

The Local Unit Criteria and Indicators Development (LUCID) Project: Monitoring for Forest Management Unit Scale Sustainability

Frequently Asked Questions

What is LUCID?

The Local Unit Criteria and Indicator Development (LUCID) project was a pilot project conducted from 1999 through 2002 by the USDA Forest Service Inventory and Monitoring Institute in conjunction with eight national forests on six sites to appraise the feasibility of monitoring sustainable systems at the forest management unit scale. The sustainability assessment will: provide forest managers and collaborators with feedback that can be used to improve Forest Land Management Plans; enhance collaboration between National Forests and other governmental agencies; and relate forest plan outcomes with regional and national C&I trends.

What is FMU scale sustainability monitoring?

The LUCID project developed and tested an approach for monitoring sustainability at the local, or forest management unit (FMU) scale. This is an area roughly approximating a national forest or grassland including the associated social, economic and ecological systems. We use the terms LUCID to refer to the specific pilot test that was conducted using a specific approach and set of methods during the 1999-2002 test period. The result of the LUCID Project was a revised set of procedures and tools to assist forests and grasslands in engaging in sustainability monitoring at the FMU scale.

Where were the tests conducted?

Six interdisciplinary National Forest teams working on eight National Forests were selected to participate in the LUCID Project including the Ottawa National Forest in the Upper Peninsula of Michigan; the Allegheny National Forest in northwestern Pennsylvania; the Modoc National Forest in northern California; the Blue Mountain Province Forests of eastern Oregon (including the Wallowa-Whitman, Malheur, and Umatilla National Forests); the Mt. Hood National Forest in northwestern Oregon; and the Tongass National Forest in southeastern Alaska.

What is sustainability?

Sustainability is not a thing but a social value or an ideal, like justice, honor, or truth. The term expresses the human desire for an environment that can provide our needs now and into the future across many generations, but what the term implicitly conveys and what it explicitly means are not necessarily the same. Although there are many available definitions, finding a specific definition of sustainability on which we can all agree is difficult – some would say it is a pointless quest – because it is about values and values vary between groups and over time. Paradoxically, the things we decide to sustain have value only because we do value them. The sustainability quest is about deciding what to sustain, for whom, for how long, how and at what cost. However, common to most expressions of sustainability are the interdependencies of social, ecological, and economic systems regarding both present and future generations so at a minimum we know that those three components (often referred to as pillars) and the interactions between them over time and space are important aspects of sustainability.

How can you develop a monitoring program for sustainability when I don't have a precise definition of what sustainability it is?

If our goal is sustainability the obvious question is: How well are we doing? In the context of sustainability, a monitoring program establishes a set of markers that help determine whether the ecological, social and economic systems within a Forest Management Unit are being managed in a sustainable fashion.

Throughout the LUCID Project, we described sustainability as an emerging value that results from the interaction of social, economic, and ecological systems. One of the primary approaches to addressing sustainability has been a focus on monitoring to aid in assessing sustainability and to monitor change towards collaboratively developed desired outcomes. Within the LUCID Project we made a conscious decision that because of the nature of values and the complexity of the concept of sustainability we would not attempt to provide a specific, uniform definition of sustainability. Instead, we would focus our attention on the notion that sustainability would be best achieved by sustaining the contexts and that a monitoring program would focus on identifying those critical aspects of systems. We also decided that to address the range of possible perspectives on what sustainability is an interdisciplinary and collaborative approach would be critical to designing, implementing, and interpreting the results of sustainability monitoring. The reality is that the criteria and indicators that you collaboratively develop become the vocabulary or language that defines sustainability for you.

What are criteria and indicators?

Criteria and indicators (C&I) are a framework designed to provide a common understanding of what is meant by sustainable forest management and to structure the monitoring process. A C&I framework expresses the goal of sustainability as a set of hierarchical parameters that can be monitored and assessed. Numerous national governments, international declarations, forest management units, and forest certifying bodies use the C&I approach to structure monitoring efforts. Although the term *Criteria and Indicators*, or *C&I*, is commonly used to describe the monitoring hierarchies, the number of levels in the hierarchy, definitions and interpretations of the terms and the overall hierarchies vary considerably. Within the LUCID Project we used a hierarchical framework that consisted of five levels: principle, criterion, indicator, measure, and reference value.

Why do we need FMU scale, or local level C&I?

Although much of the initial focus on C&I came from the need to report both nationally and internationally on sustainable forest management, there was growing realization that sustainability issues are multiscaled and that the national goals of sustainability rest, in large part, on the actions that are carried out at the local scale. The need for forest-scale C&I initiatives arose because of the recognition that local-unit monitoring and reporting were essential to understanding and achieving sustainability at the FMU scale. FMU-scale or local level indicator initiatives are underway in many countries in the world from Australia to the United States.

What is a Forest Management Unit? How do I know what areas to include?

The FMU scale can generally be described as the scale at which management policy is actually implemented with on-the-ground activity and at which one or more ownerships decide how a land area will be affected by land and resource management activities. Total land area and ownership

size might vary, but the focus on the FMU scale is based on the assumption that it is at the FMU scale that most of the decisions about management occur.

The LUCID teams found that an explicit discussion of scale definition was critical in a number of ways. Talking about the bounds of the study area and the relative influences of boundaries was important for identifying relationships and linkages that the Forest Service has not traditionally prioritized. They focused on understanding the context that they were working within, which helped them place their discussions of the role of the forest and the management responsibilities of the Forest Service within a more regional sustainability context. Discussing this led them to explore potential roles and needs for collaboration. They also discussed the systems approach and identified the questions of sustainability that are important at the FMU scale. They recognized up front that the indicators and associated sustainability questions define the boundaries, and the boundaries typically do not coincide. Every LUCID team adopted test boundaries that were larger than the NFS lands.

Is FMU scale sustainability monitoring just for National Forest ownerships?

Neither social nor ecological systems coincide with administrative boundaries; so most sustainability monitoring initiatives, regardless of scale, have gone beyond the administrative boundaries of a single forest tenure holder. LUCID test sites ranged from 500,000 acres to 17 million acres and from a single National Forest to three National Forests working within one ecoregion province. In keeping with ecological, social, and economic systems, the study areas were not just limited to National Forest system (NFS) lands.

While some other C&I initiatives at the FMU scale have defined the study area by including only areas under some common management regime, for example a community tenure, others have defined the FMU scale to include mixed management objectives based on joint agreement to engage in sustainability monitoring. Mixed-ownership models require careful consideration of the differing management objectives of tenure holders that may mean reference values and some measures will vary.

What is a systems approach?

A systems approach focuses on the contexts that allow for the production of goods, services, and opportunities to meet different values. Within a systems approach the focus is on the outcomes or states of systems and not on inputs or outputs. This is particularly applicable to forests since they are joint production systems that simultaneously, not independently, produce soil, water, air, plant and animal material. This framework is most effective for ensuring coverage of the three systems from which sustainability emerges and for examining interactions within and among the three main components of sustainability.

The systems approach was hypothesized to be useful in two primary ways: first, it would better define the items for inventorying and monitoring; and second, it would provide an integrative model for synthesis and analysis of the inventory data. A systems approach establishes a logical link from sustainability to monitoring as it helps place the monitoring component in context. From a process perspective the systems framework is very useful because it provides a common starting point for collaborators and a means of building a common language about sustainability.

What do you mean by a ‘suite of indicators’?

No system can be monitored with just one or even a few indicators. Individually, indicators provide valuable data; but the collective information from all the indicators and their interactions is what informs us about the state of the system. Therefore, indicators must be interpreted as a package or suite. The LUCID Project recommended a core suite of indicators, organized within a systems framework of principles and criteria to be used on national forests and grasslands.

What is the Montreal Process?

The Montreal Process Working Group was formed to advance the development of internationally accepted C&I for temperate and boreal forests at the national scale as a result of agreements arising from the 1992 United Nations Conference on Environment and Development (Rio). Membership in the working group currently stands at 12 countries, and among them these countries contain more than 90 percent of the world's temperate and boreal forests. In February of 1995, the working group countries endorsed a comprehensive set of national-scale C&I in Santiago, Chile (Santiago Declaration) for conservation and sustainable management applications in their respective countries. The result is a suite of 7 criteria and 67 indicators, commonly referred to as the Montreal Process C&I that are designed as a tool to help report on the state of a nation's forests (regardless of ownership). In 1995, the United States agreed to use the Montreal Process C&I to measure national progress in achieving the goals of sustainable forest management. Through the lead of the US Forest Service and in cooperation with other federal and state agencies and in consultation with the public through the Roundtable on Sustainable Forests the US is currently preparing the 2003 national report using the Montreal Process C&I.

What is the relationship between C&I and certification?

Certifying sustainable forest management and sustainable forest products represent complementary tools to address the issues of sustainability. Whereas C&I are neutral assessment tools that define a given monitoring initiative and develop "benchmarks to measure and report progress towards sustainability" (FAO 2001), certification is a market-based instrument "designed to document and reward sustainable forest management practices, and assure consumers of forest products that their purchase comes from a well-managed forest" (Washburn and Block 2001). Certification is generally understood to be a voluntary process that includes "independent verification" (Society of American Foresters 1999) of conformity to standards, typically by an independent third party. Certification and C&I share much of the same evolutionary history; but despite their common attributes, they represent two different responses to the challenge of sustainability.

Where can a National Forest get technical assistance to implement LUCID C&I?

The USFS Inventory and Monitoring Institute can provide technical assistance to support the process of implementing FMU scale sustainability monitoring including assistance on the approach and tools such as the C&I and analytical methods. Additionally, research staff can provide assistance such as help in identifying the best measures suitable to your FMU area, in designing cost effective and reliable protocols, and in researching appropriate reference values for indicators. The Regional office can provide advice and assistance in supporting the use of FMU scale sustainability monitoring in forest planning, in helping to coordinate initiatives between forests, in facilitating access to specialists, and in clarifying relationships with regional monitoring requirements.

Is there a role in LUCID C&I implementation for the Regional office?

The Regional office can provide advice and assistance in supporting the use of FMU scale sustainability monitoring in forest planning, in helping to coordinate initiatives between forests, in facilitating access to specialists, and in clarifying relationships with regional monitoring requirements.

Are there alternative C&I that have been tested and are available for use on National Forests?

Many organizations and groups have been involved in the development of sustainability C&I. Important dimensions to consider when examining other suites of C&I are: the purpose for which the C&I were developed (e.g., sustainable forests or sustainable forestry); the objectives and associated framework for the C&I (e.g., to monitor specific issues or to monitor the effectiveness of policies); the scale for which the indicators were developed (e.g., nation scale, sub-regional scale, local scale); the kind of indicators (e.g., indicators assessing the existence of management processes or indicators assessing the outcomes of management); and the context (e.g., temperate vs tropical forests, forested environments only or broader ecosystems). Testing C&I involves examining the indicator based on the above variables, adapting it to your specific conditions and testing it through the process of developing meaningful measures, collecting, analyzing and interpreting associated data.

The process of developing C&I for the LUCID project involved examination, adaptation and testing of several different suites of C&I including: CIFOR-NA, CIFOR general suite, Montreal Process C&I, Canadian Council of Forest Ministers C&I, NSF and EPA Ecological Indicators for the Nation, Great Lakes Forestry Association C&I and others. You may wish to re-examine, adapt and test these suites of C&I and other more regionally or locally available sets.

Why is a collaborative approach so important?

Given the range of human values and our differing desires and objectives for future ecological, social and economic conditions, collaboration is a critical way to include as broad a range of values as possible. Collaboration can play an important role in the sustainability monitoring process in a number of ways including: as a basis for dialogue, to help identify key components for monitoring, to establish reference values, to access alternative sources of data, and to build a collective vision on desired future conditions.

What is the difference between ‘sustainability monitoring’ and a ‘sustainability assessment’?

Some people view C&I initiatives in two distinct phases: monitoring and assessment. The monitoring component is ongoing inventory of a suite of indicators that are tracked over time to identify trends. The assessment process is the phase of interpreting and analyzing the monitoring data against a set of reference value conditions. The assessment component may be done periodically, for example before Forest Plan revision, to help identify management issues and priorities. We hold the perspective that the repeated collection of monitoring and inventory information has limited value without an analytical or assessment phase. Throughout the LUCID report the term *sustainability assessment* is used to mean the interpretation and analysis of sustainability monitoring information.

Are we talking about a ‘sustainability determination’ or a ‘sustainability assessment’?

There is an inherent appeal to the idea of being able to judge or determine with certainty that some management practice or some area is sustainable. This kind of certainty would give us a great deal of comfort in an increasingly uncertain world, would help facilitate comparisons and would give absolute assurance that management choices were correct. However, the various values that we hold about sustainability mean that, short of all of us sharing the same values, any determination or judgment of sustainability would be consistent only with the values held by one perspective. And the chances are at least even that this determination would be spatially biased resulting in a trade-off between one scale versus another and temporally biased with an emphasis on the needs and values of current generations at the expense of future generations. Beyond the challenges to determination that an understanding of the variation in our values holds comes the complexity and uncertainty associated with sustainability. Even if we shared a common set of values and could therefore agree on associated targets to aim for and to assess our current status against, the complexity of sustainability and our uncertainty regarding our understanding of systems and their interactions would suggest that our determination of a state that would be sustainable would be incomplete.

If we are unable to determine something as sustainable and provide the certainty of a stamp of approval, what are our options? Through the LUCID Project we identified the value of providing tools and processes to help managers and stakeholders assess sustainability and engage in a dialogue to help make a *relative assessment* of sustainability rather than an absolute measure or *determination* of sustainability.

How does implementation monitoring fit with sustainability monitoring?

Implementation monitoring focuses on tracking the extent to which proposed actions have been completed. It is typically focused on management actions over short time frames. Implementation monitoring is valuable for determining the effectiveness of management actions. Although the focus of sustainability monitoring is on monitoring outcomes, implementation monitoring is still a valuable activity and some implementation monitoring is required. For required implementation monitoring variables we found that they could be placed within the systems framework in order to help facilitate making a linkage between the management action and the resulting outcome.

How do required legal and regulatory monitoring requirements fit with the approach?

Over-arching legal and regulatory requirements and higher level plans have resulted in a number of specific legal and regulatory monitoring requirements for forests. As with implementation monitoring variables, we found that these legal and regulatory monitoring requirements could be placed within the systems framework in order to make a clearer link between the variable and its context. In many cases these legal and regulatory requirements are quite specific and often times they can serve effectively as one of the measures used to verify core indicators.

How does this mesh with NRIS, FIA and other corporate programs?

Corporate inventory systems for example FIA, FHM provide a potential source of data to be used for FMU scale sustainability monitoring. The Natural Resource Information System (NRIS) corporate data management and storage systems provides both a location access data from a wide range of sources and a repository for data collected to support forest scale sustainability monitoring in order that it can be used for other purposes and at other scales. Preliminary

overlaps between core LUCID indicators and potential measures and corporate inventory and data systems was conducted but further work and development is needed.

Will FMU sustainability monitoring replace existing monitoring activities?

Yes. Our experience shows that FMU sustainability monitoring can replace most existing Forest Plan monitoring. Specific legal and regulatory monitoring requirements and required implementation monitoring components may fit as measures to verify the core indicators or be supplemental to the core indicators. In pilot applications, forests found that using a common framework and indicator to organize monitoring items inter-disciplinary teams were able to identify, fewer, common data items to measure.

Can a National Forest pick and choose which indicators from the LUCID core suite it wants to use?

The LUCID Project used a hierarchical suite of principles, criteria, indicators, measures and reference values. The 3 principles and 16 criteria define the systems framework and thus provide the context and meaning to the individual indicators. The 58 indicators are the common, core suite of indicators identified from the results of the six pilot tests that were selected to measure the fundamental structural and functional components of systems. Sustainability cannot be understood by stand-alone analysis of indicators since the inter-relationships between components will be lost. Similarly, stripping the indicators from the systems framework removes them from their meaning or context. Consequently, the LUCID C&I were not designed for use as a “pick” list of indicators. Forests will, however, need to adapt and select measures and reference values specific to the nature of systems on their site, and the site-specific measurement questions. The LUCID C&I include a list of possible and optional measures for consideration in this regard but forests will need to examine their context and questions carefully. In some cases, Forests will need to customize and adapt the indicators to their site to adapt to unique situations. However, revision, adaptation and substitution should be made within the systems framework maintaining the overall context and meaning.

Can information from FMU sustainability monitoring be used for regional and National reporting?

Building relationships between sustainability monitoring and assessments across ideas, approaches, and temporal and spatial scales is an important part of an overall strategy for improving management of sustainable systems at multiple scales. Although sustainability can be studied at multiple scales, once the components of systems are identified for monitoring, selecting the correct scale is critical. So even though managing for sustainability requires thinking across all scales, monitoring and assessing sustainability must be based on the recognition that there are different questions and different methods used at different scales. Consequently while some data collected for FMU sustainability monitoring can also be used at other scales not all the data collected for FMU scale monitoring will be useful at other scales. FMU-scale monitoring will typically require complete characterization of indicators and more intense sampling in order to understand the variation at that scale, but it may be that only the measurement protocol is shared and not the actual data collection process. As measurement protocols and data elements are more clearly specified for Montreal Process monitoring at the national level, it will be easier to identify potential opportunities for data sharing.

Beyond data sharing efficiencies, however, the knowledge gained from FMU sustainability monitoring can inform regional and National reporting and v.v. At a national and regional level

sustainability monitoring can provide key information on regional and national trends and assess policy and enabling conditions that support sustainability on the ground. FMU scale sustainability monitoring can provide an assessment of progress towards sustainability that can inform management and monitoring at other scales.