From Silent Spring to the Sustainable Development Goals: On the Development–Environment Nexus

Chris O. IKPORUKPO

Department of Geography, University of Ibadan, Ibadan Nigeria

Email:coikporukpo@yahoo.com

Abstract

The conceptualization of development has changed over the years. However, it is only recently that environmental concern emerged as a dimension of development. This paper examines the trend in this paradigm shift. Development has been traditionally conceptualized in terms of income and well-being. Even when human development conceptualization emerged in 1990, this emphasis did not radically change. The fact that the environment is the basis of human well-being was hardly appreciated. However, indications of a change emerged at the United Nations Conference on the Human Environment held in Stockholm, Sweden, in 1972, particularly with the follow-up World Commission on Environment and Development (the Brundtland Commission). Whereas the Conference marked the formalization of global concern for environmental development, the seeds of this concern date back decades. The seeds first germinated in the United States of America (USA) where environmental clubs, such as the Sierra Club, emerged as early as the nineteenth century. In spite of such early attempts, it is the impact of the publication of Carson's *Silent Spring* in 1962 that effectively generated widespread environmental interest in the USA, which later diffused to other parts of the world. The impact of the environmental movement was such that when the paradigm of sustainable

development emerged as part of the Brundtland Report, it readily became an organizing principle for development. Thus, the discourse and action on world development that followed clearly took into consideration the environmental aspects of development. The Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) are prominent and typical examples. Thus, in many respects, there is a shift from conceptual development strictly in terms of human beings to one which clearly recognizes the central role the environment plays in human existence and welfare. Such conceptualization is reflected particularly in the emergent Human Sustainable Development Index, as distinct from the Human Development Index. This increasing focus on the environment is the result of the three intertwined factors of the spectre of resource depletion, the environmental movement and the global environmental summits.

Keywords: Development, Environment, Paradigm shift, Human Welfare

Introduction

The struggle for improvement and welfare have characterized the long history of humanity. This has underlain not only changing livelihood but also the entire gamut of human interaction with the environment and the choice of location. Such epoch-making events as the Industrial Revolution and the Agricultural Revolution were dictated by the need for human progress and welfare. Indeed, the so called "march of civilization" was dictated by, and was a symbol of, the push for human progress. In other words, development has been at the centre of human action.

Be this as it may, the conceptualization of development (human welfare) has changed over the years; dictated as it were by the dominant philosophical doctrine of the time. Thus, the definition has been determined, in certain eras, not only by economic considerations but also others such as religious, spiritual, psychological and social settings. For instance, a great ancient philosopher, Aristotle, who conceptualized welfare in non-economic terms, asserted in 350 B.C. thus:

> Another belief which harmonizes with our account is that the happy man lives well and does well; for we have practically defined happiness as a sort of good life and good action. The characteristics that are looked for in happiness seem also, all of them,to belong to what we have defined happiness as being. For some identify happiness with virtue, some with practical wisdom, others with a kind of philosophic wisdom, others with these, or one of these, accompanied by pleasure or not without pleasure; while others include also external prosperity. (Quoted in Stanton, 2007: 4)

This paper examines the shift in the paradigms underlying the measurement and conceptualization of development, starting from the more recent past, that is, the 20th century, to the present. In particular, it analyses the circumstances necessitating the introduction of an environmental dimension into the conceptualization that emphasised the economic and social dimensions of human existence.

Apart from this introduction and the conclusion, the paper is divided into three broad sections. These are:

i. a critique of conventional conceptualization of development;
ii. an analysis of the emergence of the environmental dimension; and
iii. an examination of the drivers in the emergence of an environmental aspect.

Critique of Conventional Measures

Beyond conceptualizing well-being (and development) in terms of spiritualism, utility, and welfarism, there emerged in the 20th century, relatively more precise and focused measures. The conventional measures that have emerged (Doessel and Gounder, 1994; Sachs 1995, Stanton, 2007) include:

i. Per capita income/ GDP or GNP;
ii. Modernization;
iii. Well-being;
iv. Physical quality of life index; and
v. Human development index

Of these, it is only modernization that has not been widely used because of the innate problem of assuming that development is about the Western way of life.

The use of per capita income has, until recently, been the most popular and the most enduring. Despite its simplicity, this measure has been widely criticized for not capturing the essence of human development, apart from the challenge of comparing the accounting and financial systems of countries which the measure requires. The unexpected boom in the prosperity of some countries such as Kuwait and the United Arab Emirates, consequent on mineral resources, particularly oil, has distorted the per capita income of these countries, thus rendering the per capita income measure unreliable. In spite of the introduction of the idea of purchasing power parity to address the issue of comparison of the currencies of the countries, the measure has fallen into disfavour. Be this as it may, it is the criticism that the use of per capita income does not really capture the well-being of people that has most fundamentally limited the use of this measure. Thus, when other measures emerged, the emphasis was on the well-being of the people.

In the mid-1980s, the United Nations Research Institute for Social Development (UNRISD) developed a well-being measure based on the orientation that development is not only an economic but also a social phenomenon (McGranahan et al., 1985). A number of indicators emerged based on the orientation that the development profile of a country involving several indices is much more effective than a single indicator. Each indicator was expected to stand on its own, that is, independent of others. Of the various indicators, nineteen were defined as core. These could be grouped into surplus income, nutrition, shelter, health, education, security, leisure, social stability, and physical environment. Similarly, based on the orientation that development is essentially social, the United Nations Educational Scientific and Cultural Organization(UNESCO) also developed indicators that measure social development. These included mainly human resources (education), inclusiveness/participation, social/cultural context, science and technology, communication networks and environmental awareness. Furthermore, still in response to the shortcomings of per capita income, a number of other measures, such as the physical quality of life index (Morris, 1979), also emerged. The physical quality of life index is also one of social development, based on infant mortality, life expectancy and

literacy. Each of these three indicators is assigned a value of zero to one hundred and the value of the index is the average of the three values.

The measures of development that emerged as a response to the shortcomings of per capita income readily attracted criticisms. Generally speaking, they have been criticized for being too diffused, not focused and difficult to effectively define in development terms as they involve many indicators which cannot effectively be collapsed into a measure, apart from associated data problems. They, just like per capita income, were also criticized for not being people-centered enough. The United Nations Development Programme (UNDP) Human Development Index (HDI) which subsequently emerged in 1990, therefore, was meant to be "people-centred" (UNDP, 1990). It was argued that development should revolve around the ability of individuals to enlarge their choices. Such choices were fundamentally seen as the ability to have economic resources, to be healthy and have long life, to have good education, to have self-esteem, and human rights/political freedom. The measure that thus emerged is composed of health consideration defined as longevity, economic resources in terms of income, and education. It is a combination of these that provides an index measuring development. The precise definition of these indicators, particularly on income and education, by UNDP in its subsequent annual development reports has been varied. For instance in the initial year, which was 1990, the education component was measured using only adult literacy but changed to a combination of adult literacy and mean years of school enrolment in 1991 and further to adult literacy and combined gross school enrolment in 1995. In the 2015 report, expected years of schooling and mean years of schooling were used.

In spite of the enthusiasm that followed the emergence of the HDI, it is now the subject of considerable criticism. The criticisms (Noorbakhsh, 1998; Sagar & Najam, 1998; Stanton, 2007; Hou, Walsh & Zhang, 2015; Pereira & Mota, 2016) centre around the innate weakness in the indicators and data reliability. Some critics argue that the three indicators are not even the appropriate ones to employ and that even if they were, the problems inherent in census data in various countries limit their reliability. Some also argue that given the fact that the indicators have high correlations, there is the problem of redundancy. Given the limitations of HDI, a number of critics go to the extreme of arguing that it is not its usefulness as a measure of

development that has made it to endure but the propaganda machinery of its promoters.

The Emergence of the Environmental Dimension

In spite of the fact that the formal global concern for the environment, which emerged with the United Nations Conference on the Human Environment held 5-16 June 1972 (Ikporukpo, 2015), predates the emergence of the human development index, the index did not incorporate an environmental indicator. This neglect of an environmental component is in spite of the fact that the Stockholm Conference clearly indicated the significance of the environment in human well-being. As the first proclamation declared:

> Man is both creator and moulder of the environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. In the long and tortuous evolution of the human race on the planet, a stage has been reached when, through the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights – even the right to life itself. (United Nations, 1972: 3)

The fact that the Brundtland Report and the United Nations Environmental Programme are all results of the Stockholm Conference underscores the significance the United Nations accorded environmental issues, which was reinforced in the follow-up Rio (1992) and the Johannesburg (2002) Earth summits. Furthermore, the emergence of the concept of sustainable development, which has environmental, economic and social connotations, from the Brundtland Report, is also an indication of the emphasis by the United Nations and its organs on the development-environment relationship.

In spite of the failure of the United Nations and its organs to formally incorporate an environmental component in the measurement of

development, as is obvious in the human development index, it could be argued that the incorporation of an environmental component in the Millennium Development Goals (2000-2015) and the Sustainable Development Goals (2016 - 2030) of the United Nations is an attempt to address this flaw of non-inclusion, even though the Goals are not really the measurements. Table 1 shows that of the eight Millennium Development Goals, one (12.3%) was on the environment, while in the case of the Sustainable Development Goals (Table 2), six of the seventeen (35%) pertain to the environment. It could be argued that some other goals not specifically indicated as being environmental, such as goals 1 in Table 1 and goals 1,2 and 3 in Table 2 have some relationship with the environment. For instance, eradicating poverty, ending hunger and ensuring healthy lives have to do with environmental implications. Be this as it may, it is necessary to note that only those goals that have clear relationships with the environment are included in columns one and two of the tables.

Table 1: The Focus of the Millennium Development Goals

Environmental Focus	Environment-Related Goals	Other Types of Focus
Goal 7: Ensure Environmental Sustainability	NIL	• **Goal 1:** Eradicate extreme hunger and poverty • **Goal 2:** Achieve Universal Primary education • **Goal 3:** Promote gender equality and empower women • **Goal 4:** Reduce Child Mortality • **Goal 5:** Improve maternal health • **Goal 6:** Combat HIV/AIDS, malaria and other diseases • **Goal 8:** Develop a global partnership for development

Source: Conceptualized and produced by the author from information in United Nations Millennium Declaration of 8 September 2000.

Table 2: The Focus of the Sustainable Development Goals

Environmental Focus	Environment- Related Goals	Other Types of Focus
• **Goal 12:** Ensure sustainable consumption and production patterns. • **Goal 13:** Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable enregy. • **Goal 14:** Conserve and sustainably use the oceans, seas and marine resources for sustainable development. • **Goal 15:** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reserve land degradation and halt biodiversity loss.	• **Goal 6:** Ensure availability and sustainable management of water and sanitation for all. • **Goal 7:** Ensure access to affordable, reliable, sustainable and modern energy for all.	• **Goal 1:** End poverty in all its forms everywhere. • **Goal 2**: End hunger, achieve food security and improved nutrition and promote sustainable agriculture. • **Goal 3**: Ensure healthy lives and promote well-being for all at all ages. • **Goal 4**: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. • **Goal 5**: Achieve gender equality and empower all women and girls. • **Goal 8**: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. • **Goal 9**: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. • **Goal 10**: Reduce income inequality within and among countries. • **Goal 11**: Makes cities and human settlements inclusive, safe, resilient and sustainable. • **Goal 16**: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all

Environmental Focus	Environment- Related Goals	Other Types of Focus
		and build effective, accountable and inclusive institutions at all levels • **Goal 17**: Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Source: Conceptualized and Produced by author from information in United Nations Resolution A/RES/70/1 of 25 September 2015.

Given the increasing dissatisfaction with the human development index and the growing concern about the environment, attempts have been made outside the United Nations circle to incorporate an environmental indicator in the measurement of development. Indeed, the attempts (Dahme et al., 1998; Ramathan,1999; Morse,2003; Dewan, 2009; Baque, 2010; Pineda, 2012; Chuluun, 2012; Maccari,2014a, 2014b; Bravo, 2014; Roman and Thiry, 2016), focus on "greening" the Human Development Index (HDI). A common thread in these is basically a reconceptualization of the HDI through an adjustment incorporating environmental sustainability. Generally speaking, the value of the HDI is depressed through the penalization of any given country to reflect its environmental damage; although some approaches are not related to the HDI. The conceptualizations include Green Growth Index, Environmental Sustainability Index, Environmental Performance Index, Environmental Vulnerability Index, Sustainable Development Index and Human Sustainable Development Index/Sustainable Human Development Index, among others (Mori & Christodoulou 2012; World Bank, 2012; Fankhauser, Kazaglis & Srivastav, 2017; Ivanov & Peleah, 2017; Kararach et al 2017; Liu, Brown &Casazza, 2017). Of these conceptualizations, the most noteworthy is the Human Sustainable Development Index (HSDI), as distinct from the Human Development Index. Generally speaking, this involves the introduction of a fourth variable (carbon emission) to the HDI, although there are variants. Table 3 shows that the results of the ranking of countries are different between HDI and HSDI. For instance, the United States, which is fourth in the HDI ranking, is not among the best ten in the HSDI ranking. Similarly, Australia which is second in the HDI ranking is not among the best ten in the HSDI ranking. Commendable as the development of the HSDI might be, as Bravo (2014) lamented, "despite the attention in the media, the Human Sustainable Development Index remains largely ignored by the scientific community".

Table 3: Comparison of Best Ten Countries' Ranking in the HDI and HSDI for 2011

Rank	HDI	HSDI	Rank Change
1	Norway	Sweden	+9
2	Australia	Norway	-1
3	Netherlands	Switzerland	+8
4	United States	Denmark	+14
5	New Zealand	Iceland	+9
6	Canada	Japan	+6
7	Ireland	Austria	+12
8	Liechtenstein	Germany	+1
9	Germany	France	+11
10	Sweden	Hongkong China	+3

Source: Chuluun, 2012.

Be this as it may, there has since been an increased interest not only in the HSDI but also in similar indices (for instance, Perez, 2016; Ivanov & Peleah, 2017; Kararach, et al 2017; Liu, Brown & Casazza, 2017). It is remarkable that attempts are being made to make the Sustainable Development Goals more and more environmentally relevant (for instance, Singh, 2014; Hajer, et al 2015; Barbier & Burgess, 2017; Freer, 2017; Wackernagel, Hanscom & Lin, 2017).

Explaining the Emergence of the Environmental Dimension

The emergence of an environmental component in the analysis and/or measurement of development could be attributed to three basic intertwined factors. These are:

i. The spectre of resource depletion;
ii. The environmental movement; and
iii. The Stockholm Conference and related ones.

The inter-related and reinforcing relationship among the variables/events could be represented in what I christen a reinforcing triangle of environmental concern and action (Figure 1). As the figure indicates, it is the spectre of natural resource depletion that led to the emergence of the environmental movement, which culminated in the earth summits and environmental conferences. The earth summits (Stockholm,

Rio and Johannesburg) and associated environmental conferences brought to the fore and further heightened the spectre of natural resources depletion.

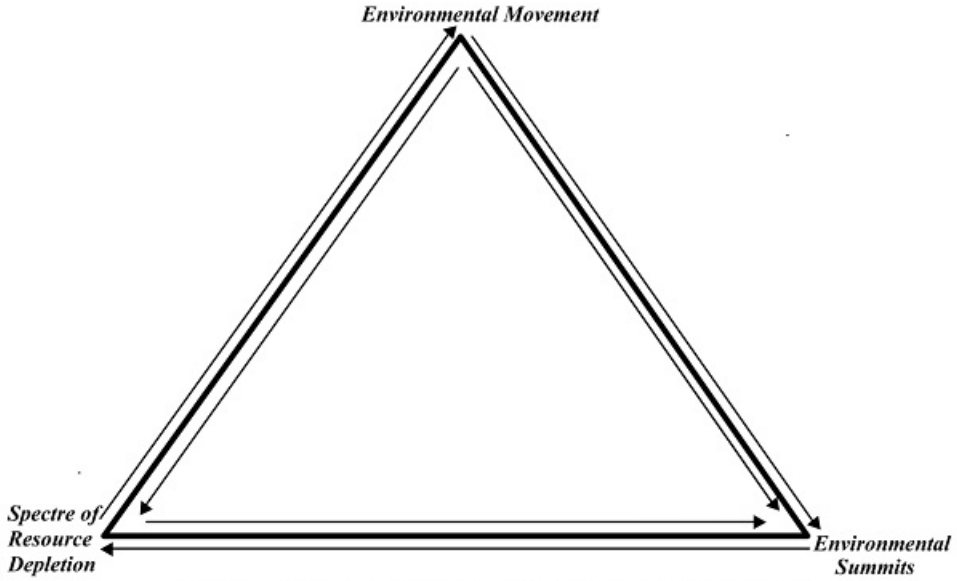

Figure 1: The Reinforcing Traingle of Environmental concern and Action.
Source:*Conceptualized by Author*

The spectre of resource depletion is the starting point of the process of environmental concern and action. In spite of the fact that the anxiety about resource depletion, indeed exhaustion, became particularly pronounced in the second half of the 20th century, its roots date back to the 18th century. A number of philosophers, notably Adam Smith, Thomas Malthus and John Stuart Mill (Jhingan, 2008; Sagnelli, 2013) addressed environmental issues. Adam Smith in his remarkable book, *The Wealth of Nations*, published in 1776, argued that humans are typically very selfish and therefore always pursue goals that will maximize their gains. Consequently, there is the tendency to overexploit natural resources. However, due to competition, the profits of the typically egoistic capitalist will fall to a state where profit will be much lower than the maximum possible, as natural resources, which are the bases of the profit, become scarcer.

The analyses by Malthus and Mill were much more explicit about resource depletion than Adam Smith. Thomas Malthus in his *An Essay on the Principle of Population*, published in 1798, analysed the relationship between population growth and natural resources availability (agricultural

resources/food). He asserted that population grows much faster than agricultural resources, such that the depletion of resources usually leads to misery, that is, hunger, disease and war.

John Mill, expounding the Stationary State Theory in his book, *Principles of Political Economy,* published in 1848, asserted that technological developments related to the Industrial Revolution and population will lead to the exploitation of natural resources to the extent that a stationary state will be attained over time. He argued that the increase in wealth consequent on natural resources exploitation is not boundless. There will, therefore, be an end to growth which marks the stationary state, that is, a condition of economic stagnation. While warning about resource depletion, he advocated proper natural resources management. He asserted:

> Nor is there much satisfaction in contemplating the world with nothing left to the spontaneous activity of nature; with every rood of land brought into cultivation, which is capable of growing food for human beings, every flowering waste in natural pasture ploughed up, all quadrupeds or birds which are not domesticated for man's use exterminated as his rivals for food, every hedgerow or superfluous tree rooted out, and scarcely a place left where a wild shrub or flower could grow without being eradicated as a weed in the name of improved agriculture. If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger but not a better or a happier population. (Quoted in Sagnelli, 2013: 35)

Significant as these early expositions on the spectre of natural resources depletion might be, later ones, particularly, the second half of the 20th century have been much more profound. Of these, Carson's (1962) *Silent Spring* and the Club of Rome's '*Limits to Growth*' (Meadows et al. 1972) are the most noteworthy, although *The Tragedy of the Commons* (Hardin, 1968) and *The Population Bomb* (Ehrlich, 1968) conceptualizations also address the same issue. *Silent Spring* sensitized the United States public about the threat pollution, especially the use of pesticides such as DDT, posed to natural resources. It covered a broad spectrum of natural resources, including birds, soil resources and aquatic life. It is largely a lamentation of the environment destructive character of humans and the implications of environmental damage. It typified the nature of environmental deterioration through the destruction of the bird population. It declared,

> Over increasingly large areas of the United States, spring now comes unheralded by the return of the birds, and the early mornings are strangely silent where once they were filled with the beauty of bird song. This sudden silencing of the song of birds, this obliteration of the colour and beauty and interest they lend to our world have come about swiftly . . . (Carson, 1962: 100)

Consequent on this environmental damage, Carson asserted that the sustainability of natural resources, the 'heredity' of humanity is threatened. She asserted thus:

> Along with the possibility of the extinction of mankind by nuclear war, the central problem of our age has therefore become the contamination of man's total environment with such substances of incredible potential for harm – substances that accumulate in the tissues of plants and animals and even penetrate the germ cells to shatter or alter the very material of heredity upon which the shape of the future depends. (Carson, 1962: 25)

Whereas, *Silent Spring* largely lamented the environmental deterioration and natural resources depletion, the Club of Rome Report (Meadows et al., 1972) analysed the issue of resource depletion and its implication for the growth of the various countries of the world. The conclusions were informed by a large computer-based model with five variables. The variables included world population, industrialization, pollution, food production and natural resources depletion. Whereas the ability of technology to increase resources was assumed to grow linearly, all other variables were expected to grow exponentially. The analysis indicated how resource depletion results in hindering growth; an 'overshoot and collapse' of the economy in some cases and a 'stabilized' world' or stabilized growth in others.

In spite of the significance of the early attempts to draw attention to the danger of natural resources depletion, it was the later ones that sensitized people enough to generate public awareness and the ultimate emergence of a sustained environmental movement. It is this apprehension on the future of natural resources, with reinforcing environmental incidents, that led to the emergence of the environmental movement. Although, the organized environmental movement emerged in the second half of the 20th century, its roots date back to the 19th century, particularly the second half of that century. Environmental groups emerged in the United Kingdom (UK) and the United States of America (USA) in the second half of the 19th century. The UK groups included the *Commons*, founded in 1865, and the

East Riding Association for the Protection of Sea Birds, founded in 1867, while those of the USA include mainly *Sierra Club*, founded in 1892 and *Audubon Society*, formed in 1898 (Wright and Boorse, 2011; Karpagam, 2012).These early organizations were not mass movements, given the limited environmental awareness.

However, with the sensitization that followed the publication of *Silent Spring* and other environmental advocacy works, there emerged public consciousness and awareness. This public concern was also aided by emergent evidence of environmental deterioration, such as the *Dust Bowl* of the 1930s in the USA, the *Great London Smog* of 1952 and the *Torrey Canyon Oil Spill* of 1967 in the UK (Wright & Boorse, 2011; Wilson, 2014). Thus, in the 1970s, government environmental agencies emerged in the USA and UK. Several far-reaching laws were also enacted to manage various aspects of the environment. It was from the United States and the UK, particularly the former, that the environmental movement diffused to first, several developed countries such as Canada and Japan (Edahiro, 2009; MacDowell, 2012), and later to developing countries. In most of the developing countries, it was the Stockholm Conference of 1972 that ignited the process.

There is no doubt that the environmental consciousness and advocacy of the environmental movement have been significant in the United Nations' policy and action on the environment. This is particularly true of the United Nations conferences/summits on the environment, (Stockholm in 1972, Rio in 1992 and Johannesburg in 2002). These summits brought to the fore the need to incorporate the environment in the conceptualization of development.

The Brundland Commission Report, a fall-out of the Stockholm Conference, was very explicit. The foreword of the report declared that,

> … the 'environment' is where we all live and 'development' is what we all do in attempting to improve our lot within that abode. The twoare inseparable. (United Nations, 1987)

The Stockholm Conference which marked a formalization of the international concern for the environment (Ikporukpo, 2015) is also significant in the development-environment coalescence; for, it was from the Brundtland Commission Report that the idea of sustainable development, which has become a basic organizing principle of development, formally emerged. The UN environmental conferences have also further heightened the anxiety about natural resource depletion. This is reflected in the proclamations, principles and declarations of the various summits. The documents that emerged from the Rio Earth Summit best illustrate this. The documents (see Gettkant, 1993) include mainly:

i. The Rio Declaration on Environment;
ii. Framework Convention on Climate Change;
iii. Convention on Biological Diversity;
iv. Statement of Principles on the Management, Conservation and Sustainable Development of All Types of Forests;
v. Agenda 21; and
vi. The Earth Charter

The Rio Declaration, Agenda 21 and The Earth Charter generally focus on the general issues of environment and development while others, as the captions suggest, pertain to specific environmental challenges. Principle 1 of the Rio Declaration indicated clearly that "human beings are at the centre of concern for sustainable development". Indeed, Principle 4 urged that "in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process…". Similarly, Agenda 21, as part of its preamble, declares "… reflects a global consensus and political commitment at the highest level on development and environmental cooperation". Principle 1 of the Earth Charter provides its focus thus: "We agree to respect, encourage, protect, and restore Earth's ecosystem to ensure biological and cultural diversity". In each of these agreements, states are urged to take appropriate action not only on the environment but also on the related issues of development and poverty.

This commitment to enthrone environmental considerations in the development process is also reflected in the decisions of the World Summit on Sustainable Development of 2002 in Johannesburg and other subsequent less significant environmental summits.

As the 5th resolution of the Johannesburg Declaration on Sustainable Development put it:

> We (the representatives of the people of the world) assume a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development – economic development, social development and environmental protection at the local, national, regional and global levels.

Conclusion

The conceptualization and measurement of development have changed over the years. Ancient philosophers conceptualized development in terms of the happiness of the people, their spirituality and other non-economic variables. However, the conceptualization of development has

since evolved, employing essentially socio-economic variables. Such measures as per capita income, indicators of well-being and, since 1990, the human development index, are currently used.

Each of these measures has its own flaws. It may be justifiably argued that the lack of an environmental dimension in the measurement of development is a major shortcoming in the indices of development. Be this as it may, there is considerable evidence that the spectre of resource depletion, which has informed the emergence of the global environmental movement, has awakened the world to the significance of the environment in development. Consequently, the United Nations has had a number of global conferences to emphasize this. Furthermore, in its global development policy, reflected in the Millennium Development Goals and the Sustainable Development Goals, the UN has emphasized the environment as an important component of development. Although, the Development Goals are not the measures of development, they point to the increasing significance of the environment.

There is no doubt that the concept of sustainable development, which formally emerged from the United Nations Commission (Brundtland) Report on the Environment, is likely to serve as an organizing principle from which an environment-sensitive index of development could emerge. The beginning by individuals on developing a human sustainable development index and related ones are an indication that an environment-sensitive development index is emerging. What is required is encouragement from, and the participation of the United Nations, such that the desirable index emerges.

Acknowledgments

This is a slightly modified version of a paper presented at the 57th Annual Conference of the Association of Nigerian Geographers at the University of Lagos, Akoka, 10-15 April, 2016. Useful comments on an earlier version by colleagues are gratefully acknowledged.

References

Barbier, E.B. and J.C. Burgess. (2017). *The Sustainable Development Goals and the Systems Approach to Sustainability.* Discussion paper No. 2017-28. Kiel Institute for the World Economy.

Baque, M.T. (2010). Integrating Sustainability into the Human Development framework. Manuscript UNDP-HDRO, New York.

Bravo, G. (2014). The Human Sustainable Development Index: New calculations and a first critical analysis. *Ecological Indicators* 37: 145-150.

Carson, R. (1962). *Silent Spring* (2000 Reprint). London: Penguin Books Ltd.

Chuluun, J. (2012). Greening Human Development Index: Accounting three pillars of sustainability. Paper presented at Conference on Planet Under Pressure, London, March 26-29.

Dahme, K., F. Hinterberger, H. Schutz and E.K. Seifert. (1998). Sustainable Human Development Index: A suggestion for greening the UN's indicator. *Wuppertal Institute for Climate, Environment and Energy Working Paper.*

Dewan, H. (2009). Redefining sustainable development to integrate sustainability and human goals. *The International Journal of Environmental, Cultural, Economic and Social Sustainability* 5(4): 147-162.

Doessel, D.P. and R. Gounder. (1994). Theory and measurement of living levels: Some empirical results for the Human Development Index. *Journal of International Development* 6: 415-435.

Edahiro, J. (2009). A brief History of the Environmental Movement in Japan. *Japan For Sustainability News Letter.*

Fankhauser, S.,Kazaglis, A.andSrivastav, S.(2017). *Green Growth Opportunities for Asia* ADB Economics Working Paper No. 508.

Freer, J. (2017). Sustainable Development Goals and Human Resources Crizis. *International Health*, 9(1): 1-2.

Ehrlich, P.R. (1968). *The Population Bomb*. Bellantine Book.

Gettkant (1993, Editor). *In the Aftermath of the Earth Summit*. Foundation Development and Peace, Bonn.

Hajer, M. et al. (2015). Beyond cockpitism: Four insights to enhance the transformative potential of the Sustainable Development Goals. *Sustainability* 7: 1651-1660.

Hardin, G. (1968). The tragedy of the commons. *Science* 162:1243-1248.

Hou, J, P.P. Walsh and J. Zhang. (2015). The dynamics of Human Development Index. *The Social Science Journal* 52: 331-347.

Ikporukpo, C.O. (2015). Public-private partnership and environmental security in the developing countries. *Ibadan Journal of the Social Sciences* 13: 165-177.

Ivanov, A. and M. Peleah. (2017). *Sustainable Human Development Index- A pragmatic proposal for monitoring sustainability within the affordable limits.* Papers Series of UNDP Regional Support Centre in Bratislava.

Jhingan, M.L. (2008). *The Economics of Development and Planning*. Delhi: Vrinda Publications.

Kararach, G. et al. (2017). Reflections on the Green Growth Index for Developing Countries: A focus of selected African countries. *Development Policy Review* 36 https://doi.org/10.1111/dpr.12265.

Karpagam, M. (2012). *Environmental Economics.* New Delhi: Sterling Publishers.

Liu, G., M.T. Brow, and M. Casazza. (2017). Enhancing the sustainability narrative through a deeper understanding of sustainable development indicators. *Sustainability* 9: 1078.

Maccari, N. (2014a). Environmental Sustainability and Human Development:A Greening of Human Development Index. http//dx doi-org/10.2139/ssrn.2426073.

Maccari, N. (2014b). Sustainable Human Development Index and the environment. *International Journal of Sustainable Human Development* 2(1): 29-34.

MacDowell, L.S. (2012). *An Environmental History of Canada.* Vancouver: University of British Columbia Press.

Meadows, D.H, Dolo Meadows, J. Randers and W.W. Behrens. (1972). *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. New York: Universe Books.

McGranahan, D. (1995). Measurement of development research at the United Nations Research Institute for Social Development. *International Social Science Journal* 143: 39-59.

McGranahan. D. et al. (1985). *Measurement and Analysis of Socio-Economic Development*. Geneva: United Nations Research Institute for Social Development.

Mori, K. and Christodoulou, A. (2012). Review of sustainability indices and indicators: Towards a new City Sustainability Index (CSI). *Environmental Impact Assessment Review*, 94-106.

Morris, M.D. (1979). *Measuring the Condition of the Worlds Poor: The Physical Quality of Life Index*. New York: Pergamon Press.

Morse, S. (2003). Greening the United Nation's Human Development Index. *Sustainable Development* 11: 1153-1163.

Noorbakhsh, F. (1998). The Human Development Index: Some technical issues and alternative indices. *Journal of International Development*. 10: 589-505.

Pereira, D.V.S. and P.C. Mota. (2016). Human Development Index based on ELECTRE TRI-C multi criteria methods: An application in the city of Recife. *Social Indicators Research* 125: 19-45.

Perez, O. (2016). The green economy paradox: A critical inquiry into sustainability indexes. *Minnesota Journal of Law, Science and Technology* 17: 153-219.

Pineda J. (2012). Sustainability and Human Development: A proposal for a sustainability adjusted HDI (SDHI). *Munich Personal RePEc Archive Paper No.39656*.https://mpra.ub.uni-muechen,de/39656.

Ramathan, B. (1999). Environment-sensitive Human Development Index*:* Issues and alternatives. *Indian Social Sciences Review* 1: 193-201.

Roman, P. and G. Thiry. (2016). The Inclusive Wealth Index: A critical appraisal. *Ecological Economics* 124: 185-192.

Sachs, I. (1995). The quantitative and the qualitative measurement of development – Its implications and limitations. *International Social Science Journal* 143: 1-10.

Sagar, A.D. and A. Najam (1998). The Human Development Index: A critical review. *Ecological Economics* 25: 249-264.

Sagnelli, M. (2013). John Stuart Mill and the Stationary State: *When Does Progress Cease*? Dissertation, Department of Economics and Finance, LUISS, Guido Carli.

Singh, V. (2014). Impact and challenges of sustainable development in global era. *Journal of Economics and Development Studies* 2(2): 327-337.

Stanton E.A. (2007). *The Human Development Index: A History. Working paper series,*Number 127, Political Economy Research Institute, University of Massachusetts.

United Nations. (1972). *Report of the United Nations Conference on the Human Environment.* New York: United Nations.

United Nations. (1987). *Report of the World Commission on Environment and Development.* New York: United Nations.

UNDP (1990). *Human Development Report, 1990*. New York: Oxford University Press.

Wackernagel, M., L. Hanscom and D. Lin. (2017). Making the Sustainable Development Goals Consistent with Sustainability, Frontiers in Energy Research, https://doi.org/10.3389/fenrg.2017.00018

Wilson, M. (2014). The British Environmental Movement: The Development of an Environmental Consciousness and Environmental Activism, 1945-1975. Doctoral Thesis, University of Northumbria.

World Bank. (2012). *Inclusive Green Growth: The pathway to sustainable development.* Washington DC: World Bank.

Wright, R.T. and D.F. Boorse (2011). *Environmental Science: Toward a Sustainable Future* (Eleventh Edition). New Delhi: PHI Learning Ltd.