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Dr. Sudhir Yadav
Assistant Professor (Ad-hoc), Department of Forensic Science, School of Life Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India

Dr. Sushama Yadav
Assistant Professor, Department of Commerce, School of Commerce & Management, Dr. Harisingh Gour University, Sagar, Madhya Pradesh, India

Correspondence
Dr. Sudhir Yadav
Assistant Professor (Ad-hoc), Department of Forensic Science, School of Life Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India

Environmental accounting with the special reference to the significance of green issues and measures in developing countries

Dr. Sudhir Yadav and Dr. Sushama Yadav

Abstract
A base understanding of environmental accounting is very useful in tracing the role of business strategy and environmental accounting. At the outset, environmental accounting has proceeded through a period of uncertain status. In the today's fascinating world there is a wide-ranging field of accounting and it provides the reports for both internal uses as well as generating environmental information. Internal use is the better termed environmental management accounting and it causes a significant impact of business activities such as assortment of pollutants, including toxic, hazardous and 'warming'. From this sort of environmental impacts, multiple disciplines are needed for the analysis of the effects, and for the integration into the management decisions and in the accounting reporting.
The green accounting still faces a number of problems, such as, the lack of support of information, specialized personnel as well as the absence of proportional international accounting models. In this present article on the basis of secondary data sources the author has mainly focuses on the two major aspects such as the significance and the various measures of green issues in developing countries.

Keywords: Environmental accounting, preventive measures, green issues, pollutants

1. Introduction
In the modern world the Environmental/Green Accounting is a comprehensive field of accounting and provides the reports for both internal uses, generating environmental information which helps to make management decisions on pricing, controlling overhead and capital budgeting, and external use, disclosing environmental information of interest to the public and to the financial community. Internal use is better termed environmental management accounting and it causes a significant impact of business activity on the environment is found in the several forms such as Media (i.e. air, water, underground pollution), Targets (drinking water, land and habitat for endangered and threatened species) and Global sites (oceans, atmosphere, land mass) (Bartolomeo *et al.*, 2000) [1].
An assortment of pollutants, including toxic, hazardous and 'warming' and is accountable to the business activities. From this sort of environmental impacts, multiple disciplines are needed for the analysis of the effects, and for the integration into the management decisions and in the accounting reporting. As per the requirements of non-accounting disciplines the followings are noteworthy:

- Environmental science,
- Environmental law and regulation,
- Finance and risk management and
- Management policies and control systems

A base understanding of environmental accounting is very useful in tracing the role of business strategy and environmental accounting. At the outset, environmental accounting has proceeded through a period of uncertain status. Mathews (1997) [2] describes the development in four phases: 1970s descriptive, with normative models of conduct;
An environmental accounting framework is yet to develop; such a framework would contribute standards for reporting, and standards for accounting. The state of the regulatory framework is given by Mathews (1997) [2]. The emphasis of a framework is to provide a general fit over the area synchronized:

a. Raise awareness of environmental issues;
b. Develop guidelines to assist identification of environmental issues and evaluation and reporting of those issues;
c. Provide education programs across disciplines focused on environmental issues and their accounting treatment and
d. Develop practices of environmental accounting, with recommendations on best practices.

A fifth direction is to connect teaching with developments and practices in business. Such a framework is to express that the accounting profession is accepting confront of an existing issue: environmental force of business activity (Medley, 1997) [3]. Accounting professionals materialize to focus on the role of environmental accounting, under deliberation that environmental issues are elementary to human survival. The nature of environmental accounting practice is considered next. Therefore, in the present article author has tried to summarize in brief about green accounting with the importance of the green issues and the measures in the developing countries like India those are directly or indirectly related to it.

2. Economic Expansion and the Environment:

It is today a platitude that much natural capital is not only intrinsically valuable, it also has functional worth. But scratch an economist and you are likely to find someone who regards natural capital as a luxury. It is commonly thought that, to quote an editorial in the UK's The Independent (4 December 1999), " (Economic) growth is good for the environment because countries need to put poverty behind them in order to care," or, to quote The Economist (4 December, 1999: 17), "trade improves the environment, because it raises incomes, and the richer people are, the more willing they are to devote resources to cleaning up their living space."

The underlying idea was popularized in World Bank (1992) [5]. Emissions of nitrous oxides (NOx), sulfur oxides (SOx), particulates, and lead were found to have declined since 1970 in OECD countries even while GDP had increased. World Bank (1992) [5] also found that among countries where per capita GDP was under US $1,200 per year, the less poor among the countries suffered from greater concentration of sulfur dioxide, but that among countries enjoying per capita GDP in excess of US $1,200, those that were richer had lower concentrations. The relationship between GDP per capita and concentration was found to be an inverted-U among environmental economists the relationship was promptly christened the "environmental Kuznets curve," because a similar relationship between GDP per head and income inequality had been found decades ago by the economist Simon Kuznets. The environmental Kuznets curve was interpreted in such terms as the following:

"People in poor countries can't afford placing a weight on the natural environment over material well-being. So, in the early stages of economic development pollution is taken to be an acceptable, if unfortunate, side effect of growth in GDP. However, when a country has attained a sufficiently high standard of living, people care more about the natural environment. This leads them to pass environmental legislation and create new institutions to protect the environment."

The literature on the environmental Kuznets curve is now huge. However, studies confirming the inverted-U shape have continued to focus on ambient air pollution in cities (e.g., Harbaugh *et al*., 2002) [4]. Notice that such pollutants literally blow away. The air shed over a city would be expected to improve in quality if emissions there were to decline. But sewage is another form of pollution that would be "subject" to the environmental Kuznets curve. Health in the cities declined at the beginning of the Industrial Revolution, largely owing to an increase in urban pollution. With rising incomes, the local environment eventually improved. Because it is consistent with the notion that as their incomes rise people spend proportionately more on environmental quality, it has proved tempting to believe that the environmental Kuznets curve holds for environmental quality generally.

The temptation should be resisted.66 If the degradation of natural capital were irreversible, economic growth could be at risk and we wouldn't observe an inverted-U. And there are other reasons we should reject the environmental Kuznets curve as a metaphor for the relationship between GDP per capita and the state of the natural environment. Here are four main reasons: First, the inverted-U has been found for pollutants involving local, short-term damages (Sulphur, particulates, fecal coliforms), not for the accumulation of household and industrial waste, nor for pollutants involving long-term and more dispersed costs, such as carbon dioxide, which typically have been found to increase continuously with GDP (World Bank, 1992) [5]. Secondly, the relationship between GDP per head and environmental pollution wouldn't be the inverted-U if the feedback from pollution to the state of ecosystems is positive (D.I. Stern *et al*., 1996). Third, the inverted-U hides system-wide consequences of emissions. Reductions in one pollutant in one country, for example, could involve increases in other pollutants in the same country or transfers of those same pollutants to other countries.

Acid rains are an example of the externalities that emitting countries impose on countries down wind. And fourth, in most cases where pollution concentrations have declined with rising GDP, the reductions have been due to local institutional reforms, such as environmental legislation and market-based incentives to reduce environmental impacts. Such reforms may ignore their possible adverse side effects on the poor and on future generations. Where the environmental costs of economic activity are borne by those under-represented in the political process, the incentives to correct environmental problems are likely to be weak.

The solution to environmental degradation usually lies in such institutional reforms as would offer incentives to private users of resources to take account of the social costs of their actions. The inverted-U curve suggests this can happen in some cases that are all. Moreover, as we have shown, growth in GDP per capita is a wrong objective; we should instead be studying movements in wealth, not movements in GDP. Movements in wealth over time pick up the right tradeoffs between the factors that determine intergenerational well-being. If there are tradeoffs that can be exploited between different types of capital assets, shadow prices would reflect them and wealth would summarize them in the right way.

3. Requirements vs. Luxuries

A large part of what Nature offers us is a necessity, not a luxury. Many of the services we obtain from natural capital are "basic needs". Among the visible products are food, fibres, fuel, and fresh water (MEA, 2005a-c, calls them "provisioning services"). Many are hidden from view. A number of services filter into a global context, but many are geographically confined. Human well-being and the state of our natural environment are closely linked. Natural capital offers joint products. Circulation of material (ocean currents and the wind system) transfers energy across the globe (e.g., it influences precipitation) and dilutes pollutants. Wetlands recycle nutrients and produce purified water. Mangrove forests protect coastal land from storms and are spawning grounds for fish. And so on. Unhappily, social tensions arise in those many cases where an ecosystem has competing uses (farms versus forests versus urban development; forests versus agro-ecosystems; coastal fisheries versus aquaculture 67). Sachs *et al*. (1998) [6] traced the location of world poverty in part to the fact that the tropics harbor some of the most fragile ecosystems, including those that regulate disease.

A resource can be a luxury for others even while it is a necessity for some. Consider watersheds, which nurture commercial timber, protect agricultural land, create recreational opportunities, and supply both market and nonmarket products (gums, resin, honey, fibres, fodder, fresh water, timber, and fuel-wood). Watershed forests purify water and protect downstream farmers and fishermen from floods, droughts, and sediments. In tropical watersheds, forests house vast quantities of carbon and are the major home of biodiversity.

A number of products from watersheds are necessities for local inhabitants (forest dwellers, downstream farmers, and fishermen), some are sources of revenue for commercial firms (timber companies), while others are luxuries for outsiders (eco-tourists). Some of the benefits accrue to nationals (agricultural products and fibres), while others spill over geographical boundaries (carbon sequestration). So, while watersheds offer joint products (protection of biodiversity, flood control, carbon sequestration, household necessities), they also provide potential services that compete against one another (commercial timber, agricultural land, biodiversity). Competition for Nature's services has been a prime force behind the transformation of our landscape.

Politics often intervenes to ensure that commercial demand trumps local needs, especially under non-democratic regimes. Governments have been known to issue timber concessions in upstream forests to private logging firms, even while evicting forest dwellers and encouraging siltation and the risk of floods downstream. Nor can the international community be depended upon to apply pressure on governments. When biodiversity is lost at a particular site, eco-tourists go elsewhere that has rich biodiversity on offer. That is why international opinion is often at best tepid. In both examples, local needs are outflanked by outsiders' demands.

4. Irremediable Uses

Ecosystems are driven by interlocking nonlinear processes that run at various speeds and operate at different spatial scales (Steffen *et al*., 2004) [7]; which is why ecosystems harbor multiple stability regimes. The global climate system is now a well-known example, but small-scale ecosystems also contain multiple stability regimes; and for similar reasons. So long a phosphorus runoff into a fresh water lake is less than the rate at which the nutrient settles at the bottom, the water column remains clear. But if over a period of time the run-off exceeds that rate, the lake collapses into a eutrophic state (Carpenter, 2001; Scheffer, 2009) [9, 8]. Usually the point at which the lake will collapse is unknown (Appendix 3). That means the system is driven by non-linear stochastic processes.

When wetlands, forests, and woodlands are destroyed (for agriculture, mining, timber extraction, urban expansion, or whatever), traditional dwellers suffer. For them, and they are among the poorest in society, there are no substitutes. For others, there is something else, often somewhere else, which means there are substitutes. Degradation of ecosystems is like the depreciation of roads, buildings, and machinery - but with three big differences: (i) depreciation of natural capital is frequently irreversible (or at best the systems take a long time to recover); (ii) except in a very limited sense, it isn't possible to replace a depleted or degraded ecosystem by a new one; and (iii) ecosystems can collapse abruptly, without much prior warning. Imagine what would happen to a city's inhabitants if the infrastructure connecting it to the outside world was to break down without notice.

Vanishing water holes, deteriorating grazing fields, barren slopes, and wasting mangroves are spatially confined instances of corresponding breakdowns among the rural poor in poor countries. In recent years we have also seen how an ecological collapse accompanying high population growth, such as the one that has been experienced in recent years in the Horn of Africa and the Darfur region of Sudan, can trigger rapid socio-economic decline (Homer-Dixon, 1999; Diamond, 2005; Collier, 2007) [12, 11]. The range between a need and a luxury is thus enormous and context-ridden. Macroeconomic reasoning glosses over the heterogeneity of Earth's resources and the diverse uses to which they are put, by people residing at the site and those elsewhere.

5. Changeover Possibilities

Environmental debates are often over the extent to which people are able to substitute one asset for another. Many believe that problems arising from the depletion of natural capital can always be overcome by the accumulation of reproducible capital, knowledge, and skills. Lomborg (2001) [13] is an example from the popular literature. But the viewpoint also pervades academic economics. Macroeconomic growth theories, for example, are mostly built on economic models in which Nature makes no appearance (Romer, 1996; Barro and Sal-i- Martin, 2003; Helpmann, 2004) [14, 15].

The implicit assumption there is that reproducible capital and human skill and ingenuity can be relied upon to make the sustainability of Nature's services unimportant. In contrast there are scientists who argue that, globally, Humanity has reached the stage where there are severe limits to further substitution possibilities among large numbers of natural resources and among environmental resources and other forms of capital assets (Ehrlich and Goulder, 2007) [16].

Four kinds of substitution help to ease resource constraints are they local or global. First, there can be substitution of

one thing for another in consumption (nylon and rayon substituting for cotton and wool; pulses substituting for meat). Secondly, manufactured capital can substitute for labour and natural capital in production (the wheel and double-glazing are two extreme examples). Thirdly, novel production techniques can substitute for old ones. Fourthly, and for us here most importantly, natural resources themselves can substitute for one another (e.g., renewable energy sources could substitute for non-renewable ones). The examples point to a general idea: as each resource is depleted, there are close substitutes lying in wait, either at the site or elsewhere.

The thought that follows is that even as constraints increasingly bite on any one resource base, Humanity should be able move to other resource bases, either at the same site or elsewhere. The enormous additions to the sources of industrial energy that have been realized (successively, human and animal power, wind, timber, water, coal, oil and natural gas and, most recently, nuclear power) are a prime historical illustration of this possibility.

Humanity has been substituting one thing for another since time immemorial. Even the final conversion of forests into agricultural land in England in the middle ages was a form of substitution: large ecosystems were transformed to produce more food.70 but both the pace and scale of substitution in recent centuries has been unprecedented. Landes (1969) [19] has shown that the discovery of vast numbers of ways of substituting resources among one another characterized the Industrial Revolution in late eighteenth century. The extraordinary economic growth in Western Europe and North America since, and in East Asia more recently, has been another example of finding new ways to substitute goods and services among one another and to bring about those substitutions. Those ecosystems are spatially dispersed has enabled this to happen.

The ecological transformation of rural England in the middle ages probably reduced the nation's biodiversity, but it increased income without any direct effect on global productivity. But that was then and there, and we are in the here and now. The question is whether it is possible for the scale of human activity to increase substantially beyond what it is today without placing undue stress on the major ecosystems that remain. The cost of substituting reproducible capital for natural capital can be high. Low-cost substitutes could turn out to be not so "low-cost" if the true costs are used in the accounting, rather than the costs recorded in the marketplace. Depleting one type of natural capital and substituting it with another form of natural capital or with a type of reproducible capital is frequently uneconomical. The example of global climate is a constant reminder of that.

6. Ecosystem Pliability

Degradation of an ecosystem not only affects the volume and quality of the services it provides, but also challenges the system's resilience, which is its capacity to absorb disturbances without undergoing fundamental changes in its functional characteristics. To interpret an ecosystem's loss of resilience, one needs to view it as having moved to a different stability regime. Sudden changes in the character of shallow lakes (from clear to eutrophied water) resulting from increases in nutrients, and the transformation of grasslands into shrub-lands consequent upon bad cattle management practices are examples of regime shifts. Human societies have on occasions been unable to avoid suffering from unexpected flips in their local ecosystems. Fishermen on Lake Victoria and nomads in the new shrub-lands of southern Africa are examples from recent years; the inhabitants of the Mayan states in early ninth Century and those of Easter Island in the eighteenth Century are examples from earlier eras.

Estimating damage to ecosystems from pollution is especially difficult in cases where the ecosystem is destroyed, or more accurately, gets transformed. Phosphorus seepage from agricultural fertilizers into fresh water lakes causes eutrophication. Reversing the damage can be costly, in some cases impossible. Regime shifts are a potential feature because the processes governing ecosystems are non-linear. In Appendix 7 we present a model of Human-Nature interactions involving reproducible, human, and natural capital. As the natural system in the model is subject to a threshold, the economy has two stability regimes.

7. Biodiversity

Determining the functional value of biodiversity is a delicate matter. When ecologists speak favourably of biodiversity, which they do in unison and with regularity, they make an implicit assumption that the diverse species have co-evolved under selection pressure. They don't mean a simple head-count of "objects" constituting the diversity. The diversity of species increased when the Nile perch was introduced into Lake Victoria. But not for long; the lake, as a fishery, was devastated. Biodiversity, appropriately defined, would seem to be a key to ecosystem productivity (Tilman, 2012) [18]. By "productivity" we mean the production of biomass, termed "primary productivity". It has been found in experiments in field stations that species-rich plots yield greater biomass than species-poor ones, which would indicate that the total productivity of a population of species is greater than the sum of the productivities of the individual species grown in isolation. This reflects a form of synergy, making ecosystems resilient to changes in the circumstances they experience.

The minor species in lightly grazed grassland could be regarded as "waiting in the wings" to take over, if required to do so because of intense grazing. The thought here is that species abundance in ecosystems is like spare capacity, it offers an insurance device for ecosystems (Tilman, Reich, Knops, 2006) [19].

It remains a popular belief though that the utilitarian value of biodiversity is located primarily in the potential uses of the genetic material it harbours (e.g., for pharmaceutical purposes). Preserving biodiversity is seen as a way of holding a diverse portfolio of assets with uncertain payoff. The idea of option value (Section 2.4.3) finds its most striking illustration in "biodiversity" viewed as a potential source of new genetic material. But biodiversity is valuable more broadly (Balmford *et al*., 2011) [20]. It is essential for the maintenance of a variety of services on which humans depend for survival (species complementarities are involved). This has the corollary that to invoke the idea of substitutability among natural resources in order to play down the usefulness of biodiversity is a wrong intellectual move.

The point is that if biodiversity is necessary for an ecosystem to provide essential service, the importance of that same biodiversity cannot be downplayed by the mere hope that for every species there are substitutes lying in wait

within the same ecosystem. Recall the famous analogy in Ehrlich and Ehrlich (1981) relating species in an ecosystem to rivets in an airplane. One by one, perhaps, species may disappear and not be missed. There is spare capacity, meaning "species substitutability". Eventually, though, the cumulative effect of biodiversity loss will lead to the crash of ecosystem functioning ("species complementarity" will kick in), just as the cumulative loss of redundant rivets will lead to the crash of an airplane.

8. Significance of Green Issues in Developing Countries

It is clearly indicated in Indian Constitution, Article 51A of Directive Principles that It shall be the duty of every civilian of India, to protect and constitutional provisions are backed by a number of laws, acts, rules, and notifications like Factories Act 1948; (Prevention and Control of Pollution) Act 1974; Forest (Conservation) Act 1980; Air (Prevention and Control of Pollution) Act 1981; Water Biomedical waste (Management and Handling) Rules 1998; Municipal Solid Wastes (Management and Handling) Rules, 2000; Ozone Depleting Substances (Regulation and Control) Rules 2000; Noise Pollution (Regulation and Control) (Amendment) Rules 2002; Biological Diversity Act 2002. The Department of Environment was established in India in 1980 to make sure a strong environment for the country. This later became the Ministry of Environment and Forests (MOEF) in 1985. The EPA (Environment Protection Act), 1986 came into force soon after the Bhopal Gas Tragedy and is considered an umbrella legislation as it fills many gaps in the existing laws. Companies around the world aspire consciously for improved transparency in disclosure as their core competence (Williams, 2000).

Environmental disclosure through internet would be the future of scientific reporting. An enterprise is a corporate citizen. Like a citizen it is esteemed and judged by its actions in relation to the community of which it is a member as well as by its economic performance. Responsibility towards environment has become one of the most crucial areas of social responsibility. Recent years have witnessed rising concern for environmental degradation, which is taking place mainly in the form of pollution of various types, viz. air, water, sound, soil erosion, deforestation, etc. Environmental Accounting is a field that identifies resource use, measures and communicates costs of a company s or national economic impact on the environment.

Table 1: Describes Important Measures and Issues Related to Green Accounting

GA Measures.	GA Issues
PPCs	Mainly concern with the costs incurred to prevent air and water pollution along with water treatment facilities and other activities.
EPCs:	Related to the costs of energy saving measures as well as costs of global warming reduction measures.
CRR:	Associated with the costs incurred for waste reduction and disposal as well as for water conservation, rainwater usage and other measures aimed at efficient resources usage.
ERCs:	Principally concern with the cost of environmental restoration operations (eliminating soil and ground water contamination, environmental compensation, etc.)
MCs:	Mainly coupled with the management-related environmental protection costs including environmental promotion activities and costs associated with acquiring and maintaining ISO- 14001 certification.
SPACs:	This episode of the activities is mainly related to the Environmental protection costs stemming from participation in social activities such as participation in organizations concerning with environmental preservation etc.
R & DCs:	Mainly associated with the Environmental protection costs for research and Development activities and costs of environmental solutions business activities (Green product/environmental technology design and development costs, environmental solutions business costs, others) etc.
GA: Green Accounting, PPCs: Pollution Prevention Costs, EPCs: Environmental Protection Costs, CRR: Costs of Resource Recycling, ERCs: Environmental Restoration Costs, MCs: Management Costs, SPACs: Social Promotion Activities Costs, R&DCs: Research and Development Costs.	

Source: (K. Moorthy & P. Yocob)

9. Conclusion

The green accounting is an emerging aspect of accounting science that will influence, in the near future. The adoption of basic elements of green accounting will portray the role of environment in the economy as well as render easier the analysis of macroeconomic questions with the help of green accounting measures and thus, will lead the economy to a viable path. Despite the fact that the corporate environmental expenses increase not only in importance but also in monetary units, some enterprises continue to underestimate and enter environmental costs in accounts as general expenses.

However, some companies try to connect environmental costs with products or services but the methods of allocation cost used are inappropriate. When no proper allocation method is used, the manager of an enterprise does not receive reliable information with regard to the real costs and profits in order to maintain or change the products and/or processes. Furthermore, the above situation prevents the effective follow-up of yield of an enterprise as well as the right pricing of products and the important activities for the maintenance of competitiveness of an enterprise.

The green accounting still faces a number of problems, such as, the lack of support of information, specialized personnel as well as the absence of proportional international accounting models. In recent years, the efforts for the growth of environmental information systems have led to the creation of proportional systems of administration (Environmental Management Systems) which face problems with regard to the treatment of complicated environmental data. The new tendencies that are found in evolution foresee a more proactive environmental planning through the recognition and the reduction of environmental cost and consequently the improvement of profitability of enterprises.

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