India's employment guarantee programme, societal metabolism and sustainability: A discussion[1]

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Abstract

The world we live in today is marked by crises that include financial, social and ecological that occurs within the earth as a closed system. In the ongoing preparatory discussions in the run-up to the United Nations Conference on Sustainable Development (UNCSD), also popularly known as Rio+20, developing countries where a large population relies on natural resources for their livelihoods recognize the importance of the social pillar of sustainability along with the environment and economic pillars. This paper will discuss societal metabolism with a specific objective of examining Mahatma Gandhi National Rural Employment Guarantee Scheme (MG-NREGS) as a large-scale intervention in rural India. MG-NREGS is chosen on the ground of its significance in socio-economic metabolism with perhaps around thirty-five percent of employment seeking rural households participating in this programme. The paper argues that MG-NREGS has placed itself as a significant mechanism with a potential to enhance fund elements including labour and natural capital. The paper finally proposes that while information is being enriched and Laplace's demons are being chased, discussion support tools based on bio-economics can contribute to deliberative and democratic processes while simultaneously playing an important role in transdisciplinary research missions.

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The duty of academia is to help attenuate this struggle and not to delude others with ideas beyond the power of human science. This is responsibility with humility-the bioethics of Van Rensselaer Potter (1971). (Nicholas Georgescu-Roegen 1977)

With the ongoing preparatory discussions in the run-up to the United Nations Conference on Sustainable Development (UNCSD) (also popularly called Rio+20)[2] – developing countries[3] largely seem to accept the fact that 'Green Economy'[4] would also need to pay an emphasis on the social pillar of sustainable development including the attainment of the Millennium Development Goals (MDGs). UNEP (2011) recognizes that the concept of a "green economy" does not replace sustainable development and that there is a growing understanding that achieving sustainability rests almost entirely on getting the economy[5] right. However such an assumption does not consider the complexity of economy and society in developing countries where sustainability cannot be linked to economy alone. In developing countries a large fraction of the population that relies on natural resources for their livelihoods are still not integrated with economic development – for example small and marginal farmers[6] in India.

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[2] Apart from the Rio+20 conference in June 2012, when the policy, civil society and knowledge community will gather to get delight from *panem et circenses* – it is worthwhile to note that in the same year the Kyoto Protocol completes its first commitment period.

[3] For example see statements by the G-77 & China; http://www.g77.org/statement/getstatement.php?id=110602

[4] The United Nations Conference on Sustainable Development (UNCSD) themes of Green Economy in context of Sustainable Development and Poverty Eradication (GESDPE) and Institutional Framework for Sustainable Development (IFSD). Some other specific discourses include Green Economy by UNEP, Green Jobs by ILO, and Green Growth by UN-ESCAP.

[5] In context of green economy, a conceptual clarity on 'growth economy' and 'steady state economy' is yet to be seen. The financial crisis has also demonstrated the bursting of financial bubbles inflated beyond physical limits. Also see Daly (2011).

[6] In India, 80% of farmers and 40% of land under agriculture belongs to the category of small and marginal farmers (NCEUS 2008)

Georgescu-Roegen (1980) proposed that humanity's true problem is not economic but bio-economic wherein economic processes lead into entropic flows of energy and matter; from a systems viewpoint, economy can be viewed as an open system that is embedded in a closed system namely planet earth (Georgescu-Roegen 1971; Martinez-Alier and Guha 1998). Recent ecological studies can also be seen in agreement with Nicholas Georgescu-Roegen proposal of entropic flows of human activities in planet earth as a closed system. For example, Rockstrom et al (2009) define planetary boundaries within which essential earth-system processes occur that transgressing one or more planetary boundaries may trigger non-linear, abrupt environmental change within continental to planetary-scale systems[7]. Other scientific assessments including the Intergovernmental Panel on Climate Change (IPCC) and the Millennium Ecosystem Assessments also list the impact of anthropogenic activities for the planet earth. These major scientific assessments agree with the possibility of non-linear changes and call for changes in policies, institutions and practices. Further socio-economic impacts will be a function of social–ecological states of affected societies; for example see the concept of adaptive capacity in the IPCC.

In the above context, bio-economic approaches become a relevant tool for examining the interactions between human societies and the environment. Bioeconomic approaches work with biophysical and socioeconomic variables in an integrated way to link the metabolism of societies with the potential constraints of the natural environment. Bio-economics includes the concepts of societal metabolism or socio-economic metabolism that analyze exchange processes of energy and matter flows between human societies and their natural environment. Integrated approaches could also perhaps help in consensus building among movements guided by the three different sustainability agendas as proposed by Martinez-Alier (2011)[8] – nature conservation, eco-efficiency and ecological justice.

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[7]Rockstrom et al (2009) also estimate that humanity has already transgressed three planetary boundaries – climate change, rate of biodiversity loss, and changes to the global nitrogen cycle.

[8] Seminar notes at the Nehru Memorial Library; and The Georgescu-Roegen Learning Forum talk at The Energy and Resources Institute, New Delhi.

Some notable initiatives linked to social metabolism include the Environmental Justice Organizations, Liabilities and Trade (E-JOLT)[9] and the Multi-Scale Integrated Assessment of Societal and Ecosystem Metabolism (MuSIASEM)[10]; some scientific thinking in these projects have been inspired by the work of Nicholas Georgescu-Roegen. Another well known (perhaps practical) approach is the System of Environmental-Economic Accounts (SEEA)[11] proposed by the United Nations Statistics Division. Bioeconomic approaches have also been discussed in interdisciplinary niches such as industrial ecology that has explored the possibility of inclusion of non-energetic variables (capital, labour, and environmental cost) (Ruth 1998; Haberl 2001; Daniels 2002; Sciubba 2004).

With the intention of examining some relevant issues in India as a developing country, this paper will seek to discuss social metabolism with a specific objective of examining Mahatma Gandhi National Rural Employment Guarantee Scheme (MG-NREGS) as a large-scale intervention in rural India. MG-NREGS is chosen on the ground of its significance in socio-economic metabolism with perhaps around thirty-five percent[12] of employment seeking rural households participating in this programme. Moreover natural resources related public works that could lead to the enhancement of "rural livelihood resource"[13] links MG-NREGS to sustainable development. Two key discussions will follow. The first discussion will be on MG-NREGS as a societal unit and its implication for sustainable development. Here some of the relevant debates ahead of the forthcoming United Nations Conference on Sustainable

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[9] The Environmental Justice Organizations, Liabilities and Trade is an FP7 project supported by the European Comission that will run from 2011-2014. The project supports the work of Environmental Justice Organizations, uniting scientists, activist organizations, think-tanks, policy-makers from the fields of environmental law, environmental health, political ecology, ecological economics, to talk about issues related to Ecological Distribution; see http://www.ejolt.org/project/

[10] UniversitatAutònoma de Barcelona research group on Integrated Assessment; see http://www.societalmetabolism.org/index.html

[11] It is worthwhile to note that the SEEA in mentions "material accounting" and not "matter" accounting.

[12] Calculated using NREGS households provided with employment in the financial year 2009-2010 (nrega.nic.in) and total rural households seeking work (Census 2001).

[13] MoRD (2008). NREGA Operational Guidelines, 3rd Edition. New Delhi: Ministry of Rural Development

Development (UNCSD) or Rio+20 will be discussed taking the case of India's employment guarantee programme. The second discussion will be on the role of such large scale interventions for sustainable development; this section will be directed more towards solutions.

Section 1) MG-NREGS: a case of societal metabolism

The National Rural Employment Guarantee Scheme in India was launched in 2006 with a basic objective to enhance livelihood security of the households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work (NREGA 2005). The National Rural Employment Guarantee Act also explicitly mentions of creation of durable assets for strengthening "livelihood resource base" of the rural poor (NREGA 2005)[14]. An important link to sustainability can be derived from the stated goal of the programme that mentions that MG-NREGS could act as a "growth engine for sustainable development of an agricultural economy" (MoRD 2008).

More than five years have passed since the implementation of the employment guarantee scheme. MG-NREGS has been lauded as a programme that follows an integrated sustainable development approach by not only the national government but also in the UN Secretary General's report ahead of the UNCSD (GoI 2010a; GoI 2011b; UN 2010a A/CONF.216/PC/2; UN 2010b A/CONF.216/7)[15]. Paragraph 67 of the UN Secretary General's report mentions the following:

> *Beyond delivering direct economic benefits to resident communities (e.g. non-timber forest products and land productivity), being labour-intensive, sustainable land management and forest conservation and regeneration also have the potential to deliver income benefits for the poor. This has been the case with India's ambitious national program of natural asset restoration under the*

[14]Schedule 1, para 2 (NREGA, 2005).

[15] See UN Secretary General's Statements and Member State Statements (India); uncsd2012.org

> *National Rural Employment Guarantee Act (NREGA). Still, an evaluation of NREGA suggests that the implementation challenges are not different from those facing other local development projects, including limited local participation, administrative complexity, and misaligned incentives across stakeholders, all potentially limiting long-term asset-building.26 Thus, the outcomes of such programs will critically depend on design and implementation details as well as surrounding institutions. (Para 67, UN 2010b A/CONF.216/7)*

MG-NREGS have significant implications in the policy arena due to the scale of involved resources, participation and people directly and indirectly impacted. For example, if MG-NREGS were considered as a societal unit, it could perhaps be the fourth largest in the world followed by China, India and the United States (see Table 1). With such a magnitude and implications for development, programmes like MG-NREGS are significant with regard to all the three pillars of sustainability—society, environment and economy—by being a link between livelihood security and long-term enhancement of rural natural resources that could facilitate rise in agricultural productivity and increase in income earning of rural farmers.

Table 1 Population of countries and MG-NREGS

Country	Population	% of world population
China	1338300000	19.5
India	1210,193422	17.7
United States	309712000	4.5
MG-NREGS as a societal unit[16]	**264359105**	**3.9**
Indonesia	232516771	3.4
Brazil	194946470	2.8

Source: data.worldbank.org; Census 2011; MG-NREGS data from nrega.nic.in

To facilitate a discussion around the themes of GESDPE and IFSD, we start with Georgescu-Roegen's flow fund approach. Georgescu-Roegen proposed a flow-fund model[17] that can be said to be analytically delimited; the distinction between flow elements and fund elements is as follows[18]:

> *Fund coordinates (people, Ricardian land and capital) are agents that enter and exit the process, transforming input flows into output flows on the time scale of the representation. The funds determine the size of the system in which the events occur.*
>
> *Flow coordinates are elements that enter but do not exit the production process on the time scale of the representation; or, conversely, elements that exit without having entered the process (e.g., a new product). Flow coordinates include matter and energy in situ, controlled matter and energy, and dissipated matter and energy. The flow can be varied depending on the accessibility of a stock and on the capability of processing it, in the relative conversion.*

[16]This is calculated as follows Households provided employment in 2010-2011 under NREGS = 52871821; Population impacted directly and indirectly assuming five members per household = 264359105

[17]The idea of 'ecosystem services' has gained much prominence in the debates surrounding sustainability. The idea of 'services' has been credited to Nicholas Georgescu-Roegen's 'fund elements'in ecological economics. For some recent discourses in ecological economics see – Baumgärtner and Quaas (2009); Gerber et al (2009); Farley et al (2010); Farley and Constanza (2010); Gómez-Baggethun et al (2010); Norgaard (2010).

[18] http://www.societalmetabolism.org/musiasem.html

We will now discuss MG-NREGS in the context of flow-fund elements to establish that labour and natural capital are two fund elements that could be linked to MG-NREGS. The scope of the discussion of this paper will remain limited to 'labour' and 'natural capital' as fund elements in the context of the paper.

Public works under NREGS are related to natural resources and include flood control and protection, water conservation and harvesting, drought proofing, micro-irrigation, provision of irrigation facility, and renovation of traditional water bodies, rural connectivity and other land development activities as approved by the Ministry of Rural Development (MoRD). Table 2 shows the public works under MG-NREGS for the financial year 2010-2011.

Table 2 Public works under MG-NREGS for the financial year 2010-2011

	Number	% of total
Rural Connectivity	273730	24
Flood Control	74529	7
Water Conservation And Water Harvesting	199321	18
Drought Proofing	76137	7
Micro Irrigation	47508	4
Provision of Irrigation facility to Land development	139850	12
Renovation of Traditional Water Bodies	72232	6
Land development	189310	17
Any Other Activity Approved by MoRD	50814	5
Rajiv Gandhi Seva Kendra	1014	0
Total	1124445	100

Source: Ministry of Rural Development, nrega.nic.in

Shah (2007) says that the non-inflationary nature of the expenditure under NREGS could be further justified if 'multiplier-accelerator' benefits from public works could lead to a spur in agricultural growth. This aspect is of further relevance to agriculture due to the amendment by MoRD[19] that has enlarged the scope of NREGS works to small and marginal farmers. Several

[19]According to the amendment to the Schedule I, Para 1 (iv) of the National Rural Employment Guarantee Act. Due to this amendment, provision of irrigation facility, horticulture plantation and land development facilities could be availed by small and marginal farmers (as defined by the Agriculture Debt Waiver and Debt Relief Scheme). However, the small and marginal farmers would be only given

studies demonstrate the positive impact of MG-NREGS to the environment and the agriculture sector (CSE 2008; CDS 2009; Tiwari et al 2011). In context of a bio-economy, MG-NREGS by enhancing natural resource base can help in building natural capital[20].

Global trends reveal that economic development has entailed a systematic and dramatic reduction of the percentage of agricultural labour who provide endosomatic energy[21] inputs for the society (Giampietro and Mayumi 2009: 70). Thus developed countries have no more than five percent of its labour in the agricultural sector (see Figure 1 for percentage of labour force and GDP in agriculture versus GDP per capita). In context of India, agriculture sector is of significance especially when approximately 58.4% of the nation's population is dependent on agriculture for their livelihoods (GoI 2010b).

An important distinction has been made by Georgescu-Roegen, who differentiated between agricultural economics, and agrarian economics or peasant economics, the latter could be termed as the 'economics of the vulnerable' – for example the small and marginal farming communities in case of India.[22] This distinction was largely ignored in India as till the 5th Five-Year-Plan it was assumed that the 'trickle-down' effect due to higher economic returns from the public sector manufacturing enterprises would end up in benefiting the most vulnerable— which did not happen. Georgescu-Roegen also recognized that at the local level, peasant communities follow institutional patterns that innovate in a manner that follows the most elementary principle of economic development, which is that no factor of production should remain unnecessarily idle (Georgescu-Roegen 1960:37).

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later preference, which is after Schedules Castes and Scheduled Tribes. Source: http://nrega.nic.in/SMF-amen.pdf.

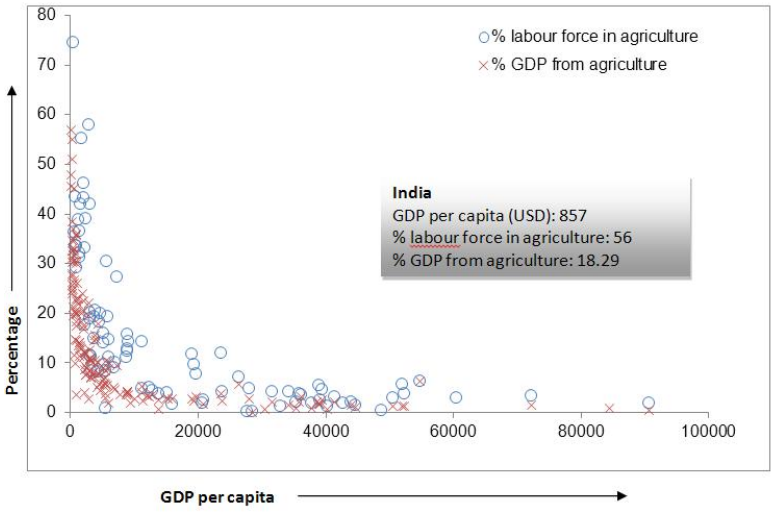
[20] Whereas the author does not know how Georgescu-Roegen would have reacted to the term, 'natural capital', it might be safe to assume that in the primary sector (agriculture, fishery and non-timber forest produce) – natural resources could be seen as a form of capital.

[21]Endosomatic energy is generated through the metabolic transformation of food energy into muscle energy in the human body.

[22] Also see discussion in Gowdy and Mesner (1998)

In India, 80% of farmers and 40% of land under agriculture belongs to the category of small and marginal farmers (NCEUS 2008). Also rural women play a large role in farm labour is significant– about 55-66% (NCW 2005). Studies on MG-NREGS find that the programme has been successful in targeting the most vulnerable (see Johnson [2009], Ravi and Engler [2009]). Georgescu-Roegen's fund elements recognizes labour as an agent responsible for transformation, in the case of MG-NREGS, labour could be linked to MG-NREGS beneficiary. It is important to note that the beneficiaries of MG-NREGS would constitute a population that have a low social metabolism characterized by simple (even subsistence) living, small production consumption systems and self-sufficiency; detail studies would still need to be conducted in this regard.

Figure 1 Percentage of labor force and GDP in agriculture versus GDP per capita



Basic data corresponds to 2010 from data.worldbank.org

Some macro-indicators pertaining to labour, a fund element, in a society asdiscussed in the multi-scale integrated analysis of societal and ecosystem metabolism (MuSIASEM) by Giampietro and Mayumi (2009: 73) at the level of whole society can be seen in Table 3.

In the following, instead of per capita accounting that can miss some important differences between countries, an assessment of human activity in terms of 'per 1000 people' is done to bring out important factors relevant to the social and demographic structures of the society.

Table 3 Allocation of human activity (per 1000 population in hours per year) in 2010

Country Name	**China**	**India**	**Italy**	**United States**	**MG-NREGS as a societal unit**
Total human activity (THA) in hours/year	8760000	8760000	8760000	8760000	8760000
Paid work sector (HA_{PW})	1839552	1437696	1021280	1352000	1011850
Household sector (HA_{HH})	6920448	7322304	7738720	7408000	7748149
Ratio of paid work/ total human activity (HA_{PW} / THA)	1/5	1/6	1/9	1/6	1/9
THA = 1000 x 8760 hours/year, and THA = HA_{PW} + HA_{HH}					

Calculated using data from data.worldbank.org, nrega.nic.in, International Labour Organization (ILO)

As illustrated in Table 3, China supplied the most amount of paid work, which is 1 out of every 5 hours indicating an active working population. Similarly for India 1 out of every 6 hours was paid. The paid work sector (HA_{PW}) can be said to be the productive sector, while the Household sector (HA_{HH}) can be said to be the consumptive sector. In the context of rural India, MG-NREGS contributed 1 out of every 9 hours; this does not include unaccounted activities like farming and agricultural labour that the MG-NREGS beneficiary might have engaged in.

From the above discussion it can be said that MG-NREGS has implications for two key fund elements in India's bio-economy—labour and natural capital. Given the design of the programme, MG-NREGS does not currently have a role in the flow elements that could include management of certain goods including food products, energy and water. We now will discuss role of such large-scale interventions in addressing sustainability issues in the next section.

Section 2) MG-NREGS and role in sustainable development

At the 1972 Stockholm Conference on Human Environment, Mrs Indira Gandhi has summed[23] up developing country perspective, "the environmental problems of developing countries are not the side-effects of excessive industrialization but reflect the inadequacy of development. The rich countries may look upon development as the cause of environmental destruction, but to us it is one of the primary means of improving the environment for living, or providing food, water, sanitation and shelter, of making the deserts green and the mountains habitable"[24].

The National Environment Policy (NEP) of 2006 states as its dominant theme that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation, than from degradation of resources. With regard to developing countries and the green economy discourses, Dasgupta (2011) reminded of the linkages between development and environmental protection. These viewpoints are important as natural resources still remains an integral part of development activities in India including agriculture.

Nicholas Georgescu-Roegen had recommended that for economies with a large agrarian population, the best economic policy could be the enhancement of individual farm holdings and promotion of cottage industries (Georgescu-Roegen 1960). Chopra (1992), recommended an ecosystems based approach implying a fundamental change in the 'socio-legal system' so as to extend natural resource management over privately owned, commonly owned and state-owned if they are to contribute to agricultural development. These of course need to be supplemented by decentralized system of decision making and participatory resource management. In this regard MG-NREGS already has a system of social audits that has the potential as well as faces challenges to facilitate a bottoms-up approach to decision-making. Thus strengthening

[23] This nuance speech of her has many a times been misinterpreted.

[24] Address to the plenary session of the UN Conference on the Human Environment, Stockholm, June 14, 1972.

institutions and democratic decision-making with the help of discussion support tools is another potential and role of these large scale interventions.

Chapter 36 of Agenda 21 also recognizes that formal education, public awareness and training should be recognized as a basis of action by which human beings and societies can reach their fullest potential. While ILO (2011) recommends skilled workers, qualified employers and informed labour institutions that are required to make the transition to 'green economy' feasible— there is not a particular elaboration as to how this might happen in the agriculture sector. In this regard, programmes like MG-NREGS and other large-scale interventions in developing countries could play an important role with adequate involvement of civil society and other major groups. There also still remains a need to realize the true potential of such poverty eradication intervention where more than 50 million households in MG-NREGS, de facto, contribute towards addressing local as well as global environment issues. For this along with the support of national governments, international agencies (the United Nations in particular) are essential[25] to realize the potential of such large scale programmes.

In this context of labour and demographics in India, in 2020, about half of the country's population would be in age group of 15 to 44 years, and a bulk of which could be concentrated in rural areas. Percentage of male and female population in age group of 15-44 years in 2020 is projected to be 24.52% and 23.11% respectively[26], which could mean nearly half of the nation's population. Thus if demographic dividend were to be realized and aspirations of the new generations were to be met then development policy interventions would need to enhance labour in rural India. Thus at the national level, focus should continue towards programmes like the National Rural Livelihood Mission (NRLM) that aim at promoting self-employment and skill building. The Union Budget allocation for 2011-2012 for MG-NREGS and NRLM is 40000

[25] Also see Raina (2011)

[26]These projections have been compiled from Adlakha (1997). Moreover K. Sundaram and Suresh Tendulkar estimated in 2006 an increase of 8-9 million job-seeking persons annually over the next decade in India, which could further increase if proportion of women in workforce follows the same pattern as Latin American and East Asian countries (in World Bank, 2010)

crores and 2621.60 crores respectively—if programmes like NRLM need to be strengthened then capacity of institutions implementing these programmes could be further strengthened. The 115 pilot districts selected for convergence include schemes under the Ministry of Water Resources (MoWR), Indian Council for Agricultural Research (ICAR) and Ministry of Environment and Forests, but none include schemes specific to skill building under the labour ministry[27].

With respect to flow elements (including fundamental resources such as food, water and energy), MG-NREGS has the potential to promote both equity and efficiency; this could be done along with other governmental and non-governmental initiatives like the Self-Help-Groups (SHG) which could help manage food grain banks to avoid wastage. Some success stories in this context include involvement of networks like the Kudumbashree in Kerala. Another example that could be relevant is the minimization of consumption of environmentally damaging goods like fertilizers and diesel through direct cash transfers to targeted groups (also see GoI [2011]).

Concluding discussion

It may be fair enough to say that MG-NREGS at least has the 'potential' to reach the rural population and also benefit agriculture through public works in water and irrigation works. Thus MG-NREGS has placed itself as a mechanism to significantly enhance the fund elements that is labour and natural capital. Having access to the basic services of water and sanitation, health, education, income support and enhancement of natural resources are requisites for poverty eradication in a country like India.

Access to basic services is also a fundamental right, enshrined in international agreements such as the Universal Declaration of Human Rights. These when discussed in the context of fund elements can be seen as a way to enhance human development. MG-NREGS along with convergence with other programmes has a potential to impact both fund and flow elements of rural ecosystems. An approach towards this requires continuation of interrelating development

[27] Also see Kedia, Kapur and Goswami (2011)

issues becomes important pertaining to large-scale government programmes like NREGS to evolve simultaneously and converge with other related rural agricultural interventions including National Rural Livelihood Mission, National Food Security Mission, Rashtriya Krishi Vikas Yojana, Rajiv Gandhi Watershed Development Programme, National Rural Health Mission, Sarva Siksha Abhiyaan, state organic programmes, public distribution system and cash transfers schemes.

In the context of policy discourses around sustainable development, it is also important to consider the debates of Institutional Framework for Sustainable Development (IFSD) and Green Economy for Sustainable Development and Poverty Eradication (GESDPE), which should consider improving mechanisms that are relevant to enhancing fund elements (including labour and natural resources) and also should not be delinked to the much tangible flow elements (also see Malghan [2011]) that has been deliberated on in the sectoral approach in green economy. The discussion thus flags that larger policy discourses around the United Nations Conference for Sustainable Development (UNCSD) should give equal emphasis to human development and equity.

This paper calls out to revive Georgescu-Roegen's bioeconomics for analytical considerations by academics and research community at large. In context of large-scale interventions MG-NREGS, a detailed analysis on the flow and fund elements could help in assessing manifestations and areas of improvement of such in order to inform development policy and practice. Georgescu-Roegen's flow-fund approach is relevant to both the Rio+20 themes – Green Economy; and Institutional Framework for Sustainable Development. A detailed analysis would help in understanding the potentials, manifestations as well as areas of improvement. Such approaches are beset with challenges due to the complexity of issues that are involved requiring unity of language and methods so as to understand the interrelations between humans and the ecosystem (also see Noronha [2004]). Moreover data sources can be irreducible and incommensurable in their nature. Such approaches can hence be considered in line with the - normal science as defined by Funtowicz and Ravetz, in the sense that it is thought to serve as a discussion support tool. While information is being enriched and Laplace's demons are being

chased, discussion support tools based on bio-economics can contribute to deliberative and democratic processes while simultaneously playing an important role in transdisciplinary research missions.

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