

Nilanjan Ghosh · Pranab Mukhopadhyay
Amita Shah · Manoj Panda *Editors*

Nature, Economy and Society

Understanding the Linkages

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Chapter 1

Ecological Economics: At the Interface of Nature, Economy, and Society

Nilanjan Ghosh, Pranab Mukhopadhyay, Amita Shah and Manoj Panda

1.1 Introduction

The evolution of ecological economics as a discipline has a chequered history, more aptly classified by cognitive dissonance, bitter debates, and scholastic antagonism. The conflict essentially emerges from the very scope of the discipline, which, according to detractors of the discipline, is still amorphous and, according to practitioners and believers of the discipline, is evolving and growing. It is a fact that till now although broad contours of the discipline have been drawn, any significant research in the disciplines of economics, ecology, sociology, geography, social anthropology to describe any ecological phenomenon affecting human, social, and economic endeavours pushes the frontiers of the discipline or brings about a separate dimension to its scope.

According to certain definitions, ecological economics is referred to as both a transdisciplinary and interdisciplinary field of academic research addressing the critical problems at the interface of nature, economy, and society. In the process of doing so, ecological economics emerges as a discipline which acknowledges the interdependence and co-evolution of human societies and the natural ecosystems over time and space. However, there is another body of thought that defines ecological economics as an attempt to expand economic theory to integrate the earth's

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natural systems, human values, health and well-being. This definition brings about a sense that ecological economics is either a subdiscipline of economics or a discipline that makes use of economic techniques to analyse problems (and offer solutions) at the socioecological interface of human endeavour.

There exists another body of thought (that is sometimes used synonymously with ecological economics) labelled as environmental economics, with which it overlaps in certain ways. Environmental economics is recognised in the mainstream economic analysis as being firmly placed within the neoclassical marginalist framework and differs in that sense from the scope and methodological foundations from ecological economics.

While ecological economics saw the economy as embedded in, and supported by, natural systems, environmental economics treats nature as a pool of resources that act as inputs in economic activity. Ecological economics goes beyond this not only by integrating models from ecology and economics but also by looking at the interplay of various other socioecological and institutional factors that governed an economic system.

In a recently published article in the *Breakthrough Journal*, Sagoff (2012) postulates, "... Ecological economics aimed to be revolutionary, but it is now ignored by the sciences it had hoped to transform. Both ecology and economics have changed, but not because of the rise of ecological economics." This position, however, is not true as a large component of Sagoff's arguments are based on the contention that ecological economics has attempted to place a price tag on the ecosystem services and functions. This position would not be true if we refer to the larger literature in environmental economics and even less so if we refer to ecological economics, which is further removed from issues of values and market prices.

Sagoff (2012) was right in pointing out the lack of advances made in this domain, as also the inherent reductionism that dominated the policy and academic spheres, because of the adherence to these measures. What Sagoff missed out in his argument is the advancement of ecological economics in the other direction that is independent of cost-benefit analysis of ecosystem services and functions.

The Indian Society for Ecological Economics (INSEE), so far, has not typecast any specific definition of ecological economics. Neither has it discarded the neoclassical framework for the sake of defining the domain of ecological economics. Rather, if one goes through the various conference papers, and the publications of the Society, the reader would recognise the broad framework INSEE has adopted. Ecological economics has been acknowledged by the Society to subsume the neoclassical framework of environmental economics, apart from considering the broader body of the literature emerging at the interface of economics, ecological sciences, hydrology, geology, geography, sociology, political science, anthropology, etc.

1.2 Ecological Economics: The Pathway to Interdisciplinarity

All the resources used by humans are embedded in complex social-ecological systems (SESs; Ostrom 2009). It is the SESs that define the critical interface of nature, economy, and society. The complexity of this interface arises from the limited (often non-existent) human knowledge about the ecosystems and their role in the social welfare function, thereby leading to inappropriate societal response to the problems of natural resource management. Human society, as such, therefore remains embedded in the SESs, gets affected by the stimuli created by them, and releases forces that again affect the SESs. This brings to the fore the critical linkage between ecosystems and livelihoods on the one hand and the ecosystem and sustainability on the other (Chopra et al. 2005).

Just as there have been attempts to analyse these relations from a systems approach, there have also been attempts to understand this dynamics from an institutional perspective. Just as social anthropological perspectives on natural resource management have gained prominence so has neoclassical economics through its offshoot of environmental economics, which tries to provide solutions to the natural resource allocation problem (Dasgupta 2001).

Yet, there is widespread recognition that such problems are too complex to be understood through the lens of a single discipline. The problems have multidimensional characteristics. These are not only intrinsic to the sub-systems of society, ecology and economy but also affected by external sources. Some of these problems also emerge from the interactive dynamics of the three. Therefore, there is a clear need to create the pathways towards interdisciplinarity in analysing the problems at the interface.

It is with this idea that INSEE conceived of its Sixth Biennial Conference's theme as "Nature, Economy, and Society: Understanding the Linkages", which was held in Centre for Economic and Social Studies (CESS), Hyderabad, 20–22 October, 2011. The objective of the conference was to deliberate on the various disciplinary approaches to analyse the interface of the three pillars of human civilisation (nature, economy, and society), and how best to understand this interaction. This volume is an outcome of selected papers presented in the conference.

1.3 About the Volume

The volume brings together a wide variety of methodological approaches to expand the frontiers of ecological economics and to find solutions to natural resource management. It begins with a theoretical overview of the dilemmas that researchers in ecological economics face—conceiving of values and fair exchange not just between human agents but also with nature.

Chopra in Chap. 2 poses the dilemma that philosophers have often raised about social exchange—how do we create equal exchange in a world of unequal relations?

Exchange in economics would translate into a simple problem of prices, but in the real world not all commodity relations lie in the domain of prices. Some commodities are non-traded, not just because there is no market for them but also because there are no prices that bring all transactors onto a common platform.

When the market is unable to mediate an exchange, then agents resort to alternative ways of acquisition: They either possess the resource by means outside the legal framework and in violation of it or acquire the resource by using state power from within the legal system—but both ways are probably violative of a system of individual or community rights not adequately or explicitly recognised by our legal framework. This then results in conflict between those who have traditionally regarded these as their natural inheritance and those who wish to acquire it to cater to a larger market mechanism for profits.

Martinez-Alier, Temper and Demaria (Chap. 3) document the transition in social metabolism in India and the conflicts over resources. Their aim is to critically evaluate the material flows in the economic system. The normal mechanism for looking at material flows is by way of trade valued in monetary terms. However, from the perspective of “social metabolism” (which examines the exchange of energy and materials with nature) it is the physical measure that needs to be examined since prices need not indicate a true value of exchange.

The authors find a growing correspondence between higher social metabolism (extraction of resources) and growing conflict in many parts of India—especially the resource-rich states which display a high interstate export of resources but also are burdened with high levels of poverty. The question that the authors leave us with is whether once can find a way to a steady state that is not ecologically damaging?

Chopra approaches these questions in the context of governance and the use of science in negotiating policy dilemmas while being cognisant that scientific knowledge itself is a disputed domain. In such a situation, she suggests a three-pronged movement forward—creation of an equal-rights-based framework for the global commons, transition to green energy sources, and a more comprehensive measure of wellbeing than GDP that better incorporates notions of sustainability and the nature–human relation.

Adjusting the current measures of aggregate income by incorporating incomes from resources (which are currently not included in the national accounting framework) requires a careful estimation and valuation of such flows. Murty and Panda (Chap. 4) examine the status of green accounting in India. They provide an overview of experiences in other countries that have generated green accounts and give a pathway for India to establish the United Nations’ (UN)integrated System of Environmental-Economic Accounting (SEEA) as part of its national income accounting system.

In an effort in this direction Mali, Singh, Kotwal, and Omprakash (Chap. 5) examine the contribution of forests to local incomes in three forest divisions of Kerala. By critically examining the existing forest resource accounting (FRA) system in Kerala, they find that there is a 100 % increment in accounted income from forestry a comprehensive accounting system is adopted. This has important implications for policy-making as well as resource management practices. They further emphasise

the need for green accounting, which would give perspective to the contribution of nature to the economy and society, especially regarding the provision of livelihood choices to the poor.

The process of accounting is just another way of recognising the importance of resources that we use for our well-being. It is a mechanism that helps us in more efficient management of natural resources. Sometimes, even the physical accounting of resources helps us in understanding the extent of losses we incur due to poor management. Krishna Raj (Chap. 6) presents the case of urban water supply in a rapidly growing city in India—Bengaluru. He finds that both the quantity and the quality of water supply are a matter of concern. The utility provider runs at a large economic loss, and by the author's estimates there is as much as 48 % difference between water supply and metered consumption. With the rapidly declining water table due to over-exploitation of ground water sources in the city and its neighbouring areas, there is need for urgent intervention. The question Raj poses is what would be a good mechanism to sustainably manage urban water supply in Bengaluru.

Management of water is an equally large concern in rural areas especially since large proportions of our agrarian systems are rain fed. Nandan Nawn (Chap. 7) attempts to find the use value of rainwater in rain-fed zones of agriculture in a framework where irrigation water is valuable, but the infrastructure to store rainwater is limited. Nawn argues that one could use a cost-benefit analysis to see the economic feasibility of creating rainwater storage systems. He proposes that the rural employment guarantee schemes could be used to financially support the labour costs of creating rainwater-harvesting systems. However, planning and execution of such works remain low in his study area of West Bengal. The issue that remains is how to create this infrastructure: Should this be a community initiative or should it be by the state?

1.3.1 Market Incentives Versus Command and Control

There has been a long-standing debate over the institutional efficiency of the market and the state in managing natural resources. This question was put to the test in understanding the solid waste management practices by firms in Sri Lanka. Udugama and Jayasinghe-Mudalige (Chap. 8) find that firms were less influenced by market-based incentives, while regulatory instruments were more effective. They, however, suggest that regulation need not necessarily be undertaken by a third party. The evolution of co-regulation framework could achieve similar outcomes.

However, command and control policies have known problems. One of these is their inability to adapt policies to local situations. Bhagya Laxmi, Adusumilli, and Rao (Chap. 9) find that in the case of livestock policies, dependence on imported breeds to the exclusion of local breeds is ill-advised, especially in ecologically fragile semi-arid regions. They recommend that livestock policies also need to take cognisance of improving feed and fodder for increased buffalo production.

The command and control in agriculture is best displayed in the large-scale roll out of the green revolution technology in India in the 1970s. The policy push for adoption of this technology helped India increase its food production tremendously. However, the adoption of this technology was possible only in irrigated areas, which left out a major part of India's agricultural sector—the rain-fed zones. The soil condition in green revolution areas is now deteriorating to an extent where yields are falling. Therefore, there is an urgent need to understand soil management practices. Suresh Reddy (Chap. 10) emphasises that financial support to farmers wanting to use traditional inputs and technology would help farmers practice sustainable agriculture best suited for these regions. Further, Reddy argues that government policies should not undermine practices that have evolved over generations.

Policy interventions in the forestry sector also have had adverse impacts. The management of forest resources in India have de jure been vested with the state for a long time since the first pre-independence Forest Act of 1865. However, the forest dwelling and dependent populations have compelled the state to re-examine its strategy of exclusion of such communities in the management strategies. A series of amendments in the forest policy have emerged – a radical law giving land rights through the Forest Rights Act (2006), and the extension of the local government institutions (*panchayats*) to scheduled areas. This would enable them to function as self-governing institutions under the Panchayat Extensions to Scheduled Areas Act (PESA 1996). Sarap and Sarangi (Chap. 11) undertake a critical evaluation of the evolution of forest governance institutions and their shortfalls in Odisha, which has large populations and areas that fall under forest governance.

Forests yield multiple benefits from provisioning and regulating services to recreational and aesthetic services. One variety of forests—mangroves—is of critical importance in coastal zones but has been under threat, leading to policy interventions to restore it. P. K. Viswanathan (Chap. 12) examines one such experiment in Gujarat with a detailed household survey on tangible and non-tangible benefits derived by the beneficiary population. He finds that state intervention has to be more creative in removing impediments from full-benefit accrual from mangrove restoration.

1.3.2 Trade and Environmental Management

In an era of globalisation, economies are open not only to flow of goods and services but also to “bads”—pollution for example. It has long been argued that trade is an engine of growth, but it is increasingly being scrutinised for its impacts on the environment. Mishra (Chap. 13) addresses this issue in the context of developing countries. Using a panel dataset for 15 developing countries for the period 1990–2005, Mishra finds that CO₂ emissions have risen as developing countries opened their trade in this time period.

The trade and environment linkage has also been examined by Demaria (Chap. 14) in the context of pollution dumping in developing countries and its

impact on local populations. His study focuses on the ship-breaking industry in Alang. 80% of global goods are carried by sealines and therefore a critical component of world trade. Unlike CO₂ that has much wider global impacts, the ship-breaking industry has much more localised impact—both are consequences of increased world trade.

Liberal trade regimes increase imports and this probably brings pressure on developing countries to increase their exports, and very often this occurs in primary products. Such efforts may impose adverse consequences in developing countries in unexpected ways. Fisheries have been an important export sector in India, and shrimp farming along the coast has been a popular economic activity. However, intensive shrimp farming techniques are known to have adverse effects on agriculture. Umamaheswari, Nasurudeen, Hattab, and Ravirajan (Chap. 15) examine the trade-off between paddy and prawn farming in Tamil Nadu. They find that paddy farms closer to the shrimp farms exhibited significantly lower returns due to salinisation of the soil.

Can the market mechanism play a role in pollution management? Dasgputa, van der Salm, and Roy (Chap. 16) examine the European Union's (EU) emission trading mechanism and its applicability in India with the Perform-Achieve-Trade (PAT) mechanism. Europe has been a forerunner in experimenting with emission trading schemes that caps pollution and yet awards cleaner performers by giving them tradable permits. The authors identify critical issues in the PAT mechanism design that Indian policymakers need to bear in mind, learning from the experiences of its implementation in the EU. These policies allow market mechanism to reach optimal solutions.

1.3.3 Social Capital

The nature–economy–society linkage cannot be complete without discussing the role of social capital. It is often argued that social capital is a catalyst in economic development. However, its presence could on occasions be a hindrance as suggested by Chowdhury (Chap. 17). She attempts to explain the persistence of Jhum cultivation in the North East in a game-theoretic framework.

The presence of a strong social network, which ties in local families to Jhum cultivation, restrains allocation of labour in any other activity and therefore leaves it immune to other economic forces. In a situation where there is no pressure on forests, this would not be a reason for concern. But given the anthropogenic pressure on forests, and the shortening cycles of Jhum cultivation, the continuance of Jhum poses serious forest management issues. Chowdhury argues that a reduced level of social capital would help wean families away from Jhum cultivation and thereby reduce pressure on forests.

Chandrasekaran and Swamy (Chap. 18) introduce a new angle to natural resource management (NRM) in a rural economy that is impacted by an invasive species.

They examine both the ecological and the economic impact of *Prosopis juliflora* (an invasive species) on biodiversity and its adoption by farmers as an economical profitable alternative to paddy. While this creeper has deleterious effects on grazing and medicinal herbs, it compensates farmers by being a profitable input for charcoal. This once again highlights the tension of balancing between biodiversity and livelihood objectives.

1.4 Conclusion

This volume is an attempt to understand the linkages between ecosystem, economy, and the social forces. It attempts to establish that causality between them is not unidirectional or linear. While economic forces affect the ecosystem, the ecosystem also creates stimuli to affect economic variables and social institutions. Sometimes, institutions emerge endogenously to manage anthropogenic pressures. History provides sufficient evidence (and climate change is an imminent reminder) of the impacts of indiscriminate anthropogenic interventions in the bio-geo-chemical cycle. Often, impacts on nature are not perceptible in the short run and, therefore economic agents get a false sense of security about their actions. Policymakers in developed countries have used this knowledge to take corrective action but this policy sensitivity is yet to emerge significantly in the developing world. It is hoped that this volume would be a step in that direction.

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Chapter 2

Nature, Economy and Society: Of Values, Valuation and Policy-Making in an Unequal World

Kanchan Chopra

In this chapter, some aspects of the linkages between nature, economy and society (the theme of the conference) are examined at different levels. The first is a conceptual one, which begins from and goes beyond stressing the urgent need for dealing with the complexity of nature and society interactions from diverse disciplinary perspectives: I intend to postulate that whichever discipline we treat as the starting point of the analysis the ethical undertones and assumptions drive the analysis in directions which acquire meaning in terms of the quality and legitimacy of decision-making. In other words, methodologies acquire meaning only when interfaced with or interpreted in the context of value systems. Continuing in the same strain, I intend to examine briefly the emerging literature on valuation of ecosystems and ecosystem services, both as a methodology and as a tool for providing policy direction.

The last issue I propose to touch on deals with the major environmental challenges that face us humans today and for alleviating which specific policy directions at international and national levels are needed. The choices which face India and South Asia, as development and environment both need to be addressed aptly, span a large number of these challenges. The question is: What directions does the current level or state of knowledge give to help us to emerge with meaningful policy directions?

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2.1 Of Methodology and Values: Towards Deliberative Processes as Links

Methodologies in all disciplines are driven by underlying values and assumptions. Take for instance economics and ecology. Both share at least one common methodological approach, that of modelling. And, underlying all models are assumptions; in economics with respect to human behaviour and in ecology with respect to community evolution and/or stability. Economics proceeds to create macro perspectives, and ecology moves towards case-by-case recommendations. In both disciplines, the models used can be classified in several ways. A division of models into descriptive, normative and decision theoretic is useful for our purposes.

Descriptive models attempt to define (and perhaps explain) the behaviour of some aspects of the environment or the economy. “Normative models” go further. They prescribe how things should be. The prime examples of normative mathematical models in ecology are formal decision models used in conservation management. In economics, the standard optimizing model that counsels an agent to maximize utility/expected utility is the representative example of a normative mathematical model.

Both descriptive and normative models by themselves can only provide images of reality and its driving forces. Most of the time, they select certain aspects of nature or economy and formalize the relationships. Normative or optimizing models can succeed in providing guidelines for environmental decision-making, but only by using ethical principles to provide an objective function. These principles could be: maximizing welfare, protecting the vulnerable, reducing inequality or adopting a right-based approach to livelihoods not to mention several others. The guidance provided for policy depends on which of these principles are taken on board by the decision-makers and stakeholders who they give recognition to. And since constituent stakeholders may have different preferences on the issue at hand, multiple solutions, non-commensurability and consensus become significant in reaching solutions. It is then correct to conclude that methodologies encompassing decision-theoretic tools and deliberative approaches are of the essence in most practical policy-making situations.

In other words, as soon as we concede that multiple criteria for arriving at decision rules exist and are to be taken into account, the emphasis in methodology has to shift to models of consensus building¹. Such models which examine real-life processes of decision-making need to augment those rooted in a Platonic ideal in which technical elites take decisions through the so-called dispassionate use of scientific knowledge. For example, in any conservation related decision-making, regarding biodiversity as an end in itself raises a variety of ethical questions about the ultimate source of the value it has. Alternatively, a purely technical approach may limit itself

¹ For a discussion of these and related issues, see Colyvan et al. (2009).

to balancing the value of biodiversity as an embodiment of one stream of goods and services against that of other streams.

The point that rational action may better be captured through models of procedural rather than substantive rationality has of course been made earlier by, among others, Simon (1972). Developing this line of argument further, deliberative monetary valuation suggests that revealed or stated preference methods be followed up with group deliberation to arrive at values which a society holds, cherishes and intends to promote. Such approaches are also based on the presumption that a deliberative process does not only elicit preferences but forms them too. While case studies using deliberative processes have been carried out at different ecosystem levels, the methods of deliberative analysis have been received with apprehension. Some claim that they are time consuming and vague. However, even if we are never able to fully model the change in preferences and the subsequent effect on decision-making which a deliberative process brings about, we will enable decisions which take into account most stakeholders' interest. In other words, to provide institutions for preference changing behaviour to emerge is an important contribution of the process. And as Norgaard (2008) has maintained, "the lines between *scientific* ways of knowing and *democratic* ways of learning and choosing continue to blur as scientists acknowledge the role of judgement in science".

Deliberative processes also, at times, illustrate the rich nature of decision-making outcomes when institutional arrangements at different levels interact and learn from each other. Witness the positive outcomes when formal legal arrangements relating to natural resources learn from and amalgamate critical lessons from community management regimes. On the contrary, when schemes such as those for payments for ecosystem services (PES) are introduced without understanding that their success involves a reconfiguration of the roles of the community and the state, they are bound to be unsuccessful. In other words, deliberation between the state's hierarchical structures, markets and community management is of critical significance in setting up systems of rights and payments for ecosystem services.²

2.2 Of Valuation Within and Outside the Market: Will Valuation of Resources or of Ecosystem Services Help?

Economists have maintained, and rightly so, that a large number of environmental problems often arise because of the absence of market value for some kinds of resources and services. An outcome of this line of argument has been a whole literature on valuation, including a focus on methodologies of nonmarket valuation. This literature has strengthened our understanding of how natural resources contribute to livelihoods of the poor and to the wellbeing of all sections of society. It has also provided refinements in methodology by giving rise to contingent valuation, hedonic

² See Vatn (2010) for details.

pricing and several other techniques. In the particular case of extensions of valuation methods to linked ecological and economic systems, in particular regulating services of ecosystems, details of ecological interactions have also sometimes been taken into account. Most of these valuation exercises fall back on an interpretation or extension of the notion of prices in the market, directly or indirectly as the anchor of the methodology.

In interpreting and applying these exercises however, it is of critical importance to remember that markets as institutions are defined within a set of assumptions relating to the knowledge, information and economic power that participants in them command. Information and power asymmetry corrode the efficient functioning of markets. More importantly, where these are asymmetrically distributed, valuation cannot take us far in terms of guidance for policy. Further, overriding considerations of societal norms and values play an important role in decisions on conservation. I wish to draw attention here to Geoffrey Heal's statement "*Valuation is neither necessary nor sufficient for conservation. We conserve much that we do not value and do not conserve much that we value*" (in monetary/economic terms).

Biological and ecological findings have often supported the conservation of areas also without any resort to valuation. Arthur Cooper argued that there were numerous examples of the way that ecology has directed environmental ethics and policy. The best illustration, he said, has been the role that findings about estuarine ecosystems have played in stimulating government programs for coastal zone management. Ecological findings were directly responsible for environmental decisions to limit the use of dichlorodiphenyltrichloroethane (DDT), to promote multispecies forests, and to publicize the problem of acid rain (Cooper 1982). In other words, ecological "facts" provide, at least, part of the basis for inferring what ethical, political and practical "values" ought to characterize environmental decision-making.

Ecological drivers by themselves are perhaps likely to be more compelling in developed countries where the drive for growth leading to perceived poverty eradication is not as paramount as in regions such as South Asia. Further, there exist other kinds of conflicts in developing countries too. The unequal distribution of income and power together with low levels of living has resulted in a focus on conflicts over resources and their appropriation by privileged sections. This is in particular emphasized by a large part of the literature on political and social ecology and for resources such as land and water. It is claimed that aggregative valuation often ignore distributional impacts and does not give due significance to the underlying relationship between ecosystems and multiple stakeholders.³ Consequently, in many cases, monetization aimed at resolving a conflict in the use of ecosystem services may, in fact, lead to the perpetuation of the conflict.⁴

³ For attempts to extend the literature on valuation to take into account stakeholder perspectives see Lele (2009 and 2013).

⁴ See, for example Martinez-Alier (2002).

Take another example, that of land; with increasing urbanization, the tensions of the interface between value of land for different uses and by different stakeholders are rapidly increasing. In the face of a huge demand from urban use, driven by purchasing power, retaining land for agricultural or ecological use is not going to be easy. The underlying asymmetries referred to above, result in very high capacity to pay resulting in high demand driven prices.⁵ *While valuation of land for different ecosystem services may provide additional inputs, an understanding that there exist “inviolable areas”, whether for ecological or distributional justice reasons will have to be a critical component of policy.* Once again, we are led to conclude that although ecologists and economists in the past have frequently employed a notion of “scientific or economic rationality”, current environmental problem solving requires them also to use “ethical rationality”.

2.3 Of Emergent Issues Facing the Region and the World: And the Way Ahead

During the last century, an array of natural resource scarcity related issues have often led to emergent situations in parts of the world. At the same time, it is true that not all resources are equally threatened or scarce, whether from the perspective of nation states or of the world at large. There are large areas where knowledge and ingenuity are likely to alleviate resource shortages. In particular, we know that in some cases the more nuanced the technology for exploration, the more the reserves that become known. Also, substitutes are used when resources become scarce and there often occurs substantial reduction in resources used per unit of output. Such developments have led to more production per unit of a resource and alleviated scarcity. On the other hand, certain other kinds of resources and the ecosystems within which they are found may be nearing critical thresholds of change and sometimes moving towards extinction due to overuse.

Keeping in view all such possibilities, scientists have identified nine areas which are in need of a limit on human resource use, what they term as areas in which human use is straining boundaries at the planetary level (Rockstorm et al. 2009). Climate change and biodiversity loss are high on the list. Global consumption of

⁵ Driven by India’s high rates of urbanization, demand for land for urban construction and infrastructure continues to push the price of land to very high levels. Undoubtedly, these are higher than values yielded by “traditional” valuation of ecosystem services. Tensions from differing land values associated with different uses and different stakeholders are rapidly increasing. For instance, supply side ecosystem services-based approach to valuation yielded estimates of forest and deemed forest land between ₹ 7 to 9 lakhs per hectare for dense natural forests (See Chopra et al. (2006) Supreme Court Expert Committee 2007, Chopra and Dasgupta 2008). This was much higher than the compensatory afforestation payment of ₹ 50,000 per hectare paid for conversion. But demand-driven urban land use could garner a price of up to ₹ 90 lakhs per hectare or more. A similar situation exists for land diverted to mining. The drivers in this case may be high export prices.

fresh water, air pollution and changes in land use also figure. Closer home, at the national and regional levels too we witness many conflicts related to these areas to deal with.

Simultaneously, pressures from increased demands for natural resources continue. Countries such as India and China are undergoing major economic and social transformations. As a consequence, many boundaries between sectors (e.g. between the rural and the urban) are getting blurred. Changes in use of natural resources are driven by market determined drivers operating across sectors and ecosystemic scales. This change takes place so fast that we do not have the time to sit back to examine or rectify the dynamics of the processes which are simultaneously changing ecosystems, depriving us of important services and thereby increasing the costs to the economic and social systems of providing them. We destroy floodplains, (the natural sponges for excess water) through indiscriminate urban construction and then set up elaborate systems for flood relief. We create pollution and then clean-up expenditure needs to be incurred. Such quick fix solutions are often harmful. In the longer run, we also need to understand how to increase and sustain the capability of people, economies and nature to deal with fast changes in economic systems.

Are governments showing any long run leadership in this direction? A few policy pronouncements of the Indian government such as the Forest Rights Act (2006) and the recognition of places of ecological value as “no-go” areas or more recently “inviolable areas” incorporate some of the movement towards such leadership roles. Newspaper headlines sometimes (refreshingly) contain allusions to principles of environmental economics, for example in the case of the oil spill off the west coast, “*polluter pays principle to be used*”. Or to lack of enforcement of Acts as in the case of the Vedanta mining project, the Saxena committee report pointed out “*violations of the Forest Rights Act, the Forest Conservation Act and the Environment Protection Act (in the case of the associated aluminium refinery)*”. Further, “*the government ordered the closure of the Loharinag Palla hydro electric project*” and “*the Minister for Power and for the Environment and Forests jointly decided this*”. Also, lately, an incentive for conservation approach seems to have found favour as when we hear that “*green states to get a bonus*”.

More often than not, however, the emergence of trade-offs between environmental and development concerns has witnessed short-run expediency gaining the upper hand in policy-making. The moves to enable mining in certain forest areas and to proceed with hydel power development in pristine ecologically sensitive areas are examples of such policy directions.

In other words, while a certain amount of dynamism in the acceptance of these developments by policy-makers has been observed, an understanding of the underlying long-run linkages between human wellbeing and wise use of nature and its reflection in the design of policy seems a far cry at the present moment of time.

There is in fact, a focus on “the two cultures” when referring, in particular to the environment development debate.⁶

This preponderance of “two cultures” is true at all levels of governance; local, national and global. At the same time, learning in social science from policy implementation is itself the moving force behind the progress of some aspects of social science. All this happens in a somewhat piecemeal fashion with very little of an analytical framework to define it. The discourse is not a part of regular policy-making.

What is the way ahead in such situations? The term “green growth” has been used extensively of late, in particular in the context of the Rio + 20 conference. The United Nations Environment Programme (UNEP) defines a green economy as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive” (UNEP 2011). The “green economy” approach is nothing but a reiteration of the viewpoint that since developing countries are at the point where massive investments are being undertaken, they can choose to invest in ecofriendly technologies. Such a choice will reduce the human footprint on areas in which human use is straining at planetary boundaries. In other words, these countries have the opportunity of “tunnelling through” the Environmental Kuznets curve, which postulates that the initial stages of development have seen a deterioration in environmental quality, with the relationship being reversed later.

However, investments in pathways to a green economy may not be easy to come by. They will require the framing of a *compelling and committed global interest*, in investing at least 1–2 % of global gross domestic product (GDP) in greening the economy⁷ in order to shift development and unleash public and private capital flows onto a *low-carbon resource-efficient path*. They may also require specifics in policies such as: reducing or eliminating environmentally harmful or perverse subsidies (e.g. at the global level, around US\$ 235 billion per year way back in 1992); creating markets for ecosystem goods and services; providing market-based incentives, opportunities and enabling institutions through appropriate regulatory framework. There is every possibility that potential investors under the banner of corporate social responsibility may find the best options to undertake green investments only in such countries,

- a. Which are very high in carbon and suffering from “brown economic growth”.
- b. Which have all the essential infrastructures such as transport, communication and markets for investment.
- c. Where the returns or turnover on investments are higher. One is not sure if developing countries like India, Nepal or Brazil will become their first candidates.⁸

⁶ See Jairam Ramesh (2010), for a succinct exposition of the state of the debate and the policy-makers’ consequent dilemma.

⁷ The Stern review (2006) places the figure at 1 %.

⁸ See Kadekodi (2012) for details.

In other words, while technologies that use renewable resources efficiently and achieve distributive justice exist at least in some sectors, the challenges presented by their widespread dissemination seem formidable. They may require large one time investments with low returns in the short run. Alternatively, if indeed constraints to unabashed maximization of short run growth rates are presented by natural capital, they may need to be tackled using the “reduce, reuse and recycle” route. In other words, developed and developing countries may be confronted with the question of whether some sections of the population are indeed consuming too much.

This significant underlying question leads us to the second component of the way ahead. We need to monitor macroeconomic parameters in all countries to inform us on the nature of production and consumption in economies. Are the present levels of consumption and production “sustainable”? This question can be answered only if a few macroeconomic parameters relating to the environment and natural resources are monitored in conjunction with standard macroeconomic indicators covered in the System of National Accounts (SNA). The SNA focuses policy attention on parameters such as Gross Domestic Product (GDP), Gross Fixed Capital Formation (GFCF) and others. Yearly and indeed quarterly assessments of the state of the economy are based on these parameters. A similar statistical accounting of critical components of natural capital needs to be undertaken to ensure that year to year economic growth is not eating into the natural capital of the country. In recent times, developments in environmental economic accounting have taken place both at the international and national levels (See, for example, Government of India CSO (2013)) which attempt at providing a common basic framework for such an exercise. Most of this work is an attempt at using the theoretical developments in “sustainable income” to develop the outlines of a System of Environmental Economic Accounting (SEEA). The United Nations presented SEEA (2003) as a possible starting point. This has been revised subsequently and now provides the following two tier framework:

- a. SEEA central framework which starts from the perspective of the economy and its economic units.
- b. A SEEA experimental ecosystem accounting which links ecosystems to economic and other activity. This approach understands and states upfront that placing ecosystems in an accounting context requires the disciplines of ecology, ecological economics and statistics to come together and think of measurement and policy issues in new ways. It does not give precise instructions on how to compile ecosystem accounts but it represents a strong and clear movement towards a convergence across the disciplines on many core aspects.

“Genuine savings” is one of the most documented macro parameters, both internationally and in India. Estimates for different countries from the World Bank of genuine savings indicate that for India, the number is 24.64 % in 2008 and 24.56 %

in 2009 as against net savings of 29.68 and 26.60 % (of the GDP).⁹ These estimates indicate that green GDP is lower than conventional GDP by 8.22 % in 2008 and by 5.1 % in 2009.¹⁰ Though these estimates are partial, they provide the way forward with respect to the Central SEEA framework mentioned above.

Two approaches to assist in policy-making which accounts for nature–economy relations have been outlined above: Taking “the green economy” route to resource conservation and monitoring macro parameters for “sustainable development”. But this is not enough. These policy changes need to be nested in a larger blueprint for a longer term development future, both for the planet and for the country. In such a blueprint, the following components could provide a good starting point:

1. The first is a framework of equal rights and entitlements for all humans to share the global commons resources, in particular atmospheric space. Either legally binding (for developed nations) or voluntary commitments (for e.g. the BRIC nations) to limit the use of that space by limiting greenhouse gas (GHG) emissions is then the next step. This will lead us on to consumption and production patterns that are feasible. We may be able to respond to the question of whether we are consuming too much. Or who is?
2. The second component of the blueprint is the transition to a green source of energy. In other words, the new technology has to be based on renewable sources and away from fossil fuels. A global as well as national agenda for moving in that direction can then be drawn up.
3. To understand the significance of the first two components of the blueprint, a new economic indicator of wellbeing which complements macro measures such as GDP is urgently needed. We need to measure relative prosperity of nations in a more inclusive and carbon liable manner. Then, alone can the implication of a relentless pursuit of individual material prosperity be made transparent. Though steps are being taken to estimate “green” GDP, real savings and related measures, in some countries it has to be globally mandated.

To enable nations to move towards the vision inherent in the blueprint mentioned above, new and reformed institutions are needed for facilitating a change in human behaviour, to increase local appreciation of shared global concerns and to correct collective action failures that cause global-scale problems. However, this change in behaviour assumes acceptance of a common international norm. Such norms are more likely to emerge with decreases in inequalities in distribution of income and power and more interactions across the globe which facilitate emergence of international institutions. (Walker et al. in Science 2009). This brings us back, full circle, to the issue of distributional justice and shared norms. In conclusion, it is true that shared values with regard to the linkages between economy, society and nature need to inform policy-making at both macro and project levels. It is these that we need to move towards, as we simultaneously strengthen the information and data bases that enable us to do so.

⁹ Corresponding gross national savings are 38.17 and 35.20 % for 2008 and 2009, respectively. See World Bank, World Development Indicators (2010 and 2011).

¹⁰ See Murty and Panda (2012).

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Chapter 3

Social Metabolism and Environmental Conflicts in India

Joan Martinez-Alier, Leah Temper and Federico Demaria

3.1 The Standard of Living

The industrial economy works in practice by shifting costs to poor people, to future generations, and to other species. Could an industrial economy work otherwise? K. W. Kapp wrote in 1950 that capitalism is an economy of unpaid costs, but the socio-environmental impacts are not due to capitalism as such, they would not be different in another system of industrial economy if there was one. The impacts occur at various temporal and geographical scales. They arise because of the increased social metabolism, and this article shows which are its main trends in India.

Sometimes, environmental liabilities appear in the public scene when there are sudden accidents as in Bhopal in 1984 or the Gulf of Mexico (with British Petroleum) in 2010 or Fukushima in 2011 and so many other cases. But here we shall look more at the smooth trends than at the (not very surprising) surprises.

Shrivastava's and Kothari's brilliant book of 2012, *Churning the Earth: the making of global India* is written in the spirit of Karl Polanyi's *Great Transformation* drawing also on the critique of uniform development brought forward since the

This chapter has been in the making for some time, with parts of it being presented at two INSEE conferences and also at the Nehru Memorial Museum and Library in New Delhi in December 2012. It contributes to the EJOLT project.

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