

POVERTY, SUSTAINABILITY AND COMPLEXITY

Measuring and making change towards sustainable livelihoods.

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INTRODUCTION

A major task for governments, civil society organizations (CSOs) and international development agencies is assessing the impact and performance of their policies, programmes and projects. Attempts at measuring the effectiveness and efficiency of policy prescriptions have been aided by the development of specific indicators that strive to capture a particular circumstance, situation or condition (i.e., GDP). The current shift in thinking and action towards a more people-centred, human development paradigm has necessitated a concurrent re-orientation of the policies and programmes pursued by development agencies, CSOs and governments. Evaluating these efforts has meant looking beyond conventional quantitative indicators to more qualitative ones (i.e., governance). This has been, by no means, an easy task. Qualitative processes such as empowerment, for example, do not easily lend themselves to being objectively measured. Another important distinction is between single indices such as employment or population and composite measures such as the United Nations Development Programme's Human Development Index which combines data on levels of educational attainment, life expectancy, and a decent standard of living as measured by GDP per capita. Use of the former provides specific and detailed information, for example, on the share of the labour force in industry or services.

Composite indices, however, can be used as an advocacy tool, highlighting deficiencies in a particular area.

While the questions of quantitative or qualitative or single versus composite indices remain in debate, there are a number of desirable characteristics that any indicator should possess. These are briefly described below:

- Be developed within an agreed upon conceptual and operational framework

- Be sensitive insofar as that a small change to be measured should result in a measured change in the indicator;

- Clearly and consistently defined so as to be un-ambiguous or lend themselves to various interpretations, or to give inconsistent results in different situations;

- Specific and measurable in that they have an explicit scale ranging from undesirable states to desirable states (along with specific weightings) that enables them to be used for assessment purposes;

- Policy oriented so as to provide practical information by being able to record either changes in the means recommended by policy or changes in the development impact attributable to policy;

- Have ownership by users;

- Reflect input, output process, and outcomes or impact; and

- Readily collectable and, thereby, lowering the technical and collection costs. Preference should be given to indicators for which existing data-collection mechanisms exist or can be adapted to fulfill the purpose of collecting data.

The references to an agreed upon conceptual and operational framework and ownership by users are extremely important. With respect to the framework, it is essential to examine and review the ongoing work in the thematic area where indicators are needed or have been established (i.e., poverty, environment). This helps in identifying not only the underlying philosophy and strategies employed, for example in poverty reduction, but also the types of indicators that have been developed to measure performance in this area. A review of this sort helps form a framework that incorporates the lessons learned as well as ways forward in terms of programming and evaluation.

In regard to ownership, indicators have traditionally been designed to assist policy-makers in government and multilateral organizations assess the impact or performance of certain policies and programmes (i.e., agricultural, industrial, environmental). While these two constituent categories remain important, it is also necessary to explore how indicators can be both developed and utilized by those who are affected (positively and negatively) by existing policies. This form of self-assessment can subsequently inform policy-makers of how people perceive and respond to policy prescriptions. What is

apparent is that both quantitative and qualitative measures are required to assess the various components of a particular policy or programme.

For agencies such as the United Nations Development Programme (UNDP), grappling with these issues is a necessary step in its efforts to measure progress towards poverty eradication and the achievement of sustainable human development (SHD). For example, the 1997 Human Development Report is devoted entirely to the multi-dimensional aspects of poverty and has introduced a Human Poverty Index (HPI) that measures levels of human deprivation as distinct from income/expenditure measures. The organization has also benefited from the work undertaken by other UN system agencies in the area of indicator development, ranging from indicators of sustainable development to conflict and democratization. These efforts have served to improve and integrate various themes (i.e., poverty and environment) into overall UNDP programming.

An integral part of this programming process within UNDP has been the adoption of the sustainable livelihoods (SL) concept and approach as a means for poverty elimination. In essence, SL brings together the thinking and practice of poverty reduction strategies, sustainable development and participation and empowerment processes into a framework for policy analysis and programming. While SL has not yet become fully institutionalized within UNDP, it has made some significant contributions in advancing the SHD agenda. This is especially true at the country-level, where UNDP country offices have utilized the SL approach in the areas of rural food security, micro private sector development and urban development. The evolution and particulars of the SL concept and approach will be discussed in detail in the following section.

Although monitoring and evaluation of development efforts are part and parcel of UNDP's programming cycle, little experience exists in appraising the impact of SL initiatives. This is partly due to the heterogeneity of SL systems on the ground, and lack of a framework for monitoring and evaluation of SL and the accompanying indicators to assist undertaking such a task. These deficiencies are the primary reason for holding a workshop that helps identify whether developing indicators for SL are feasible and, if so, what specific indicators can be crafted. There are a number of assumptions that we have adopted in this exercise. First, we believe that the SL concept and approach can integrate current strategies for poverty reduction and participation and empowerment. Second, the added value of the SL approach is that it brings the sustainability issue into the fold, thereby establishing the linkages between poverty, environment and participation. Third, and following this rationale, indicators for SL should combine elements particular to poverty, environmental sustainability and empowerment, thus linking more constructively

both social and economic aspects of development strategies. These assumptions are, at best, speculative and warrant careful examination and criticism. We hope that discussions that arise within the workshop will help address the above issues and offer advice on how best to proceed.

The following section examines the SL concept, its respective components and some of its theoretical underpinnings. This is augmented with suggested examples of conceptual frameworks which could guide the development of SL indicators. Subsequently, we look at the lessons learned from indicator development in the areas of poverty reduction, sustainable development and participatory development and their links to our exercise. Based on this analysis, a number of scenarios are suggested as means to measure SL in the context of country-level programmes and projects.

. SUSTAINABLE LIVELIHOODS AND INDICATOR DEVELOPMENT

Background and Overview

Surfacing a decade ago in the report of the World Commission on Environment and Development, the idea of sustainable livelihoods began as an approach to maintain or enhance resource productivity, secure ownership of and access to assets, resources and income-earning activities as well as to ensure adequate stocks and flows of food and cash to meet basic needs. It was a reflection of the growing recognition that food security was not merely a problem of agricultural productivity but was a problem of poverty in all its multi faceted dimensions. The 1992 United Nations Conference on Environment and Development (UNCED) moved the concept towards an action agenda especially in the context of Agenda 21, and advocated for the achievement of sustainable livelihoods as a broad goal for poverty eradication focused on the poor who live in marginalised areas. Agenda 21 stated that sustainable livelihoods could serve as an integrating factor that allows policies to address development, sustainable resource management and poverty eradication simultaneously. The Copenhagen World Summit for Social Development and the Fourth World Conference on Women (FWCW) at Beijing underscored the significance of linkages between sustainability, employment, social integration, gender and poverty eradication for policy and development programming

Sustainable livelihoods is a systemic and adaptive approach that links issues of poverty reduction, sustainability and empowerment processes (e.g., participation, gender empowerment, and good governance). The attractiveness of SL lies in its applicability to different contexts, situations of uncertainty and in its capacity as a consultative and participatory process for the cross-fertilization of ideas and strategies between various stakeholders. Those living in extreme poverty and outside the formal labor market, for example, constantly improvise their livelihood strategies due to high

uncertainty and limited options. A subsistence farmer in the off-season or during drought becomes a wage laborer and could later revert back to farming when it is time to plough the field. In a similar vein, we find that job security in the traditional sense seems to be decreasing in the modern/formal/urban sectors and people are changing jobs several times in their life time. The SL approach has the flexibility to tap into such kinds of adaptive responses and utilize them as entry points for policy making.

Underlying these complex issues of human sustenance and livelihoods, is peoples' interconnectedness with the natural environment. The earth's natural resources are not limitless. Can we then produce and consume resources and also realize our livelihood aspirations without jeopardizing the capacities of each other, or of the future generations in maintaining at least the same level of opportunities? Given this initial description, we proceed to offer a few working definitions that help clarify the various components of the SL concept and approach. In much of the developing world, people are engaged a number of activities (sequential and simultaneous) that contribute to their well being, or constitute their livelihoods.

These activities span the range from agriculture, petty hawking/trading, wage labour, to provision of low-cost transportation services. Livelihoods, therefore, are the means, activities and entitlements by which people make a living. A livelihood system is a dynamic realm that integrates both the opportunities and assets available to a group of people for achieving their goals and aspirations as well as interactions with and exposure to a range of beneficial or harmful ecological, social, economic and political perturbations that may help or hinder groups' capacities to make a living.

Sustainable livelihoods are derived from people's capacity to make a living by surviving shocks and stress and improve their material condition without jeopardizing the livelihood options of other people's, either now or in the future. This requires reliance on both capabilities and assets (i.e., stores, resources, claims and accesses) for a means of living. A livelihood is sustainable if it can cope with, recover from and adapt to stresses and shocks, maintain and enhance its capabilities and assets, and enhance opportunities for the next generation.

One of the ways to understand SL systems is to analyze the coping and adaptive strategies pursued by individuals and communities as a response to external shocks and stresses such as drought, civil strife and policy failures. There is, however, an important distinction between coping and adaptive strategies. Coping strategies are often a short-term response to a specific shock such as drought. For example, during the 1991-92 drought in Southern Africa, smallholder farmers (both women and men) in Zimbabwe, who

normally crop hybrid maize varieties, reverted to planting indigenous varieties of drought resistant sorghum and millet to meet immediate household food needs. This practice lasted only until the drought ended, at which point smallholders returned to cultivating maize.

On the other hand, adaptive strategies entail a long-term change in behaviour patterns as a result of a shock or stress. A common example is that of agro-pastoralists who have adapted to changing conditions of climate, water and vegetation variability by optimizing the mix of cattle, sheep, goats and camels in their herds. The SL concept and approach builds on these foundations and can assist in the formulation of appropriate policies and programmes that are cognizant of the various risks and opportunities faced by communities and individuals, help them harness their coping and adaptive strategies, encourage sustainable use of natural resources and strengthen the learning of national and local institutions and networks so as to create an enabling environment for sustainable livelihood patterns.

A crucial element of the SL approach is the notion of mutuality and reciprocity. The approach provides a lens through which to view people and their environments in a reciprocal relationship. Thus, people are neither cast as powerless objects, nor as free agents who can become whatever they choose. In other words, there is a feedback loop not only between people themselves, but also between people and the political, social, economic situations in which they find themselves. Based on experimentation and lessons from the field, the SL approach has been operationalized in five interactive steps:

- Identification of the risks, assets, entitlements, livelihood activities, and knowledge bases of communities and individuals through the use participatory research techniques.

- Analysis of macro, micro and sectoral policies which impinge on people's livelihoods.

- Assessment and determination of key technology contributions to SL.

- Identification of existing investment (e.g., micro-finance) opportunities.

- Making sure that the first four stages are integrative and interactive in real time.

The fifth stage raises the question: how do we insure that the first four stages are integrative? A framework is needed, one which brings together SL's various elements: coping and adaptive strategies, poverty reduction, sustainability and issues of process. The framework which emerges can then be treated as a heuristic tool or template (by the actors involved in implementing the SL approach) for identifying the linkages between the different elements, developing indicators for them, and evaluating outcomes.

Sustainable Development for Sustainable Livelihoods

A possible option for a conceptual framework within which to place SL is one developed by the International Institute for Sustainable Development (IISD). The framework integrates the concepts of sustainable development and sustainable livelihoods. It is best conceptualized as a diagram merging two interactive triangles, one representing the cornerstones of sustainable development (economic efficiency, environmental integrity, and human well being) and other the showing those of sustainable livelihoods (local knowledge, science and technology, and policy structures). It is opined that elements and issues that make for sustainable livelihoods lie at the critical interface of human-environment interactions. Political, cultural, religious, social, economic, biological and geo-physical factors simultaneously interact with and in combination with each other to produce a variety of functions, processes and products, which shape the way a community makes a living in a given ecozone. Analysis of these factors allows policy-makers and practitioners to formulate appropriate and context-specific programmes and projects that aim to promote particular SL systems. The framework is shown below.

Figure 1. Elemental Integration of Sustainable Development and Livelihoods

Vulnerability Assessment

A second scenario is the "vulnerability assessment (VA)" model. The notion of "vulnerability" and "sustainability" in the context of livelihoods can be viewed as two ends of a continuum. The properties of a vulnerable livelihood system are contrary to those of a sustainable livelihood system. For example, SL aims to:

- Manage (reduce) the risk of "exposure" to crises, stress and shocks

- Enhance the "capacities" to cope with stress, crises and shocks, thus reducing vulnerability

- Focus on "potentiality" by maintaining and enhancing enabling environments within which people can realize their livelihood aspirations.

Sustainability and vulnerability are "processes" and not events. Livelihood systems and groups (i.e., individuals, households, communities) on the abovementioned continuum are dynamic in nature. Based on the specific configuration of this space, livelihood systems can be located at a certain point on this continuum. Additionally, accounting for vulnerable and sustainable livelihoods as processes allows us to view the relationship between, for example, economic growth and social equity, or even sustainability and vulnerability not in either/or terms, but as more complex relationships where the existence of such contradictions is a part

of the process.

An added advantage of the VA mode, and its natural link to SL, is that it recognizes that not everybody is equally at risk and therefore takes coping and adaptive strategies as the entry point for developing strategies. Thus, using this framework, we can state that the most vulnerable livelihood systems can be identified as those which are most exposed to perturbations, which possess the most limited coping capacity and suffer the most from the impact of crisis or environmental perturbations, and which are endowed with limited potential for recovery. Accordingly, the prescriptive and normative response to vulnerability-the SL approach-is to reduce exposure, enhance coping capacity, strengthen recovery potential, and finally create, maintain and enhance an enabling environment within which people can realise their livelihood aspirations. It needs to be pointed out that peoples adaptive strategies are a function of their position on the vulnerability-sustainability continuum. For example, the short-term activities of a subsistence farmer during drought would be to maintain her assets and obtain food for the household. The livelihood activities of person in a white-collared job, in the short-term, could be to take care of the monthly credit card bills or go for a holiday.

Having made the case that one way for devising an SL programme or creating indicators for sustainable livelihoods is by outlining vulnerable livelihoods, we need some kind of theory to ground the variability and dynamism of livelihood systems and adaptive strategies. As a starting point, we suggest a tentative theory or model of livelihood change which needs empirical verification. Thereafter, we identify the elements or structure of a dynamic livelihood system.

A Process Model of Dynamic Livelihoods

A nonlinear model of livelihood evolution can help explain how the elements that constitute a livelihood system change over time. The model of change extends the work of Braudel (1980) and Gould (1980,1989). Braudel's is a three-fold model that differentiates change between the instant (at the level of everyday occurrences), the cyclical (less transitory change, and structural in nature), and the *longue durée* (where change is virtually imperceptible). Applying the Braudelian scheme of change to livelihood systems we suggest that change in livelihood systems might be categorized as interaction change, rank order change, or change in constitutive units. Interaction change is manifested at the individual or household level of decision making, for example, in daily coping strategies. Rank order change pertains to cyclical changes, for example, seasonal shifts in capabilities of different livelihood groups. We may find that the livelihood strategies which individuals

or households undertake make them either vulnerable or sustainable in different seasons. Finally, change in constitutive units (unit change), for example, the change in the governance structure, is similar to the *longue durée* of the Braudelian scheme. This type of change or transformation does not happen often.

A second model is that of Stephen Jay Gould. Gould's "punctuated-equilibrium" model purports that stages of relative tranquility are interrupted by sudden and dramatic changes. Such broad exogenous change--punctuation--will lead to a flurry of radically new forms. In the long run, some of these forms may die out and a period of relative tranquility will ensue. In sociopolitical terms, war, revolution, economic changes such as emergence of capitalism and post-industrialist economies are the "punctuations" that trigger innovation. What follows is dramatic change in organization, culture, or economics which changes the constraints and opportunities for social actors. In other words, broad based external change has a variety of internal repercussions. We can extend Gould's theory of biological evolution to social evolution. We do so by (a) considering livelihood groups as intentional agents as they perform livelihood strategies, and (b) that these outcomes (adaptive strategies) are not necessarily efficient responses to environmental changes.

Another facet of the model is a focus on the role of beliefs and norms (an individual's belief system)--mental constructs in shaping outcomes. We utilize Weber's notion of "elective affinity" to address this issue. A belief system, according to Weber, is a conceptual framework through which individuals aggregate and evaluate social events. Different social groups often have different belief systems because of the elective affinity of interests and beliefs. For example, subsistence farmers may have a different conception and valuation of manual labor than landlords.

The Evolution of Adaptive Strategies

External changes such as growth of trade and increase in urban centers or floods and droughts lead to realignments and changes in the capabilities of livelihood systems. External change is mediated by the specific interests, calculations, and belief systems of livelihood groups. Individuals and households then, select among a variety of adaptive strategies. However, the evolution of adaptive strategies is not perceived as linear and deterministic. The process is akin to "punctuated equilibrium" where external socio-ecological conditions change at critical junctures to such an extent that a reordering of opportunities and capabilities of individuals and households takes place. This in turn may lead to a change in interests, perceptions and capabilities to make a living. From these newly formed conditions emerge adaptive strategies, of which a few

are selected, survive, and are retained.

We can view this process as different forms of learning. The selection of certain adaptive strategies are similar to single-loop or first order learning. These are responses to the existing socio-ecological milieu, without an attempting to drastically change the situation. As dissonance increases, individuals or households may be unable to adapt and become increasingly inefficient and unsustainable through their use of specific strategies. A critical juncture that punctuates the development of these adaptive strategies could be, for example, increased trade and urbanization or some extreme ecological event. This may lead individuals or households into double-loop learning, or Learning II, where change occurs in both the framework of values and norms (cognitive structure or epistemology) that guide strategies and actions, and a change in the strategies and actions themselves. This kind of change also pertains to individuals' or households' capacity for "learning to learn." Individuals or households not only solve the problem, where each solving is a case of Learning I, but they also becomes more and more skilled in solving the problems.

A Way Forward?

Based on the above information, we put forth the idea that the space of a livelihood system can be defined by three distinct processes which are linked through a tripartite structure (see figure below).

Figure 2. An Analytical Framework for SL

The three sides of the analytical triangle are Human Ecology, Expanded Entitlements and Policy Matrix. The core of the triangle comprises of coping and adaptive strategies of the livelihood group. Coping and adaptive strategies are reactive and proactive "decisions" by the livelihood groups for reducing risk, regaining their capacities and capabilities, and maintaining or enhancing their livelihood options by creating a positive change in their lives.

Each point of the triangle (i.e., exposure, potentiality, capacity) represents a network of "interconnected ideas" and "indicators" which can be categorized on the basis of processes, structures, values and decisions. Ideally, we need to understand the three sides in relation to one another in addition to the points of the triangle which help shape decision-making. For example, the impact of policies on adaptive strategies of subsistence farmers needs to be understood in relation to the quality of resource base on which they depend and also within the context of the social milieu (i.e., some notion of social capital). The indicators should reflect the interconnectedness of these relationships. The next few paragraphs describe the elements of a livelihood system when viewed through the analytical triangle.

In a general sense, the human ecology side of the triangle refers to the relations between nature and human society. The emphasis in our model of a livelihood system emphasizes the relationship between livelihood systems, reproduction (population growth) and consumption patterns and their implications for sustainability. This relationship raises several pertinent issues. One of the questions is, whether livelihood activities maintain and enhance, or deplete and degrade, the local natural resource base. On the positive side, livelihood activities can improve productivity of renewable resources like air and river water, organic soil fertility and trees. On the negative side, livelihood activities may contribute to desertification, deforestation, soil erosion, declining water tables, salinisation, pollution and the like.

The other question is whether livelihood activities make a net positive or negative contribution to the long-term (environmental) sustainability of other livelihoods? Livelihood activities can therefore be regarded as unsustainable if they have a net negative effect on the adaptive capacities and recovery potential of people themselves, others, future generations, or the physical environment. Population pressure (e.g., density of population) is another important factor which interacts with the sustainability of a livelihood system. The relationship between population pressures and sustainability, however, is mediated by several contextual factors such as life-styles and consumption patterns. In a rural setting, for example, population pressures may contribute to environmental unsustainability when there is interference (migration) of population into new areas. Initial interference is followed by high levels of damage. This is especially true when there is interference into areas of lower resilience and higher sensitivity (where the resource base is depleted) and when existing management practices may not be adequate for the sustainable use of these areas. Even if there are sustainable management practices, population pressures coupled with certain kinds of consumption patterns, reduces the margin of subsistence. This could in turn induce pressure for short term gains at the cost of long term sustainability.

The policy matrix side refers to the relationship between policy and livelihood systems. Patterns of entitlements and distribution of assets are embedded in a macro-structure of policy. A variety of policies also affect local adaptive strategies. These relationships may not be clear at the beginning of an investigation, but their relevance to the SL approach needs to be emphasized at the outset. First, we need a definition of what we mean by a policy. For the purpose of SL we define policy as: a written or unwritten intent with related incentives and disincentives designed to achieve some stated societal goals. A range of policies, such as structural adjustment policy, marketing policy, animal health policy, education

policy, credit policy, legal reforms, forest policy, or land tenure policy can either enhance vulnerability and reduce resilience, or vice-versa. This underscores the emphasis of SL approach not only being 'down-stream' at the micro-level, but also working 'upstream' attempting to create an enabling macro-policy environment or scenario.

For example, land and resource tenure patterns, whether traditional or modern, have a significant impact on the productivity and sustainability of livelihood systems. Legislation on land reform may have a positive impact on the ability of women, who have been historically discriminated against because of patriarchal social systems or existence of caste hierarchies, to gain access to an important economic asset. Removing these barriers can greatly improve the resilience of their livelihood systems and empower women to take advantage of opportunities in the area of credit, small-business development and agricultural extension and services. The third side of our theoretical triangle is the issue of expanded entitlements. Amartya Sen defined entitlements as the set of different commodity bundles that a person can acquire through the use of the various legal channels of acquirement open to someone in his position. This definition needs to be expanded to entitlements that include security and support derived from social capital formation. This would include intra and inter-community forms of reciprocity that are a direct result of kinship, ethnicity or culture. Another extension would be that of environmental entitlements which can be defined as the combined outcome of both the environmental resource bundles that people have command over as result of their ownership, their own production, or their membership of a particular social or economic group; and their ability to make effective use of those resource bundles. In essence, the issue boils down to empowering individuals so that they are able to tap into various resources as a means to improving their livelihoods and, hence, their well being.

Keeping this framework in mind the next two sections will suggest how indicators for SL can be devised and the lessons that have been learned from previous work on indicators for poverty, sustainable development and participatory development.

. INDICATOR DEVELOPMENT

“ The real act of discovery consists not in finding new lands but in seeing with new eyes”

-Marcel Proust

The following section first discusses a tentative definition of indicators and some properties of SL indicators. While keeping these issues in mind, our purpose is to move beyond popular thinking on the subject of indicator development. For one, we highlight some of

the epistemological issues underlying activities such as indicator development. We want the readers to begin recognizing their personal epistemologies--how do they know what they know. It is possible that following this reflection, the exercise for developing indicators for SL may require a shift in the way we perceive reality.

What are indicators?

Further to the initial discussion on certain characteristics, indicators are generally considered as pieces of information or data that can be used to make decisions based on observed trends towards or away from specific goals. For example, some kinds of information about the socio-ecological environment can indicate to decision makers the status and trend towards (or away from) the goal of sustainable livelihoods.

In addition to the properties of SL discussed in an earlier part of the paper, we need to mention another issue. This pertains to the type of indicators and audience to which indicators apply. We differentiate SL indicators as exogenous and endogenous. Exogenous indicators are national or global level indicators which are derived from and based on established scientific facts and information (e.g., dietary requirement and environmental data such as soil fertility or biodiversity). On the other hand, community level indicators should be evaluated against a standard or norm that is established endogenously by the local people themselves.

In the SL context, indicators are designed to assist policy makers in governments, multilateral organizations and those who are affected by the policies, to assess the impact or performance of SL policies and programmes. The impetus for indicator development, therefore, should not be only technical in nature where issues such as ease of measurement and gathering data, and policy relevance are considered. Nevertheless, some indicators should also be devised as tools for "communication."

Sensitively constructed and chosen, communicative indicators articulate the problems and educate the participants and the public by providing appropriate information. In doing so it is hoped that they will engender a sense of social responsibility for the problems they measure. This, it can be argued, will have two effects. First, it may encourage people to change their household behavior: knowing that deforestation is occurring at a rampant rate, for example, households can be more receptive in moving from fuel-wood to bio-gas or other forms of sustainable technology for cooking food. Second, such information will change people's political responses, encouraging support for public policy to deal with the problems. The ideal indicator, then is both accurate and resonant.

Often, indicators are taken at face value and viewed as measures for monitoring a specific situation. However, moving beyond such simplistic thinking, we begin to comprehend that indicators are

partial and imperfect reflections of reality. Student test scores and report cards, for example, are indicators of learning. But it is debatable whether test scores are truly representative of learning. Whether indicators are test scores or the Gross National Product (GNP) of a country, they are inevitably reductionist in nature where a certain population ascribes some meaning or value to a part of reality. Underlying indicator development there exist complex issues of values, mental models and world views. We bring with us our mental baggage-our sets of assumptions about how the world works, and what is important-when we create indicators. In other words, we measure what we value, and we also come to value what we measure. In this context, we recognize that one of the main properties of the SL approach is that it is dynamic and process-oriented. Therefore, indicators of SL should reflect the following properties:

(A) The SL approach is adaptive and learning. We therefore require concepts and theories of change which also lend themselves to developing indicators. In our earlier discussion on properties of SL, we briefly alluded to concepts of learning. In this section we suggest the applicability of some concepts of learning such as single and double loop learning to SL indicators.

In single loop learning an individual detects an error following which she modifies her strategies or assumptions while remaining within the same set of alternatives. Learning II, double loop or deutero-learning, on the other hand, is a change in the process of Learning I (e.g., a corrective change in the set of alternatives from which choice is made), or change in how the sequence of experience is punctuated. This kind of change also pertains to an individual's capacity for "learning to learn." An individual not only solves the problem, where each solving is a case of Learning I, but she also becomes better equipped to solving the problems at hand. Take the case of adaptive strategies of the rural poor. While we recognize that people living in poverty adapt themselves to the changing circumstances, we need to highlight instances when the poor learn to learn adaptive strategies which make them sustainable or vulnerable. One of the challenges for indicator development, especially when we apply notions of learning and adaptation, would be to identify, for example, trends or thresholds which reflect single-loop and double learning in livelihood systems and people's adaptive strategies.

(B) Nested relationships between individual, community, national, and global levels. In light of indicator development this property pertains to "hierarchies." This paper suggests that individual and household decision-making should be the first level of indicators. The other levels include the national and global levels. One of the challenges for creating SL indicators is to identify the linkages and causal relationships across these levels of analysis.

(C) Interconnectedness between different elements of SL (i.e., poverty and participation, appropriate technology and division of labour), where change in one element is related to and impacts on the other elements. These processes of change reflect feedback loops (positive and negative), sudden changes (punctuated equilibrium), and uncertainties in the whole process. A revealing indicator in dynamic systems, for example, is the rapidity of exponential growth processes (i.e., positive feedback loops). Exponential growth is growth that feeds on itself where small changes in the growth rate can signal large potential changes in the system. Indicators for SL should be able to identify and represent trends of thresholds in livelihood systems.

(D) Another property of SL is that it is contextual in nature. While properties of adaptation and learning suggest that there is no blueprint of the SL approach, contextuality pertains to the emphasis placed on specific contexts for creating indicators or interventions. With regard to indicator development the contextuality of the SL approach is reflected in grass-roots or community-derived indicators. Our assumption here is that such indicators are not an understanding of reality waiting to be discovered by the detached scientist. Instead they are a constructed understanding--an informed perception--developed by those engaged in the activity under scrutiny. These indicators should be obtained through participatory research techniques such as participatory rural appraisal (PRA) or participatory action research (PAR).

The next step is to investigate whether we can develop indicators which reflect the complexity and dynamism of the SL approach. We suggest a few directions this endeavour could take. We need to explore whether the concept of sustainable livelihoods can be modeled. For example, "integrated assessment" has been used as a methodological tool to bridge the gap between science and decision making by modeling complex human-environment systems. Similar methodologies have also been used to create partial models of different human activity sectors (e.g., energy and transport). Since the SL approach is holistic and situates its strategies in both socioecological and economic systems, integrated assessments and related methodologies might provide the breakthrough for SL indicator development.

We also need further analysis on the types of indicators needed for the SL approach. Ultimately, they could be a combination of qualitative and quantitative indicators, derived exogenously by experts and endogenously by the people themselves. SL indicators could incorporate a composite indicator such as the Human Development Index (HDI) and also include a list or map of individual indicators. Consequently, methodologies for gathering indicators would include large scale sample surveys, qualitative methodologies

such as ethnographies and PRAs, and scientific assessments of ecological phenomena such as deforestation and climate change. If this approach is adopted for developing SL indicators, it might be useful to organize the data in an information system. Information systems are tools for unifying diverse indicators while accounting for causality and interlinkages. A kind of GIS System mapping overlays on poverty indices with information on access to assets, technology, etc. might provide useful insights in to SL indicator development. Before suggesting some options on how best to proceed with developing indicators of SL, it is helpful to outline the experiences associated with measuring poverty, sustainability and participation and empowerment.

LESSONS FROM PREVIOUS INDICATOR WORK

There has been a considerable amount of work undertaken in the area of defining and measuring poverty, sustainable development and participatory development. Each thematic area has, surely, faced challenges in determining which indicators are appropriate and the contexts within which they have been developed. Given this experience, it would be useful to review how these efforts can assist in the development of SL indicators.

Poverty Definitions and Poverty Lines

Absolute poverty denotes the inability of households (and individuals) to command sufficient resources to satisfy basic needs or a standard of living. Given this framework there are distinct components to the measurement of poverty. The usual yardstick for identifying the poor is either income or expenditures (explained below). Everything is reduced to common monetary units, and prices provide the weights for each item (i.e., value of goods and services). A threshold or poverty line has to be chosen to distinguish the poor from the non-poor. Once a line has been created, the poor can be aggregated into a summary index or measure to estimate their level of poverty.

The number of poor can be aggregated to produce a "headcount index"; the average depth of their poverty can be included to produce a "poverty-gap" index; and inequality among the poor can also be highlighted with a "weighted poverty gap" index. These three measures together can reveal the extent, depth and severity of poverty. But they still rely on how accurately poverty is defined. This information is usually gathered through the use of surveys. In this context, there are a number of considerations that need to be incorporated into surveys that intend to establish a poverty line:

Income or Consumption? Establishing poverty lines entails use of income and consumption patterns. Given that incomes tend to fluctuate seasonally (and yearly), this has meant that consumption analysis is seen to be a better method for setting poverty lines.

Non-Cash Income. Other than obtaining direct income, there are a number of other sources that contribute to overall well being.

These include, food goods produced at home and health care or housing

Regional Differentiation. Another aspect in the creation of a poverty line is the variability in the cost of living from region to region within a particular country. Therefore it is often beneficial to have separate poverty lines for urban versus rural households, or for different states and provinces. These should be coupled with distinct inflational adjustments and imputations for home-produced goods or public/employer benefits on a regional basis.

Adjusting for Inflation. The poverty line also needs to be adjusted for annual inflation. It is also important to disaggregate the cost-of-living among high, middle and low-income households.

Underlying Problems

One of the fundamental problems with poverty lines is that they look at income/expenditure information at the household level not at the individual level. It is assumed that intra-household income/consumption is the same for all household members without accounting for different nutritional or other requirements.

Intra-household inequality is virtually ignored, especially gender considerations.

Furthermore, current poverty measurements ignore the both causes of poverty and, therefore, the various dimensions (including temporal) of poverty. For a majority, being poor is not merely a function of income and expenditures. Lack of physical assets (i.e., land, housing), residing in isolated regions, low educational attainment precluding access to productive employment, ethnicity or caste, age and gender all have implications on whether poverty is a temporary phenomenon or a permanent state.

Alternative Indicators

Despite many of its failings, conventional poverty lines continue to be the conceptual and operational foundations for current anti-poverty policies. This being said, however, there are a number of alternative measures of poverty that are gaining momentum. These methods look more at the social and human dimensions of poverty as opposed to economic imperatives. At the heart of this process is the recognition that people go in and out of poverty and it is essential to look at the causes of poverty in addition to its measurement.

Capability Poverty

Human development is defined by the expansion of capabilities. Unlike income, capabilities are ends, and they are not reflected in inputs, but in human outcomes-in the quality of people's lives. Human deprivation should not be defined in terms of all capabilities, but only essential or "foundational" capabilities. Capability poverty occurs when people are unable to reach a certain level of essential human achievement or functioning (i.e., malnourishment, illiteracy, poor health). Examples of basic capabilities are leading a life free of avoidable morbidity, being informed and educated, well nourished and having access to satisfactory levels of resource and asset bases.

Being able to function on the basis of these essential capabilities is an objective, observable phenomenon; it is not a matter of subjective perception, nor is it culture specific. Measures of capability should be used to complement an income measure of poverty, but should not be aggregated as conventional poverty lines because of the dimensions of deprivation (i.e., different levels of deprivation between different individuals). A potential solution is to use the percentage of the population below an expenditure-based poverty line as a point of reference, and compare this to the percentages of the population deprived in other non-income dimensions. For example, the percentage of people who are illiterate could be considerably higher than the percentage of those below the poverty line.

Indicators (equally weighted) for the capability poverty measure include: percentage of under-five children who are underweight, percentage of adult women who are illiterate and the percentage of births unattended by a trained health personnel. The first two indicators are direct measures of human capabilities (i.e., adequately nourished and literate). The third is not a direct measure, but acts as a proxy for the capability of safe and healthy reproduction. Other proxy indicators could include:

- Under 5 children who are stunted or wasted

- Low-birth-weight babies

- Adult literacy rate

- Net primary enrollment ratio

- Primary school completion rate

- Immunization rate

Where direct and indirect/proxy measures do not exist, or are difficult to acquire, indicators reflecting access to the means to capabilities can be used. For example:

- Attendance of trained health personnel at births

- Access to potable water

- Access to adequate sanitation

- Access to electricity

- Access to primary health care (potential means)

Access to public transportation (potential means)

The potential means does not imply that a household will use these services, but simply that it is located at a certain distance, presumably accessible, from the household.

Adding to the capability poverty measure is the human poverty index (HPI) recently introduced by UNDP. The HPI measures the level of deprivation in three essential elements of human life. These are:

(a) Longevity or the vulnerability to death at an early age. This is calculated as the percentage of people expected to die before the age of 40;

(b) Knowledge or being excluded from the world of reading and communication. This is measured by the percentage of adults who are illiterate; and

(c) Decent living standard or, in particular, the percentage of people with access to health services and safe water, and the percentage of malnourished children under five.

Despite the alternative methods for measuring poverty, an income/consumption bias continues to be the mainstay for most governments and international agencies. Nevertheless, a fundamental shortcoming of all poverty indicators to date is their failure to grapple with the issue of sustainability, a topic to be discussed in the following paragraphs.

SUSTAINABLE DEVELOPMENT

Since the early 1980s, the concept of sustainable development (SD) has attempted to bridge the gap between economic growth and sound use of renewable and non-renewable natural resources. Humans use the natural resources in a variety of ways to support and enhance life.

Renewable resources, those resources that can theoretically be used forever, if used in a sound manner, include water (fresh and marine), the fishery (both freshwater and marine), the forests, agricultural land, and wildlife that is hunted, trapped or fished for sport. Non-renewable resources are those for which there is a finite supply. Such resources include fossil fuels (coal, gas and oil), minerals, and base and semi-precious metals. In many cases, pressure on these resources is increasing with the increasing demands of a growing population.

The issues surrounding the use of renewable and non-renewable resources, and the resulting stresses on the environment created by such use, have resulted in the proliferation of literature on the subject. This is testament to the universality of the concept, but also highlights the wide range of opinion on how the concept can be put into practice. Disagreements involve a host of assumptions concerning, not only what exactly is to be sustained (for example, is sustainable economic development different from sustainable growth?) as well as what are appropriate levels of such

sustainability, but also more fundamental disputes over legitimate methodologies for setting sustainability levels in general, along with basic methodological issues over what would count as acceptable standards of proof that sustainability has been achieved. A concurrent process has been the development of various indicators that assist policy makers and practitioners monitor the interface between the economic, ecological and social policies in the SD context. A cross-section of these are summarized below.

PHYSICAL AND ECOLOGICAL INDICATORS

As an alternative to conventional measures of economic progress, such as GDP, the literature on sustainable development indicators has suggested some physical and ecological indicators that warrant attention. Net Primary Production (NPP) is considered a ecological counterpart of GDP in that it assess the amount of living tissue created by photosynthesis. NPP is the basis for the maintenance, growth and reproduction of all of the species that feed off plant life: it is the total food resource of the biosphere. Indicators based on Maximum Sustainable Yield (MSY) are based on renewable natural resources. If one takes the example of fisheries, the stock size (S_0) is dependent on the catch/harvest (H_0) that, in a period of time, will "cream off" natural growth leaving the stock size unchanged over time. Such a catch is then sustainable over time. If, however, at a given stock (S_0), the catch is larger than H_0 then the stock would reduce and eventually drive the stock size to zero. Additional indicators include carrying capacity (i.e., maximum population or human and other life forms that can be supported by a particular resource base) and density measures such as population, agricultural production and energy consumption. These ideas of "absolute" sustainability have been criticized because they tend to look at deep-ecology issues rather than focus on equity and economic concerns. One possible alternative that looks at the ecological-equity interface is the Relative Measure of Sustainability (RMS) considers the issue of inter-generational trade-offs. Given a particular resource system and the various entry points for extraction of resources at any given time, RMS tries to identify a "sustainable path" that lessens the impact of resource depletion on current and future generations.

Pressure State Response

A final example for monitoring sustainable development is one that has been developed by the Organization for Economic Cooperation and Development (OECD). The Pressure-State-Response model looks at the interaction between human populations (and human settlements) and the environment. Pressure is defined as the pressure of human activities in the area of energy, transport, agriculture and industry. State refers to the condition of the environment (i.e.,

water, land) as a result of the pressures. Response is the action taken by economic and environmental agents. In other words, the state is subject to pressures and elicits societal responses designed to reduce pressures and improve the state. It is important to mention that most PSR analyses look at human pressures without sufficiently looking at how environmental impacts (i.e., drought, floods) affect human populations.

The PSR model may be a good starting point for analysis of sustainable livelihood outcomes/processes. For example, a livelihood system may be considered as a pressure which can have an adverse (or positive) impact (i.e., state) on the immediate environment within which the livelihood system is placed. The response by people could be a set of adaptive strategies that are adopted. A second tier would be to look how environmental pressures affect livelihood systems and the correlating adaptive strategies that are pursued. Finally, it would also be instructive to look at types of shocks and stresses (pressure) that influence livelihood systems (state) and whether these impacts create second order pressures that would require a package of inter-related responses.

PARTICIPATION AND EMPOWERMENT

Measures to fight poverty and other forms of deprivation can often lead to dependency and further stigmatization if those affected are not empowered through greater access to assets, resources and opportunities. The promotion of empowerment is predicated upon the increased organization and participation of all people in decision-making, the mobilization of social energy, and the development of capacities at all levels in society, especially among the poor and vulnerable groups. Hence, participatory development has become a central component of the work of multi and bilateral agencies, governments and civil society organisations (CSOs), as a vehicle for greater empowerment and reducing forms of deprivation. Within the framework of SHD, people's participation means more than simply sharing the benefits of development, it entails an active and sustained role in determining how those benefits are generated and distributed. Furthermore, popular participation is seen as contributing to programme relevancy, effectiveness and sustainability at national and local levels. Consequently, it seems evident that participation if used appropriately, particularly in the decision-making process, empowers individuals to initiate action for self-reliant and sustainable development.

Defining these terms, namely, empowerment, sustainability, and participation, has proved difficult as different circumstances lead to different interpretations. Moreover, operationalizing these perceptions has been troublesome to the practitioner as the ambient factors influencing the empowerment of individuals by way of

participatory development are long-term processes, not inputs to be managed and manipulated. Subsequently, rationalising the success or failures of these processes vis-à-vis evaluation techniques and appropriate indicators remains the primary and still elusive challenge for development practitioners. This paper will attempt to provide the reader a qualitative analytical framework for reviewing the fruition of 'participatory' and 'empowerment' processes. As these concepts tend to permeate all aspects of society (for constructive or negative purposes), one should employ a flexible and iterative methodology for measuring and evaluating social development within these parameters. Hence, this exercise serves not as a definitive step-by-step 'measuring' exercise but rather the backdrop for understanding the various components that lend to participatory processes and recommendations for appropriate indicators to ascertain the successes or shortcomings of these processes.

Types of Participation and Means to Appraise

- A. Political (voter registration/turn out, regime type, # of political parties, exposure to transparent media, etc.)
- B. Economic (access to and participation in determining economic resources including natural and infrastructure, household income control, etc.)
- C. Social/Cultural (access to and participation in determining types of social services such as education, modes of communication and transport, health facilities/gender bias, exclusion of ethnic minorities, etc.)
- D. Project cycle (identification, design, implementation, report writing, etc.)
- E. Decision-making at all levels (intra-household distribution, water management, agronomy practices, policy formulation, etc.)

Who is Participating

- A. Popular (participation of the poor and deprived)
- B. Stakeholder (borrower, intermediate or indirectly affected groups, development organisations and institutions, etc.)
- C. Age, religious affiliation, gender, etc.

Levels of Participation

- A. Local, municipal, country, region, inter-regional, global

Degrees/Intensity of Participation

- A. Will and enthusiasm to participate
- B. Time involved
- C. Depth of activities, commitment

Process of Participation

- A. Upstream (catalysing a national dialogue, developing strategies, gathering support, disseminating and exchanging information nationally and internationally)
- B. Downstream (ensuring effective and collaborative national policy)

for local initiatives)

C. Beneficial (self-empowerment, direct, sustained)

D. Harmful (coercion, manipulation, assumed, top-down)

E. Methodology used and group/individual responsible for initiation

V. Crafting Indicators for Sustainable Livelihoods

As we have seen, the problems faced by practitioners and policy-makers when developing indicators for poverty, sustainable development and participation and empowerment also correspond to the difficulties faced by those involved in SL: the context, scope of coverage, impact of endogenous and exogenous factors and the like. This section seeks to propose three possible ways in which SL indicators can be identified and tested. Our approach is to build on our analytical triangle framework as well as to incorporate some of the lessons learned from other fields.

An Asset Approach

One way to look at SL indicators is to initially identify the assets that people draw upon on at various times (i.e., monthly, yearly) and which help form the backbone of their adaptive and coping strategies. We should mention that these assets can be divided into stores and resources (S&R) and claims and access (C&S). If we use this approach, it is possible to map out a particular livelihood system over the course of time, the assets that are used and how these advance or hinder adaptive strategies. The challenge for the workshop group, therefore, is to ascertain how one can measure whether these assets are being replenished or eroded and what are the factors which contribute to these processes. It is important to mention that these suggestions are simply starting points rather than established means. They serve to stimulate discussion, be critiqued and, if necessary, be discarded.

Examples of assets are described/listed below with tentative indicators for their measurement:

Land Tenure(S&R)

Fertility

Quality of Health Care

Life Expectancy

Savings/Investment (S&R)Livestock (S&R)

Jewelry

Access to Credit

Cash Savings Type/Mix

Dwelling/Shelter (S&R)Natural Resource Base (S&R)

Ownership

Quality Common Property Resources

Traditional Knowledge (S&R)Intra-household Relations (C&A)

Institutions

Traditional Education Household Size

Division of Labor
 Educational Status of Women
 Infrastructure (S&R)Time
 Wells
 Roads
 Health Clinics/primary health care
 Electricity
 Flexibility in using transport mode
 Learning
 Time spent with other age groups
 Leisure time as fraction of free time
 Community time
 Food Security/insecurity /Belief systems/attitudes/life style
 (C&A)
 Fluctuation of food prices
 Number of food distribution Centers/Happiness
 Awareness
 Experimental innovation
 Aspirations (short term, medium term, long-term
 Social Capital (C&A)
 Robberies
 Civil/social violence
 Physical mobility, especially for women
 Patronage/corruption
 Networks of reciprocity: Activities done collectivity
 Number of CBOs
 Length of school days
 How many neighbors do you know?
 Percent of elections involved with and vote for politicians
 liked

Impact of SL System

A second option is to identify a SL system and evaluate its impact on the natural environment and social equity. For example, will a particular livelihood have an adverse impact on the ecosystem upon which it is dependent? While this will require identifying livelihood systems, it could build upon the asset approach mentioned above and look at what indicators signify a worsening or improvement in both the livelihood system as well as the social and environmental systems with it interacts.

MEASURING SL COMPONENTS

A final method could be to look at ways of measuring the components of the SL system: adaptive strategies, technologies, investment patterns, policies, ecosystems and local knowledge. Again this could

utilizing existing data on environment, technology impact and local knowledge systems to develop a framework for indicators.

VI. A Critique of the SL Approach

In this section of the paper our purpose is to raise some concerns with the SL approach. There are inherent tensions in integrated and holistic concepts such as sustainable livelihoods and sustainable development since there are constant trade-offs between different elements and goals. Theoretically, it is now clear that the SL approach attempts to balance concerns of social equity, ecological security, and economic integrity. The approach, however, seems to be unrealistically tidy since neither does it overtly identify the compromises people make while pursuing their livelihood strategies, nor has it sorted out the trade-offs between its constitutive elements (e.g., resource conservation versus economic activity) and activity levels (local, national and global). Instead, it begins with a holistic entry point which hopefully reduces the need for such trade-offs which arise largely from the traditional reductionist approaches to development that are in current use. Often groups in a society manipulate rules and compete to increase their share when resources are scarce. For example, land tenure systems in several developing countries reflect this inequality. Consequently, livelihood groups constantly blend their coping and adaptive strategies to eke out a living. These strategies could include encroachment in reserved forest areas (for example, the Chiapas in Mexico). How do we then (or can we) differentiate between adaptive strategies that enhance vulnerability and with those that lead to sustainable livelihoods. Encroachment into reserved areas fulfill one goal of the SL approach, i.e., achieving social equity. However, by degrading the environment they are (environmentally) unsustainable. Adaptive strategies, which are entry points for SL policy making raise another issue. We need to ask if there is something intrinsic about the people who constantly adapt their livelihood strategies, or is it something unique about the conditions, or is it both, individuals and the circumstances, which leads to certain kinds of adaptive strategies? We acknowledge that adaptive strategies as entry points for policy making makes development interventions participatory and holistic. However, it is an open to refutation whether livelihood groups continue to adapt in similar dynamic ways, if their window of opportunities is expanded.

UNDERSTANDING THE COMPLEXITY OF SUSTAINABLE LIVELIHOOD SYSTEMS

Livelihood systems comprise a complex and diverse set of economic, social and physical strategies. These strategies are realized through the activities, assets and entitlements by

which individuals make a living. Sustainable livelihoods are derived from people's capacities to exercise choice, and to access opportunities and resources, and use them for their livelihoods in ways that do not foreclose options for others to make their living, either now, or in the future. In order to fully understand and work with such a multi faceted concept as a livelihood system we are proposing to use a complex adaptive system paradigm. A CAS framework (see Figure 1) adds value to livelihood analysis and poverty reduction because:

Being holistic in nature a CAS analysis provides an effective framework for dealing with the multi faceted nature of poverty.

A CAS framework can identify more effective entry points for poverty eradication strategies than traditional sectoral approaches.

As an advocacy tool CAS highlights the inter- relatedness of poverty, socio-economic factors and eco-systems.

Figure 1 illustrates a sustainable livelihood framework for analysing and formulation policies and programmes designed to improve the sustainability of people's livelihoods:

LIVELIHOOD AS A COMPLEX ADAPTIVE SYSTEM

As shown in Figure 1,(see website www.uoguelph.ca/~rsphd/SL/summary.html) livelihood systems are based on the availability and

use of assets, activities and entitlements, which people use to make their living. In traditional development thinking each of these areas are divided into separate development themes, and fails to take into account the interactions and dynamic changes in the elements of people's livelihoods.

The evolving paradigm of complex adaptive systems, therefore, provides an effective framework for analysing and understanding people livelihoods. A CAS is made up of smaller components with complex interactions and changing rules for interaction as time progresses. Complex adaptive systems are dynamic systems able to adapt and change within, or as part of, a changing environment. They have the capacity for self-organization and are characterized by the presence of multiple feedback loops, both negative and positive. Their behavior is, therefore, inherently unpredictable and surprise is a common feature. This paradigm provides a framework for livelihood analysis as it recognizes the complex nature of human interactions with the surrounding economy, social environment and natural ecosystems. Using a CAS paradigm, we can better identify the most effective areas for intervention in support of livelihood systems. Working with CAS requires taking multiple perspectives into account, and being

prepared for sudden change. The rules governing the system can only be partially and inadequately understood by the outside actor. Approaches such as multi-stakeholder and participatory processes, conflict resolution and consensus building become critical.

Action Levels

Intra-system: Actions that promote and capitalize on interactions within a livelihood system. Development interventions at this level would aim to improve access to and use of the core livelihood components (assets, activities, and entitlements). For example improving access to assets, improved education, skills training, improved health.

Intersystem: Actions to promote and capitalize on mutually beneficial interactions between livelihood systems such as those between different individuals, communities, countries, organizations, etc. This can be seen as horizontally linked actions, which could include contracts, trade relations, marketing, exchange of livelihood lessons among individuals, among communities, among countries, etc.

Hierarchical: Actions to promote and capitalize on the macro micro linkages that impact on livelihood systems. Here, the livelihood system is seen as a nested hierarchy of livelihood systems of individuals who are in households, which are in communities, which are in local areas in provinces or states located in countries, which are linked globally by socio-economic and biophysical inter-relationships.

Shocks and Stresses can be broadly grouped in three categories: economic (recession, high price volatility etc.), social (civil conflict, deaths of family members etc.) and natural (floods, drought etc.). These shocks and stresses can destroy or alter people's asset base, disrupt livelihood activities and hinder their ability to appropriate entitlements. In response to these outside shocks and stresses, people develop livelihood strategies, which maybe short-term responses to a specific shock such as drought or others, which entail a long-term change in behavior patterns. Both have implications on and result from the composition of the assets (i.e., depletion, regeneration) from which they are derived. These livelihood strategies embody generations of knowledge and learning that incorporates local realities faced by the community. Focusing on these strategies provides an effective broad entry point to support livelihood systems because it builds on indigenous learning and knowledge and is inherently more empowering than a prescriptive approach to development. These strategies can be supported, for example, through interventions in policy, governance, investment and technology.

Macro policy and institutions have a major impact on the livelihoods systems of communities and individuals. Higher-level policy development and planning must be informed by the local level realities facing communities. This can simultaneously give local people a stake in policy and increase overall effectiveness of policy making. However, this is a difficult task to achieve and support is usually required to further

develop mechanisms that help to increase the linkages between local communities and macro level institutions and policy makers. The entry point for policy development and intervention is an analysis of the macro, micro and sectoral policies, and governance arrangements, which impinge on people's livelihood strategies.

Governance is the exercise of economic, political and administrative authority to manage a country's affairs at all levels. More specifically governance regimes should allow for civil society to articulate its vision of development. The governance focus, therefore, is on self-organization to meet the challenges associated with abject poverty, environmental degradation and gender inequality. But governance is also about mobilization of self-organized groups or segments within civil society. This area is squarely related to the principle of social capital and the manner in which social capital fosters cooperative behaviour. Third, governance has a distributive facet, whereby government facilitates the access to productive assets and ensures that resources are available to all segments of civil society, not just that of specific interest groups. Finally, we have the aspect of confirmation: establishing the rule of law, an independent judiciary and the enforcement of rights and entitlements. Our role is in facilitating co-ordinated bottom-up and top-down policy making processes in country, and building the capacity to do so.

An investment strategy that supports livelihoods means more than micro finance schemes - investing for livelihoods also requires action at the macro level. The broad goal must be to improve the mobilization and allocation of domestic resources. This includes advocacy to increase the effectiveness of existing government expenditures so that they are more responsive to the priorities of the poorest communities. Our role is to draw out the lessons learnt from existing pro poor investment mechanisms (i.e. pro poor and participatory budgets) and to use this information to provide advice and capacity building support to those countries interested in developing responsive pro poor investment strategies. Given that some developing countries, notably Bangladesh and South Africa are already implementing pro poor budgeting systems, UNDP also has an important role to play in facilitating a south- south exchange of information.

On the technology side, the entry point for supporting livelihoods is indigenous knowledge found in the community, but equally important, we have to see if outside knowledge can complement or if necessary and feasible, even replace indigenous technologies. The reason for this is twofold: firstly to ensure that local problem identification and insights remain the starting point for inquiry; and secondly to accelerate innovation by systematic and focused efforts that build on indigenous scientific methods as well as examples from outside the community or country. Technology development is a dynamic process and must be refined through a participatory process, since to support livelihoods effectively local solutions, assets and ideas must be central to technology development. Science and Technology development has traditionally been

very sectoral in nature and followed a linear pattern. In comparison, a complex adaptive systems approach requires that a technology strategy be multi sectoral and multi disciplinary in order to fully utilize the assets of communities. Technology policy must reflect these issues in order to support livelihood systems.

Complexity theory provides useful insights in helping us to design practical and manageable interventions in complex systems that have a better chance of reaching their goals than interventions, which are based on many simplifying assumptions. Some of the design principles, which can be deduced include some well known practices such as multi-stakeholder and participatory processes; and consensus building and conflict resolution. It also justifies the need for taking multiple perspectives into, for example, policy making, and allows the judicious use of multiple entry points for action. In many ways, complexity theory has the potential for providing a conceptual framework to design holistic actions, which would otherwise be designed by trial and error.

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