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Integrating Environmental Accounting into Ghana's Emerging Oil and Gas Economy

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Abstract. There is an increasing interest, study and research at different scales of reference and analysis into environmental protection and its relationship tosocio-political and economic variables at all levels.Thispaper investigates and examines how emerging oil and gas economics like Ghana, could integrate Environmental Accounting into their respectiveNational Accounting Systems (Gross Domestic Product).Although exploratory, descriptive and empirical in nature, the preliminary methodology thus adopted for this research paper is based on the approach of the System of Integrated Economic and Environmental Accounting (SEEA) developed by United Nations and the World Bank. The SEEA attempts to integrate many of the different methods proposed for environmental accounting into a single organized framework. The emphasis is on a nation's macro-economic measures of the National Income Accounts in which economic indicators such as Gross Domestic Product are measured. Henceforth, environmental accounting could refer to consumption of the nation's natural resources in monetary form. It is imperative to investigate, examine and analyze the intricate nexus of broadly defined natural resource management of oil and gas, the environment, socio-economic, spatial sustainability, growth and economic development. Running an oil and gas industry is not an easy task and more importantly, enhancing the processes of socio-economic growth and development in a developing country? Therefore, this paper will bring to the fore a framework hinged on the integration of environmental accounting that underpins sound policy decisions, support and guide oil and gas industry, environment management within the processes of good governance, security, economic growth and development in emerging economics such as Ghana, in sub-Sahara Africa.

Keywords: Economic growth and development,Integrated Economic and Environmental Accounting (SEEA),Good governance,National Income Accounts,Natural resource management, Oil and gas industry, Spatial sustainability and regional development.

1. Introduction

The need and desirability of an enhanced process of economic growth and development is universally recognized. However, there is a growing concern as to the intricate nexus between rapid development and environmental degradation which pertains to sustainable quality of life.1Improved Environmental Accounting

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[1]Sustainable Development with reference to the Brundtland Commission Report: The Brundtland Commission, formally the World Commission on Environment and Development (WCED), known by the name of its Chair Gro Harlem Brundtland, was convened by the United Nations in 1983. The commission was created to address growing concern "about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development." In establishing the commission, the UN General Assembly recognized that environmental problems were global in nature and determined that it was in the common interest of all nations to establish policies for sustainable development, http://en.wikipedia.org/wiki/Brundtland_Commission, accessed: September, 1, 2011.

(EA) is seen by many including policy makers, corporate managers and Civil Society Groups -- environmental advocates alike as a necessary component to improved socio-economic and environmental decision-making within the processes of enhancing sustainable development. Whether the goal is pollution prevention, or some broader notion of increased welfare or corporate sustainability, there is a widespread belief that sound Environmental Accounting will help identify and implement financially desirable environmental innovations. Moreover, environmental regulation is evolving toward public policies that rely to a much greater extent on the collection and reporting of environmental information (Akaiyea, 2009). All of thesehighlight the desirability of a framework that identifies priorities for improved system of environmental accounting particular in emerging oil and gas economies as exemplified by Ghana, within sub-Saharan Africa. This research paper derives such a framework by exploring indicators as used in the 2005 University of Sydney publication Balancing Act to benchmark 135 sectors of the Australian economy providing a snapshot of Australia's Gross Domestic Product. The paper proceeds as follows: the next section (two) defines environmental accounting and its meaning. Section threeprovides a brief history of environmental accounting. Section four examines the methodology underpinning environmental accounting and the status of international efforts at developing applicable standards.Section five highlights a set of considerations that should guide the search for environmental accounting priorities within a framework applicable to an emerging oil and gas economy such as Ghana, within the West African sub-region and section six concludes.

2. Concept and Definition of Environmental Accounting

It is quite difficult to provideanagreed-upon definition of Environmental Accounting as the concept of and scope of Environmental Accounting (EA) is very wide. It includes corporate level, national and international level.The objective of sustainable development and the integrated nature of global development challenges pose problems for institutions, national and international, that were established on the basis of narrow preoccupations and compartmentalized concerns. Governments, policy makers and corporate world general response to the speed and scale of global changes has been a reluctance to recognize sufficiently the imperative to manage change themselves. The challenges are both interdependent and integrated, requiring comprehensive approaches and popular participation. Yet most of the institutions facing those challenges tend to be independent, fragmented, working to relatively narrow resources and protecting the environment are institutionally separated from those responsible for managing the economy. The real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must (WCED, 1987;Coglianese and Nash, 2006).Sustainability measurement is a term that denotes the measurements used as the quantitative basis for the informed management of sustainability (The Association of Chartered Certified Accountants, 2008). The metrics used for the measurement of sustainability (involving the sustainability of environmental, social and economic domains, both individually and in various combinations) are still evolving: they include indicators, benchmarks, audits, indexes and accounting, as well as assessment, appraisal and other reporting systems (Dalal-Clayton, Barry and Sadler, Barry, 2009). They are applied over a wide range of spatial and temporal scales (Bell and Morse, 2008).The principal objective of sustainability indicators is to inform public policy-making as part of the process of sustainability governance (Moldan and Dahl, 2007).

Sustainability indicators can provide information on any aspect of the interplay between the environment and socio-economic activities (Stanners, 2007). Building strategic indicator sets generally deals with just a few simple questions: what is happening? (descriptive__ indicators), does it matter and are we reaching targets? (performance __ indicators), are we improving? (efficiency __ indicators), are measures working? (policy__ effectiveness indicators), and are we generally better off? (total__ welfare indicators). One popular general framework used by The European Environment Agency uses a slight modification of the Organisation for Economic Cooperation and Development DPSIR system (Hill, 1992). This breaks up environmental impact into five stages. Social and economic developments (consumption and production) *(D)rive* or initiate environmental *(P)ressures* which, in turn, produces a change in the *(S)tate* of the environment which leads to *(I)mpacts* of various kinds. Societal *(R)esponses* (policy guided by sustainability indicators) can be introduced at any stage of

this sequence of events (Boulanger, Innes, 1990; Cobb, 1998; Chambers, Simmons and Wakernagel, 2000; Dasgupta, 2001; 2008).

Environmental accounting" - sometimes referred to as "green accounting", "resource accounting" or "integrated economic and environmental accounting" - refers to modification of the System of National Accounts to incorporate the use **or** depletion of natural resources (International Union for Conservation of Nature, 2010). The System of National Accounts (or SNA) is the set of accounts which national governments compile routinely to track the activity of their economies. SNA data are used to calculate major economic indicators including gross domestic product (GDP), gross national product (GNP), savings rates, and trade balance figures. The data underlying these aggregate indicators are also used for a wide range of less publicized but equally valuable policy analysis and economic monitoring purposes. These economic accounts are calculated by all countries in a standard format, using a framework developed, supported, and disseminated by the United Nations Statistical Division (UNSTAT). The fact that all countries make these calculations in more or less the same way is crucial to the value of the data for national and international decision-making, because it makes international comparisons possible and thus allows us to place individual countries in the context of world trends. Similarly, the fact that the accounts are calculated routinely, rather than just once, lets us use them to understand how the world is evolving, and where each country fits within that pattern of change. This provides a valuable basis for defining public policies designed to move individual countries and the world towards desired patterns of growth and development (Economist, 2005; Herman, 2005;Wagner, 2007; Edwards, 2009; IUCN, 2010).

3. A Brief History of Environmental Accounting: International Progress on Environmental Accounts

According to the International Union for Conservation of Nature (IUCN, 2010) work on the design and scope of EA has been underway since the 1970s. In the 1980s, United Nations Environmental Programme (UNEP), United Nations Statistics Division- Economic Statistics (UNSTAT), the European Commission, International Monetary Fund (IMF), the Organization for Economic Cooperation and Development(OECD),and the World Bank launched a concerted international effort to build consensus on how the SNA might be modified to include the environment. This led in 1993 to the publication by UNSTAT of a draft "Handbook for Integrated Economic and Environmental Accounting," describing a preliminary methodology to be tested and refined. The approach described in this document is often referred to as the System of Integrated Economic and Environmental Accounting, or (SEEA).The SEEA attempts to integrate many of the different methods proposed for environmental accounting into a single organized framework. It proposes a series of versions or "building blocks" for the construction of the accounts, beginning with physical accounts and disaggregation of data already included in the SNA, and working towards more complex information such as calculation of depletion and estimation of the maintenance costs required for sustainable use of resources (United Nations, European Commission, International Monetary Fund, OECD and World Bank, 2003).

The first environmental accounts were constructed in European countries working independently of each other. A few European countries have established physical accounting systems which are routinely compiled and applied to economic and environmental policy-making. Many other countries have undertaken more limited or one-time experiments and case studies with monetary environmental accounts, focused on issues such as forestry, soil erosion, and minerals depletion (Hecht, 2007). A few examples suggest the richness of their experience:

(i). Norway was among the first countries to make a commitment to environmental accounting and an innovator in the development of accounting frameworks. Their work began in the 1970s, in response to the Club of Rome's publication of *Limits to Growth* (Meadows, Meadows, Rander and Behrens, 1972) and a growing environmental movement. The Norwegians became concerned that their natural resources, on which their economy is relatively dependent compared to other European countries, would run out. They therefore developed accounts that tracked their use of natural resources, focusing on forests, fisheries, energy, and land.

Norway thus compiled physical accounts focused on energy resources and air pollution. They use these data as an input into a macro-economic model with which they explore the environmental and economic feasibility of different growth strategies (Vesselbo, Kolttola, Danielsson, Austbø, and Eriksson, 1993; Alfsen., Torstein, and Holmoy, 1996).

(ii). The Netherlands was also a leader in the development and adoption of environmental accounting. The Netherland's interest in this area originated with the work of economist RoefieHueting in the Central Bureau of Statistics, who developed and sought to implement a measure of sustainable national income that would take into account the degradation and depletion of environmental assets resulting from economic activity. The result was the development of the so-called NAMEA, the National Accounts Matrix including Environmental Accounts. The NAMEA builds on the input/output framework of the national income accounts by introducing additional columns containing physical data on air pollutant emissions by sector, for twelve different pollutants. The table also includes imports of pollution from the rest of the world, and exports to the rest of the world. The physical data on emissions have been aggregated into a series of environmental theme indicators. Two of these are international in impact, pertaining to greenhouse effect and ozone layer depletion. Others are national, covering acid rain, eutrophication, and waste (Netherlands Ministry of Housing, 1993;Keuning, and Timmerman, 1995/1997; Konijn, De Boer, and Van Dalen, 1997; Bas, L., and Jan van Dalen, 1998).

(iii).Sweden has been working on environmental accounting through much of the 1990s, and made an official decision to make this a routine government activity in 1996. They worked closely with Eurostat on the implementation of many of its recommended activities, and received financial support from the European Union for several components of their work. The Swedish Government also called for a number of studies based on the accounting data. They have created national commissions on climate change, growth and environment, and green taxes, all of which have commissioned analytical work relating the economy and the environment. These commissions are central to the Swedish process for framing policy issues and analyzing strategies to resolve such issues. Thus the accounting data have feed into high visibility public debates about tax policy, climate change, and economic growth (Branvall, Ribacke, Rudander, andGiaWickbom, 1999; IUCN, 2000; Carsten, 2000).

(iv).France was a third early-adopter of environmental accounting. In the 1980s it began developing its own approach to the design of environmental accounts, referred to as the *Comptes dupatrimoine*, or patrimony accounts. These were an integrated system structured around three distinct but linked units of analysis. Resources were measured in physical terms, and their stocks and flows quantified. In addition to natural resources, patrimony accounts were to include cultural resources and any other assets that were received from previous generations and should be passed on to future generations. Places were to be organized into geographical accounts, giving physical data about assets organized by location and by ecological and land characteristics. The identity and actions of agents - people and institutions using the resources - were to be represented in both physical and monetary terms in agent accounts, which provide information about how resources are used and where. All data in the system would be integrated within this broad framework of resource, place, and agent accounts. Implementation of the patrimony accounts proved difficult, because they are so comprehensive. Portions of the system were constructed, particularly those focused on forests and water. In 1992 the newly created French Institute for the Environment (IFEN, the InstitutFrançais de l'Environnement) took over the country's environmental accounting work (Hamilton, 2006; Hecht, 2000; IUCN, 2000; FAO, 2004;Statistics Canada, 1994/1995/1997/1999/2000; IUCN, 2000).

The above case studies to a degree demonstrate the importance and relevance of EA in calculating National Incomes. More importantly, in promoting a fine balance between the processes of economic growth and development on the one hand and, on the other hand, environmental degradation as espoused by the concept of sustainable development. The next section of this paper sheds light on international efforts at developing methods that enhances the process of incorporating EA into the calculation of Gross Domestic Product.

4. Methodology:International Efforts to Develop Standards

To enhance the processes of achieving the goal and objectives of sustainable development, in 2004, the United Nations Statistics Division (UNSD) and Food and Agricultural Organization jointly released the *Handbook of National Accounting: Integrated Environmentaland Economic Accounting for Fisheries*(SEEAF).The SEEAF is intended to:clarify the SNA and SEEA concepts and expandthem for fisheries and related resources (such asocean areas, inland lakes and rivers, and coastalareas);harmonize accounting practices for fisheries so thataccounts are comparable across countries; promote accounting for the fisheries sector (throughcase studies and explanations of how the accountsare useful for policymakers); andprovide a guide and a training tool (United Nations, European Commission, IMF, OECD and World Bank, 2003).By 2007, the United Nations (UN) released the *System of Environmental and Economic Accounting for Water* (SEEAW). Building upon themethodologies for water accounts described in SEEA-2003, theSEEAW is divided into two parts. Part I includes internationally accepted concepts, definitions, and classifications for water accounts and a set of standard tables outlining statistics that countries are encouraged to compile. On the other hand, Part II covers more experimental concepts and methodologies including quality accounts, the economic valuation of water beyond the 1993 SNA16 and examples describing applications of the SEEAW. Although still considered experimental, the concepts explored in Part II can be an important resource for policymakers (Alfieri, 2010). Forexample, water quality accounts can help policy makers identify the cause of water pollution and design appropriate responses, such as charging fees for sanitation services. The SEEAW hasbeen adopted as an interim international statistical standard by the United Nations Statistical Division upon recommendations by the United Nations Committee of Experts on EnvironmentalAccounting (UNCEEA).UponUNCEEA's recommendation, the UN is developing the *System of Environmental-Economic Accounting forEnergy* (SEEA-E), with technical assistance from the London Group on Environmental Accounting and the Oslo Group on Energy Statistics. The SEEA-E will present the agreed-upon concepts, definitions, and classifications and standard tables and accounts for energy and energy-related air emission accounting. Furthermore, the SEEA-E discusses the links between the emission inventories—which are reported under the United Nations Framework Convention for Climate Change—and the air emissions accounts. A process similar to the drafting of the SEEA-E has been established to draft the System of Environmental-Economic Accounting for Material Flow Accounts (SEEA-MFA). The SEEA-MFA will present agreed upon concepts, definitions, classifications, and accounting rules for measuring items such as domestic extraction, imports and exports, supply and use of products, and the generation of residuals. The SEEA-MFA accounting framework will allow physical data on material flows to be presented with economic data in a format designed for economic analysis and policy-making (INTOSAI WGEA, 2010; Finnveden and Moberg, 2011).

Methodologically, a number of steps have been instituted toward the goal of ensuring that environmental accounting is as well integrated into SNAs.Here are some of the methodscurrently in use: Natural Resource Accounts __These include data on stocks of natural resources and changes in them caused by either natural processes or human use. Such accounts typically cover agricultural land, fisheries, forests, minerals and petroleum, and water. In some countries, the accounts also include monetary data on the value of such resources (Hassan, 2002; Hartwick, 1990; Hamilton, K., and M. Clemens. 1999; Hamilton, 2000; Hecht, 2007).Emissions Accounting__Developed by the Dutch, the National Accounting Matrix including Environmental Accounts (NAMEA) structures the accounts in a matrix, which identifies pollutant emissions by economic sector. Eurostat, the statistical arm of the European Union, is helping EU members apply this approach as part of its environmental accounting program. The physical data in the NAMEA system are used to assess the impact of different growth strategies on environmental quality(Gary, 2008; Pearce, Hamilton, and Atkinson, 1996; O'Connor, 2000; Hecht, 2007).Disaggregation of Conventional National Accounts __Sometimes data in the conventional accounts are taken apart to identify expenditures specifically related to the environment, such as those incurred to prevent or mitigate harm, to buy and install protection equipment, or to pay for charges and subsidies. Over time, revelation of these data makes it possible to observe links between changes in

environmental policy and costs of environmental protection, as well as to track the evolution of the environmental protection industry. While these data are of obvious interest, some people argue that looking at them in isolation can be misleading. For example, while end-of-pipe pollution control equipment is easily observed, new factories and vehicles increasingly are lowering their pollutant emissions through product redesign or process change rather than relying on special equipment. In such cases, no pollution control expenditures would show up in the accounts, yet environmental performance might be better than in a case where expenditures do show up (Pandit, Shanmugan, 2009; Peskin, 1989/96; Domingo, and Sylvia, 1998; National Statistical Coordination Board, 1998a; delos Angeles, 2000; Hecht, 2007).Value of non-Marketed Environmental Goods and Services__Considerable controversy exists over whether to include the imputed value of non-marketed environmental goods and services in environmental accounts, such as the benefits of an unpolluted lake or a scenic vista. On the one hand, the value of these items is crucial if the accounts are to be used to assess tradeoffs between economic and environmental goals. Otherwise, the accounts can end up reflecting the costs of protecting the environment without in any way reflecting the benefits. On the other hand, some people feel that valuation is a modeling activity that goes beyond conventional accounting and should not be directly linked to the SNA. The concern underlying their view is that it is difficult to standardize valuation methods, so the resulting accounts may not be comparable across countries or economic sectors within a country (Atkinson, 2010; Economic valuation of natural resources: a handbook, 2011). Green GDP__Developing a gross domestic product that includes the environment is also a matter of controversy. Most people actively involved in building environmental accounts minimize its importance. Because environmental accounting methods are not standardized, a green GDP can have a different meaning in each project that calculates it, so values are not comparable across countries. Moreover, while a green GDP can draw attention to policy problems; it is not useful for figuring out how to resolve them. Nevertheless, most accounting projects that include monetary values do calculate this indicator. Great interest in it exists despite its limitations.(INTOSAI WGEA, 2010Carrol, 1985; Parikh, Parihk, Sharma and Painuly, 1993; Bartelmus, Stahmer, and Tongeron, 1991; Lange, 1997; IUCN, 2000; Nazmul Islam and KamruzzamanMajumder, 2010).

5. Application of Environmental Accounting to Emerging Oil and Gas Economy: Ghana

Like most nations, the calculation of Ghana's GDP is still based on traditional variables - investment, savings, market capitalization, exports, imports etc. The growth rates in GDP and its components are one of the most important variables investigated and examined by analysts.As per National Income Accounting there are 3 ways to compute GDP:Product wise: Calculating the total production; Income wise: Calculating the total incomes received by factors of production – labour and capital; and Expenditure wise.[2]In a way all the three are part of a cycle. You begin production by using factors (labour and capital) and then you pay them incomes which they eventually spend purchasing items of their need. So, whichever way you take it, each of the estimates, should provide you the same GDP. But all these calculations have errors and in reality we never have one figure (Agrawal, 2011).Ghana's economic growth accelerated to an annual 23 percent in the first quarter of 2011 as the country began producing oil for export, the country's statistics agency said (Dzawu, 2011). Thus, for all these years, Ghana, has been calculating its GDP Product-wise; basedon sectors excluding environmental degradation; value added in each sector and aggregated to get GDP figure.

The focus of traditional (conventional) accounting practices is on the economic aspects only. Taking into consideration the environmental dimensions, in the accounting system, especially natural resources/assets, depletion … can be termed as "green accounting" (Markandya and Tamborra, 2006). The term "Greening" has been used a lot in the past thirty years in relation to different environmental issues. In many cases, the term is also used to name organizations such as Green Belt Movement, operations such as Green Contracting … etc.

[2] It is the classic Keynesian equation: Y = C + I + G + (X – M): where Y = Income (GDP), C = Consumption (or private final consumption expenditure), I = Investment (or gross final consumption expenditure), X = Exports, M = Imports, calculating the total expenditure of all the entities (Agrawal, 2011).

Green Accounting is a general term where it may mean Environmental, Ecological or Natural Resource Accounting. Needless to say that Environmental Accounting is also a general term which may mean the integration of environmental dimension into the macro or micro level despite that it is more applicable to the latter level. However, the four main terms mentioned overlap with each other. Environmental Accounting, which calls to introduce a system that supports Sustainable Development (SD) that is gaining more interest especially from multinational energy companies, has many meanings and uses. Environmental Accounting can support national income accounting, ecological accounting at local administration level and at micro level related to financial accounting, cost accounting or internal business managerial accounting. In the following section the different terms is clarified (Bennett and James, 2000;Ashley, Jon Barnes, Chris Brown and Jones, 1997; IUCN, 2000; Lange, MacGregor and Suich, 2001; Hecht, 2007).

According to the Wentworth Group (2011), economics and related fields often distinguish between quantities which are stocks and those which are flows. A stock variable is measured at one specific time, and represents a quantity existing at that point in time, which may have been accumulated in the past. A flow variable is measured over an interval of time, that is, quantity per unit of time. For environmental accounts it is not so simple, because as yet, we do not have a common currency for environmental assets. For the purpose of this paper, it is suggested that as part of the initial process, integrating Environmental Accounting into Ghana's emerging oil and gas economy should be based on the 2005 CSIRO/University of Sydney publication *Balancing Act* based on a benchmark/indicators[3] of 135 sectors of the Australian economy.For an indication of economic impact *Balancing Act* used:gross operating surplus (or profits); dependence on imports*;* exports earnings.An indication of social impact is gained from:family income*;* tax contributed by the organisation to the 'Commons' (government revenue)*;* job/employment generation.Environmental impact was indicated by: greenhouse gas emissions; primary energy use; managed water use and land disturbance (Integrated Sustainability Analysis, 2011). Figure 1 below (Environmental Accounting Framework: Sample -Indicators) provides a framework that could serve as the building blocks in developing and integrating Environmental Accounting into Ghana's emerging oil and gas economy.Although modified to suit the broad goal of this paper, the University of Sydney framework has over a thousand detailed indicators aggregated into over 180 categories which in turn are aggregated into more than 20 top-level indicators like *water use* and *energy use*. Top-level indicators include such items as: imports, employment, greenhouse gas emissions, land disturbance, land use and material flow. An indicator is referred to as *positive* if more of it is generally thought to be a good thing, for example, *employment*. On the other hand, an indicator is referred to as *negative* if more of it is generally thought to be a bad thing, for example, *greenhouse gas emissions*. Moreover, other indicators in the framework have far more detail. For instance, the indicator *energy consumption*includes more than 480 separate components aggregated into 28 categories that can be accountedfor either at the top level (*energy consumption*), aggregate level (in the case of Ghana, *oil and gas*) or individual component level (example, *oil and gas used in powering the Floating Production storage and Offloading System Ghana*). The Floating Production Storage and Offloading System (FPSO) in Ghana uses the biggest turret ever constructed. It has an oil processing facility of 120,000 of oil per day and storage capacity of 1.6 million barrels and can produce 160 million standard cubic feet of gas per day (Government of Ghana, 2011).

The suggested framework will include indicators such as(1). Economic (2) Social (3) Environment: material flow; energy consumption [Primary energy consumption is the combustion of non-renewable fossil fuels, in units of megajoules (MJ). This definition covers coal, natural gas, fuel petrol, diesel and kerosene. Items such as crude oil for refinery feedstock and wood are not included, since they are either not combusted or renewable. Energy consumption serves as a good proxy for a wide range of other pollutants such as emissions of SO2. As a

[3]Indicators are useful proxies that *indicate* the economic, environmental and social impact of doing business. They are said to be *proxies* because they can only *stand for* or *approximate* the actual impact. For example, *climate change* might be one of the environmental impacts of doing business; greenhouse gas emissions can be used as a proxy for climate change. Similarly *well-being* may be a social impact of doing business; income and employment may be proxies that indicate, or point towards, social well-being (Integrated Sustainability Analysis, (2011) ISA Information Sheet 6: ISA Indicator suite, http://www.isa.org.usyd.edu.au/research/ISA_TBL_Indicators.pdf, accessed: 2011 – 07 – 21.

measure of non-renewable fossil fuels this indicator is crucial to an understanding of resource depletion. This is especially important to oil dependent economies]; water use [Managed water use denotes the consumption of self-extracted and in-stream water (from rivers, lakes and aquifers, mainly extracted by farmers for irrigation) as well as mains water. Collected rainfall such as in livestock dams on grazing properties is not included]; land use; land disturbance; greenhouse gas; national pollutant; and ecological footprint. For a full description of these indicators see Balancing Act: A Triple Analysis of the Australian Economy: http://www.isa.org.usyd.edu.au/publications/balance.shtml#accessing.

6. Conclusion

The paper investigated and examined the nexus between the processes of economic growth and development and in particular, how emerging oil and gas countries like Ghana in the sub-Saharan Africa could integrate Environmental Accounting into their economies. Thus, in light of the above analysis of increasing environmental attention (local and international) and in view of that fact that oil and gas sector have profound production impact on the environment and communities, the paper brought to the fore, a modified framework that serves the bases of enhancing the process of sustainable development in emerging oil and gas economies in the developing world. The paper is relevant for improved System of National Accounts (SNA) for National Income computations considering environmental renewable and non-renewable natural resources. The emphasis is on the nation's macro-economic measures of National Income Accounts in which traditional economic indices such as Gross Domestic Product are measure. The modified framework presented underpins a move towards an enhanced approach that supports and guide oil and gas industry, environmental management within the processes of good governance, security, economic growth and development.

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Economic Indicator	Category (can be reported separately or aggregated into indicator)	Explanation
Components of GDP	Gross operating surplus	Gross operating surplus is defined as the residual of an industry's total inputs, after subtracting all intermediate inputs, compensation of employees, and net taxes and subsidies. It consists of operating profits, and consumption of fixed capital for capacity growth and replacement (depreciation).
Imports	Complementary imports, competing imports	Imports represent the value of goods and services purchased from foreign residents. They consist of any commodity needed forthe domestic production of commodities.
Businesses		This reports the number of businesses supported directly and indirectly through all purchases. Unit: number.
Exports		Exports represent the Australian production of primary commodities that are destined for final demand outside Australia. Units A$million.
Social Indicator	**Category (can be reported separately or aggregated into indicator**	**Explanation**
Employment		Employment means full-time-equivalent employment measured as full-time employment plus 50% part-time employment of employees,including employers, own account workers, and contributing family workers. Units: employment-years (e-y) and employment minutes (min) are used.

Source: http://www.isa.org.usyd.edu.au/publications/index.shtml
*Original framework has been modified to suite the goal and objectives of this paper.

Figure 1: ENVIRONMENTAL ACCOUNTING FRAMEWORK: SAMPLE--INDICATORS*