

Towards an Ecosystem Approach to Policy Process: Insights from the Sustainable Livelihoods and Ecosystem Health Approaches

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Abstract: Reductionism in rural development policymaking can have serious practical ramifications for human life and well-being. Ecosystem Health and Sustainable Livelihoods (SL) are two approaches that have been assisting development practitioners to avoid reductionism and to take complexity seriously. Both of these approaches have primarily been applied at relatively small scales, and the application of SL at policy level has been largely in terms of the *substance* of policy – considering the impacts of policy on livelihoods. Nevertheless, we argue that they offer insights for policy *processes*, as well. Drawing on these insights we outline factors that should be considered in an ecosystem approach to policy process. This is an approach that would be characterized by a set of nested deliberation and decision-making processes, by a method of problem definition, analysis and solution seeking that is iterative and based on negotiation among multiple stakeholders, and by careful attention to the cross-scale aspects of decision-making processes and the flow of information.

Keywords: Adaptive Methodology for Ecosystem Sustainability and Health, AMESH, complexity, ecosystem approach, nested deliberation, policy, Sustainable Livelihoods approach

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1 Introduction: short-changing complexity

The social-ecological environments in which rural people live and create their livelihoods are characterized by multiple lines of cause and effect, positive and negative feedback loops, unpredictability, and influences that operate across scales. They are, in a word, *complex*. We can devise theories that attempt to explain some *aspects* of complex systems: identifying food webs; succession patterns; energy flows; capital circuits; patterns of political power; social, political or ecological feedback loops and cause-effect patterns; and so on. However, each of these theories would be a description of a *subsystem*. No theory can encompass all possibly relevant aspects of the whole system, any more than a map can display all possibly relevant features of a territory. In fact, one way to define a complex system is to say that it is a system for which many distinct yet valid subsystem descriptions are possible (Rosen, 1991). In other words, for any given social-ecological system various valid "maps" are possible, and therefore matters of deciding which data are relevant and of interpreting that data are problematic (Giampietro, 2004).

Unfortunately, researchers, policymakers and practitioners typically predetermine what elements should be included in any map of a social or social-ecological system, and tend to act as if cause-effect relationships are simple. It is very easy to allow these assumptions to lead to reductionism and disciplinary exclusivity. Reductionism – whether based on discipline, sector or paradigm – can have serious practical ramifications for human life and well-being, as the following two examples illustrate. The first example relates to Bovine Spongiform Encephalopathy – BSE or "Mad Cow Disease". For many years in Great Britain, policymakers, regulators and managers treated cattle production primarily as an economic matter. In a context where everything was defined in terms of production and economic efficiency, the recycling of animal protein within the system was a logical way to reduce waste and increase productivity. But this meant that all variables were not accounted for (Waltner-Toews and Lang, 2000). In management and policy, cattle raising was seen solely as a matter of economics and certain feedback loops which operated beyond the *economic* system were ignored. This had profound effects on human life and livelihoods.

Reductionism in policymaking is sometimes based on the way particular sectors or disciplines define the world, as occurred with BSE in the example described above. Sometimes, however, it is not a discipline or sector that constrains understanding, but a

single concept. For example, problems associated with the degradation and low productivity of communal land in African drylands have typically been defined as problems associated with *rangeland* and *rangeland management*, and causes traced to land tenure systems, incentive structures, or poor livestock management systems. Yet rangeland, to the local people who use it, is much more than *range-land* – it is "the bush" – a multifaceted resource where they hunt, harvest wild fruit, and extract resources such as firewood, gum-arabic, and materials for roofing, fencing, charcoal, ropes and household items such as mattresses, furniture, and mortars and pestles (Robinson, 1994). Interventions that follow from an analysis based on the concept of *rangeland* typically focus on maximizing the productivity for livestock production, and may include fencing and modifications to the land tenure system. Such changes can reduce the access of the poorest households to a resource on which they depend for their livelihood security (Robinson, 1994).

This tendency toward reductionism is understandable: the use of simplifying assumptions is a necessary part of understanding reality, but if we are to take complexity seriously in studying and planning for rural social-ecological systems, we must be very careful about the boundaries that we put around a situation and the lenses that we use to view that situation. However, merely exhorting policymakers to avoid reductionism is not enough; the more difficult questions are *how* to avoid reductionism, *how* to employ multiple perspectives, and *how and when* to make the necessary value judgements.

Complexity, the need to make value judgements, and the existence of multiple valid "maps" and multiple, often conflicting value judgements together imply an unfamiliar realm for science and technocratic policy knowledge, a realm that Funtowicz and Ravetz (1993) refer to as "post-normal science". The question arises of just how to do it – how to integrate knowledge in a complex, integrated world. A variety of frameworks have been devised: Soft Systems Methodology (Checkland, 1981; Checkland and Scholes, 1990), the Capabilities and Freedoms Approach (Nussbaum, 2000; Sen, 1999), the European Environmental Agency's Drivers-Pressure-State-Impacts-Response (DPSIR) framework (EEA, 1995; Holten-Andersen, et al., 1995), the Components-Relationships-Innovation-Continuity framework for assessing resilience (Cumming, et al. 2005; Robinson and Berkes, 2010), and the Integrated Sustainable Cities Assessment Method (Ravetz, 2000), to name a few. Ecosystem Health and Sustainable Livelihoods (SL) are two such approaches that have been in use for over a decade, challenging development practitioners to take complexity seriously and to break community development and project planning processes out of paradigmatic and disciplinary constraints. Recently, these two approaches were also the primary conceptual vehicle behind a University of Guelph project, sponsored by the Canadian International Development Agency, that was aimed at helping policy makers and rural development practitioners to address the challenges of complexity in rural development planning. We will argue that insights from these two approaches have much to offer if applied not only at project and community level, but also at policy level. In considering these insights, we provide a broad outline of factors that should be considered in what we are calling an *ecosystem approach to policy process* – an approach that would be characterized by a set of nested deliberation and decision-making processes, by a method of problem definition, analysis and solution seeking that is iterative and based on negotiation among multiple stakeholders, and by careful attention to the cross-scale aspects of decision-making processes and the flow of information.

2 Dealing with complexity at the community or project level: two approaches

2.1 *Sustainable Livelihoods*

Of the two approaches considered here, SL is the more prominent and has a much larger body of literature to support it. The origin of the SL approach is generally attributed to Chambers and Conway and their 1992 discussion paper. The approach outlined was both descriptive and normative. It describes, on the one hand, a social theory about how poor people, especially rural poor people, draw on a complex variety of capabilities, assets and entitlements to create a livelihood, and, on the other, a prescriptive framework for development practitioners to plan and act in recognition of that complexity. While the approach emerged in the context of poverty reduction in developing countries, it has been found to also have value in the West (e.g., Fuller et al., 2000; Hinshelwood, 2003; MacKeigan and Govindaraj, 2003).

SL is an explicitly transdisciplinary approach that encourages us to use the perspective of the rural household and its livelihood, rather than the boundaries of an academic discipline or government-defined sector, to identify relevant variables and describe the system. In this way, SL is not simply about using a systems perspective to identify relevant factors and the causal linkages between them, as, for example, with the European Environmental Agency's DPSIR framework. That is to say, it is not simply about organizing information; instead, it aims to help its users to restructure information and knowledge and to see the world through different lenses. The various SL frameworks in use recognize that livelihoods are created from diverse assets and diverse activities. Analyzing livelihood assets and activities at the household level can contribute to an understanding of livelihood dynamics that transcends both disciplinary boundaries and inadequate concepts such as "employment". The assets approach enables us to consider in a positive way what assets people have that contribute to their livelihoods and how these assets are valued, traded and generally mobilised into forming a livelihood. The accessing and mobilizing of assets depends upon a number of transforming structures and processes including markets, laws, entitlement and tenure regimes, culture, and many others. The key operational aspect of this approach is the "capacities" of people that enable them (or not) to recognize and mobilize their assets, otherwise assets will remain "inert".

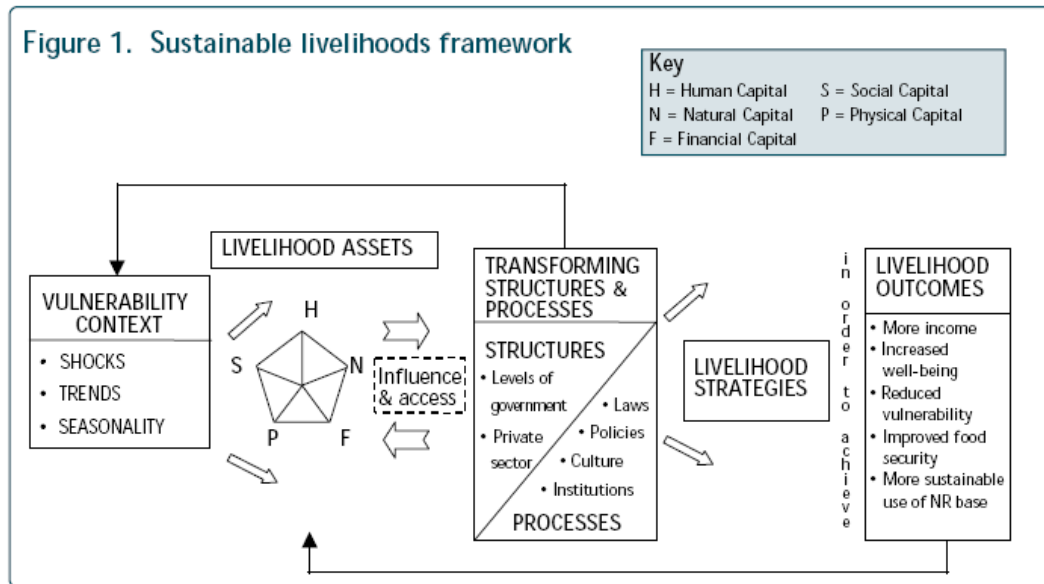
2.2 *SL frameworks as analytical tools*

Development of the SL approach has included the creation of a number of frameworks (e.g., DFID, 2001; Ellis, 2000; Scoones, 1998; Soussan et al., 2000) that identify, in the form of a table or diagram, the key types of variables involved in the creation of livelihoods and some of the most important interactions between those variables. We will refer to the framework used by the UK's development agency, the Department for International Development (DFID), not because it is necessarily the best of these frameworks, but it is by far the most well known (see Figure 1). The main elements of this framework include:

- The vulnerability context (shocks, trends, and seasonality)
- Livelihood assets (including physical capital, natural capital, financial capital, human capital and social capital)

- Transforming structures (public sector and private sector) and processes (policies, legislation, institutions, culture, and power relations)
- Livelihood strategies
- Livelihood outcomes.

Figure 1 SL framework



Source: DFID (2001)

Probably the greatest value of this kind of framework is that it provides a checklist of a wide variety of factors that must be considered. For example, the *assets* component of the framework is based on the recognition that rural livelihoods depend upon a wide variety of assets that are drawn upon for any particular livelihood activity. In conventional analyses, one or more of the capital assets, and hence some of the complexity of the livelihood system, are often overlooked. This diversity and complexity of livelihood assets are key factors in making a livelihood sustainable. The *transforming structures and processes* component – or as it is increasingly being referred to, "PIP" (policies, institutions and processes) – is based on the recognition that external factors such as policies can constrain, or enable, SL in important ways. In short, this and other livelihood frameworks can help a researcher or change agent to prepare a map of a local livelihood system that is, while not complete, at least representative of some of the elements in the system that are critical to matters of poverty and vulnerability.

The SL approach has much to offer for taking complexity seriously at the policy level in this respect. It is particularly useful for highlighting the effects of large-scale factors, including policy, on the small-scale reality of people's livelihoods, and has been used to inform policy and evaluate the impacts of policy in a variety of settings including, e.g., in relation to poverty reduction strategy papers (e.g., Ellis and Bahiigwa, 2003; Ellis and Freeman, 2004; Ellis and Mdoe, 2003; Ellis et al., 2003; Freeman et al., 2004; Thin et al., 2001) and other national-level strategies and policy processes (e.g., *Improving Policy-*

Livelihood Relationships in South Asia, 2003; *Jordan Human Development Report*, 2004; Karl et al., 2002). Policy is explicitly incorporated into SL frameworks – part of "PIP" or "Transforming Structures and Processes" – and identified as a critical set of causal variables. PIP "comprises the social and institutional context within which rural individuals and families construct and adapt their livelihoods" (Ellis, 2006). Furthermore, by focusing on the wide variety of assets, entitlements and activities that contribute to a livelihood at individual or household level and by focusing analysis on the livelihood rather than on sectoral considerations, SL helps to break down reductionist constraints on thinking and allows us to have a better understanding of the complexity and therefore the reality of livelihoods. In other words, it gives us a different way to map the system. In doing so, it helps us to see the potential impacts of policy on livelihoods through lenses appropriate for a human scale and helps us to be more alert to those impacts.

However, SL has been developed primarily as a tool for understanding the *micro* realities of people's livelihoods, and even though SL analyses are often used to examine the impacts of policy, the SL approach does not give us a *systemic* view of policy processes, nor does it help us to make policy recommendations in a systematic way. As Norton and Foster (2001) note, the PIP box of the framework contains too many key variables to be very helpful for policy analysis, and "unpacking" that box has been problematic. SL helps us to understand the complexity of livelihoods at the household level and helps us see how larger scales affect livelihoods, but it does little to help us to understand those larger scales. It has been argued, therefore, that on the whole SL has not been very useful for policy development (de Haan, 2000). As noted by Shankland (2000, p.6), the SL "framework offers some pointers for efforts to translate micro-level insights into broadly relevant policy recommendations, but little in the way of systematic support for such efforts".

A recent exception is the development by Blaikie and Soussan (2003) of a model to systematically link micro-level insights of a SL analysis to policy analysis. Their strategy is to link *ex post policy process analysis* with a livelihoods perspective, with much attention given to livelihood outcomes and indicators. The model does not, however, describe in detail *how* insights gained from the analysis are to be inserted back into decision-making, except to say that key actors should speculate together as they look toward the future.

While an *ex post* analysis of policy is helpful, there is also a need for a detailed understanding of *how* holistic analyses of the complexity of livelihoods can *inform* and *improve* policy, *ex ante*, at all levels of government. Meeting this requirement is not a straightforward task. Blaikie and Soussan (2003) note that *ex ante* approaches to policy have traditionally been linear models based on rationalist assumptions. And while national policymakers and the experts who advise them need to have a strong understanding of livelihoods in order to identify possible impacts of policies, we must also recognize that those at the national level will not often be in the best position to identify impacts at smaller scales. This implies that some sort of a participatory approach is needed.

While much attention has been given to implementing the SL approach in a participatory way at the local level (e.g., Ashley, 2000; DFID, 2001; Farrington et al., 2002; Westley and Mikhalev, 2002), the implications of SL for the scaling up of participation have yet to be fully explored. The SL approach and SL frameworks are, at the core, theoretical and analytical tools that make no explicit reference to participation.

Put into practice, however, they provide a strong impetus to those who use them to adopt a participatory approach: experts, especially sector- or discipline-based experts cannot unaided uncover all the various components and processes that are relevant to people's livelihoods, and so the knowledge and voices of the people themselves are needed. It is our contention that application of the SL approach inevitably leads one to a recognition of the need for cross-scale consultative processes so that local level insights into the potential livelihood impacts of policy can feed into large scale policy making.

However, recognizing the need for a better map is not the same as knowing how to create that map, and there is little inherent to SL that provides guidance as to *how* participation should take place, except perhaps that one of the aims of a participatory process in project planning, in community development, or in rural development policy making should be to contribute to a comprehensive, holistic picture of a particular livelihood system. The task is not straightforward. Because of the multidimensional nature of complex social-ecological systems we are faced with the technical incommensurability of alternative understandings of the system(s) in question, and because of the multiplicity of legitimate values in society we are faced with social incommensurability (Munda, 2008). A few different approaches to multi-stakeholder participation have been devised that are systems-based and that attempt to address the problems of technical and social incommensurability. One of these comes out of research into ecosystem health.

2.3 *Ecosystem health and AMESH*

Like the SL approach, ecosystem health¹ offers promise for addressing the challenge of complexity. As with SL, the label – *ecosystem health* – is both a goal and an approach for trying to make sense of a complex world in order to achieve that goal (i.e. the goal of healthy ecosystems). It is based on a few key concepts central to the complexity paradigm, one of which is *holonocracy*², the notion that complex systems exist as nested hierarchies. Each system (holon) is both part of a larger system that is made up of smaller subsystems. For example, defined ecologically, holons at various scales might include individuals, populations, habitats, landscapes, and biomes. Defined in socio-economic terms they might include individuals, households, communities, and regional, national and international economies. A second central concept is *complexity* itself, which, as alluded to above, implies that certain systems *cannot* be adequately understood by any single scientific model or theory. A third concept is that system dynamics cannot be understood without understanding cross-scale interactions. The new element that ESH adds to the concepts of holonocracy, complexity, and cross-scale interactions is the analogy of health. *Health*, as a concept or metaphor, provides us with a way to think about our goals without providing predetermined, pat answers that cannot function within the context of complex social-ecological systems. Achieving healthy ecosystems and healthy social-ecological systems requires a conscious examination of values and goals: "[H]ealth is more than survival – it is survival in a condition and manner that satisfies human goals" (Rapport, 1998: 27).

One of the tools to come out of ESH is the Adaptive Methodology for Ecosystem Sustainability and Health (AMESH) (Murray et al., 2002; Waltner-Toews et al., 2004), a planning methodology that has typically been applied at community and micro-regional level. AMESH can be seen as an action-research cycle that includes the following broad, iterative steps:

- A presenting situation (the entry point);
- Analysis of stakeholders, issues and governance, and their relationships;
- People and their stories;
- Systems descriptions and narratives, including systems analysis and systems synthesis; and
- Collaborative learning and action, including cross-talk and seeking solutions, design of an adaptive approach for implementation of the vision and collaborative learning, implementation, and monitoring and evaluation.

(Waltner-Toews et al., 2004)

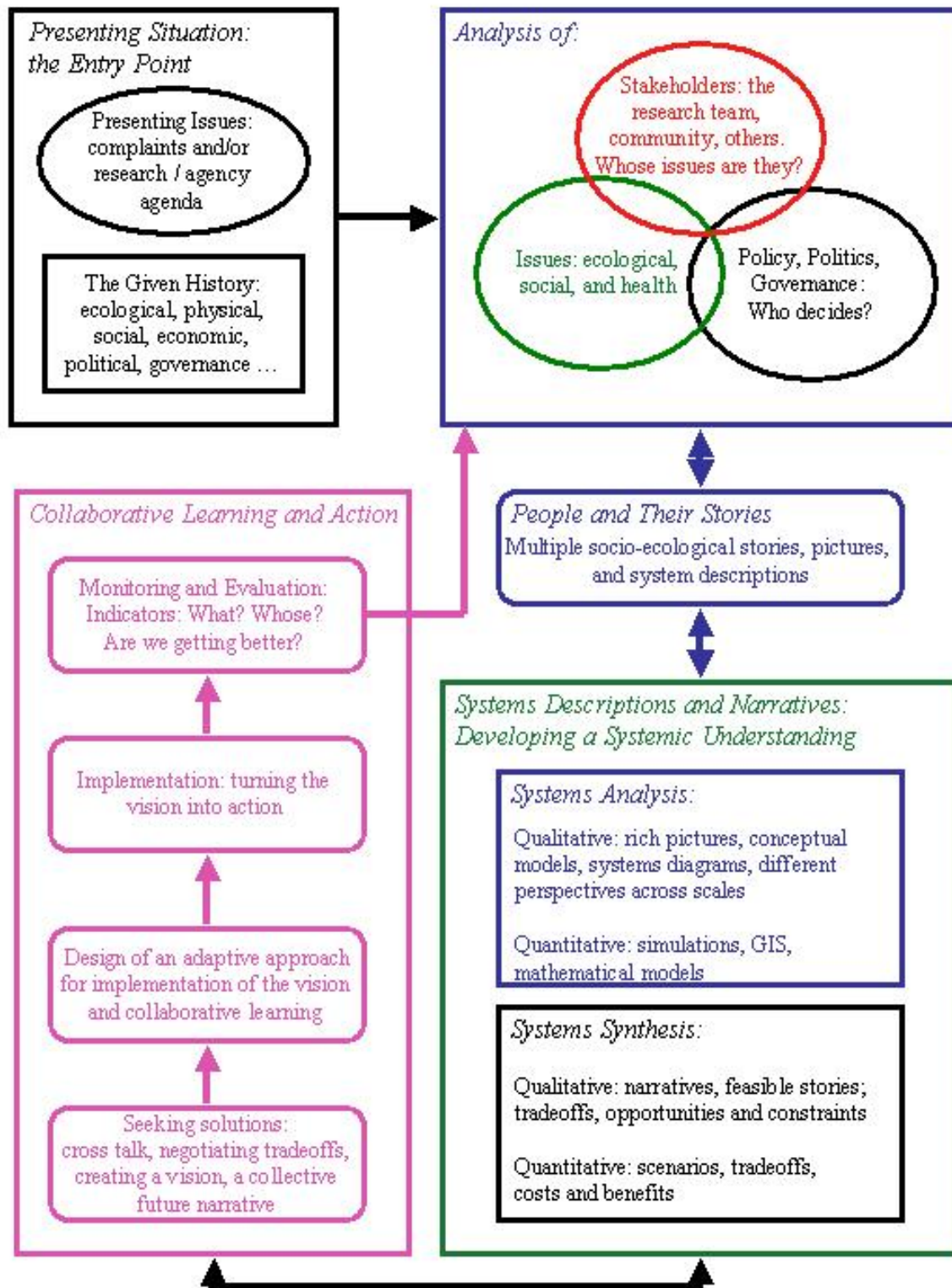
This process is summarized in Figure 2.

AMESH shares features with other participatory planning and action-research processes. However, its incorporation of multiple perspectives on the part of multiple stakeholders differentiates it from many of these other processes. The existence of community consensus is neither assumed to exist nor treated as non-problematic and easily achievable. AMESH avoids the mistake that many participatory processes are accused of: assuming that communities are homogenous. Nor does the AMESH process avoid this problem by focusing on only one stakeholder group. Instead, the process is designed with negotiation as an integral part. The existence of multiple stakeholder groups is explicitly recognized at four of the five stages mentioned above, the only possible exception being the entry point stage at which a *presenting situation* attracts the involvement of outside researchers/change agents. Involving stakeholders throughout the process in this way, without lumping them together as a "community", does two important things. First, it reflects an understanding that complex systems can be mapped in different ways and cannot be completely comprehended with any one single map: "AMESH draws attention to such different 'versions' of reality and provides a systemic means to expose, incorporate and reconcile them within the research agenda" (Waltner-Toews et al., 2004, p.11). The second consequence of involving multiple stakeholders in this way, which follows from the first, is that real-life complexity is incorporated into the analyses and plans that emerge in ways that researcher-driven processes and artificially accelerated consensus-based processes cannot.

2.4 *A comparison of the frameworks*

Table 1 summarizes in broad terms the DFID SL framework and AMESH, as well as, for comparison purposes, two policy analysis/policy process models: DPSIR, and the format that Blaikie and Soussan (2003) propose for linking a livelihoods perspective with policy process analysis. As AMESH is not a methodology that was devised with focus on policy and as the DFID SL framework is as much concerned with project design as with policy, the table does not provide a detailed comparison of approaches to policy. Instead, the comparison is more fundamental, considering approaches to analysis, approaches to decision-making processes, and the overall strategy implicit in each framework.

Figure 2 AMESH



Source: Waltner-Toews et. al (2004)

Table 1 A comparison of the four frameworks

	<i>Framework/Model</i>			
	<i>DPSIR</i>	<i>DFID SL Framework</i>	<i>Blaikie and Soussan 2003</i>	<i>AMESH</i>
Strategic response to complexity	Improve analysis of complex reality (particularly of macro level drivers, pressures and impacts)	Improve analysis of complex reality (particularly of livelihoods)	Improve analysis of complex reality (particularly of livelihoods) <i>and</i> of decision making processes	Improve analysis of complex reality and ensure decision-making <i>processes</i> reflect that complexity
Approach to analysis	Organizing knowledge: work towards an integrated analysis based on a systems perspective by organizing information	Restructuring knowledge/using alternative "lenses": work towards an integrated analysis by adopting a household level perspective and using the SL framework	As with SL, but also with attention to <i>how</i> knowledge is put to use: analysis of how policy affects livelihoods <i>and</i> of the processes through which policies are developed and implemented	Creating new collective knowledge through negotiation: stakeholders develop multiple (potentially contradictory) narratives and systems analyses which are then synthesized through negotiation/ deliberation
Approach to decision-making processes	Not explicitly addressed. The framework is a tool for analysis which is used both by experts and to structure stakeholder participation in information gathering and analysis.	Not explicitly addressed ³ . The framework is a tool for analysis which is used both by experts and to structure stakeholder participation in information gathering and analysis.	Ex post policy analysis feeds into discussion by multiple stakeholders as they look to the future of the unfinished and continuing policy process	Decisions/actions are negotiated through deliberation among multiple stakeholders

3 An Ecosystem Approach to Policy Process

3.1 Complexity, AMESH, and insights for participatory policy making

The complexity paradigm provides an epistemological foundation for the call for participation. Complex open systems are systems for which many valid system descriptions are possible and which can never be fully modeled or described. A variety of "maps" and a variety of perspectives can, therefore, contribute to a more comprehensive understanding of the system – this requires meaningful participation. Furthermore, in trying to understand a complex system we must pick and choose which elements of the system are relevant to us, and therefore value judgments must be made, strengthening the moral imperative for stakeholder engagement and participation.

The AMESH represents an example of working through the implications of these tenets of the complexity paradigm for participation at relatively small scales: say a community or watershed/catchment. Whereas SL and the use of SL frameworks provide one critical way to map a system, AMESH is a process that explicitly includes the production of several maps of the system and the synthesis of these maps for the purpose of planning collaborative action. That is to say, for the purposes of understanding the complexity of livelihoods and the systems in which they are set, insights from the application of SL approach are mostly in terms of *substance* whereas AMESH provides insights in terms of *process*. We argue that AMESH can serve as a model for the core of what we are calling *an ecosystem approach to policy process*. This approach to policy process is iterative, adaptive, and brings multiple perspectives to bear, and it would have at least the following three characteristics:

- vertical and horizontal integration are carried out through a set of nested deliberations and decision-making processes;
- problem definition, analysis, and solution seeking are addressed through an iterative, negotiated process involving all stakeholder groups; and
- particular attention is given to cross-scale aspects of existing decision-making processes and of the flow of information in the social-ecological systems in question.

Other authors have suggested frameworks that similarly outline processes for bringing together multiple perspectives for policy making in settings where complexity, uncertainty and the stakes are all high (e.g., Social-Multi-Criteria Evaluation, Munda, 2008, and the Integrated Sustainable Cities Assessment Method, Ravetz, 2000). The ecosystem approach to policy process described here, unlike some of these other methodologies, does little more than hint at particular tools that might be used. Given the idiosyncratic and contingent nature of social-ecological systems, the particular opportunities that are created or precluded by particular political conditions, and the variety of deliberative and policy making processes that may already exist within different settings, we suspect that being too methodologically prescriptive may be counterproductive. Instead, what we are proposing is a fairly general framework that helps policymakers and others to conceptualize multi-level, multi-stakeholder policy processes, and within which various tools might be used. In any case, we see the ecosystem approach to policy process as complementary to the other approaches mentioned, and as different in emphasis rather than in kind.

3.2 *Nested deliberation and decision-making processes*

In the workshops and conferences that were a part of the above-mentioned University of Guelph project, participants repeatedly identified working across scales to influence policy and shape programming as one of the key features of successful micro-regional development initiatives and community-based resource management systems (Robinson, 2005). It has similarly been suggested (Dietz et al., 2003; Folke et al., 2005) that systems of adaptive governance typically involve polycentric institutional arrangements operating across levels. Soft Systems Methodology likewise is based on understanding human activity systems existing within a nested, hierarchical structure – holons (Checkland and Haynes 1994). For those working at policy level rather than in the context of local level

development, the existence of multiple scales of ecological, social, economic, and political subsystems is particularly important and has novel implications for what the process might entail. AMESH, applied at a community or micro-regional level, might be thought of as *one process* with a broad and somewhat fluid, but nevertheless identifiable, set of stakeholders working through the entire process. While the analysis that takes place may devote particular attention to the different scales of the system and include mapping out the cross-scale interactions, the stakeholders involved operate primarily at one or two levels of that system. On the other hand, in a policy process applied at higher levels of social organization, within a large social-ecological system that includes many micro-regions and many more communities, the process itself might be best carried out as a set of nested processes, including consultative and deliberative processes, taking place at different levels.

The literature on deliberative participation provides a way to address conflicting interests and asymmetrical power relations by emphasizing the role played by decision-making processes, and the role that decision-making processes can play in helping to reshape interests and power relationships and to open participants to the possibility of having their minds changed (Cunningham, 2002; Smith, 2003; Robinson et al., 2010). Nested deliberation (Zachrisson, 2005; Robinson et al., 2005) can take place through events and processes created specifically for action around a particular policy issue, through existing institutions and mechanisms, or both. To take a policy process focused on water resources management as an example, likely participants at various levels might include the following: at local level, farmers, water service providers, water users associations, local government, local NGOs, and local industries; at basin level, city councils, regional NGOs, regional government, water users associations, and representatives of small-scale farmers, large-scale irrigators, and industry; and at national level, basin representatives, government departments, legislators, representatives of relevant economic sectors, and international NGOs. If new events and processes for deliberation are to be implemented, there exist various particular methodologies for multi-stakeholders deliberation and negotiation that might be used: search conferences, future search, open space technology, etc. However, implementing a new participation event brings the danger of the event not being linked in any meaningful way to existing institutions and decision-making processes, and hence never becoming more than an isolated and disconnected *event*, so ideally at least some components of the overall nested deliberation process should take place through existing institutions and mechanisms. In our water policy example, this might include multi-stakeholder catchment or basin management bodies or regular multi-stakeholder forums where these exist. For any of these deliberation processes – whether pre-existing or newly created – to effectively contribute to the overall nested deliberation process two things are needed. One is to ensure that they become linked to deliberation processes at other levels of the system, both informing and being informed by those processes at other levels, ideally with individuals who participate at more than one level. The other is to ensure that these bodies and forums are given genuine scope and potential authority to influence policy.

3.3 *Iterative, negotiated approach to problem definition, analysis, and solution seeking*

An ecosystem approach to policy process must also be one in which problem identification, analysis and decision-making are brought to the foreground. The fact that

the social-ecological systems in which rural people live and work are complex implies, among other things, that for any particular rural development problem there can be different ways to map the system, and different features of the system (in relation to the problem) that might be considered important. The existence of differing values underpinned by differing worldviews further complicates the situation. Like Checkland and Scholes (1990), and Checkland and Haynes (1994), we suggest that the negotiation process include making these values and worldviews explicit. This applies at policy level just as much as it does at community, district or catchment level. AMESH, as it is applied at relatively small scales, does not treat the process of defining the system in question, its boundaries, its relevant features, and the problems to be addressed, as non-problematic: rather these tasks become key nodes in an iterative process rather than simple steps in a linear process. AMESH accomplishes this by providing a methodology for having multiple stakeholders insert their varied perspectives into the processes of problem definition, analysis, and solution seeking. We argue for the same approach to be applied to the development of policy.

This iterative approach might involve various steps:

- identification/analysis of issues, stakeholders and power relationships,
- collection of people's stories to help identify what should be focused on,
- systems analysis by stakeholder groups including, as suggested by Checkland and Scholes (1990), and Checkland and Haynes (1994), articulation of the values and worldviews and development of models,
- synthesis of the various stakeholders' narratives and analyses, and
- collaborative learning and action including negotiation of a collective vision, identification of policy options, implementation and monitoring and evaluation.

For example, considering our water policy example and starting at the point of *systems analysis*, it can be seen that there are different ways that the system might be parsed and analyzed. Some stakeholders might see the levels of their social-ecological system in terms of micro-catchments, watersheds, and river basins whereas others might consider wards, districts, provinces and the nation state to be more relevant units. Economic geography might suggest yet another way to make sense of local, regional and national economies that do not necessarily conform to either hydrological or administrative boundaries. Depending on what problems and issues stakeholders consider most important – water rights law, inter-basin transfers, catchment degradation, climate change, etc. – any or all of these ways of defining the social-ecological systems could be valid. As stakeholders negotiate issues of importance they may need to re-examine which stakeholders are involved and re-examine their understanding of the system, and therefore to return to "earlier" steps in the process.

Researchers can play an important role in most of these steps. They can provide critical guidance, and bring important leverage to bear, on facilitating the participation of less powerful stakeholder groups. Difficult policy questions will, moreover, often require technical input both from disciplinary science and from interdisciplinary perspectives. Among the latter, we feel that SL is particularly useful because of its contribution to overcoming reductionism. Nevertheless, because of the uncertainty and value judgements that are involved in making sense of complex social-ecological systems and in taking

action that affect people's lives and livelihoods, these tasks of problem definition, analysis and solution seeking should remain open to input and negotiation among all stakeholders. Researchers should not be put in a privileged position, but rather are just one more category of stakeholder.

3.4 Attention to cross-scale aspects of decision-making and information flow

There can be no standard formula for identifying which stakeholders, which line agencies, and which governance processes should be represented and involved in such consultations, nor for how these consultations should be structured. Furthermore, as alluded to above, in an ecosystem approach to policy process, part of the function of the nested set of deliberation and participation processes will be to make sense of the social-ecological system – to, in complex systems language, map the relevant holons and the linkages (energy flows, power relations, alliances and disputes, institutional interplay) across holons. A critical aspect of these linkages relate to decision-making and the upward and downward flow of information. For these reasons, particular attention must be paid to how governance takes place across scales and to the flow of information across scales. A key aim here is to insert some level of reflexivity into the decision-making processes, creating what Checkland calls a "learning system" (Checkland and Scholes, 1990; Checkland and Haynes, 1994). Questions to be asked would include the following:

- How does information flow between decision makers and other stakeholders, both horizontally and vertically across scales?
- In designing new participatory policy processes, how might it flow?
- Do decision makers at smaller scales have enough autonomy/authority to allow them to react and adapt to changing situations?

This is both an analytical task and part of designing and refining the participation process. One of the aims of this task should be to ensure that weaker voices are not filtered out as information moves up the levels, e.g., by creating multiple routes for information to flow upward and downward thereby providing alternatives to the power of what in social network theory are termed "brokers". In South Africa's water policy reform process, e.g., it was envisioned that two key institutions for mobilizing stakeholder participation were to be Water Users Associations (WUAs) and Catchment Management Agencies (CMAs). But as of 2003, few WUAs for small scale irrigators were yet functional, and where they did exist they had not yet passed through the official registration process that would legitimize their participation in the CMA (Wester et al. 2003). In fact, in the Olifants River basin many small farmers have not even been aware of the existence of the CMA (Stimie et al. 2001) and numerous authors worry that the CMA process is exacerbating inequities and not allowing the poorest groups to benefit from water resources in the basin (Lévite and Sally 2001; Perret 2002; Wester et al. 2003). While not ignoring the need for improving the representation of small farmers in WUAs and CMAs, an ecosystem approach to policy process would also seek to create other routes for small farmers to have a voice at higher levels, and to open up new spaces of participation that links them to higher levels and allows them to deliberate on and to influence policy. Policy processes would certainly benefit from the views contained in these voices.

4 Implications of taking complexity seriously in policy and development

Those involved in the formulation of rural development policy are not unaware that the reality of rural livelihoods is complex and that effective policymaking requires the input of multiple perspectives. However, questions such as *how* to gain insights into the complexity of livelihoods and livelihood systems, *what* precisely it is that participatory policy development processes should aim to do, and *how* spaces of participation should be structured are not so easily answered. The SL approach, by providing a theory for making sense of how livelihoods are constructed at the household level, and by helping to identify key factors at larger scales (the vulnerability context and PIP – policies, institutions and processes), can help in the "mapping" of key aspects of social-ecological systems and thereby offers some assistance for answering the above questions.

Complexity and its related concepts, along with AMESH, provide further insights and suggest what an ecosystem approach to policy process might look like. It would be a set of nested processes in which multiple stakeholders identify and try to make sense of the key features and dynamics of the multiple scales of the social-ecological systems in which they live. It would be an iterative process in which these stakeholders negotiate over the definition of problems and the identification of solutions. It would have, as one important component, a sub-process for making sense of the multiple levels of governance structures and mapping the flow of information, knowledge and decision-making across scales.

Among the fundamental principles of the complexity paradigm are that for any complex system there is more than one valid way to describe the system, that our knowledge of complex systems is never complete and always uncertain, and that complex systems are inherently unpredictable. These principles imply, among other things, that our forecasts for complex systems are not predictions, but only plausible scenarios. There are policy tools already in existence that share these principles and that are compatible with the multi-stakeholder process described above. Scenario analysis is a good example. It is a tool that can be enriched by the concept of *complexity* and by the SL and ecosystem health approaches.

These principles also imply that to reach any kind of understanding of a complex system one needs to account for diverse interests and draw upon multiple perspectives. Behind these diverse interests there is the further complication of asymmetrical power relationships, and the broad process described above is certain to at times involve conflict and be messy. There is a need for some powerful actors, whether governmental or based in civil society, to actively facilitate the participation of marginalized groups and to build their capacity for participation. In this regard, the stakeholder analysis component of the iterative process and the particular attention given to cross-scale aspects of decision-making are particularly important. We also contend, however, echoing some of the literature on deliberative approaches to participation, that interests and power should not be seen as reified, immutable entities. Appropriately structured processes of deliberation can contribute to people reconceptualizing problems, and redefining their interests. That being said, the approach being described is most appropriate when stakeholders have already begun to recognize that the complexity of the problems faced and their interconnection with other stakeholders behoves meaningful dialogue with those other stakeholders, despite differences in interests and the spectre of having to, in one way or

another, share power. An ecosystem approach to policy process is not primarily a conflict resolution paradigm, but one in which the different perspectives can at least be acknowledged and accounted for in the general scheme of things...the scheme of things being as constructed and negotiated by the participants.

Aside from the specific tools that will be needed, the process described above would require mobilization of the relevant stakeholders, including an array of stakeholders within government. The complexity of social-ecological systems highlights the need for information and decision-making to flow, not only vertically across scales, but also horizontally across sectoral boundaries. It also highlights the need for any policy process to mobilize participation across the "silos" of powerful line agencies. For bilateral aid agencies such as CIDA, DFID and USAID, which work within other countries' political systems, this is doubly challenging. In the coming years, a major challenge for such agencies, which increasingly work on a government-to-government basis rather than on a project basis or through NGOs, will be to encourage policy processes that are not straight-jacketed by sectoral boundaries.

Complex systems thinking has great promise for decision makers concerned with territorial policy, regional development, and most forms of economic development in rural systems. However, unpacking the complexity of social-ecological systems for discourse and for eventual policy action will take time. It will require long-term commitment on the part of government agencies and civil society organizations. Civil society organizations that are relatively stable and that have a strong grassroots foundation represent an important resource for the creation of policy processes that embrace complexity. It has been suggested that they have an important role to play as "bridging organizations" (Folke et al., 2005; Hahn et al., 2006), and they may be the steady presence that is needed to ensure that such policy processes stay the course beyond the next electoral horizon.

In societies that venerate simplification through reductionism, there will be enormous resistance to complex systems thinking and a continued oversimplification of rural development problems. Even when complexity is acknowledged, there can remain uncertainty as to what to do about it, and the kinds of reductionist thinking and policy making described at the beginning of this paper are much easier to recognize after the fact than at the outset. Utilizing approaches such as SL and ecosystem health not only provides information of intrinsic value but can also assist us to step closer to the true complexity of rural systems and thus the potential for better policy decision-making in rural development.

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Notes

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- ¹ Various labels are used, each corresponding to a slightly different emphasis: Ecohealth, Ecosystem Health, Ecosystem Sustainability and Health, Agroecosystem Health. We consider these approaches to be variations within one broad family and use the acronym ESH to encompass them inclusively. See especially: Murray et al., 2002; Rapport, 1998; Robinson et al., 2006; Waltner-Toews, 2004.
- ² In describing these nested scales, Koestler (1978) coined the term *holarchy*. More recently, some authors have begun substituting to the term *holonocracy* to "more accurately reflect the mutual power relations across scales", and to provide "an ecologically grounded counterpoint to terms such as democracy and technocracy" (Waltner-Toews 2004: 18).
- ³ This is not to say that the SL literature does not consider this issue, only that the answer is neither explicit nor obvious in most SL frameworks