

# IMPACT OF ENVIRONMENT WITH SUSTAINABLE DEVELOPMENT AND ECOLOGICAL DEMOCRACY

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## ABSTRACT

*We begin by conceptualizing sustainability as the ratio of human welfare or quality of life to overall environmental impact. We propose an indicator of sustainability that uses infant survival a key component of the Physical Quality of Life Index (PQLI) as a measure of welfare. We combine two measures, the Ecological Footprint (EFP) and the Environmental Systems Indicator (ESI) into an overall measure of environmental impact. The ratio of the welfare measure to the impact measure (welfare per unit impact) is then a measure of sustainability. Recent work in the tradition of ecological modernization theory (EMT), the environmental Kuznets curve (EKC) and reflexive modernization theory (RMT) suggests that nations may make a transition towards environmental sustainability. We offer a theory of ecological democracy that hypothesizes the conditions under which nations might move towards sustainability. In particular, we suggest that three conditions are necessary. First, institutional arrangements and culture must promote altruism. Second, information on the analysis of environmental problems must be available. Third, the state must not be captured by capital, the military, religious groups or other special interests who will have little interest in sustainability. In contrast, EMT and EKC posit the institutions of traditional liberal democracy as sufficient to promote sustainability. In a preliminary empirical assessment using data on nations, measures of liberal democracy have a significant positive relationship to sustainability in the form predicted by theory. But the indicators of our three conditions for ecological democracy also behave as predicted by theory and are more strongly related to sustainability. This work is quite preliminary, ignoring, for example, ideas emerging from World Systems Theory (WST) but indicates that further analysis of measures of sustainability and of the conditions that favor sustainable development are warranted.*

## INTRODUCTION

Since the historic analysis offered by the International Union for the Conservation of Nature in its World Conservation Strategy (1980) and the subsequent arguments made by the Brundtland Commission, the concept of sustainability or sustainable development has occupied the center of discussions about environment and development. Unfortunately, the centrality of the idea of sustainability is mirrored by a very broad but unresolved debate about what precisely is meant by sustainability. We cannot review that extensive debate here, but begin our analysis of sustainability and its determinants by raising three points.

First, sustainability is as much a normative as a scientific concept. Our Common Journey, one of the most extensive analyses of sustainability, is persuasive on this point. Our Common Journey deals with the normative dimension of sustainability by referencing the wealth of international agreements regarding human welfare. As the report notes, there are many international agreements that specify precise goals regarding various components of human welfare such as literacy or access the clean water. However, the authors also note that, in contrast to the many agreements regarding human welfare, there are very few environmental standards that are based on an international normative consensus. That may change. But for the moment the point we emphasize is that in conducting analyses of sustainability, it is appropriate to be explicit about the normative substrate that underlies use of the concept. We may differ in our normative assumptions, and we can certainly learn much from a discussion of alternative normative stances. But we will not make much progress if we are not explicit about the normative component of our work on sustainability.

Second, there have been several important recent efforts to develop measures of sustainability and environmental impact for most nations of the world. Here we will focus on the Ecological Footprint (EFP) and on one aspect of the Environmental Sustainability Index, the Environmental Systems Indicator. These, no doubt, are just the first of a number of efforts to refine our ability to measure and thus analyze sustainability. Without such measures, the sort of comparative analysis we undertake here would not be possible.

Third, as sociologists, we work in a tradition of macro-comparative political economy. Our goal is to develop a theoretical explanation for variation in sustainability across nation- states, disciplining the theory with empirical analysis. At one level this approach is a step removed from the analyses of local, national and international institutions and behaviors that are central to most empirical work on human dimensions of global change. We are not critiquing those efforts, indeed we admire them. But we believe that the kind of analysis we undertake trying to identify the social structural and cultural determinants of sustainability—provide a valuable complement to other approaches.

## **LITERATURE OF REVIEW**

To analyze sustainability we must define it however tentative the definition ultimately may be. Our approach grows out of an ongoing research program, conducted jointly as Washington State University and at George Mason University, focused on the anthropogenic driving forces of global environmental change. Our approach is to link the venerable but analytically limited IPAT model of environmental impact to contemporary social science theory and methods. We have completed analyses based on this approach with the goal of understanding why nations vary in the magnitude of their environmental. IPAT can also be used as a starting point for thinking about sustainability. The IPAT formulation, which had its origins

in a debate between Barry Commoner on the one hand and Paul Ehrlich and John Holden on the other, is as follows:

$$I = P * A * T$$

In most analyses, A is operationalized as per capita gross domestic product (GDP). But as we have noted (Dietz and Rosa 1994), it may make more sense in examining sustainability to define A as quality of life, what some might call “true affluence,” and use a measure other than GDP per capita. Our work has found that per capita GDP is strongly associated with a variety of environmental impacts with increasing impacts accompanying increasing affluence. The hope is that “true affluence” may not be closely linked to impacts, therefore indicating the potential for human development without environmental deterioration. A useful way to think about sustainability, though admittedly a rather anthropocentric one and one that reveals hints of utilitarianism is to look at the ratio of human quality of life to environmental impact per capita. That is, sustainability can be thought of as increasing much human welfare while reducing environmental impact.

The normative implication is that we want to make human welfare or quality of life large and environmental impact low and thus see as desirable maximizing the ratio of welfare to environmental impact.

If we follow this approach, measuring sustainability reduces to the problems of measuring quality of life or human welfare and of measuring environmental impact. We will address each of these in turn. Affluence, usually measured as gross domestic product per capita, has often been used as a surrogate for quality of life or human welfare. This is problematic on several grounds. First, it ignores equity issues. Second, as a comprehensive economic measure GDP per capita conflates what may be a driver of both welfare and environmental impact with welfare itself? Third, it makes normative assumptions about the unlimited benefits of economic growth that have been debated (e.g. Daly and Cobb 1989). It seems reasonable that welfare or quality of life has a non-linear relationship to affluence because of diminishing returns and inherent upper asymptotes (e.g. limits to life expectancy) in a number of reasonable components of quality of life. For example, as gross domestic product per capita, energy consumption and CO<sub>2</sub> emissions increased in the historical development of industrial societies, there is evidence that quality of life did not initially increase and may have declined. There is also evidence that as the measures of affluence reach high levels, there are diminishing returns in quality of life (Mazur and Rosa 1974; Rosa 1997). So, at some stages of development and for some paths of development, the coupling between GDP per capita and welfare or quality of life may be very loose. The Physical Quality of Life Index has been developed as an alternative to GDP as a measure of welfare (Morris 1979). The Physical Quality of Life Index combines infant mortality, life expectancy at age 1 and adult literacy. We agree with the measure conceptually, but have chosen to work only with infant mortality as our indicator of quality of life for two reasons. First, infant mortality is more responsive to short term changes in socio-economic

conditions and the biophysical environment than are either literacy or life expectancy. Infants, unfortunately, are more acutely vulnerable than other members of the population to changes in these conditions. In this context, infant mortality can be viewed as a “flow” variable rather than a “stock” variable. Second, using the PQLI requires measures on three separate indicators and because data are hard to obtain for literacy, it would restrict our calculation of the sustainability measure we develop to 88 countries. Using infant mortality alone allows calculations for 121 countries. To avoid confusion we convert infant mortality death to those under age 1 per 1000 live births to infant survival, which is just 1000 minus infant mortality. This yields a measure where high values can be seen as socially desirable.

Most research on environmental impact to date has used single indicators of impact, such as CO<sub>2</sub> emissions or deforestation rates. But a sound measure of impact must take account of several complications. First, there can be tradeoffs among impacts. Greenhouse gas emissions will be lower for nations that make substantial use of hydroelectric power and nuclear power, but each of those energy sources has their own environmental impacts. Second, environmental impacts can be “off-shored” in the sense that consumption in one part of the world is linked via world trade to changes in the biophysical environment in another part of the world. In accounting for impacts, it is difficult to know how much of such impacts should be attributed to the site where the impacts occur and how much to the site where the consumption occurs. A third point rests on the other two. There seems to be rather distinct patterns of pollution that differ across groups of nations: a pollution of the “rich” mostly based on intensive consumption of energy and various chemicals and a pollution of the “poor” mostly based on extensive land use and lack of sanitation. In a previous analysis of all environmental impact variables available for a majority of nation states in the world, we found those two patterns emerge as well as a distinct pattern for nations that both made heavy use of nuclear power and had a substantial forestry sector in their economies.

The two most extensive efforts to develop environmental indicators that combine multiple measures are the Ecological Footprint (EFP) and the Environmental Systems Indicator (ESI). Each emphasizes a different aspect of the problem of defining environmental impact and each makes different assumptions about how to resolve key issues. EFP emphasizes consumption and allocates all impacts to the consumption site rather than to the site at which the adverse effects may occur.

### **ECOLOGICAL DEMOCRACY AS A THEORY OF SUSTAINABILITY.**

There is clear variation in national levels of our sustainability measure, but this variability is not a strong linear function of GDP per capita. Understanding the basis of this variability will help us understand what drives sustainability and may help us move towards more sustainable societies. If we were to generalize from the theory of the Environmental Kuznets Curve (EKC) our hypothesis would be that sustainability is largely a function of affluence or “development”

and that gross domestic product per capita would be an appropriate measure of affluence. Ecological Modernization Theory (EMT) in sociology makes a parallel argument that the historic path of development at least in the most affluent societies, will lead to a reduction in environmental impact. Again, if we are to generalize from environmental impact to sustainability, then this development path “ecological modernization” in their terms—would lead to higher levels of sustainability. Our empirical work on environmental impact suggests that population and affluence are indeed related to impact. But the arguments of EKC and EMT that modest levels of affluence lead to a reduction in impact are not supported by our previous work. Reflexive Modernization Theory (RMT) goes beyond EKC or EMT theory to argue that democratic political forms are required for reducing environmental impact. Our previous work has found little evidence for a relationship between democratic political forms and national environmental impact in that the standard measures of liberal democratic political institutions are not related to reduce environmental impact. Does the nonbinding’s using RMT indicate the political regime of a nation is unrelated to environmental impacts? On operational and theoretical grounds, we do not believe so. A valid test of Reflexive Modernization Theory (RMT) requires an adequate conceptualization of democratic forms in the context of environmental problems and meaningful operational measures of those concepts.

## CONCLUSIONS

We have suggested that an appropriate way to measure sustainability is to look at the ratio of human welfare to environmental impact. We have operationalized this idea in a preliminary way by developing a sustainability index that is the ratio of infant survival rate to a measure of environmental impact that combines the ecological footprint per capita and the environmental systems measure for the Environmental Sustainability Project.

We then suggest that to understand variation in sustainability, we need to supplement theories that emphasize classical liberal democracy and economic growth with the notion of ecological democracy. We suggest that ecological democracy has three requisite conditions: altruism, access to scientific information, and openness of the state. We offer some initial and tentative operationalizations of these ideas and an initial test of our theoretical framework. We find that while the variables that represent the idea of liberal democracy have some ability to explain sustainability, the variables representing ecological democracy are more powerful predictors.

Our main conclusion is that further discussion and investigation of these matters is warranted. One obvious direction is to examine work in World Systems Theory that has long been concerned about the linkages between the global political economy and the internal economics and politics of nations. We view our arguments here as preliminary and the empirical results quite tentative. But the initial results are sufficiently encouraging to continue this line of inquiry.

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