province. We thus explicitly account for the sustainability of consumption by incorporating monetary values of capital stocks and their consumption. The GPI income statement adjusts for the shortcomings of the GDP and the System of National Accounts.

Even if adjustments to the GDP are not made using these human, social and natural capital cost and benefit estimates, simply accounting for their magnitude is an important exercise. It allows us to distinguish between those contributions (expenditures) to economic growth that are genuine improvements in well-being of society and those that are regrettable detractors.

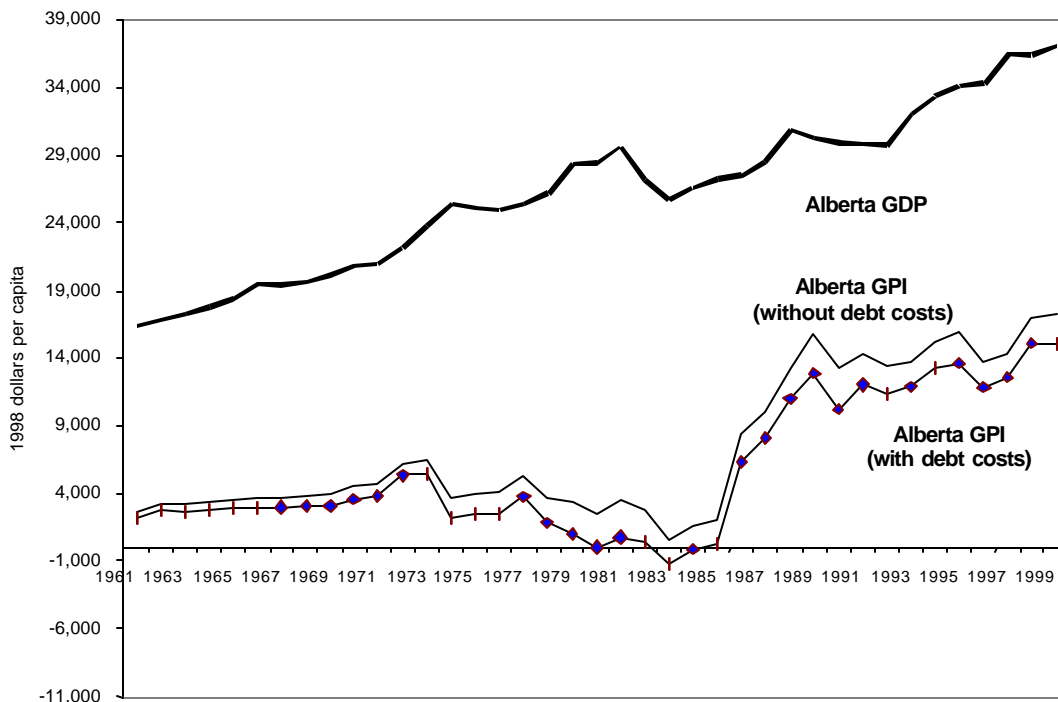
Starting with the GDP or with personal consumption expenditures (a component of GDP), an adjusted GPI income statement that measures net sustainable income can be derived (see Appendix E). Like the U.S. and Australian GPI estimates, the Alberta GPI starts by adjusting personal consumption expenditures for changes in income inequality, assuming that higher inequality between income groups detracts from the well-being and social cohesion of a society. This new income (or expenditure) statement then identifies the magnitude of real costs or expenditures that contribute to a rising GDP but might otherwise be identified as regrettable costs and detractors from genuine progress. These could include, for example, the costs of crime, family breakdown, problem gambling, and the depletion of finite stocks of non-renewable energy resources. Making such adjustments to GDP will always be controversial since some value judgment is needed about which expenditures should be treated as regrettable (i.e., a form of capital depreciation that requires a negative adjustment to the GDP), and which should be viewed as genuine contributions to the money measure of progress.

⁹ Hicks also wrote that “the practical purpose of income is to serve as a guide for prudent conduct” (Hicks, 1946: 172), a comment that has particular relevance for today’s concern with ecological sustainability (Hamilton and Denniss, 2000).

We offer this preliminary GPI net sustainable income statement as the basis for future development of annual full cost-benefit reporting of economic growth. In future, policy analysts and citizens will be better informed about the key contributors to economic growth by knowing the magnitude of either the dollar value of expenditures or the value of the unaccounted benefits. Adjusting the GDP for the value of unpaid work and for societal, human, and environmental capital costs provides a revised provincial income statement (see section 5.1 for details). The result is a more complete picture of Alberta's sustainable economic performance measured in money terms.

With these adjustments, the Alberta GPI net sustainable income statement attempts to account for the full monetary value of benefits and costs associated with consuming living and produced capital. This is consistent with previous GPI studies in the U.S. and Australia, with some of our own modifications. The monetary expression of the GPI can then be compared with Alberta's GDP (Figure 11).

Figure 11: Alberta GPI Net Sustainable Income versus GDP (1998\$ per capita), 1961 to 1999



Source: Alberta GPI Accounts, GPI income statements, 1961-1999

When we add the benefits of unpaid work, deduct various social and environmental costs (including depreciation costs of depleting oil and gas reserves), and adjust for the cost of servicing household debt, the trend in sustainable income (i.e., the monetary-based GPI) looks much different from the trend in GDP. From 1961 to 1973, the monetary-based GPI rose only slightly while the GDP showed considerable growth. From 1973 to 1983, the monetary-based GPI declined even as the GDP continued to rise. From 1986 to 1990, the GPI rose sharply, but remained relatively constant throughout the 1990s while the GDP continued to increase.

Estimating the monetary expressions of the GPI is of interest and is important to public policy and to budget decision making. However, it is more challenging than creating composite GPI indices from raw physical data of capital conditions. Methods for estimating these money values can be complicated and controversial. Tracking money flows through an economy for such things as auto crashes or crime will require careful study and analysis. Some may view putting money values on social, human and natural capital as repugnant. Some correctly identify both the methodological difficulties in accurately estimating costs and the problems associated with double counting and mixing stock and flow value estimates. Other concerns relate to whether non-market values should be introduced in the equations. Notwithstanding, we have drawn upon the best available academic work, methods and other research to estimate the full costs and benefits associated with sustainable economic well-being in Alberta. We recognize that this particular component of GPI accounting represents a significant work-in-progress that should be subjected to considerable debate and forensic analysis.

5.1 Constructing the GPI Net Sustainable Income Statement

Drawing from Canadian research, from the U.S. and Australian GPI work, and from the work of Dr. Ron Colman at GPI Atlantic, we have constructed an Alberta GPI net sustainable income statement. Our methodology includes several important modifications to the original U.S. GPI and ISEW (Index for Sustainable Economic Welfare) models developed by others,¹⁰ as well as the new Australian GPI (Hamilton and Denniss, 2000) by the Australia Institute.

First, we measure the depreciation of natural capital based on the estimated value (depreciation costs) of drawing down finite oil and gas stocks and on the cost of unsustainable forestry and agricultural practices. Second, we include estimates of the liability costs of greenhouse gas emissions to global climate change, plus the liability costs of the cumulative impact of toxic waste production and storage (net of disposal), and the potential cost (i.e., risk) to the environment from cumulative municipal landfill waste. Third, we estimate the costs of debt servicing by households as a regrettable cost to well-being; individuals and households experience financial stress as a result of debt and we view this as regrettable and a cost to sustainable well-being.

To understand economic systems and sustainability, one must first understand money and how it is created (Daly and Cobb, 1994; Anielski, 2000). Virtually all money in our current debt-interest-based system is created in the form of debt with little or no relationship to living capital management. Thus, the GPI accounting system treats interest payments on cumulative debt of households as a regrettable cost to genuine well-being and also as a hindrance to sustainability objectives. No other GPI accounting research has considered the nature of money creation and household debt in this manner, although both the U.S. and Australian GPI work regard net foreign borrowing as a cost to national well-being. Discussions of sustainability and well-being must include an analysis of the role of money creation in modern economies and its relationship to economic growth (Daly and Cobb, 1994). The Alberta GPI net sustainable income statement considers sustainable income, with household debt servicing costs both included and excluded (as seen previously in Figure 11).

The result is a different perspective on economic progress than that traditionally measured by the System of National Accounts and the GDP. The Alberta GPI Income Statement shows the full benefits and costs associated with our management of living and produced capital, expressed in money terms. It explicitly corrects for the shortcomings of the System of

¹⁰ Cobb and Cobb (1994); Daly and Cobb (1989); Cobb, Halstead and Rowe (1995); and Anielski and Rowe (1999a and 1999b).

National Accounts and the GDP in measuring total well-being by assessing the full benefits and costs of human, social, natural and built capital consumption. Thus, the GPI income statement provides a more comprehensive look at the real costs of economic progress as well as the unaccounted benefits such as unpaid work.

While the GDP is not an effective measure of economic well-being it does provide a useful measure of the economic transactions of the economy. Indeed, although it has grown to be used for much more than that, the GDP as it was originally intended is still useful.

Appendix E shows the real costs and benefits of the consumption of all capital and provides a new bottom line of genuine progress. The GPI income statement begins with gross personal consumption expenditures by households, because it is the economic well-being of the households of the nation with which we are concerned, including the unaccounted benefits and social and environmental costs that affect welfare. We then adjust consumption expenditures by the change in income distribution, using an index derived from the Gini coefficient for after-tax income distribution.¹¹ In 1999, there is no adjustment to consumption expenditures since income was most evenly distributed in that year, compared with the other years in the time series.

The next step is to add the estimated monetary value of unpaid work, the value of services (less depreciation) of public and private infrastructure, and the value of net capital formation (growth in capital stock per worker). For example, in 1999, the value of unpaid work was estimated at \$38.8 billion (1998 dollars) or 35.4 percent of Alberta's GDP (\$109.7 billion). We also include an estimate of the value of public expenditures that represent genuine investments in improved economic well-being of the nation or province and exclude so-called defensive expenditures that were made to mitigate regrettable damage to human, social and natural capital.

We then subtract estimated social costs of unemployment, underemployment, auto crashes, commuting, crime, family breakdown, suicide and problem gambling. The social costs of human and social capital erosion, which is treated as a deduction against gross output (GDP), are estimated at \$13.4 billion (1998 dollars), or 12.3 percent of GDP.

We also deduct several environmental costs to account for the depletion of natural capital (oil, gas, unsustainable timber resource use, unsustainable agricultural practices) as well as the costs of environmental pollution and degradation (greenhouse gas emissions, air pollution, loss of wetlands, toxic waste liability costs, and estimates of municipal landfill liabilities). The estimated cost of depleting oil and gas finite reserves (a reduction of inventory) is \$10.6 billion (1998 dollars) or 9.7 percent of GDP; this would be a deduction in our GPI income statement. As indicated above, total environmental costs of pollution, environmental liabilities and depletion of natural capital stocks (both non-renewable and renewable resources) are estimated at \$26.4 billion (1998 dollars) or 24.0 percent of GDP; thus we would adjust Alberta's provincial income accounts (GDP) downward by these estimated costs.

The resulting GPI net sustainable income estimate for 1999 is estimated at roughly \$37.0 billion (net of household debt servicing costs) or \$43.4 billion (without household debt servicing costs), compared with \$52.8 billion in personal consumption expenditures (the starting point in the GPI net sustainable income statement) and \$109.7 billion in GDP.

¹¹ The Gini coefficient is a measure of income inequality among income groups, expressed as a ratio from 0 (no income inequality) to 1.00 (maximum income inequality). It measures the dispersion within a group of values (usually income), calculated as the average difference between every pair of values divided by two times the average of the sample. The larger the coefficient, the greater the dispersion.

6.0 So What? Policy Tools for Sustainable Management

The GPI accounts tell us whether Alberta is better off or worse off—not just in traditional economic terms like changes in the GDP, but also in terms of how we use our time; the condition of our stocks of natural resources; and the health of individuals, households, communities and the environment. Understanding these conditions is critical to Alberta’s future. The Alberta GPI Accounts (1961-1999) suggest that while more money has changed hands, the price in this growth in GDP has been an erosion in the condition of many forms of living capital.

These accounts can be used to develop annual “state of sustainability trends” reports to citizens about the changing conditions that affect their lives. With better information, people would be empowered to participate more fully in the democratic process of shaping their future. The strength of the GPI accounts is their open architecture. The accounts are a “work-in-progress” and are intended to be transparent and flexible to accommodate the changing values of citizens.

GPI accounts are a powerful tool for public policy development, strategic planning and budgeting. They allow decision makers to compare many different measures of sustainability and well-being using a common measuring system. As we did in this analysis, raw data can be indexed in relation to benchmarks of best-case scenarios for a province or community. Provincial or community data can also be examined in relation to targets of other jurisdictions. Both approaches are valuable and meaningful ways for setting public policy objectives. The flexibility of GPI accounting allows for comparison against oneself, as well as assessment of progress over time or against other jurisdictions or organizations.

Because GPI accounts give such a comprehensive perspective on long-term trends in sustainable well-being, they are ideal for measuring sustainable development. They can be used in any organization for measuring “triple bottom lines” of economic, social and environmental performance. GPI accounts can be used for non-partisan reporting to citizens on their overall “state of well-being” in accordance with their quality of life values. It is the ideal 21st century navigational tool for charting a sustainable future—one in which stewardship of real wealth takes priority over making money.

7.0 Charting a Sustainable Future

The GPI Alberta project raises several fundamental questions about how to chart a sustainable future for Alberta and other jurisdictions. How are we doing as stewards of the households and of the natural environment of Alberta? A sustainable society could be defined as one in which all four forms of capital—human, social, natural and produced—are managed so they are in equilibrium; that is, they are stable at sufficient levels over time. The focus would thus be to maintain the stock, flow and quality of all capital. The challenge is to understand and define the equilibrium or threshold for each form of capital, on an individual as well as a collective basis. At the very least, one principle would be to ensure that the integrity of each form of capital is maintained in terms of its quality and the services it generates. This is where GPI accounts could provide guidance as a measure of the health and integrity of each form of capital and as a tool for designing a sustainable future.

Alberta's prosperity over the past 40 years or so has relied heavily on the development and export of natural capital. This continues even now with oil, gas, forest products and agricultural product exports. A sustainable future might consider several important questions. How much of our natural capital do we need or want to export beyond Albertans' or Canadians' basic needs for living? Are we currently getting maximum value or service from using natural capital? Could we improve the eco-efficiency of resource and energy use from natural capital? Should we be using today's oil and gas revenues to invest in sustainable, renewable energy capacity at the household, business or industrial level? What are the thresholds or limits to how much natural capital can be developed in our industrial complex without negatively affecting the integrity of nature or ecosystems to sustain a continuing flow of natural resources and environmental services? Is there such a thing as "enough"? Can production from agriculture, forests, and energy resources be pushed further without compromising long-term sustainability and ecological integrity? These questions must be addressed.

On the level of personal lifestyles, how could Albertans change their consumption habits to reduce their ecological footprint—a footprint that is more than five times the Earth's carrying capacity? Can we reduce our energy and food footprint to live within the carrying capacity of Alberta's natural environment? This would require some serious choices about what constitutes a level of sustainable self-sufficiency in food, clothing, homes, energy and other materials that are consumed. Do we have a responsibility to other global citizens with whom we share the Earth's carrying capacity to ensure our lifestyle does not jeopardize or preclude others from enjoying benefits of the Earth?

When it comes to human and social capital, sustainability might be defined in terms of how we spend our time—do we have a healthy balance of work time, family time and free time? Are we enjoying the time "dividends" of a more productive and efficient society and economy? Or are we working harder and feeling more stressed than ever, while eroding the time we have to spend with our families and friends? While we may be living longer, various stresses seem to be showing up in the form of disease, injuries, suicides and family breakdown. Is the drive for greater economic prosperity coming at personal and social cost? Are we as a society investing enough in our intellectual capital to build a knowledge legacy? Do we have an effective ratio of teachers to students in primary school? Are we graduating university and college students with unreasonable levels of financial debt? Why aren't all Albertans earning a fair living wage? Are food banks really necessary? Are we building a fair and just society by investing in alternative methods of resolving conflict and healing the hurt from crime? Are companies operating in a socially and environmentally responsible way? These are some of the important human and social sustainability issues.

In terms of sustaining produced or manufactured capital, the question of maintaining the integrity and services of household, business and public infrastructure is fundamental. Are we investing enough in the maintenance and refurbishment of our infrastructure to ensure that the services continue now and for future generations? Or have we let some of our infrastructure erode so that future costs will be that much higher?

If we agree that these are some of the key issues concerning well-being, then the GPI accounts can guide us as we seek to chart a sustainable future. If we are serious about pursuing sustainable well-being then we must develop clear visions, policies, goals and performance targets. This will mean tackling many tough questions about our consumer lifestyle, trade policy, economic policies, social policies, and our approach to stewardship of nature. Charting a sustainable future is an exciting task that will require the collective energy and spirit of all Canadians.

GPI Alberta References

NOTE TO THE READER: The references in this list were consulted during the research for the full GPI Alberta study. They are listed here to give a sense of the scope of the project and to assist those who may wish to obtain additional information. Only a few are actually cited in this document.

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Appendix A: The Alberta GPI Raw Data

GPI Indicator	Description of indicator	1960s	1970s	1980s	1990s	1999
Economic growth	GDP at market prices, expenditure based (1998\$ per capita)	\$ 18,371	\$ 24,333	\$ 28,196	\$ 33,315	\$ 37,005
Economic diversity	Economic Diversification Index, based on Hachman Index (closer to 1.00 means closer to national average)	*	0.280	0.137	0.275	0.228
Trade	Trade balance (exports less imports) per capita (1998\$)	\$ (800)	\$ 1,801	\$ 2,950	\$ 2,963	\$ 3,219
Disposable income	Personal disposable income per capita (1998\$)	\$ 10,386	\$ 14,977	\$ 20,361	\$ 19,762	\$ 20,147
Weekly wage rate	Weekly wage rate (1998\$)	\$ 438.07	\$ 593.95	\$ 699.57	\$ 694.10	\$ 718.15
Personal expenditures	Alberta personal consumption expenditures, per capita (constant 1998\$)	\$ 9,736	\$ 13,253	\$ 16,650	\$ 17,112	\$ 18,389
Transportation expenditures	Direct expenditure per capita on transportation in Alberta, including public transit (1998\$)	\$ 204	\$ 343	\$ 422	\$ 485	\$ 530
Taxes	Taxes on persons per capita (1998\$)	\$ 1,286	\$ 2,481	\$ 3,533	\$ 4,099	\$ 5,172
Savings rate	Savings rate as percentage of after-tax disposable income	4.4%	6.6%	12.6%	6.8%	4.7%
Household debt	Household debt per capita (1998\$)	\$ 6,891	\$ 11,566	\$ 14,517	\$ 18,975	\$ 21,172
Public infrastructure	Value of services from public infrastructure, \$ per capita (1998\$)	\$ 503	\$ 543	\$ 659	\$ 676	\$ 612
Household infrastructure	Value of services from household infrastructure, \$ per capita (1998\$)	\$ 964	\$ 1,432	\$ 1,737	\$ 1,782	\$ 1,866
Poverty	Percentage of all persons living below LICO (poverty line)	11.9%	13.4%	14.9%	16.4%	15.5%
Income distribution	Gini Coefficient (after-tax-and-transfer income, all families)	0.410	0.367	0.324	0.304	0.316
Unemployment	Unemployment rate in Alberta over the study period	2.7%	4.7%	8.2%	7.6%	5.7%
Underemployment	Underemployment rate (underemployed as a percentage of those employed)	0.6%	1.0%	2.6%	3.9%	3.5%
Paid work time	Hours of paid work per person in the labour force per year	2,403	1,991	1,683	1,475	1,463
Household work	Household work hours per person per year	985	983	938	1,004	1,032
Parenting and eldercare	Parenting and eldercare hours per person per year	197	178	138	137	137
Free time	Leisure hours per person per day	5.0	5.2	5.5	5.8	5.9
Volunteerism	Volunteerism hours per person per year	69.3	69.2	63.4	68.0	75.4














GPI Indicator	Description of indicator	1960s	1970s	1980s	1990s	1999
Commuting time	Average minutes per day per worker (includes both automobile and transit users)	24.25	25.74	28.39	27.13	25.04
Life expectancy	Estimated blended life expectancy (years) for men (50%) and females (50%)	72.7	74.4	76.5	78.6	79.3
Premature mortality	Person years of life lost per 100,000 population from all causes of death	5,385	5,469	4,411	3,628	3,373
Infant mortality	Infant mortality (deaths per 1,000 live births)	*	14.7	9.1	6.5	5.6
Obesity	Percentage of adults (15 years or older) with Body Mass Index (BMI) greater than 27	*	*	17.4%	27.7%	32.9%
Suicide	Suicide rate for both sexes per 100,000 population	11.5	15.5	16.3	16.2	14.4
Drug use (youth)	Youth drug use (% of youth)	*	0.08%	0.10%	0.11%	0.15%
Auto crashes	Total auto crashes per Alberta adult (15+ years)	375	475	571	446	408
Family breakdown	Divorce rate (percent of marriages that end in divorce)	13.5%	29.1%	41.2%	43.7%	40.9%
Crime	Crime incidents per 100,000 people in Alberta	3,799	6,353	7,386	6,889	5,624
Problem gambling	Estimated cost of problem gambling (1998\$ per capita)	\$ 42.08	\$ 55.74	\$ 74.63	\$ 407.35	\$ 731.11
Voter participation	Composite voter participation rate (federal, provincial, municipal), % of eligible voters	56.6%	55.6%	49.8%	50.9%	48.6%
Educational attainment	Percentage of population (15 years and over) with some post-secondary education or university degree	12.1%	31.2%	43.7%	50.5%	53.8%
Oil and gas reserve life	Average reserve life for conventional crude oil and natural gas, excludes oilsands	39.59	23.32	19.04	11.39	8.46
Oilsands reserve life	Average reserve life for oilsands	*	40.2	27.4	23.1	31.8
Energy use	Total energy demand GJ per capita	367	491	592	720	754
Agricultural sustainability	Composite agriculture index, includes summerfallow, soil organic carbon, pesticide use, salinity, yield	49.2	48.7	49.8	58.0	61.5
Timber sustainability	Timber Sustainability Index, the ratio of annual increment (growth) divided by total harvest, energy and agriculture depletions	4.08	3.63	1.68	1.32	0.87
Forest fragmentation	Percentage of Alberta's forests (Boreal and Foothill) that remain unfragmented, based on World Resources Institute report	92.5%	80.4%	54.5%	24.0%	10.9%
Parks and wilderness	Area protected, km ²	55,400	56,350	58,070	63,570	68,000

















GPI Indicator	Description of indicator	1960s	1970s	1980s	1990s	1999
Fish and wildlife	Average of caribou (benchmark year =100), bears (target of 2500 bears in province) and sport and commercial fisheries (benchmark year =100)	58.15	53.61	63.11	51.64	44.77
Wetlands	Wetlands area remaining in square kilometres	17,253	16,309	15,315	14,362	14,051
Peatlands	Peatlands, area change per annum (million ha)	0.21%	0.21%	0.21%	0.21%	0.21%
Water quality	Average water quality Index (100 = best)	*	50.50	48.67	58.91	72.73
Air quality	Average Air Quality Index, includes SO ₂ , CO ₂ , VOC, NO _x and PM (100 = best)	63.67	65.75	74.99	81.76	80.34
Greenhouse gas emissions	Total greenhouse gas emissions (tonnes) per capita	24.25	35.57	53.81	68.22	68.70
Carbon budget deficit	Annual greenhouse gas emissions as a percentage of sequestration capacity	57%	105%	205%	313%	338%
Hazardous waste	Tonnes of hazardous waste produced per annum	*	*	*	28,806	46,850
Landfill waste	Per capita disposal rate, tonnes per person per year	*	*	1.02	0.85	0.75
Ecological footprint	Total Ecological Footprint (hectares per capita)	7.14	9.49	10.05	10.37	10.74
GDP (gross 1998\$ millions)		\$ 26,711	\$ 44,564	\$ 67,281	\$ 91,548	\$109,708
GPI net beneficial output (1998\$ per capita)		\$ 10,505	\$ 16,507	\$ 19,792	\$ 29,557	\$ 34,234
GDP (1998\$ per capita)		\$ 18,371	\$ 24,333	\$ 28,196	\$ 33,315	\$ 37,005








Source: Alberta GPI accounts from various sources, including Statistics Canada, Alberta Government and others
 Note: * not available












Appendix B: Alberta GPI Sustainability Condition Report, 1961 to 1999








NOTE: The GPI Condition Indices reflect the conversion of the raw data for each Genuine Progress Indicator to an index that can range from 0 to 100, with 100 being the optimal or best condition recorded between 1961 and 1999 (column two). The third column shows which year had the highest index rating and which had the lowest. The fourth column uses directional arrows to show the 40-year trend in the condition of each Genuine Progress Indicator variable, whether increasing, decreasing or constant. The last column provides a brief description of the trend.



ECONOMIC WELL-BEING Genuine Progress Indicators	GPI Condition Index in 1999 (100 = best) (0 = worst)	Best Year Worst Year*	Trend in the GPI variable 1961-1999	Description of Trend
Economic growth (real GDP per capita)	100	1999 1961*		The economy (real GDP, 1998\$) grew 400% in 40 years, representing a growth rate of 4.4% per annum or 2.2% per capita.
Economic diversity (distribution of GDP)	38	1971 1983*		Alberta's economy was more diversified in 1999 than in 1985 but less diversified than in 1971.
Trade balance (exports less imports)	61	1996 1971*		The balance of exports to imports has been variable, though slightly improved.
Real disposable income	92	1981 1961*		Higher than in the 1960s and 1970s but virtually unchanged since 1984.
Real weekly wage rate	95	1982 1964*		Real weekly wages while higher in 1999 compared to the 1960s, have been stagnant since 1984.
Personal consumption expenditures	100	1999 1961*		Real spending per capita grew at 2.0% per annum.
Transportation expenditures	26	1961 1997*		Real transportation expenditures per capita are growing at 3.8% per year.
Taxes	17	1961 1999*		Average annual growth of real taxes per capita was 5.1% per annum.
Household and personal debt (per capita)	25	1961 1999*		Household and personal debt is growing at 3.8% per capita per annum.
Savings rate	26	1982 1970*		Savings rate fell to 7.5% from a high of 27% in 1982, but was higher than in 1960s
Public infrastructure (value of services)	84	1990 1964*		Value of services increased at 0.6% per annum per capita.
Household infrastructure	94	1989 1961*		Value of services from household appliances and infrastructure has been increasing at 3.3% per capita per annum.
Economic GPI Index	63	1985 1970*		Increased since 1961, but stagnant since 1981.

PERSONAL and SOCIETAL WELL-BEING Genuine Progress Indicators	GPI Condition Index in 1999 (100 = best) (0 = worst)	Best Year WorstYear*	Trend in the GPI variable 1961-1999	Description of Trend
Poverty (percentage living below LICO – low income cut-off)	59	1981 1992*		Rate of poverty was higher in the 1990s than the 1960s but is largely unchanged since 1981.
Income distribution	90	1989 1961*		The distribution of income is more even in the 1990s, but the gap between the earned (market) income of the rich and poor is widening.
Unemployment (rate)	44	1966 1984*		Unemployment is higher than in the 1960s and '70s but has fallen since 1993.
Underemployment	16	1966 1993*		Underemployment, while lower since 1993 is significantly higher than in the 1960s and '70s.
Paid work (time use)	52	1961 1998*		Total hours of paid work per worker have steadily declined since 1961.
Household work (time use)	89	1997 1982*		Hours spent at housework per Albertan were up only slightly in the latter part of the 1990s compared to the '60s.
Parenting and eldercare (time use)	69	1966 1986*		Albertans spend less time (60 hours less per year) with children and parents than ever before.
Free (leisure) time (time use)	100	1999 1961*		Albertans have more slightly more hours of free time (leisure) than before.
Volunteer time (time use)	100	1999 1986*		The hours spent volunteering have remained virtually unchanged at roughly 66 hours per person per year.
Commuting time (time use)	96	1961 1992*		Time spent commuting to and from work was up slightly in the 1990s compared to the '60s but is effectively unchanged
Life expectancy	100	1999 1961*		Albertans are living longer than ever.
Premature mortality	100	1999 1974*		Premature mortality (from all causes except suicide) is declining, since peaking in 1974.
Infant mortality	87	1997 1970*		Infant mortality has declined significantly since the 1960s (an improved condition)
Obesity	21	1985 1999*		Obesity and overweight conditions are rising steadily.
Suicide	66	1964 1993*		Suicide is much higher than in the 1960s, peaking in 1993 and moderating slightly since then.
Youth drug use	39	1983 1999*		Youth drug use shows a slight increase since 1968.

PERSONAL and SOCIETAL WELL-BEING Genuine Progress Indicators	GPI Condition Index in 1999 (100 = best) (0 = worst)	Best Year WorstYear*	Trend in the GPI variable 1961-1999	Description of Trend
Auto crashes	68	1961 1981*		Auto crashes per adult Albertan increased until about 1990 and have since declined.
Divorce and family breakdown	24	1961 1986*		The percentage of marriages that ended in divorce was higher at 41% in 1999 than in the 1960s (10%).
Crime	54	1962 1991*		The rate of crime rose steadily, peaking in 1991, and declining since then.
Problem gambling	6	1973 1999*		With access to more legalized gambling, the cost associated with problem gambling is increasing dramatically.
Voter participation	80	1967 1997*		Fewer eligible voters are casting votes in all elections than at any time in history.
Educational attainment (intellectual capital)	100	1999 1961*		More adults (54% of the adult population) had some post-secondary education in 1999 than ever before.
Societal GPI Index	67	1962 1988*		The GPI Personal and Societal Well-being Index has declined at a rate of 2.4% since 1961, though it has moderated in the latter part of the 1990s.

ENVIRONMENTAL WELL-BEING Genuine Progress Indicators	GPI Condition Index in 1999 (100 = best) (0 = worst)	Best Year Worst Year *	Trend in the GPI variable 1961-1999	Description of Trend
Conventional crude oil and natural gas reserve life	20	1966 1999*		Natural gas and conventional crude oil reserves continue to decline, with replacements not keeping pace with extraction.
Oilsands reserve life	79	1979 1998*		Oilsands reserves are relatively constant given that there are an estimated 300 billion barrels of economic reserves of oil that could last hundreds of years.
Energy use	44	1962 1999*		Total energy demand (intensity of use) continues to rise at a rate of 2.2% per annum, per capita, similar to the GDP per capita.
Agriculture sustainability	62	1999 1961*		The agriculture sustainability index (a composite index of yields, soil organic carbon, summer fallow, pesticide use and salinity) increased somewhat in the 1980s and '90s. However, increasing farm debt, and fertilizer and pesticide use may become problematic.
Timber sustainability	79	1994 1998*		The Timber Sustainability Index (ratio of timber growth to all timber capital depletions) continues to decline, falling below sustainable thresholds in 1998 and 1999.
Forest fragmentation	11	1961 1999*		The fragmentation of Alberta's forests (due to industrial development) has risen so dramatically since the 1960s that an estimated 90% of Alberta's vast productive forest land base is now fragmented.
Parks and wilderness	33	1999 1995*		While the area of parks and wilderness under protection has increased slightly, not all landscape types are adequately represented.
Fish and wildlife	45	1980 1999*		Caribou populations are falling; grizzly bear populations are uncertain, and sport and commercial fisheries are declining.
Wetlands	40	1961 1999*		Area of wetlands has declined at an estimated 0.6% per year since 1961.
Peatland	99	1961 1999*		The area and volume of peatland is largely unchanged.
Water quality	73	1999 1986*		Overall water quality (a composite index of pulp effluent, sewage treatment, water-related illness and river water quality) has improved. However, river water quality shows a slight decline and groundwater conditions are uncertain.

ENVIRONMENTAL WELL-BEING Genuine Progress Indicators	GPI Condition Index in 1999 (100 = best) (0 = worst)	Best Year Worst Year *	Trend in the GPI variable 1961-1999	Description of Trend
Air quality	80	1997 1972*		The Air Quality Index (includes SO ₂ , CO ₂ , VOC, NO _x and PM) has improved. However, some emissions are showing increases, and particulate matter is a health concern.
Greenhouse gas (GHG) emissions	31	1962 1996*		GHG emissions have risen an estimated 3.2% per capita, per annum since 1961.
Carbon budget deficit	14	1974 1998*		Alberta carbon budget deficit (the relationship between CO ₂ emissions to the annual carbon storage by the environment) has increased at 5.4% per annum from 1961-1999, but slowed in the '90s.
Hazardous waste	42	1974 1998*		The volume of hazardous waste increased three fold between 1991 and 1999. Alberta ranked third highest among Canadian provinces for releases of pollutants to air, water, landfill and underground in 1997.
Landfill waste	55	1995 1991*		As a result of recycling efforts, waste to landfills has decreased somewhat, but the target of a 50% reduction by 1999 was not met. Alberta has the lowest rate of recycling and reuse in Canada (17%).
Ecological Footprint	44	1961 1997*		The ecological footprint of each Albertan is increasing at a rate of 1.4% per year with a 1999 footprint roughly six times larger than the average global carrying capacity.
Environment GPI Index	44	1962 1970*		The Environment GPI Index has declined steadily at a rate of 0.8% per annum since 1961.

Alberta GPI Index	61	1961 1998*		The overall GPI Index for Alberta has declined an average 0.5% per annum from 1961-1999, though it moderated slightly in the 1990s.
Alberta Economic Growth (GDP) Index	100	1999 1961*		Total GDP has grown at an annual real rate of 4.4% since 1961 or at 2.2% per capita.

Appendix C: Best and Worst GPI Years in Alberta, 1961 to 1999

Figure 12: GPI Sustainable Well-being Index, Best Year, 1961

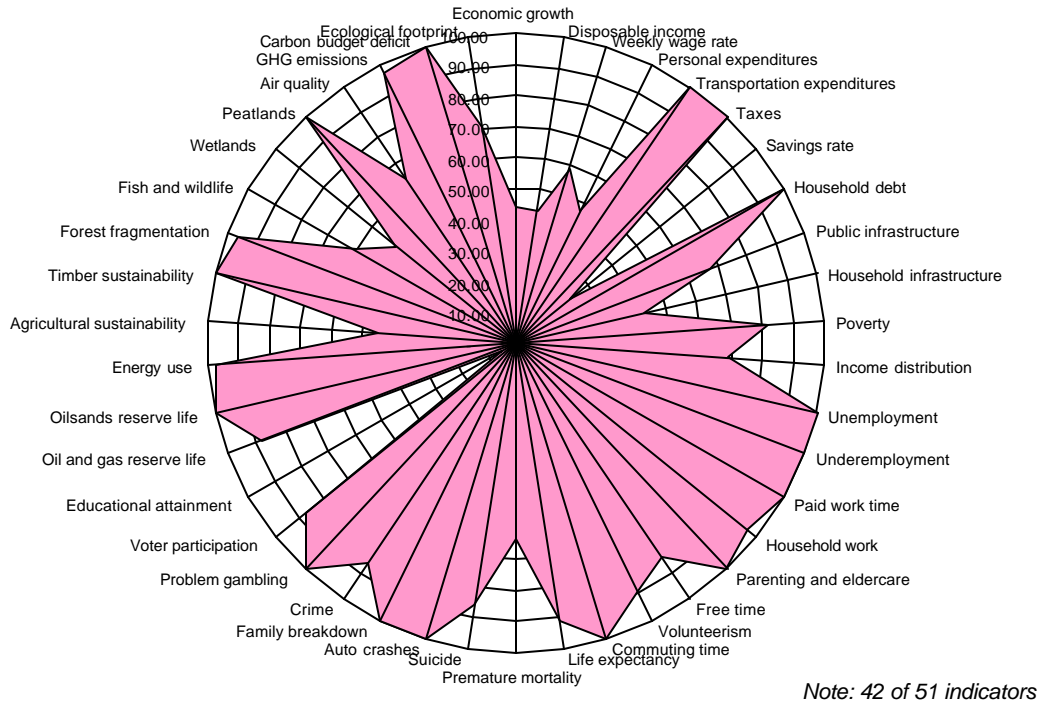
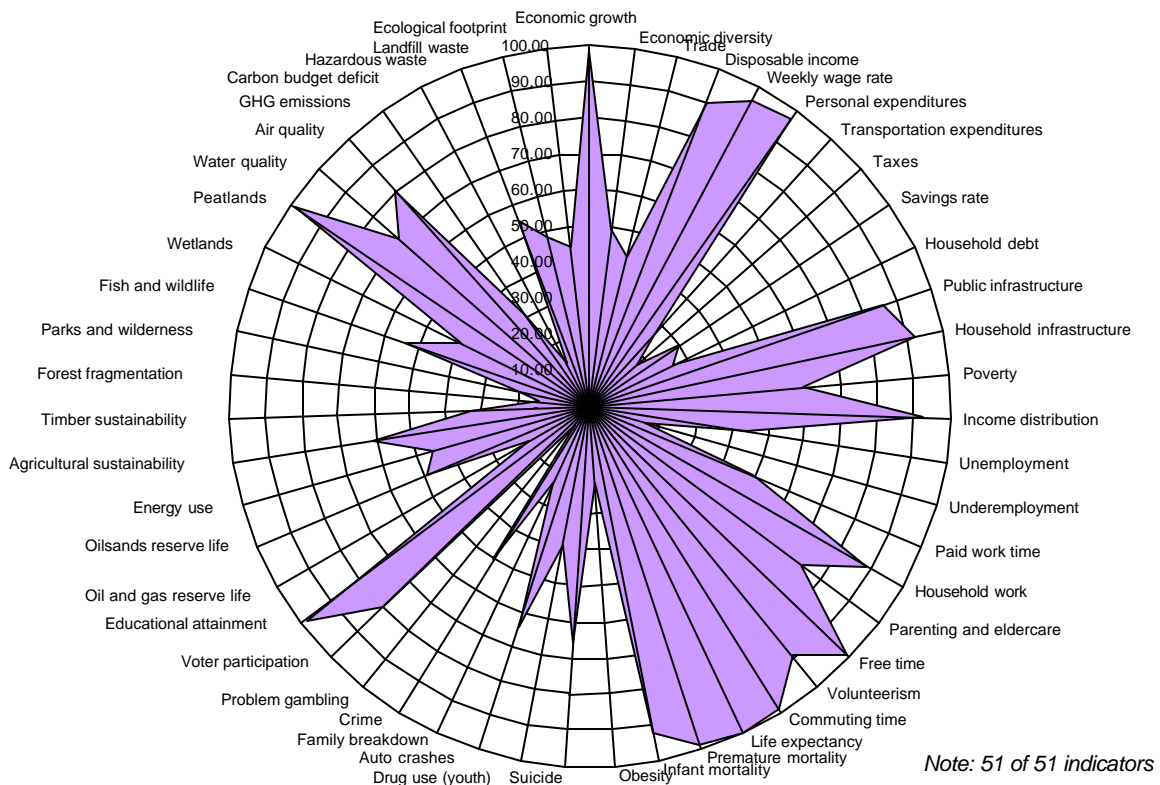
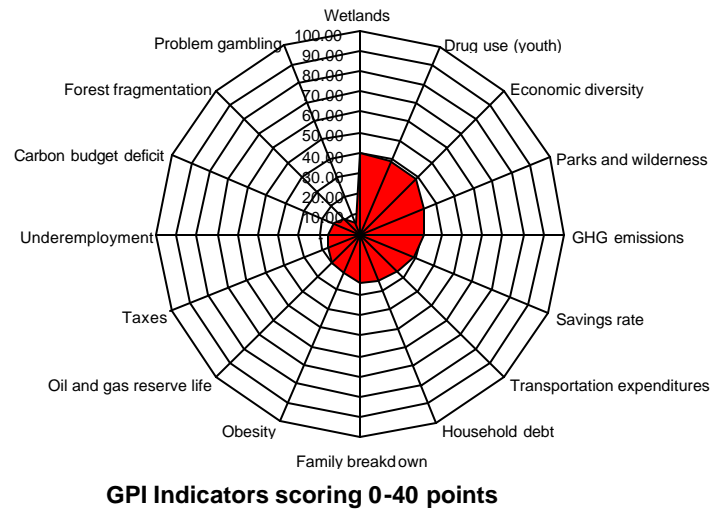
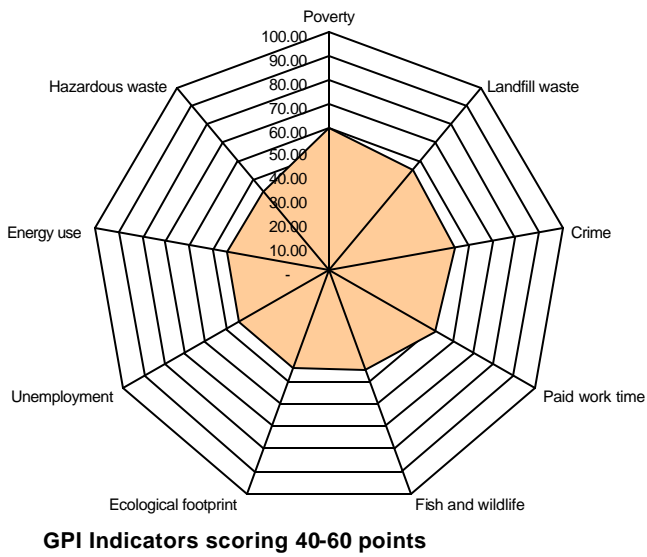
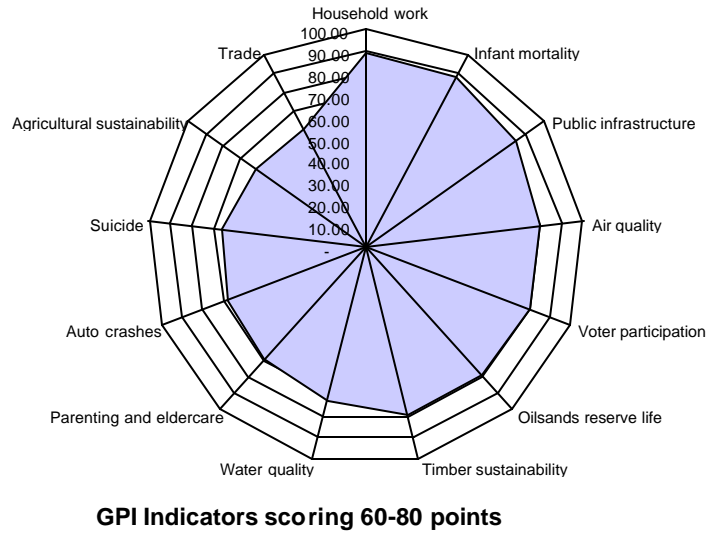
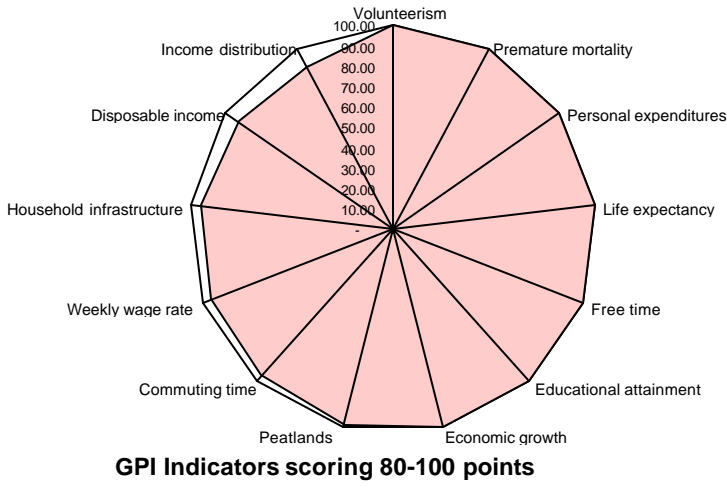


Figure 13: Alberta GPI Sustainable Well-being Index, Worst Year, 1998



Appendix D: Alberta GPIs Ranked by Order of Scores



Appendix E: Alberta GPI Net Sustainable Income Statement

(million 1998\$)	million (1998\$)	% of GDP
Gross Domestic Product (expenditure-based)	109,708.43	
Personal consumption expenditures	52,838.59	48.2%
Consumption expenditures adjusted for income distribution	47,957.49	43.7%
Non-defensive government expenditures	7,727.89	7.0%
Value of services of consumer durables	5,532.50	5.0%
Value of public infrastructure services	1,660.96	1.5%
Net capital investment	(864.64)	-0.8%
Cost of household and personal debt servicing	(6,433.77)	-5.9%
Value of unpaid time use		
Value of housework	32,907.30	30.0%
Value of parenting and eldercare	3,291.54	3.0%
Value of volunteer work	2,631.30	2.4%
Value of free time	0.06	0.0%
	38,830.19	35.4%
Social Costs		
Cost of consumer durables	(7,998.17)	-7.3%
Cost of unemployment and underemployment	(3,823.98)	-3.5%
Cost of auto crashes	(3,026.43)	-2.8%
Cost of commuting	(4,406.03)	-4.0%
Cost of crime	(1,833.23)	-1.7%
Cost of family breakdown	(147.96)	-0.1%
Cost of suicide	(2.43)	0.0%
Cost of gambling	(2,167.50)	-2.0%
	(23,405.73)	-21.3%
Environmental Costs		
Cost of non-renewable resource use	(10,656.30)	-9.7%
Cost of non-timber forest values due to change in productive forest	(23.78)	0.0%
Cost of unsustainable timber resource use (loss in pulp production value)	(14.60)	0.0%
Cost of erosion on bare soil on cultivated land (on-site only)	(12.78)	0.0%
Cost of reduction in yields due to salinity on dryland and irrigated cropland	(58.15)	-0.1%
Cost of air pollution	(3,666.00)	-3.3%
Cost of greenhouse gases (damage of climate change)	(4,073.33)	-3.7%
Cost of loss of wetlands	(7,682.01)	-7.0%
Environmental cost of human wastewater pollution	(0.57)	0.0%
Non- market cost of toxic waste liabilities	(4.71)	0.0%
Non-market cost of municipal waste landfills	(190.10)	-0.2%
	(26,382.33)	-24.0%
GPI (Net Beneficial Output), with debt servicing costs	36,999.62	
GPI (Net Beneficial Output), without debt servicing costs	43,433.40	
GPI (with debt) per capita	12,480.10	
GDP per capita	37,005.04	