SUSTAINABLE DEVELOPMENT

THE PROBLEM OF ECONOMIC INEQUALITY AND A CRUDE LOOK AT THE WHOLE

Introduction

Sustainable development is a complex concept. It draws on a number of branches of knowledge beginning with the physical and biological sciences, to ethics and political economy, to economic policy formulations and the challenge of forecasting the future. In all these distinct aspects that converge to a knotty problem, the concept of economic inequality is fundamental in defining the core issue of sustainable development. Arguably, the most widely used definition is the one that is attributed to the Bruntland Commission Report titled Our Common Future (1987) that described sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is obvious from this definition that sustainable development has to do with inter-generational equality. The current generation may not 'eat up' productive resources that leaves the future generations unable to meet their needs and live like we do. The current generation then has a decision problem to use resources so that everyone living now may have a decent life while leaving enough resources for the future. Would inequality in the current generation have any bearing on this? It would. The very rich may have a tendency to waste resources since they have enough and more to spare. On the other hand, the very poor may have to depend on natural resources like land and forests and rivers where an over use of these resources could despoil Nature and leave a less productive environment for future generations. Since nature is shared by all living beings and the natural environment is commonly owned, any sustainable solution has to be necessarily global. It is impossible to have sustainable development in one part of the world and a terrible despoliation of the environment in another. This is yet another form of equality that sustainability entails.

In both cases extreme wealth and extreme poverty reduce resources left for posterity. Less economic inequality would save more resources and contribute to a more sustainable future. It can also be easily appreciated that inequality is to be found at two interrelated levels – at the level of individuals within a nation and in inequality across nations. This is not to claim that the problem is only about inequality. There are issues in defining 'needs' of a particular generation. Similarly there could be differences in understanding what exactly needs to be sustained; incomes or wealth, or utilities or nature itself which provides us with food and about everything else that make up the world. However, tackling inequality becomes the core of any strategy of development that attempts to address issues of sustaining economic development over time and across generations.

In this paper we first take a look at how sustainable development can be defined in an operational form to aid decision making. Next, we take a look at using those definitions and indicate how dynamic decision making may be quite difficult and how our attitude to inequality comes into play. Finally, we discuss what kinds of changes are necessary to make human society sustainable not only for people inhabiting the planet, but also for all living beings.

Sustainable Development as Non-decreasing Comprehensive Wealth

What is to be sustained such that inter-generational well-being is non-decreasing? One widely accepted approach is to ensure that society's stock of wealth is non-diminishing (see Dasgupta 2001) so that at least an equivalent stream of income can be generated from it. Different kinds of capital are supposed to be substitutable - one kind of machine or material could be substituted for another. Similarly, knowledge could be replaced too, say from using oil to drive a car to nuclear energy powered electric batteries. Ecologists and scientists would be quick to point out that not all capital is substitutable as economists quite often presuppose (see Neumeyer 2013). One can hardly think of substituting fresh water, or clean air, or the fertility of the top soil, or the cyanobacteria that form the base of oceanic food webs. Hence, one may think of a set of substitutable economic and social capital (machinery and equipment, institutions, rules of functioning) and a distinct non-substitutable set of natural capital like bio-diversity. Sustainable development would imply a non-decreasing stock of both the sets of capital.

Mere bequests of a stock of non-decreasing capital, including natural capital is clearly not enough. All these forms of capital could be maintained while having a terribly unequal distribution of power and wealth where political or corporate elites might keep wealth to themselves holding down a dominated and powerless populace. In such a case of absence of freedom the provision of basic needs for everybody of the current generation would be unattained. Hence the best way to view sustainability from an anthropocentric perspective is to ensure a non-diminishing measure of human well-being that includes not only income and wealth, but also basic capabilities such as health, education, political voice, and access to natural capital, and the freedom to choose one's lifestyle from an expanding set of functionings.

Sustainable development is distinguished from the usual considerations of economic development in terms of ensuring that development is not just a one-off change in the state of affairs of a society. Rather, it has to be seen as a *process* that can be replicated over time and space for future generations of people who will inhabit the earth (see Sinha (2012) Sinha (2013) Martini (2012)). Indeed, sustainable development is essentially a serious critique of thinking about development as mere economic growth accompanied by improvements in the average income and standard of living attained by a given population. It is more about a fair distribution of wealth and income and access to productive resources, across generations, keeping within the bounds of the planetary constraints.

Acceptable as it may seem at first glance, the social solution may be difficult to arrive at, and even more difficult to implement. First of all, it entails a basic understanding of the role of Nature in the process of economic activities, and especially the kinds of constraints this role might throw up. The second problem is agreeing about what exactly is to be bequeathed to future generations. Would it be some subjective notion of utility or satisfaction measured with the help of a social welfare function, or some more tractable concept of well-being? The third issue is about how much importance we attach to the well-being of future generations of yet unborn people (see Koopmans (1960)). Does one treat them to be as important as we consider ourselves, or does one discount their well-being only because they are born at a later date? Finally, depending on how one resolves the first three questions, one has to agree upon a time-path of resource allocation and the resultant social well-being from those resources accruing to successive generations.

In solving the dynamic resource allocation problem there are bound to be many complications too. People living in a society normally prefer to consume things in the present time as opposed to waiting for the future, especially for a long period of time. This is referred to as time preference or impatience, and is usually considered in economic theory to be a subjective choice exercised by the individual. How would the social rate of time preference be chosen? Is there a well-defined method of arriving at this number? The social planner chooses some number that could be low implying that society (assumed to live forever) would consider today's consumption as important as tomorrow's consumption (consumption being taken as a rough and ready measure of social well-being). On the other hand, a large amount of poverty and current levels of material deprivation might compel a planner to treat the consumption in the here and now to be more important than the future, especially the distant future. An implication of this would mean having more to consume now. The opportunity of productive investment on the other hand, implies that if one sacrifices and saves for the future, the action will be rewarded with a positive rate of return on investment, usually captured in the rate of interest as the reward for waiting. This in turn, would imply society would try to consume a little less now and save for a future attracted by the rewards earned from saving. Finally, the nature of the social well-being function with some reasonable properties such as diminishing marginal gains would imply a smooth distribution of income over time. This is referred to in economic theory as the 'aversion' to inequality. If marginal gains are diminishing, then a tiny amount of consumption (again taken as a rough indicator of social well-being) withdrawn from the future and re-allocated to the present would imply that the loss (of future consumption) would be less than the gain (in current consumption). The dynamic decision problem could exert pulls in three different directions. Society's choice would depend on the *combination* of values chosen for the allocation of resources over time with the values of time preference and the aversion to inequality playing a critical role in determining dynamic outcomes.

There are complicated ethical choices made, even when an individual allocates personal resources over time, say the lifetime of the individual, and the terminal bequests left for the next generation. When it comes to an entire society making a decision to ensure that development is sustainable in the sense of inter-generational well-being is chosen in such a fashion that it is non-decreasing (see Dasgupta (2001)) the complexity is compounded. How does society ethically choose a set of numbers for planning its allocation of resources as a representative of a large set of individuals each of whom has a particular ethical ranking of states of affairs (current and in the future)? Obviously the role of the public policy planner becomes crucial. For instance it would of great convenience for the planner, if she knew that an overwhelmingly large number of persons (whom she is supposed to represent) had a strong ethical preference for guaranteeing a non-diminishing level of well-being for future generations, even if it entails making current sacrifices for the purpose. The complexity of sustainable development does not stop there. Even if all these issues could be resolved or a consensus arrived at, the pathway to sustainability would entail some sacrifices to be made by the current generation of people living on the planet. What would be the quantum of this sacrifice and how would the cost of making the sacrifice be shared across individuals and nations.

Creating Public Policies from Scientific and Economic Knowledge

One important reason for the growing concern about sustainable development is that scientific evidence suggests that the business as usual strategy of continuing production and consumption could lead to a crisis that would limit economic growth and force large changes in lifestyles, like

those associated with the problem of irreversible climate change(Meadows et al 1972). Hence society has to agree to a set of responses that would minimize the chance of catastrophic change. Knowledge about the past and possible futures becomes an essential ingredient in choosing a course of action. In the nineteenth and the twentieth centuries, science was understood to be exact knowledge with its universal laws and precise predictions. Scientific knowledge has increased enormously and has the ability to indicate the possibility of problems and disasters like the effects of increasing pollution, or the effects of bio-diversity loss. However, with the rise of knowledge two things have changed. The first is the realization that Nature must be understood in its entirety. It is a complex system where the sub-systems cannot be broken down as in linear systems. The sub-systems interact with one another and affect the system as a whole. The second aspect of rising knowledge is the ability to view possible futures but where the chance of an outcome cannot be assigned objective probabilities. Yet in many cases (for instance climate change) the future possibilities are understood as deep uncertainty, where predictions about time frames, extent of damage or costs are subject to large degrees of error. Science, in this sense, provides fuzzy, imperfect knowledge. On the other hand if society does not do anything to mitigate future problems then the costs can be unacceptably high, even jeopardizing life on earth. Society has to make an ethical choice, and if it needs to act, the action has to be, comprehensive, decisive, and with a shared global responsibility across nations. Social responses cannot afford to be hazy and divergent beyond a narrow band. In the past two centuries it was just the opposite. While science was precise, the social responses were subjective and diverse made complicated by the plurality of ethical positions that could be taken by society.

Hence in the era of what is now described as post-normal science (Funtowitz and Ravetz 2003), public policy must be generated from a constant inter-action with scientific knowledge as it emerges, (however fuzzy it might be), and social choices that are consistent with sustainable development.

We are normally used to breaking up complex systems into more manageable simpler sub systems and studying them to understand the whole. However, in non-linear complex systems it is difficult since the sub systems are constantly interacting with each other affecting the system itself (see Coveney and Highfield (1996), Camaren and Swilling (2014) Ramalingam et al 2008). Hence when contemplating about the future of human society long term issues such as economic well being, health, political systems, military and diplomatic issues, environment and climate; all are considered important and all are interrelated. All these issues go beyond the individual or the nation state into global or planetary scales. These are not decomposable into isolated silos that can be studied by the specialist. This world *problematique* of the twenty-first century needs a more comprehensive knowledge that is not in the ken of any one branch of specialization. Hence the importance of inter-disciplinarity which starts with a crude look at the whole referred to as CLAW (Gell-Mann 2010 and Lucht 2010). This requires a different approach to understanding the planet and its inhabitants. The geo-sphere is important in the sense that an understanding of it gives us the way important minerals and resources such as water or air or soil are formed and what these life-support systems signify. The bio-sphere helps us understand the web of life and its intricate interconnectedness where human beings are just one species out of innumerable ones. The bio-sphere affects the geo-sphere as the soil's fertility is maintained by bio-geo-chemical cycles like the carbon, phosphorus and nitrogen cycles. Geo-sphere can change the bio-sphere by altering habitat conditions or forcing migration as terrains and climate along with the availability of food and water change. Finally there is the anthropo-sphere which includes human society and all activities around it. This is supposedly the

most disruptive as we have changed nature to a very large extent and our use (or as most now believe, overuse) of natural resources and damage done to the environment has had irreversible effects on both the geo-sphere as well as the bio-sphere.

Economists would tell us that if we are to ensure that we can sustain life and human society on earth in the complex system we need to preserve, we need to bestow a non-decreasing comprehensive wealth to future generations. The planning problem is theoretically solvable but in reality it will need a number of changes in how we do things and above all, how we think about things. For instance, as described earlier we are not used to thinking about history as the history of the planet where human beings are just one critical cog in a giant machine. We think of history as a narrative of humans on earth and our domination of the planet is limitless and thought to be glorious reflective of the human genius. We are also not (so far at least) trained to think in terms of complex systems. We break complexity into simpler parts. That strategy, we argued, is likely to give us erroneous understanding of the whole. However, a crude look at the whole of what sustainability entails gives us some actionable points as it were for societies to engage in with debate and discussions that would inform public policy and facilitate the solution to the planning problem which would reduce inequalities.

The first concern is that we not only need to think about ways and means to reduce inequality over time but also in the here and now. Yet we know that eradication of poverty and deprivation in the current generation will require growth and development. The obvious and well-travelled way for this is to adopt the business as usual path which has helped in creating material wealth but one that has led us into the morass of environmental degradation too. We do not know how, and what cost we can decouple growth from high energy use and resource extractions. This is a big challenge that will require radical changes. Population growth and demographic transitions is the second area of concern as far as public policy is concerned. How do we tackle the problem of too many people on the planet given technology and the institutions that govern our lives? The earth's carrying capacity has been stretched where scientists believe we are using not only the renewable interest of the environmental capital, we are also diminishing the finite stock itself. However, can we change lifestyles so that we consume less? Who should consume less? Which people are surplus? However, changing population growth patterns and rates is tricky since these decisions are private while the adverse impact is one that hurts all. If economic development reduces population growth rates, as has been observed for the societies that are now materially affluent, then economic growth in the poor nations of the world today will further despoil the environment and make development unsustainable. We do not have a well articulated alternative model of development yet.

The third area of concern is that we need a social and institutional transformation that will be more concerned with the well beings of all and can cope with conflict. New attitudes must also yield some national space to global forums that can make sustainability concerns consistent across nations and succeed in making some form of compliance mandatory. This leads us to the fourth area of concern. Social and institutional changes would be impossible without an ideological change where myopic self-centred interests are reconciled with a bigger planetary consciousness which informs our decisions and the choices we make (Cavalcanti 2000, Schellhnuber 2010 Raskin 2002).

The final area of concern, which is arguably the easiest to address is the need for a new way of looking at technological innovations that reduce materiality of production and help the transition to

a low carbon economy, and a set of economic policies that quickly identifies and addresses the internalization of external costs that damage the natural environment. Improvements along this last area of concern are already discernable. It should be emphasized that these concerns are not independent of each other.

Some Alternative pathways to Reduce Inequality

The areas of concern we discussed above have different proponents (Sengupta and Sinha 2003) who prioritize importance of these areas differently. Broadly there are different approaches that can be traced to those who think that primacy of technology is of the greatest importance, those who put emphasis on ethics and values that would trigger and facilitate the transformations necessary, and finally the rational school that believes humans will perforce realize that the most wise thing to do would be to save the planet since without that their own existence could be in jeopardy.

Technological Primacy

There is widespread belief, especially amongst social scientists who do not actually design new technologies that scientific changes will help decouple growth from higher energy intensity and higher use of material resources. The current problems of environmental degradation, bio-diversity loss and climate change is a necessary phase that human society must perforce pass before a greener sustainable world can be built. Indeed, there have been a lot of technological changes that are greener and more ecologically efficient. However, by the end of the century primary energy use is predicted to grow threefold. If this turns out to be true would it lead to a lower use of material inputs in production? Over history from the hunter-gatherer stage to agriculture to the modern industrial phase, this has never actually occurred. Materiality of production and waste creation has systematically increased, sometimes dramatically fast as in the past two hundred years. History at least does not support this expectation of a turnaround in the impact of technology. A purely technology led solution is unlikely. Yet, so much of the current world economic order is based on technology-led growth where even the rich nations get enormously worried if growth declines. The emerging economies are almost exclusively focussed on the robustness of their growth path and poor nations quite rightly so aspire to grow out of widespread poverty and deprivation.

Ethics and Values

A second area of the debate revolves round the primacy of values, justice, rights and the natural world (Nolt 2015). Here the argument is that human beings have to first build their lives around a cultural identity with nature and other living beings, and this must be reflected in the political and ethical systems of society, in construction of social order, in religious understandings and spiritual relationships. This will lead to a transformation that will make the world more sustainable and less unequal. In this view there are non-technological limits to growth when growth impinges upon the rights of others, including other living beings, whether now or in the future and whether the problems arise nearby or in a far away geography. This culture, in short, is expected to be universal and shared by all. It clearly calls for a revolution in lifestyles and values (Sinha 2017) that may be difficult to attain, especially in the short span of a few decades. There are problems with this approach and why it might take more time than expected. Human beings have for centuries put material comfort and well-being as far more important than the mental state they live in. A materially poor life where the person experiencing poverty is actually happy is indeed rare. It might

happen for a few people especially those who might enjoy a hermitical existence, but it is very difficult to think of the overwhelming majority of people to be transformed in any short span of time. Another problem is that if this was to be engineered through social policy or education, there would be a clash between these attempts and a fundamental human value of freedom especially the individual's freedom to choose how she leads her life.

Rational Choice

A third approach in the debate about what is to be done is the reliance on rationality underlying the enlightened human intellect. This is particularly strong in European and Western thought where there is a deep belief that the rational side of human thought would resolve the complications of values and ethics in the construction of identity (ref.). However, rational thought has seen the development of universalistic monolithic institutions of capitalism which dominate the economic and technological structures. This has been referred to as the totalitarian aspect of enlightenment. There is hope that enlightened self interest will make the human mind understand the lock-in into unsustainable growth and help transcend that condition, driven by human agency and will power. Science and scientific evidence plays an important role in this context. The warning is sounded based on the new evidence that science has brought forth in the last two hundred years. It is only recently we know why the dinosaurs became extinct, how old the earth is, about ice ages, about where the sun obtains its energy from and how chemistry works. There was no knowledge about the biology of genes and epigenetic theories. There was no theory of evolution and the big history of the planet was unknown. This new knowledge more than a pure faith in technology or values can be demonstrated to convince the rational human mind that something has to change and change quite fast if a disaster has to be avoided.

This expectation too is doubtful. Whether this evidence will actually help transcend the older beliefs about the world, ideologies, and above all selfish short term material interests is questionable. The bigger challenge is how to integrate this knowledge of science (however imprecise and probabilistic) into slow moving societal belief systems and induce a faster than usual response in terms of changed actions and preferences.

Crude Look at the Whole

If instead of arguing about the primacy of technology, or values, or rationality, it may be important to begin with a crude look at the whole where science and culture have to come together to find solutions and facilitate changes. This can be done by looking at earth system processes which is developing as a scientific, networked, collective global subject that is attempting to understand the world with all its complexities. The features of this new knowledge building attempts include a highly developed comprehensive earth systems science using complex computer simulations as an important tool for making projections of the geosphere biosphere and anthroposphere and their continuous interactions. A second key feature is a giant earth observation system which provides empirical links between the planet's past and the future. Finally, there is a globally networked system of communication, negotiation and goal-setting that is essential to manage the large number of processes in a consistent manner (Sulston 2010). *Together* these features might contribute towards the building of a global consciousness that might steer policy and action towards sustainability. If, however, time is to be of the essence, then waiting for socially acceptable change may take too long and some catastrophic event might set in before that. Hence it might be necessary to provide active

management or engineering to bring certain changes that can trigger others. For instance, an emphasis on new technology and the reduced use of energy in production and consumption, or the creation of new institutions for managing the environment can easily be started through conscious efforts without waiting for a global consensus. Such changes must obviously pay attention to design, but the designs themselves must be deeply embedded in a value based analysis when weighing the consequences and adverse effects of these changes – convincing people that there are compelling reasons to implement them.

As far as changing the way we think about human societies and their relationship to the planet, we need to create and develop what is referred to as the Big History of the planet (Christian 2005, Christian Brown and Benjamin 2014 and Spier 2015). This Big History project puts together three time scales through which we normally view the earth and its inhabitants and puts them together. The first is the very large geological-astronomical scale of time followed by the biological time scale of life on earth and lastly the human time scale when human beings evolved from the big apes. This would help create a more nuanced understanding how human beings along with other forms of life interact with the environment and how the environment itself evolves. The construction of such views is not without dangers. Societal visions of Nature and the natural have often clouded human interactions with the environment. It requires capable science and its embedding in culture. This is enormously significant since projections of the past as well as the future are fuzzy and imprecise while our knowledge of ecological systems is also incomplete. There are also large differences in the underlying assumptions about human behaviour that historians, economists, sociologists and anthropologists make. Yet there is hope that with the crude look at the whole humanity will overcome the fragmentary perceptions of the world and be able to construct mental images where the whole is more than the isolated parts.

Inequality as the first priority to be addressed

A new global consciousness should allow us to realize that any pathway to sustainable development must perforce be moving society towards more equality. The first task when thinking about sustainability as a systemic problem that is hard to break down into fragmented parts is the need to tackle inequality. We need new policy solutions, or else the widely accepted solution for inequality would continue to remain economic growth through business as usual which is itself self-defeating (Baer et al. 2007). Such growth may directly conflict with sustainable development, at least the type of growth that informs the imagery of development – energy intensive material accumulation. Economic growth also promotes mobility and enlarges the ecological footprints of individuals as well as communities. Economic growth alone, in the age of global mobility, does not necessarily reduce inequality (Sen 1985, 1987, 1992 and 1999) and make the world more sustainable on its own. There are a host of other social policies required to redistribute the fruits of growth in a more equitable fashion. Moreover, economic globalization has eroded the power of nation states to handle these social policies in as effective a manner as before. It is also true that the environmental setting in which economic growth is to take place (as at least a necessary condition for reducing inequality) is already quite alarming. In 2005 the United Nations Millennium Ecosystem Assessment was the first check on global health of nature. It estimated that 60 per cent of the planets ecosystem services has been degraded see also Rockstrom et al 2009). These services are not only fundamentally important for human well-being, but are critical for poor communities and a key feature of the planets capacity to adapt to climate change. In the absence of concerted global action to fight inequality and its

associated ills, sustainable development will remain on a collision course with business as usual and the pattern of growth that emerges from it.

In the absence of the transformations we have discussed, especially the reduction of contemporaneous inequality there could arise environmental crises (Constanza 2007) sooner than many scientists expect. In that event two distinctly different social responses could come about. In the past there have instances when big crises have united people and nations by creating a common reason for action. Effective leadership has often been able to engage a larger population to greater social trust and collective action like the Great Depression did in the making of the welfare state. More recent events such as global health problems of pandemics have fostered much greater cooperation and action than ever before in fighting disease. However, crisis can lead to conservative responses too. International migration has often been perceived as a threat to the local populace and that has led to insularity and exclusion and often increased racism.

Conclusion

We have argued that inequality is germane to understanding sustainable development, and its reduction is of paramount importance in creating a pathway to sustainability. However, to be able to do that we require a more nuanced analysis of sustainability as a complex system which cannot be usefully be broken up into independent parts. Unless it is understood that the planetary system is bigger than its constituent parts, any effort to reduce inequality and move to a sustainable world will be well-nigh impossible. We have argued that a nuanced understanding of the earth system has to begin with a crude look at the whole and realize that interactions between the environment, society and ecology are constantly taking place. To change and transform the business as usual model of growth and development we must understand the links between the geosphere, biosphere and the anthroposphere. Once we understand that (however imperfectly) we need a series of radical transformations that entail better management of the environment, better understanding of science and technology as well as a far better understanding of how to change social institutions and belief systems, altering them from parochial and myopic to a global consciousness of the large framework of planetary history. Social change based on fuzzy predictions of science requires technological change, changes in value systems and an open approach to observing and analysing scientific evidence and projections. The pathways of transformation must serve to reduce inequality as an essential element. The core of that challenge is to address both intra-generational inequality as well as intra-generational inequality. Attempting both simultaneously is a big challenge since the instruments of attaining them may conflict with one another. Economists know this as the trade-off between efficiency and equity. In the arena of sustainable development, the trade-off is between justice now and justice later. Fair choices about the planets future must be made on the basis of imperfect knowledge. It is much more complex and more planetary in its aspects than any single branch of knowledge or academic discipline can handle by itself.

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