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EDITORIAL
Environment, Economy and Society: Critical Conceptual Linkages in the Economics of Nature

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The concerns related to the linkages between environment, economy and society are not very new. However, they certainly got a renewed attention since the publication of the Stern report on the 'Economics of Climate Change' (Stern, 2006) and the dimensions of discussions both at the policy level as well as the common public created a substantial awareness on the issues of fragility of Nature and its complex web of inter-linkages with various walks of human life on this earth; whether cultural, ecological, social or economic (Roy & Mukherjee, 2008). The inter-dependant and interrelated strings of the web provide necessary checks and balances of inputs and outcomes that have both ecological and social implications. Unless these interconnections are studied in a comprehensive manner, it is difficult to understand the systemic behaviour of the web that is so significant for the survival of an apparently fragile perspective called 'life'. Here, by 'life' we mean an all-encompassing biological and social framework that sustains, propagates and evolves both within the existing form and creating new forms of itself. Understanding these interconnections also involve a trans-disciplinary study of economics, history, science of evolution, human behaviour and psychology as well as the issues in environment and ecological systems over time and space (Mohanty S. S., 2013).

Ecological resources have economic use and a progressive increase in the use of these resources supports development efforts as well as human comfort. However, such a progressive increase is also limited by the capacity of the earth to produce these resources (Catton, 1986; Meadows, 1972; Roy & Mukherjee, 2008). It is therefore necessary to protect and conserve the resources and limit their use for human comfort of the consuming generation alone. In theoretical discourses, there are two different and conflicting views of looking at this phenomenon. One view holds that effective pricing of the resource may put deterrence on the excessive consumption of these resources. On contrary, the other view holds that sustainable use of resources may be the key to effective resource use (Rees W. E., 1996).

As common science teaches us, most processes in the Earth involving life and elements of life that happens irrespective of any human intervention, are cyclical in nature. These cycles may take form through the process of production, both primary and secondary consumption, decomposition and recycling (Edwards, 2000). These processes transform material substances from one form to other and subsequently return them in their original form. However, there are some limiting factors to such processes; such as light, temperature, rainfall and greenhouse effects (Edwards, 2000). Sometimes these processes involve substantial time that makes them difficult to assess them through observation. For example, the movement of substances from the interior core of the Earth to its surface and back again into the interiors of the Earth takes geologically long time[1] that may be measurable in millions of years. However, a deeper understanding on these cyclical movements that involve migration of substances from surface of the Earth to its interior and back was developed only a few decades ago. It is believed that the mountains that we see today are nothing but the sediments erupted from the ocean by tectonic movement of

1 *Geologic time scale is a method of preparing a chronology of events and relationships between the agents that were responsible for those events that have occurred during the unknown history of Earth. "The first geologic time scale was proposed in 1913 by the British geologist Arthur Holmes (1890 - 1965). This was soon after the discovery of radioactivity, and using it, Holmes estimated that the Earth was about 4 billion years old - this was much greater than previously believed." For more details, please see* (Col, 1997).

landmasses. Similarly, the coal we use today, as a source of energy, is nothing but a transformed form of woods that went inside the Earth for several incidents happened million years ago (National Research Council, 1993; Roe , Stolar, & Willett, 2006).

So, in some cases it is beyond the control of human beings in their limited life as individuals, nations or even civilisations to observe many of these cycles. But their continuity and consistency helps to understand that these cyclical processes are what bring stability and dynamism to life. 'As a result of bio-spherical evolution, a stable chain of global geochemical cycles have been formed whose violation in the second half of the 20th century has made mankind face many principal problems such as an unpredicted climate change due to greenhouse effect' (Krapivin & Varotsos, 2008). Many biogeochemical processes also determine the climatic conditions on Earth both at a global level and a local level. Attempts to hinder some of these cyclical processes have their resultant implications in terms of their impact on the ecological balance we are acquainted with. In this context, the global biogeochemical cycles hold a lot of significance as it is possible to perturb those and the implications (Charlson, Orihans , Wplfe , & Butcher , 1992) of such perturbations have evident impact on the lives of the human beings irrespective of the comparative benefits or disadvantages to the existing and future human beings. Continuation of these cycles also depends on the carrying capacity of the Earth. Here, it is worthwhile to discuss a bit about the concept of 'carrying capacity', as with our discussion on the biogeochemical cycles, this is one of the concepts we shall be dealing with more often than not. In common parlance, carrying capacity of the Earth can be defined as its 'maximum persistently supportable load'[2]. 'Despite our increasing technological sophistication, humankind remains in a state of "obligate dependence" on the productivity and life support services of the ecosphere' (Rees W. E., 1990).

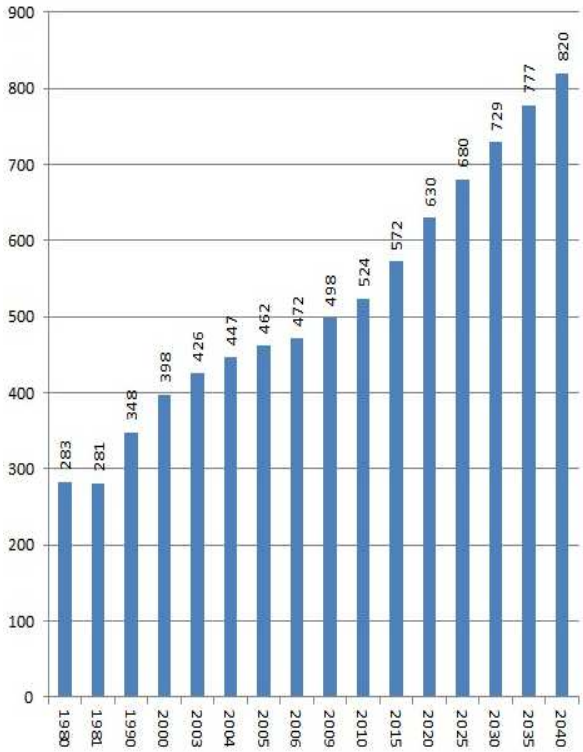
Therefore, for a balanced and sustainable life system to exist, it is necessary to understand that natural capital comprising land and other life supporting substances are fundamental for a 'continued civilised existence on Earth' (Rees W. E., 1996). But the present juncture witnesses a dilemma. At one hand, the population and needs of maintaining that population are growing at an ever increasing speed and on the other hand, the means of production comprising of total productive land and stocks of other resources are fixed in volume and deteriorating in terms of quality. 'The world is being required to accommodate not just more people, but effectively "larger" people'.

Table-1
World Primary Energy Consumption (Btu), 1980-2006 (Quadrillion (10^{15}) Btu)

Region/Country	1980	1990	2000	2005
United States	78.1	84.7	99.0	100.5
North America	91.6	100.7	118.3	121.6
Cent. & South Ame.	11.5	14.5	20.8	23.4
Europe	71.9	76.4	81.5	86.2
Eurasia	46.7	61.0	40.6	45.8
Middle East	5.8	11.2	17.3	22.7
Africa	6.8	9.5	12.0	14.5
Asia & Oceania	48.9	74.4	107.3	147.8
World Total	**283.2**	**347.7**	**397.9**	**462.1**

Note: Total primary energy consumption reported in this table includes the consumption of petroleum, dry natural gas, coal, and net hydroelectric, nuclear, and geothermal, solar, wind, and wood and waste electric power. Total primary energy consumption also includes net electricity imports (electricity imports minus electricity exports).
Source: US Energy Information Administration,

Figure-1: Growth in World Primary Energy Consumption Projections



2 For a descriptive review of carrying capacity of earth, please see (Catton, 1986).

As mentioned by Rees (1996), between 1790 and 1980, the estimated average daily energy consumption by Americans had increased almost twenty fold from 11,000 kcal to 210,000 kcal/ day (Rees, 1996). Between 1980 and 2006, the total primary energy consumption in the world has increased from 283 quadrillion Btu to 472 quadrillion Btu (British thermal unit or BTU is equivalent to 1 kilowatt hour; See Table-1). If this is approximately the speed, at which the energy consumption in the world increases, one can imagine the pressure on the energy sources and the energy supplying capacities of the Earth (given the fact that most of these sources of energy is only fixed).

Not only that the carrying capacity of the Earth in terms of its ability to sustain a growing demand of its human inhabitants is at stake, there also is a threat of change in the physical and chemical composition of the atmosphere. 'The physical and chemical composition of the atmosphere determines the transmission, absorption and reflection of incoming solar radiation and outgoing terrestrial radiation, and the resulting energy balance determines surface temperature' (Charlson, Orihans , Wplfe , & Butcher , 1992). Any change in such balance of physical and chemical composition of the atmosphere is necessarily bound to impact the atmospheric temperature on the Earth. Probably, global warming is one of the most talked about challenges facing the human race today. Economist from London School of Economics and former Chief Economist at the World bank, Lord Nicholas Stern, in his most influential political document on climate change, said in a meeting of scientists in Copenhagen on 13 March 2009 that

> 'New research done in the past two or three years had made it clear there were "severe risks" if global temperature rose by the predicted 4C to 7C by 2100. Agriculture would be destroyed and life would be impossible over much of the planet. ... A rise of 5C would be a temperature the world has not seen for 30 to 50 million years. We've been around only 100,000 years as human beings. We don't know what that's like. ..... We haven't seen 3C for a few million years, and we don't know what that looks like either.' (McCarthy, 2009)

Table-2 throws some light on the biogeochemical cycles of life and their relationship with the carrying capacity of the Earth and climate change (or global warming). With this broad understanding on life supporting cycles, their implications and the some important associated issues, let us now focus on the issue of their linkages with the broad arena of economic wellbeing.

Table-2
Classifications and Examples of Impacts of Changes in Water Cycle

Impact type	Atmosphere	Surface water	Wetlands	Soil	Ground water	Biodiversity
Physical	Increased precipitation, dry deposition	Increased surface run-off and flood, high water temperature	Changes in water balance	Soil erosion, changes in physical structure	Change in water table	Loss of habitat, benthic organism burial
Chemical	Acid or toxic rain	Pollution of Streams and lakes	Pollution	soil pollution	Dense non-aqueous phase liquid (DNAPL) Contamination	Toxic effects, loss of biodiversity
Micro-Biological	Small risk of exposure during sludge handling	Faecal pollution of beaches or drinking water	Change in the bacterial ecology	Change in the bacterial ecology due to sludge application	Polluted drinking water	Risk of biodiversity impacts (diseases)
Combined	Smog	Loss of biodiversity, impairment of beneficial uses	Loss of biodiversity, impact on biota	Landfills	Degraded aquifers	Loss of abundance, loss of biodiversity

Source: (Marsalek , et al., 2008)

In the later part of the 20th century, development of an outlook towards the basic human aspects of vulnerability and sustainability in the framework of welfare made a marriage of paradigms in natural and social sciences. An attempt to associate 'ethics' in research also made the contemporary studies truly trans-disciplinary.

Probably, the concern for environment among economists is not a very new development. Boulding's views expressed long back in 1966 clearly establishes the concern that we live in a closed system called Earth and we have to do our economic endeavours within the capacity of the Earth itself. 'In a closed system, the outputs of all parts of the system are linked to the inputs of other parts. There are no inputs from outside and no outputs to the outside; indeed, there is no outside at all.' (Boulding, 1966).

> 'We are now in the middle of a long process of transition in the nature of the image which man has of himself and his environment. Primitive men, and to a large extent also men of the early civilizations, imagined themselves to be living on a virtually illimitable plane. There was almost always somewhere beyond the known limits of human habitation, and over a very large part of the time that man has been on Earth, there has been something like a frontier. That is, there was always some place else to go when things got too difficult, either by reason of the deterioration of the natural environment or a deterioration of the social structure in places where people happened to live. The image of the frontier is probably one of the oldest images of mankind, and it is not surprising that we find it hard to get rid of.' (Boulding, 1966)

With this backdrop, let us now focus our attention to the inaugural issue of JSDC. In academic literature, there are several disciplines that attempt to study the relationship between nature and economics under different paradigms of thought. A typical way of doing so is studying the policy implications of the ways of using natural resources for augmenting consumption. Whether policy makers use the tools of pricing or controlled use; policies have differentiated implications for different population groups in social and economic stratification. A higher price may eventually result in free access by the affluent and a controlled use may eventually result in discrimination against the groups of people who are less influential; economically and socially (Bo, 1998).

The quality of environmental resources like water, air and forests affect the production process and the relations of production in a profound manner. Evidences suggest that the degradation of environment puts pressure on the livelihoods and quality of life of marginalised sections of population; especially, the women and the poorer sections of the society (Barnett, 1963; Jahan, 2008). Environmental degradation is often considered as not only a cause for economic marginalisation, to some extent pressing economic conditions and lack of economic security among the marginalised groups also forces the poor to increase the pressure on environment. As a result, we consistently face a vicious circle of deterioration of environment linked in a two-way relationship with economic and social inequality. Therefore, from a policy point of view, it is necessary that both individual and community rights on the natural resources are recognised (Varadarajan, 2014). In the absence of such recognition, the process of development will not only remain lopsided, it will also tend to be unsustainable in the longer run (John, 2014). While Vardarajan (2014) studied the relationship in the context of REDD with a special focus on tribal communities, John (2014) looked at it from the point of view of marine fishing communities whose livelihoods depend largely on sustainable use of natural resources.

The impacts of climate change have been in discussion for quite some time. It not only affects the atmosphere in terms of temperature rise, it also affects our socio-economic relations and all the webs that are tied with ecological and environmental conditions. Towards this, the paper by Sharma & Dobriyal (2014) highlights some critical linkages between climate change and the agricultural sector in the mountainous regions of Uttarakhand (Sharma & Dobriyal, 2014). Kumar (et al.) analyses the same for different crops and their productivity (Kumar, Sharma, & Ambrammal, 2014). Both the papers suggest that our wellbeing is not isolated from the balance of natural synamics that influences and is influenced by the design of development and the shaping of our consumption needs. What may be the solution then? A biased control, that ecentually leads to marginalisation and discrimination of a majority section of population! We are again in the middle of an age old debate.

Probably, we do not have an outright answer as of now. But the fact that we recognise the condition we are in makes a clear case for adjustment. Such an adjustment needs a planning and effective management of our endowments. The paper 'Database Creation and Analysis for Rational Planning' (Naithani & Patwal, 2014) is an attempt to highlight such need for planning of resources for their sustainable use.

The inaugural issue had a broader scope. Unfortunately, the issue could not cover many other aspects due to lack of sufficient number of articles.

We shall make a conscious effort to take forward the discussion in the forthcoming issues.

Works Cited

Barnett, H. a. (1963). *Scarcity and Growth. The Economics of Natural Resource Availability.* . Baltimore: Johns Hopkins University Press.

Bo, G. (1998). Scope and limits of the market mechanism in environmental management. *Ecological Economics 24* , 259–274.

Boulding, K. (1966). The Economics of the Coming Spaceship Earth. In J. H., *Environmental Quality in a Growing Economy.* Baltimore.: Johns Hopkins University Press.

Catton, W. (1986). Carrying capacity and the limits to freedom. *Paper prepared for Social Ecology Session 1, Xl World Congress of Sociology. 18 August, 1986* . New Delhi, India.

Charlson, R. J., Orihans , G. H., Wplfe , G. V., & Butcher , S. S. (1992). Human Modification of Global Biogeochemical Cycles. In S. S. Butcher, *Global Biogeochemical Cycles.* London: Academic Press Limited.

Col, J. (1997). *Geologic Time Scale*. Retrieved from Enchanted Learning: http://www.enchantedlearning.com/subjects/Geologictime.html

Edwards, G. I. (2000). *Biology The Easy Way.* New York: Barron's Educational Series Inc.

Jahan, M. (2008). The Impact Of Environmental Degradation on Women In Bangladesh : An Overview. *Asian Affairs*, Vol. 30, No. 2 : 5-15, April-June.

John, J. (2014). Technological Changes in Marine Fishing and Livelihood Threats of Fisher Folk. *Journal of Studies in Dynamics and Change, 1*(1), 23-28.

Krapivin , V. F., & Varotsos, C. A. (2008). *Biogeochemical Cycles in Globalization and Sustainable Development.* Chichester, UK: Praxis Publishing Ltd.

Kumar, A., Sharma, P., & Ambrammal, S. K. (2014). Climatic Effects on Food Grain Productivity in India: A Crop Wise Analysis. *Journal of Studies in Dynamics and Change, 1*(1), 38-48.

Marsalek , J., Jimenez-Cisneros , B., Karamouz , M., Malmquist , P.-A., Goldenfum , J., & Chocat, B. (2008). *Urban water cycle processes and interactions.* The United Nations Educational Scientific and Cultural organisation (UNESCO).

McCarthy, M. (2009, March 13). *Lord Stern on global warming: It's even worse than I thought*. Retrieved from The Independent: http://www.independent.co.uk/environment/climate-change/lord-stern-on-global-warming-its-even-worse-than-i-thought-1643957.html

Meadows, D. M. (1972). *The Limits to Growth.* New York: Universe Publishers.

Mohanty, S. (2014, May). How a Downward Sloping Demand Curve Failed Environmental Protection Efforts? *Journal of Studies in Dynamics and Change, 1*(1), 30-41.

Mohanty, S. S. (2013). Economy, Ecology and Wellbeing: Some Inter Connections in the Context of Marine Fishing Economy of Orissa. *Unpublished Doctoral Thesis*. New Delhi: Thesis Submitted to Jawaharlal Nehru University.

Naithani, S., & Patwal, P. S. (2014). Data-Base Creation and Analysis for Rational Planning. *Journal of Studies in Dynamics and Change, 1*(1), 29-37.

National Research Council. (1993). *Solid-Earth Sciences And Society: A Critical Assessment.* Committee on Status and Research Objectives in the Solid-Earth Sciences (U.S).

Rees, W. E. (1990). Sustainable development and the biosphere. Teilhard Studies Number 23. American Teilhard Association for the Study of Man, or: The Ecology of Sustainable Development. . *The Ecologist 20(1), 18-23*.

Rees, W. E. (1996). Revisiting Carrying Capacity: Area-Based Indicators of Sustainability. *Population and Environment: A Journal of Interdisciplinary Studies*.

Roe , G. H., Stolar, D. B., & Willett, S. D. (2006). Response of a Steady State Critical Wedge Orogen to Changes in Climate and Tectonic Forcing. *The Geological Society of America, Special Paper 39, Penrose Conference Series, USA.*, 227-229.

Roy, S. B., & Mukherjee, R. a. (2008). *Conceptual Framework for Criteria and Indicator for Assessment of Sustainable Development : An Illustration on Joint Forest Management.* Indian Institute of Bio-Social Research and Development.

Sharma, P., & Dobriyal, P. (2014). Climate Change and Agricultural Sector in Uttarakhand. *Journal of Studies in Dynamics and Change, 1*(1), 6-14.

Stern, N. (2006). *Stern Review on The Economics of Climate Change (pre-publication edition).* London.: HM Treasury.

Varadarajan, D. B. (2014). REDD, Climate Change and the Rights of Tribals in India. *Journal of Studies in Dynamics and Change, 1*(1), 15-22.