INDICATORS OF SUSTAINABLE DEVELOPMENT

Some Challenges

Note: This text is taken from Dalal-Clayton (1993)

It is well recognised that environmental indicators are vitally needed to capture trends in ways that policy makers and others can grasp immediately. As Mathews and Tunstall (1991) have pointed out, "economic planning would be unthinkable without GNP figures, unemployment rates, and the like; so would social planning without such indicators as life expectancy and rates of fertility, infant mortality and literacy. Yet, environmental policy-making has no comparable measures today". New indicators are needed to guide policy-makers in their assessment of environmental quality and to enable the integration of environmental, economic and social concerns for sustainable development planning. Such indicators will be a vital ingredient in the development and monitoring of national strategies for sustainable development. They will also be a key tool in sustainable analysis.

There have been some suggestions of indicators of sustainability for individual sector or ecosystems (eg, ITTO, 1991), and others have suggested indicators for sustainable development in general (e.g., Mathews & Tunstall, 1991 - Table 1; Holmberg, et.al., 1991, Table 2). But these are still far from satisfactory.

However, it will be extremely important to avoid focussing on indicators that are difficult or impossible to measure in developing countries. Simple and practical indices are required.

Those suggested in Table 1 provide a useful starting point. They are less post-hoc than the quantitative indicators listed in Table 2, focussing on Clarke's (1991) 'path towards sustainability'. They provide qualitative and 'barometric' measures which encompass practical and legitimate targets, i.e. they give a flavour of what sustainable development would look like. In this regard, they are more easily monitored than the 'harder' indicators of Table 2 and are more condusive to participatory monitoring by citizens groups.

GDP is perhaps the most used 'hard' measure of development, but it fails to allow for capital maintenance of natural assets and takes limited account of the contribution of the environment to economic activity. As a consequence, this measure might actually discourage the implementation of sustainable development policies, particularly in countries with an economy which is heavily dependent on the use of natural resources.

Holmberg (1991) has suggested a typology of the indicators that might be considered:

- **environmental indicators** - measuring changes in the state of the environment.

  These indicators should be simple and practical, easily read and understood by decision makers, and might best be expressed in non-monetized, physical terms, placing an emphasis on rates of change (eg, rates of depletion of fish stocks or forest resources). They should be based on data that is readily available in common data sources.

- **sustainability indicators** - measuring the distance between that change and a sustainable state of the environment.

- **sustainable development indicators** - measuring progress towards the broader goal of sustainable development in the national context.

The development of these indicators will require careful consideration of a number of methodological issues related to qualitative variables, such as the performance of institutions.

In terms of this typology, the indictors listed in Table 1 are clearly sustainable development indicators whilst those in Table 2 are actually a mixture of environmental and economic indicators.

Some people would argue that the bureaucratic mode of many donors and governments could not cope with a multiplicity of separate environmental indicators and that a single or 'collapsed' indicator would be preferable. It has to be admitted that this argument has some logic, particularly given that much data is of poor quality, that individual indicators provide a limited impression of the overall environmental situation in a particular country, and that not all indicators will apply to all countries (for example, all countries will have a literacy rate and a GDP, but not all will have a rate of deforestation).

Daly and Cobb (1989) have suggested an index of sustainable economic welfare which includes environmental components but is much broader. This index might usefully be refined with time, using the above typology, into an index of sustainable development.

The relative merits of a range of separate indicators and single indices will need very careful consideration. But the key guide in our framing of operational recommendations for sustainable development must be simplicity.

TABLE 1: A FEW INDICATORS OF SUSTAINABLE DEVELOPMENT

THE USE OF ENERGY AND MATERIAL Per capita resources consumption, for a given standard of living, is dropping. The proportion of non-renewable energy usage in primary production is diminishing, while renewable sources, such as solar or human energy, are increasing: and sectors using non-renewable forms of energy are investing significantly to develop and apply technologies that will use renewable forms. Passenger kilometres travelled by public transport are increasing in proportion to those travelled by private motorized transport. There is a progressive increase in both official incentives to use renewable energy and disincentives to use non-renewable forms. There is an increasingly free flow of technology, especially to poor countries.
ECOLOGICAL PROCESSES & BIOLOGICAL WEALTH Development activities seek to maintain ecological processes (soil fertility, waste assimilation, and water and nutrient cycling) and not to exceed the capacity of these processes. Development increasingly depends upon and conserves a growing range of genetic material, not only the different species but the varieties within species. Renewable resources are increasingly used and harvested at rates within their capacity for renewal. More and more areas of high value for their irreplaceable environmental services are not only being set aside, but are being effectively managed, with secure funding.
POLICY, ECONOMICS & INSTITUTIONS Economies - especially those that depend upon high-volume natural resources data - are diversifying, especially towards high-value information and service industries. There are growing numbers of formal mechanisms to integrate environmental and development concerns, and to insert environmental values in prevailing systems of economic policy, planning and accounting. More accurate and representative economic indicators are being introduced to measure sustainable development, so that the currently dominant concerns of consumption, savings, investment and government expenditures are increasingly joined by measures of natural resource productivity and scarcity. More methods are being introduced for valuing use by future generations, for comparing such use to today's needs and for making equitable trade-offs between generations. Flows of resources to and from a given country are increasingly stable and equitable, and do not result in severe net depletion of the national resource base.

Both the incidence and the effects of "boom and bust" are diminishing.

There are both regulatory measures that ensure that resource limits are not exceeded, and enabling measures that encourage voluntary improvements in technology to make more sustainable use of resources within those limits.

Environmental monitoring is regularly and effectively carried out, and both policies and operations are adjusted to suit.

Military budgets are decreasing in relation to budgets for work to ensure environmental security and sustainable development.

SOCIETY & CULTURE

The notion of resource limits, and the need for sustainability in production and livelihood systems, is increasingly prevalent in a society's values, embodied in its constitutions and inherent in its education systems.

The community is becoming more diverse in terms of skills and enterprises, and yet remains coherent as a community.

There is a growing body of commonly held knowledge and available technology for maintaining a good quality of life through sustainable activities.

There is a tendency towards full employment, good job security and household stability.

Increasing numbers of people have access to land adequate for sustaining good nutrition and shelter for their families and/or adequate, reliable incomes to pay for these necessities.

The costs and benefits of resource use and environmental conservation are more equitably distributed: consumers increasingly choose to pay for goods and services that are resource-efficient and minimize environmental degradation.

Conflicts over land and resource rights are diminishing.

People who once relied upon unsustainable activities for their livelihood are being supported in their transition to sustainable activities.

Development is increasing people's control over their lives, the range of choices open to them and the knowledge to make the right choices: it is compatible with the culture and values of the people affected by it, and contributes to community identity.

Source: Holmberg et.al. (1991)

TABLE 2: SOME ENVIRONMENTAL AND ECONOMIC INDICATORS OF DEVELOPMENT

Countries	1985-90 Population Growth Rate (%)	1985-89 GNP Growth Rate (%)	1991 Human Development Index [a]	1989 Energy Consumption [b] (gigajoules per capita)	1988 Carbon Emissions [c] (metric tons per capita)	Mid-1980s Production of Hazardous Wastes [d] (metric tons)	Annual Rate of Deforestation [e] (hectares)	1989 Protected Areas (% of country)	1990 Water Use (% of available supply)	Soil Erosion (metric tons per hectare per year)
Algeria	3.12	1.7	0.490	27	0.7	X	40,000 [f]	0.2	16	X
Botswana	3.51	11.4	0.524	X	0.4	X	20,000 [f]	17.7	1	X
Brazil	2.07	3.9	0.759	23	0.4	X	1,380,000	2.4	1	X
China	1.39	7.9	0.614	24	0.6	X	X	0.8	16	X
Costa Rica	2.64	4.6	0.876	15	0.2	X	42,000	12.0	1	X
France	0.36	3.2	0.971	116	1.6	2,000,000	X	8.2	18	X
Haiti	1.88	(0.6)	0.296	2	0.0	X	2,000	0.3	0	X
India	2.08	5.8	0.308	8	0.2	36,000,000	48,000 [f]	4.4	18	75 [g]
Jamaica	1.52	5.3	0.761	25	0.6	X	2,000	0.0	4	36 [h]
Mexico	2.20	0.9	0.838	49	1.0	X	595,000	2.9	15	X
Nigeria	3.43	2.9	0.242	6	0.1	X	300,000	1.1	1	14 [g]
Peru	2.51	(0.2)	0.644	15	0.3	X	270,000	4.3	15	15
Rwanda	3.40	(0.4)	0.213	1	0.0	X	3,000	10.5	2	X
Sau. Arabia	3.96	1.5	0.697	186	3.5	X	X	0.4	106	X
Sier. Leone	2.49	2.3	0.048	2	0.0	X	6,000	1.4	0	X
Spain	0.38	5.3	0.951	73	1.3	1,700,000	X	5.1	24	X
Sweden	(0.03)	2.4	0.982	149	1.8	500,000	X	4.1	2	X
Thailand	1.53	10.2	0.713	19	0.3	X	158,000	9.1	18	X
USA	0.82	3.3	0.976	297	5.3	265,000,000	159,000 [f]	8.6	19	10 [h]
Zimbabwe	3.15	3.6	0.413	20	0.5	X	X	7.1	5	50 [g]

Source: Mathews & Tunstall (1991) using data from the United Nations, World Bank, World Conservation Monitoring Centre, World Resources Institute.

Notes: X = Not available. O = Zero or less than half the unit of measure.
[a] The Human Development Index, constructed by the UNDP, combines, in one number, a measure of economic, educational, and health deprivation. Countries above 0.8 are considered to have high human development; 0.5 to 0.8, medium development; and below 0.5, low development.
[b] Energy consumption includes traditional fuels.

[c] Figures include carbon from energy consumption and other industrialized sources.

[d] Hazardous wastes are not defined consistently from country to country.

[e] All figures are from the Food and Agricultural Organisation of the United Nations for the 1980s, except the following countries, which come from national sources for the years indicated: Brazil, 1990 (legal Amazon only); Costa Rica, 1973-89; India, 1983-87; and Thailand, 1985-88.

[f] These figures include open and closed forests; all others are for closed forests only.

[g] Figures are for seriously affected cropland only.

[h] Figures are for total cropland.

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