



Appropriate Investment of Kuwait's Natural Capital for Sustainable Development

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Abstract:

The study holds the view that Kuwait should be looking to have sustainable development. Both the current and future generations have a right to the natural resources of the country and as such it is imperative to find out whether the substantial development achieved by Kuwait during the period of study 1970-1997 was achieved through sustainable development by investing Kuwait's Natural Capital, mainly Oil.

The study looks critically at the current system adopted for national accounting, which does not include the cost of the depleting natural resources. The criticality of the natural resources for a country like Kuwait, whose GDP is dependant on oil, means that the cost of depleting natural capital has to be incorporated in the national accounts system so that to put things in the proper perspective. This ensures that the economic costs of the policies that may affect the environment are not ignored.

Two major methods, 1) the user cost approach and 2) the domestic product approach, are used in the study to estimate the depletion of petroleum and gas, as well as in the calculation of the permanent income in Kuwait.

The researcher has created a Development Framework for measuring Kuwait's Sustainable Development.

A new National Accounting System, which includes the cost of utilized environmental capital, is suggested for Kuwait. Apart from

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this, environmental amendment is made to both the net domestic product and the net domestic investment.

The study clearly shows that regardless of the method used, the adjusted net domestic product measures indicate that a significant percentage of Kuwait's income actually represented a consumption of natural capital and as such a review of the way the natural capital is invested is called for. Kuwait's economy has been on an unsustainable path for the major part of the period of study. There is a steady depletion of natural capital in Kuwait. The erosion of natural resources of Kuwait is to the tune of KD 7837 billions during the period from 1970 to 1997. This amounts to more than half of the average domestic product of one year during the period. An analysis reveals that there is a capital loss representing 3.85% of the gross domestic product in one year. During the period of study, the average natural capital depletion was 23% of the total capital components. There is a clear trend of low domestic capital formulation during the period of study. The study also shows that the total wealth is declining.

An overhaul of the Current National Accounting is overdue and a new system incorporating the green factors has been implemented so that the plans based on it are more realistic. This will ensure that Kuwait's economy is on a sustainable path and the future generation's interests are protected.

1. INTRODUCTION

It is imperative that a balance has to be obtained between development and maintenance of the environment. The natural resources have to be treated as an important factor in the National Accounts system, which is not the case now. Incorporating the cost of depleting natural resources in the National Accounts System will provide the economic policy makers with a comprehensive economic development perspective, linking environmental development with national accounts. This will allow the country to understand the economic costs of the policies and practices that may affect the environment.

Sustainable Development

The concept of sustainable development is fairly recent. The basic objective here is to ensure that future generations are not deprived of the benefits accrued from the natural resources, which are exploited by the current generation. The measurement of this has to take into

account the NDP, depreciation of natural capital, defensive expenditure and monetary value of residual pollution.

The World Commission on Environment and Development (WCED) in 1987, also known as Bruntland Report gave a practical dimension to the concept of Sustainable Development. WCED defined sustainable development as " the paths of human progress which meet the needs and aspirations of the present generations without compromising the ability of the future generations to meet their needs". Kuwait, is rich in oil, a major natural resource, and its GDP is depended on it. Indiscriminate exploitation of this precious natural resource may lead to a situation where the development is not sustainable and the future generation's ability to meet their needs will be compromised.

It is argued that focus on environment hinders economic development. The aim is not to halt progress but to harness the resources in such a way that there is sustainable development. Sustainable development can be defined as the development that fulfils the basic needs of both the present and future generations without exhausting the resources.

- * This concept argues that both the present and future generations have a right to the natural resources and hence they should be preserved.
- * Development should not concentrate on the quantity of the economic growth but rather on the quality as well as on the distribution of return on investment of natural resources
- * This also calls for the reconsideration of the patterns of present investment so that to meet stricter environmental conditions.
- * Development should also examine the cost and benefit. The social cost of the natural resources, rather than the market cost should be taken into account while evaluating development projects. While assessing the social cost, the outlook has to be as wide as possible so that even the cost to the future generation should be taken into account.
- * Since an individual may not have a social outlook, but rather would like to maximize his returns, the matter of environment development should not be left to him or the free market, but

rather the government should play an active part and have a comprehensive plan to ensure that there is Sustainable Development. The natural resources belong to the nation, and as such any investment made using them as capital should be the responsibility of the government.

Objectives

The study has the following major objectives,

- * Modification of the current Kuwait's System National Accounting (SNA) to include Environmental Capital and to analyse how to use this to measure the sustainability of Kuwait's Economy.
- * To analyse whether Kuwait's economic development has been achieved through depletion of natural resources during the period 1970-1997.
- * To find out whether the natural capital of Kuwait is being invested in the most judicious manner so that to maintain sustainable development.
- * To measure the real effects of natural resources exports on stimulating macro economic growth.

The study initially measures natural capital depreciation and use it to adjust Kuwait's SNA. This will lead to calculating Kuwait's sustainability. Further analysis will determine the effects of incorporating environment in SNA that will produce Green Indicators.

Research Hypothesis

Kuwait's economic development in the period 1970-1997 has been achieved through depletion of natural resources, mainly oil and at the cost of damaging the environment

Research Methodology

To develop a framework that will be implemented in measuring Kuwait's sustainability, the following steps will be undertaken,

- 1 - Measurement of Kuwait's natural capital depreciation
- 2 - Once the natural capital depreciation is measured, it will be used to adjust Kuwait's System National Accounting (SNA). This is

to be followed by measurement of Kuwait's sustainability in order to make a realistic assessment of the situation

- 3 - Determination of the effect of incorporating the environment on SNA aggregates that will produce green indicators

Following the normal practise, initially the Environmental Details were assessed followed by the Economic Details and finally by the Green Measures

Assessment of Environmental Details

Three different models, namely, User Cost, Net Price Model and Net Present Value are used to measure the depreciation of natural resources.

User Cost Model (El Serafy method) (El Serafy, 1981)

This states that income is a level of consumption that can be sustained indefinitely. If a time series of expected net receipts R from the sale of a resource, that will exhaust in n years and if the true income element is X and $X < R$ and $R - X$ is invested year after year at an interest rate r the accumulated investment would yield the same level of income X .

Repetto's Model (Net Price Model) (Landefeld, 1985)

Used to primarily the Green GDP, takes into consideration soil erosion, oil and forest depletion apart from the cost of extraction for calculating the depreciation of natural resources.

The Present Value Model

Here the factors total rent, life expectancy of the resources, value of resources in any year and the social rate of discount. This model helps to calculate the depreciation allowance and the revaluation of the remaining income stream.

Economy Details measurement

The main focus of this study is on measuring the depreciation of natural capital such as oil and gas. While measuring the degradation of the natural resources, three factors are taken into account, namely, the willingness to pay for the degradation, the cost of pre empting the degradation and the cost of making good the degradation.

Framework for measuring Kuwait's Sustainable Development

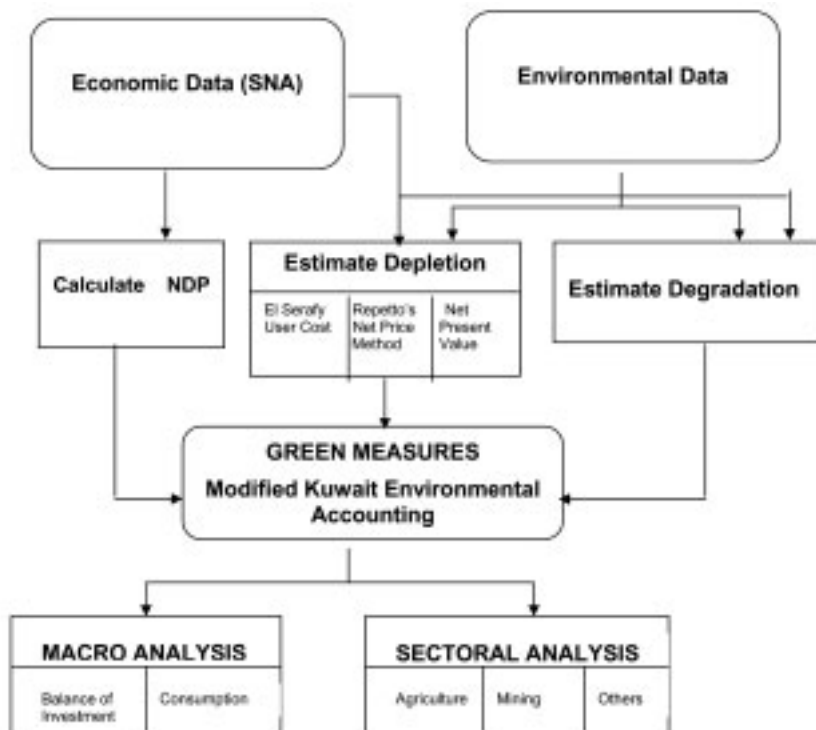
The SNA Module, the Degradation Module and the Exports Module are used. The SNA module, which produces the development indicators, is the core of measuring Kuwait's sustainable development.

Development of Green Measures

As phase 3, the Economic variable is adjusted under the environmental measurements to have an environmentally adjusted variable to arrive at the Environmentally Adjusted Domestic Product and the Net Environmentally Adjusted Domestic Product.

Pears - Atkinson Measure (PAM) (1993), which adopts the depleted resources method is used to study the data.

A Development Framework for Measuring Kuwaits Sustainable Development - Developed by the researcher



The figure given above presents a block diagram model of the study developed by the researcher. The model's framework is flexible that it can be enlarged to cover more resources as our knowledge improves and the accuracy of the results improve when methods of calculation improves. The green aggregated and disaggregated indicators show a totally different picture of the whole economy, which will indicate the distortion in the country's planning and policy analysis on both macro and sector levels. When model's output is compared with its inputs, important issues are expected to arise like gaps in the environmental and economic data and actions which are needed to be taken to reduce environmental deterioration. This framework is built specifically for Kuwait. The model incorporates both the conventional economic data and the environmental data. Provisions are made for the depletion and degradation of the natural capital to portray a more realistic picture of the economy. This model could be modified and applied in other countries which have similar or different environmental problems

Measuring Kuwaits Natural Capital Depletion

Sir John Hicks, Nobel Laureate in Economics, says that "when natural capital is depleted without the simultaneous investment of a portion of revenue into other assets, future generations are left with fewer resources to produce goods and services". Deviating from the normal accounting practices, we have to view Income as a function of both Natural Capital and Fixed Capital. Maintaining Capital intact is prudent as depletion of capital reduces its capacity to generate income. A portion of the current receipts must be used to repair, restore and maintain Capital to preserve its ability to produce goods and services. It is imperative that provision be made for the depreciation of the Natural Capital.

The study looks deeply into the specific case of the impact of the petroleum industry on Kuwaits Economy. Here the emphasis is on the quality of growth, which differentiates between expansion by liquidating geological resources and the growth rate derived from investment in plant and equipment. This will also make the inter country

comparison of national income more objective. Finally, by measuring transformation, which measures the success of mineral exporters in transforming their economies through investment of their natural assets, an accurate picture of the state of economy is obtained.

Though the concept of depletion effect exists in all economies, it is significant only in those economies where 1) share of economic rent in the minerals price is high and 2) mineral exports form a large share of the total GDP.

The oil and gas industry is the most important sectors of the Kuwaiti economy. During the period under study, the share of oil and gas extraction in the GDP was 61% in 1970, 66% in 1980, 39% in 1990 and 40% in 1997, with an average share of 50 % over the study period (MOP 1998, 1999). Petroleum exports constituted an average of 92% of the total export revenues during the period 1990-1997 (MOP 1999). The impact of oil rent on Kuwait's macro economy is very high. It is dominating total export receipts, the GDP and the government revenues.

Oil is the major source of revenue for Kuwait. Since there is a vast disparity between Oil Price and the cost of production, monopoly rents make up 95% of the total price of crude oil. Kuwait has 10% of the worlds oil reserves and at the 1997 production level, the reserves are expected to last another 131 years. The impact of Oil rents on Kuwaits macro-economy is very high and it is dominating total exports receipts, the GDP and Government Revenues. The percentage share of Oil in total GDP averages 50% over the period of study 1970-1997 and Oil exports constitute 92% of the total exports during the same period (MOP 1999). It is surprising that Kuwait does not have a precedent for recognizing depletion of mineral resources while calculating the National Income.

The study uses two natural resource accounting methodologies for assessing the depletion of natural resources, the Depreciation method by Robert Repetto (1989) and the User Cost method by El Serafy (1989) are used to arrive at the true income of the nation.

Results obtained by using both methods show that the depletion allowance have a significant effect on both the sector and macro aggregate of Kuwait's economy. The study indicates that the NDP is reduced by 6% & 48% for the period 1970-1997. The impact on the GDP is 0.1 to 6 percentage points in 1972 and by 1991 the effect on GDP is 1.0 to 18 percentage points. This is substantial and cannot be ignored. The factors that account for fluctuations of the user cost adjustments over the years were new discoveries and the price change of the oil in the world markets. It is to be noted here that despite the positive impact of the above factors the GDP has been affected pointing to substantial depletion of natural resources.

Table 1 shows four alternative measures for Kuwait's net domestic product adjusted for oil depletion. The users cost adjusted measures for 2 and 4 percent are called EDP (UC 2%) and EDP (UC 4%). The adjustments for user cost and depreciation approach were made at the GDP level. The depreciation adjusted measures for net price I and net price II are called EDP (NPI) and EDP (NPPII).

Table 1
Environmentally adjusted measures for Kuwait's net domestic product, 1970-1997 (KD billion and 1995).

Year	GDP*	EDP(NPI)	EDP (NPPII)	EDPUC 2 %	EDPUC 4%
1970	7.89136	4.23927	4.23927	6.26000	7.06338
1971	8.12703	4.16673	4.16673	6.32727	7.26407
1972	8.12813	4.33075	4.33075	6.34137	7.24612
1973	8.01528	5.22384	5.22384	6.73597	7.34580
1974	7.94109	3.60322	3.60322	6.51767	7.44297
1975	7.91959	3.90028	3.90028	6.86450	7.54399
1976	7.99269	4.23727	4.23727	6.94557	7.60172
1977	7.94432	4.38366	4.38366	7.02846	7.57448

Cont. Table 1
Environmentally adjusted measures for Kuwait's net domestic product,
1970-1997 (KD billion and 1995).

Year	GDP*	EDP(NPI)	EDP (NPII)	EDPUC 2 %	EDPUC 4%
1978	7.89689	4.33899	25.97454	6.90334	7.45724
1979	7.88770	4.13294	8.83399	6.67639	7.40685
1980	7.91363	3.93129	10.13462	7.15513	7.58729
1981	7.90875	4.29060	6.23100	6.99207	7.48895
1982	7.14284	4.22970	7.94962	6.44915	6.68527
1983	7.90057	4.67555	195.83912	7.21435	7.43092
1984	7.93157	4.46634	8.64584	6.88086	7.32497
1985	9.77264	6.45626	26.43849	8.78657	9.13611
1986	6.58583	4.12260	7.57723	5.54217	5.79798
1987	7.89029	5.21335	5.21335	6.88239	7.17707
1988	7.90853	5.56643	8.43403	6.89650	7.11292
1989	7.93631	5.16924	9.09691	6.98100	7.25834
1990	7.95185	5.00049	6.71320	6.78722	7.10267
1991	4.60413	3.63036	3.63036	3.84865	3.87052
1992	7.87360	5.52384	5.52384	7.09572	7.14824
1993	7.94569	5.10825	5.10825	7.07859	7.29682
1994	7.93522	5.18502	5.18502	6.80635	7.16525
1995	7.92532	5.07327	5.07327	6.78208	7.13762
1996	7.95090	4.94360	4.94360	6.87794	7.28880
1997	7.94707	5.14921	5.14921	6.95772	7.27702
Average	7.81317	4.65330	14.13502	6.73625	7.18691
VAR	0.6149414	0.439169	1299.757	0.583247	0.668453
COV	12.705557	10.5957	0.010875	11.54956	10.75155

* GDP figures - MOP 1999

Table 2
*Annual percent change in real Kuwait's net domestic product,
 1970-1997 (KD billion and 1995).*

Year	GDPG	EDP (NPI)G	EDP (NPII)G	EDPUC 2 %G	EDPUC 4%G	ED- PUC3%G
1971	3.0%	-1.7%	-1.7%	1.1%	2.8%	2.1%
1972	0.0%	3.9%	3.9%	0.2%	-0.2%	-0.1%
1973	-1.4%	20.6%	20.6%	6.2%	1.4%	3.3%
1974	-0.9%	-31.0%	-31.0%	-3.2%	1.3%	0.0%
1975	-0.3%	8.2%	8.2%	5.3%	1.4%	3.0%
1976	0.9%	8.6%	8.6%	1.2%	0.8%	0.8%
1977	-0.6%	3.5%	3.5%	1.2%	-0.4%	0.2%
1978	-0.6%	-1.0%	492.5%	-1.8%	-1.5%	-1.7%
1979	-0.1%	-4.7%	-66.0%	-3.3%	-0.7%	-1.8%
1980	0.3%	-4.9%	14.7%	7.2%	2.4%	4.5%
1981	-0.1%	9.1%	-38.5%	-2.3%	-1.3%	-1.8%
1982	-9.7%	-1.4%	27.6%	-7.8%	-10.7%	-9.7%
1983	10.6%	10.5%	2363.5%	11.9%	11.2%	11.4%
1984	0.4%	-4.5%	-95.6%	-4.6%	-1.4%	-2.6%
1985	23.2%	44.6%	205.8%	27.7%	24.7%	25.7%
1986	-32.6%	-36.1%	-71.3%	-6.9%	-36.5%	-36.7%
1987	19.8%	26.5%	-31.2%	24.2%	23.8%	23.9%
1988	0.2%	6.8%	61.8%	0.2%	-0.9%	-0.6%
1989	0.4%	-7.1%	7.9%	1.2%	2.0%	1.8%
1990	0.2%	-3.3%	-26.2%	-2.8%	-2.1%	-2.4%
1991	-42.1%	-27.4%	-45.9%	43.3%	-45.5%	-44.9%
1992	71.0%	52.2%	52.2%	84.4%	84.7%	84.7%
1993	0.9%	-7.5%	-7.5%	-0.2%	2.1%	1.4%
1994	-0.1%	1.5%	1.5%	-3.8%	-1.8%	-2.6%
1995	-0.1%	-2.2%	-2.2%	-0.4%	-0.4%	-0.3%
1996	0.3%	-2.6%	-2.6%	1.4%	2.1%	1.9%
1997	0.0%	4.2%	4.2%	1.2%	-0.2%	0.3%
Age	1.6%	2.4%	105.8%	2.4%	2.1%	2.2%

Table 2 shows the annual percentage change for each alternative of environmentally adjusted net domestic product (EDP). The average growth rate of GDP was 1.6% compared to 2.4% for EDP (UC 2%), 2.2% for EDP (UC4%), 2.4% for EDP (NP I) and 108.8% for EDP (NP II). EDP (NP II) has shown the highest growth average growth rate due to the volatility of new discoveries for oil reserves during the study period. Environmental accounting is used to construct modified National Income indicators, which incorporate the cost of oil and gas depletion. It is observed that when resource depletion costs are incorporated, the Kuwait's oil sector has always produced lower incomes. The total net domestic product is reduced by 11% to 0.71% for the period 1970-1997. The main factor that account for the fluctuation of the user cost adjustment over the years was the new discoveries.

The two accounting approaches used in the study gave oil and gas depletion adjustments of the same order of magnitude, following the same trends, divergence being noticed only in the size of the cost of the adjusted income series.

Both depreciation and user-cost approaches show that the average GDP was 40.4% lower using NPI and 13.82% and 8.06% lower using the user cost approach with 2% and 4% discount rate of the 1970-1997 period respectively.

Regardless of the method, the adjusted net domestic product measures, indicate that a significant percentage of Kuwait's income over 1970-1997 actually represented a consumption of natural resources.

The User Cost approach, in the case of Kuwait, appears to offer more appropriate results than the Depreciation method.

Measuring Kuwait's Sustainable Development

Sustainability Indicators

Pearce and Atkinson in 1993, proposed a warning indicator for weak sustainability based on the neo classical assumptions inherent in Harwick/Solow approach, in that man-made and natural capitals are assumed to be perfect substitute for each other.

Table 3 and Figure 1 which use the Pearce-Atkinson Indicator of sustainability - Depreciation method highlight the fact that Kuwait's

development from 1970-1997 cannot be considered sustainable. Only 11 out of 28 years of the study period was sustainable.

Table 3
Pearce-Atkinson Indicator of Sustainability, Depreciation Method
(KD billions of 1995)

Year	GDP	Gross Capital Formation	Government and Private Expenditures	Consumption of Fixed Capital	Net Savings as % of GDP	Natural Capital Depreciation	
1970	7.8914	960.8867	4134.2308	448.0739	41.93%	47.77%	Unsustainable
1971	8.1270	743.3745	3402.0899	367.1268	53.62%	52.01%	Sustainable
1972	8.1281	737.9490	3386.4183	379.1854	53.67%	49.48%	Sustainable
1973	8.0153	754.2393	3224.5264	375.7354	55.08%	35.46%	Sustainable
1974	7.9411	537.1810	1750.1109	168.4148	75.84%	61.77%	Sustainable
1975	7.9196	1009.0706	2597.1053	211.5166	64.54%	56.57%	Sustainable
1976	7.9927	1312.0971	3013.8406	221.9468	59.52%	52.01%	Sustainable
1977	7.9443	1847.7673	3761.5372	252.9643	49.47%	48.98%	Sustainable
1978	7.8969	1603.6782	3738.3035	314.7828	48.67%	48.32%	Sustainable
1979	7.8877	1078.3376	2884.4949	250.5099	60.25%	52.27%	Sustainable
1980	7.9136	1101.2571	3259.6235	269.1470	55.41%	55.20%	Sustainable
1981	7.9088	1308.0834	4079.3477	326.5142	44.29%	48.96%	Unsustainable
1982	7.1428	1818.2973	5783.0875	433.1907	12.97%	40.85%	Unsustainable
1983	7.9006	1964.3632	5186.0812	451.9429	28.64%	41.29%	Unsustainable
1984	7.9316	1666.2384	5032.8896	523.2246	29.95%	43.64%	Unsustainable
1985	9.7726	1494.2539	5564.8041	584.2171	37.08%	32.89%	Sustainable
1986	6.5858	1752.2759	6317.7576	740.9120	-7.18%	30.77%	Unsustainable
1987	7.8903	1390.4368	5313.0289	660.3809	24.29%	30.07%	Unsustainable
1988	7.9085	1243.9258	6314.8663	760.1790	10.54%	23.53%	Unsustainable
1989	7.9363	974.7197	6076.2590	635.5278	15.43%	31.60%	Unsustainable
1990	7.9518	1258.0493	7704.1012	792.6100	-6.85%	31.94%	Unsustainable
1991	4.6041	1810.5224	13560.706	731.4955	-210.42%	6.19%	Unsustainable
1992	7.8736	1574.5583	7440.3067	723.7150	-3.69%	24.30%	Unsustainable
1993	7.9457	1363.2322	6286.9728	625.3585	13.01%	32.75%	Unsustainable
1994	7.9352	1280.4434	5941.4562	686.7324	16.47%	30.59%	Unsustainable
1995	7.9253	1197.4910	5884.8310	710.9160	16.78%	31.78%	Unsustainable
1996	7.9509	1213.4209	5659.7417	571.2493	21.63%	36.05%	Unsustainable
1997	7.9471	1098.4666	5758.7336	612.7922	19.83%	32.35%	Unsustainable

Net Savings = Gross Domestic Product - Consumption of (Public and Private) -
Fixed Capital Depreciation

Figures - MOP 1999

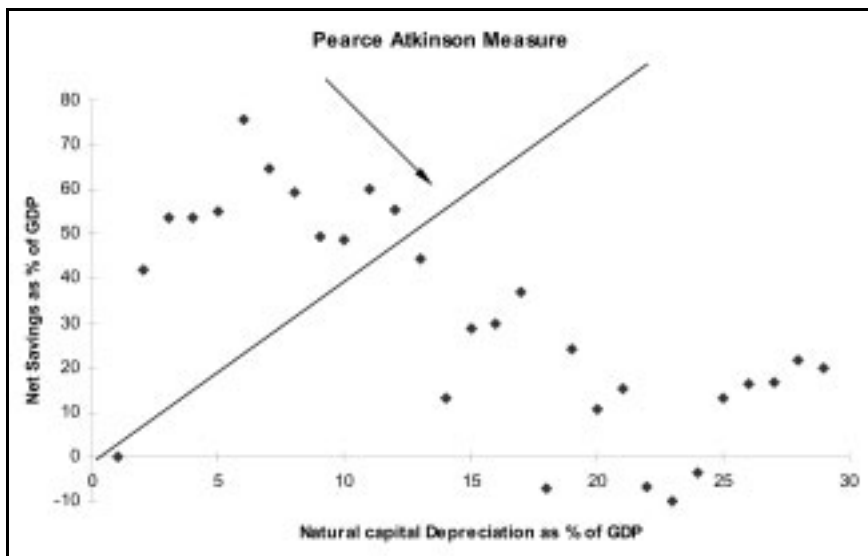


Figure 1: Pearce and Atkinson indicator of sustainability for NPI, 1970-1997
Only eleven years out of the 1970-1997 period were sustainable.

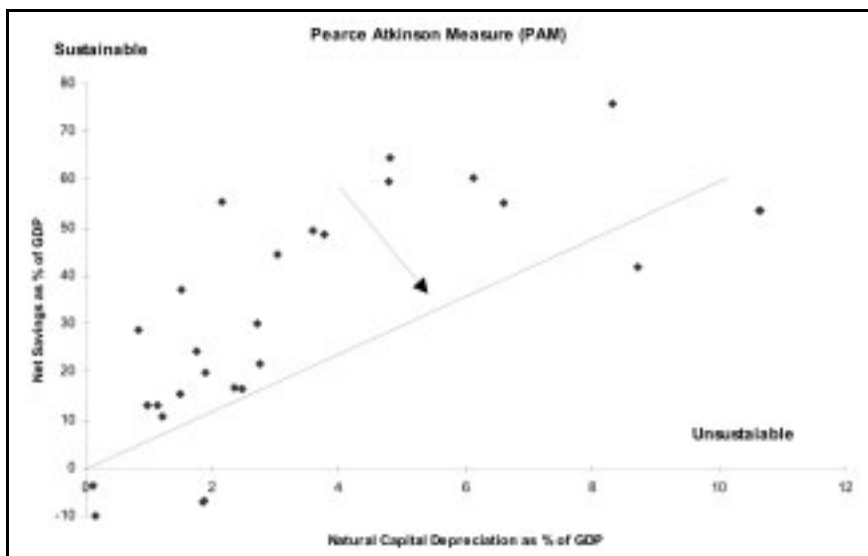


Figure 2: Pearce and Atkinson indicator of sustainability for user cost, 1970-1997
Only seven years out of the 1970-1997 period were unsustainable.

Table 4
Pearce-Atkinson Indicator of Sustainability,
User Cost (KD Billions of 1995)

Year	GDP	Gross Capital Formation	Government and Private Expenditures	Consumption of Fixed Capital	Net Savings as % of GDP	User Cost as % of GDP	
1970	7.891362	960.8867	4134.231	448.0739	41.93%	8.727%	Sustainable
1971	8.127029	743.3745	3402.09	367.1268	53.62%	10.654%	Sustainable
1972	8.128133	737.9490	3386.418	379.1854	53.67%	10.634%	Sustainable
1973	8.015275	754.2393	3224.526	375.7354	55.08%	6.602%	Sustainable
1974	7.941094	537.1810	1750.111	168.4148	75.84%	8.316%	Sustainable
1975	7.919591	1009.0706	2597.105	211.5166	64.54%	4.820%	Sustainable
1976	7.992688	1312.0971	3013.841	221.9468	59.52%	4.794%	Sustainable
1977	7.944318	1847.7673	3761.537	252.9643	49.47%	3.594%	Sustainable
1978	7.896894	1603.6782	3738.303	314.7828	48.67%	3.782%	Sustainable
1979	7.887698	1078.3376	2884.495	250.5099	60.25%	6.122%	Sustainable
1980	7.913632	1101.2571	3259.623	269.147	55.41%	2.166%	Sustainable
1981	7.908751	1308.0834	4079.348	326.5142	44.29%	3.042%	Sustainable
1982	7.142836	1818.2973	5783.088	433.1907	12.97%	1.142%	Sustainable
1983	7.900566	1964.3632	5186.081	451.9429	28.64%	0.834%	Sustainable
1984	7.931569	1666.2384	5032.89	523.2246	29.95%	2.711%	Sustainable
1985	9.772638	1494.2539	5564.804	584.2171	37.08%	1.521%	Sustainable
1986	6.585830	1752.2759	6317.758	740.912	-7.18%	1.856%	Unsustainable
1987	7.890292	1390.4368	5313.029	660.3809	24.29%	1.761%	Sustainable
1988	7.908532	1243.9258	6314.866	760.179	10.54%	1.224%	Sustainable
1989	7.936310	974.7197	6076.259	635.5278	15.43%	1.505%	Sustainable
1990	7.951846	1258.0493	7704.101	792.61	-6.85%	1.870%	Unsustainable
1991	4.604131	1810.5224	13560.71	731.4955	-210.42%	0.158%	Unsustainable
1992	7.873600	1574.5583	7440.307	723.715	-3.69%	0.122%	Unsustainable
1993	7.945693	1363.2322	6286.973	625.3585	13.01%	0.972%	Sustainable
1994	7.935223	1280.4434	5941.456	686.7324	16.47%	2.480%	Sustainable
1995	7.925322	1197.4910	5884.831	710.916	16.78%	2.358%	Sustainable
1996	7.950903	1213.4209	5659.742	571.2493	21.63%	2.754%	Sustainable
1997	7.947068	1098.4666	5758.734	612.7922	19.83%	1.894%	Unsustainable

Net Savings = Gross Domestic Product - Consumption of (Public and Private) - Fixed Capital Depreciation

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Table 4 and Figure 2 which use the Pearce-Atkinson Indicator of sustainability - User Cost method shows that 21 out of 28 years of the study period was sustainable. Either way, it is clear that Kuwait's economy has remained on an unsustainable path during a significant number of years. This does not augur well for the economy of the country.

Following the adjustment made in the GDP for depreciation of produced capital, two more steps were taken to calculate the Hicksian income or Sustainable income. Firstly, the depletion of the Natural Capital was reduced from the NDP to arrive to the first variant of the Economic Net Product, and secondly, the degradation cost was subtracted. The Degradation cost is equal to the first definition of sustainable income in the Peskins framework.

An alarming drop in the Gross Capital Formation, Net Domestic Investment and Environmentally adjusted Net Capital Formation (ECF) was noticed during the period 1970-1997. Kuwait experienced negative net capital formation in 5 of the 28 years under study. This is vivid from Table 5 which measures the Gross Capital Formation using depreciation method and the environmentally adjusted net Capital Formation for NPI as well as Table 6 that measures Gross Capital Formulation using User Cost Method.

Declining ECF should serve as a warning signal to Kuwait especially with respect to the economic prospects of the country for the 21st Century. ECF, derived using NPI, show clear trends of low domestic capital formation throughout the last 3 decades.

The Pearce-Atkinson Measure (PAM) and the Genuine Savings demonstrate the over dependence of Kuwaits Economy upon depleting the natural capital in the surveyed years. Also it shows that for a significant portion of the period of study, Kuwait has remained on an unsustainable path. Investment in Human Capital as a share of the GDP did not make a big change. Regardless of the calculation methods, either GSI or GSII, Kuwaits genuine savings rate was near zero or negative for at least half the period. Negative Genuine Savings implies that the Total Wealth is declining. Policies resulting in persistently negative genuine savings lead to unsustainability.

Table 5
Gross Capital Formation, Depreciation Method
(KD Billions of 1995)

Year	Gross Capital Formation	Consumption of Natural Capital Fixed Capital	Env. adjusted Net Depreciation	Capital Formation	ECF as % of GDP
1970	960.8867	448.07387	3.769428	-3256.6155	-41.27%
1971	743.3745	367.12684	4.227264	-3851.0166	-47.39%
1972	737.9490	379.18542	4.021404	-3662.64	-45.06%
1973	754.2393	375.73538	2.841995	-2463.4914	-30.73%
1974	537.1810	168.41485	4.905241	-4536.4746	-57.13%
1975	1009.0706	211.51659	4.479756	-3682.2021	-46.49%
1976	1312.0971	221.94678	4.157028	-3066.8775	-38.37%
1977	1847.7673	252.96428	3.891409	-2296.6057	-28.91%
1978	1603.6782	314.78281	3.815437	-2526.5412	-31.99%
1979	1078.3376	250.50995	4.122645	-3294.817	-41.77%
1980	1101.2571	269.14701	4.368462	-3536.3516	-44.69%
1981	1308.0834	326.51418	3.872508	-2890.9383	-36.55%
1982	1818.2973	433.19066	2.917583	-1532.4763	-21.45%
1983	1964.3632	451.94287	3.262436	-1750.016	-22.15%
1984	1666.2384	523.22461	3.461178	-2318.1643	-29.23%
1985	1494.2539	584.21708	3.214306	-2304.269	-23.58%
1986	1752.2759	740.91195	2.026252	-1014.8878	-15.41%
1987	1390.4368	660.38088	2.372423	-1642.367	-20.82%
1988	1243.9258	760.17900	1.861083	-1377.3366	-17.42%
1989	974.7197	635.52777	2.507693	-2168.5014	-27.32%
1990	1258.0493	792.61000	2.539701	-2074.2619	-26.09%
1991	1810.5224	731.49546	0.285029	793.99776	17.25%
1992	1574.5583	723.71498	1.912996	-1062.1528	-13.49%
1993	1363.2322	625.35850	2.602449	-1864.5754	-23.47%
1994	1280.4434	686.73243	2.427608	-1833.8972	-23.11%
1995	1197.4910	710.91600	2.518986	-2032.4111	-25.64%
1996	1213.4209	571.24928	2.865942	-2223.7702	-27.97%
1997	1098.4666	612.79223	2.570662	-2084.9879	-26.24%

GCF: Gross Capital Formation

ECF: Environmentally-adjusted gross Capital Formation

ECF = GCF - Fixed Assets Depreciation - User cost of Natural Capital

Table 6
Gross Capital Formation, User Cost Method
(KD Billions of 1995)

Year	Gross Capital Formation	Consumption of Natural Capital Fixed Capital	Env. adjusted Net Depreciation	Capital Formation	ECF as % of GDP
1970	960.88669	448.07387	688.69290	-175.88008	-2.23%
1971	743.37449	367.12684	865.87282	-489.62517	-6.02%
1972	737.94900	379.18542	864.36402	-505.60044	-6.22%
1973	754.23933	375.73538	529.19899	-150.69504	-1.88%
1974	537.18099	168.41485	660.41198	-291.64584	-3.67%
1975	1009.07061	211.51659	381.68594	415.86808	5.25%
1976	1312.09713	221.94678	383.18466	706.96569	8.85%
1977	1847.76729	252.96428	285.48710	1309.31591	16.48%
1978	1603.67820	314.78281	298.63747	990.25793	12.54%
1979	1078.33764	250.50995	482.87497	344.95272	4.37%
1980	1101.25708	269.14701	171.42627	660.68380	8.35%
1981	1308.08345	326.51418	240.59863	740.97063	9.37%
1982	1818.29734	433.19066	81.60542	1303.50126	18.25%
1983	1964.36321	451.94287	65.92170	1446.49865	18.31%
1984	1666.23844	523.22461	215.04276	927.97108	11.70%
1985	1494.25388	584.21708	148.59898	761.43782	7.79%
1986	1752.27589	740.91195	122.22416	889.13978	13.50%
1987	1390.43681	660.38088	138.93720	591.11873	7.49%
1988	1243.92578	760.17900	96.83746	386.90932	4.89%
1989	974.71972	635.52777	119.40989	219.78207	2.77%
1990	1258.04929	792.61000	148.73359	316.70571	3.98%
1991	1810.52243	731.49546	7.29581	1071.73116	23.28%
1992	1574.55827	723.71498	9.63498	841.20831	10.68%
1993	1363.23218	625.35850	77.22404	660.64965	8.31%
1994	1280.44344	686.73243	196.79520	396.91581	5.00%
1995	1197.49100	710.91600	186.87448	299.70052	3.78%
1996	1213.42092	571.24928	218.99229	423.17935	5.32%
1997	1098.46660	612.79223	150.54677	335.12759	4.22%

GCF: Gross Capital Formation

ECF: Environmentally-adjusted gross Capital Formation

ECF = GCF - Fixed Assets Depreciation - User Cost of Natural Capital.

Conclusion

The study has clearly proved that though Kuwait has achieved a good economic growth during the period 1970-1997, the economic growth was achieved not without the depletion and deterioration of the natural and environmental resources, oil in particular. Ideally the country should have attained sustainable growth in all the years. During the period of study, Kuwait has depleted its natural capital by more than KD 7.837 billions. This sum exceeds half of the average value of one years GDP during the period. It is seen that the capital loss averaging 3.85% of GDP a year could easily have reduced the potential growth rate of GDP by 0.77%. This is highly significant as the average growth rate of GDP during this period was 1.65% and a loss of potential growth rate of 0.77% constitutes 47%.

The inadequacy of the traditional accounting system, which has given an exaggerated picture of the net components of the capital in Kuwaits economy by more than 21%, attributed to the ignoring of the disappearance of the most natural productive asset of Kuwait, is clearly established. This is misleading. The traditional accounting system, which is used currently by the economic planners, has to be dispensed with and a new system, which incorporates the depletion of natural resources has to be adopted, which will be realistic and future oriented.

The study proves that the concerns regarding the environmental degradation and natural capital deterioration in Kuwait is valid and calls for a comprehensive strategy for Environmental Management. An overhaul of the Current National Accounting is overdue and a new system incorporating the green factors has to be implemented so that the plans based on it are more realistic. This will ensure that the Kuwaits economy is on a sustainable path and the future generations interests are well protected.

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