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Ecosystem-based Conservation Planning: Definition, Principles and Process

- revised boreal version -

by Herb Hammond

March 2005

The forest sustains us; we do not sustain the forest.

Ecosystem-based Conservation Planning:
Definition, Principles and Process

revised boreal version, March 2005

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1 Introduction

Ecosystem-based conservation plans (EBCPs) are necessary in order to protect and maintain ecological health and biological diversity at all scales, from small land and water ecosystems to large landscapes. Human cultures and economies depend on healthy ecosystems and biological diversity—in other words, on natural capital. Planning human activities that protect, maintain, and, where necessary, restore ecosystem health and biodiversity is the basis for developing sustainable human economies and cultures. Such activities are ecologically responsible because they ensure that ecological processes continue to support the full range of life.

If our society believes that Earth is borrowed from our children rather than inherited from our ancestors, we will use ecosystem-based conservation planning to protect, maintain, and restore healthy ecosystems and biological diversity, and to develop diverse, ecologically sustainable economies. This brief paper outlines the goals, principles, and general process for preparing ecosystem-based conservation plans.

Ecosystem-based conservation planning is a system that may be effectively applied in unmodified to highly modified landscapes; and may be used for a wide range of purposes from conservation area design to resource development, settlement design, and urban planning.

1.1 Silva's definition

Ecosystem-based conservation planning is a method of ecosystem protection, maintenance, restoration, and human use that, as the first priority, maintains or restores natural ecological integrity—including biological diversity—across the full range of spatial (*from very large to very small areas*) and temporal (*from short to long periods of time*) scales. At the same time, it provides for ecologically and culturally sustainable communities and their economies. In other words, ecosystem-based conservation planning provides a picture of the **ecological framework** that is necessary to protect, and the **ecological limits** within which human uses need to be carried out, in order to be sustainable.

1.2 Major goal & important underpinnings

The major goal of ecosystem-based conservation planning is first to protect, maintain, and, where necessary, restore fully functioning ecosystems at all spatial and temporal scales, and then to design human activities that fit within those constraints.

Ecosystem-based conservation planning seeks to identify and understand the important ecological characteristics of a landscape or region, and then to design plans to guide the development of ecologically responsible human activities. This approach is based on the understanding that inappropriate human use of ecosystems and landscapes can have serious and long-term negative ecological, cultural, social, and economic impacts.

Ecosystem-based conservation planning is also based on the understanding that ecological landscapes and patches are not static and unchanging—they contain a variety of ecosystem types and successional patterns through time that are tied to natural disturbance regimes. Natural changes diversify and maintain ecosystem composition, structure, and function at all scales; are unpredictable in frequency and character; and focus on sustaining the whole, not on producing any one part. In other words, change due to succession and natural disturbance is part of natural ecosystem functioning. Natural patterns of ecological succession and disturbance interact in unpredictable ways that sustain ecosystem functioning and provide a diverse range of habitat for plants, animals, and other organisms.

1.3 Within Silva's definition, several concepts need clarification

- **Natural** is defined as the composition, structure, and function of ecosystems and landscapes prior to industrial development. In North America this generally describes conditions *pre-European contact*, and, therefore, *natural* conditions include Indigenous peoples' management systems.

  In contrast, change and disturbance due to industrial development is often chronic and predictable, and results in the loss of natural ecosystem functioning at a variety of scales. Some types of industrial development fundamentally alter ecosystem functioning, and are neither conservational nor part of an ecosystem-based conservation plan.

- **Maintaining ecological integrity** includes protecting, maintaining, or restoring natural ecosystem composition, structure, and function—the parts, the arrangement of the parts, and the processes of ecosystems.
- **Protecting** means the maintenance of ecological integrity, but protected areas may include Indigenous cultural activities and soft human uses such as ecotourism and wildcrafting.
- Ecosystem-based conservation planning is **inclusive** of a wide range of human activities and recognizes that **healthy human communities** provide the necessary human resources to implement ecosystem-based conservation planning.
- The sum of **community economies** is the global economy. Therefore, ecosystem-based conservation planning recognizes that the starting point for the development of sustainable economies needs to be at the community level.
- The definition may be applied to the **spectrum of ecosystems**, from terrestrial ecosystems to marine ecosystems, and to the **range of conditions**, from unmodified landscapes to urban landscapes.
- Moving into ecosystem-based conservation planning from conventional management systems requires a **transition** that provides for development of diverse inclusive community-based plans and economies.

2 Interdependent Principles of Ecosystem-Based Conservation Planning

Important principles that underlie ecosystem-based conservation planning include:

1. **Focus on what to *protect*, then on what to use.**

   An ecosystem-based approach maintains or restores fully functioning ecosystems at all spatial scales through time. That is, it maintains ecological integrity. Biological diversity is protected, including genetic, species, community, landscape, and regional diversity. Natural composition, structure, and function of ecosystems are maintained, ranging from small patches of trees or wetlands, to large river basins or regions.

2. **Recognize the *hierarchical relationship* between ecosystems, cultures, and economies.**

   Economies are part of human cultures, and human cultures are part of ecosystems. Therefore, protecting ecosystem functioning provides for healthy human cultures and the economies that are part of these cultures. This intuitive relationship (see figure below) is well grounded in both Indigenous knowledge and western science.

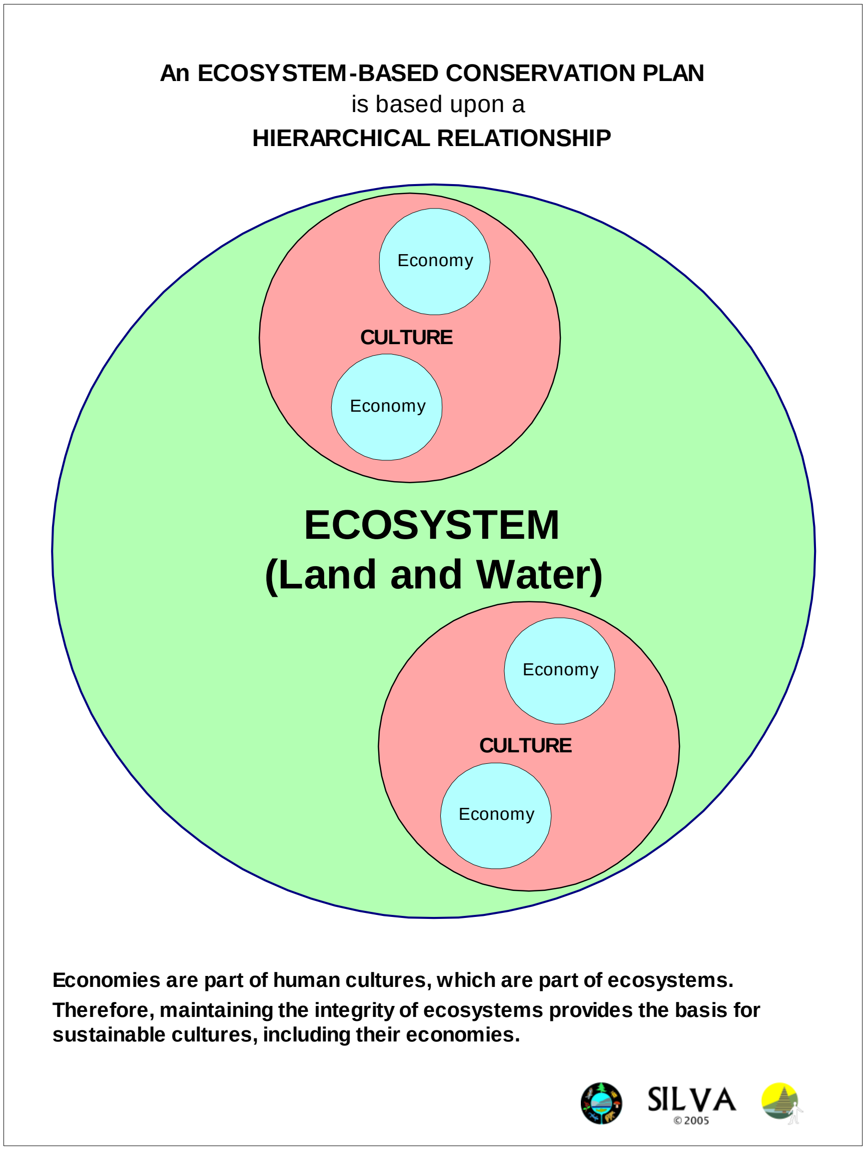
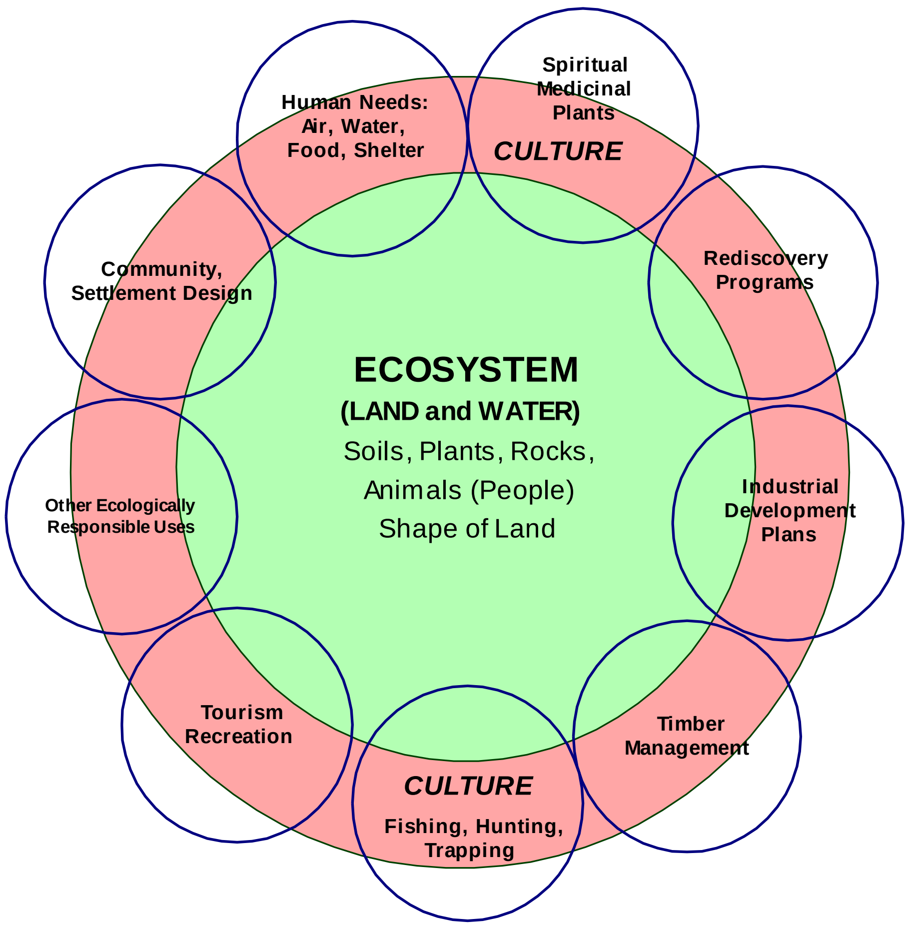


Figure 1: An EBCP is based on a hierarchical relationship.

CONCEPTUAL VIEW of an ECOSYSTEM-BASED CONSERVATION PLAN

. . . a framework for making decisions

First, protect the land
Second, use the land in ways that maintain all of the parts and processes



Ecosystem-based conservation plans are community-based.

Healthy communities have place, are diverse, and take responsibility for their actions, ensuring that the needs of future generations guide their actions in the present.

Community-based plans share decision-making power, are inclusive of all interests, and develop clear lines of accountability for activities.

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Figure 2: Conceptual view of an EBCP.

3. Apply the precautionary principle to all plans and activities.

The precautionary principle deals with uncertainties by directing that decisions, interpretations, plans and activities must err on the side of protecting ecological integrity, as opposed to erring on the side of protecting resource exploitation. In other words, if you are not sure that an activity will protect, maintain, or restore ecosystem functioning, then modify the activity so that it occurs within ecological limits, or do not do it.

APPLYING THE PRECAUTIONARY PRINCIPLE

PRECAUTIONARY ACTIONS
:
COMMON SENSE

* Look before you leap
* An ounce of prevention is worth a pound of cure
* Better safe than sorry

PRECAUTIONARY ACTIONS

...are taken because of a lack of information and uncertainty about the impacts of human activities

PRECAUTIONARY ACTIONS
characterized by . . .

* Cautious, conservative approaches, including . . . doing nothing

PRECAUTIONARY ACTIONS include:

* **Preventing harm**
  . . . cautious evaluation and decision-making that focus on intergenerational equity
* Requiring **burden of proof of no harm** from proponent
* Examining the **full range of alternatives,** including . . . doing nothing
* Providing for **participatory decision-making**
  . . . open, informed, democratic, and includes all parties

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Figure 3: Applying the precautionary principle.

4. **Protect, maintain, and, where necessary, restore ecological connectivity, and the full range of composition, structure, and function of enduring features, natural plant communities, and animal habitats and ranges.**

   This principle is implemented by establishing nested, interconnected networks of ecological reserves at multiple spatial scales (see Figure 4):

   - *Protected areas networks (PANs)*, consisting of large core reserves and linkages, are established at the regional, territory/subregional, and large landscape levels.
   - *Protected landscape networks (PLNs)* are nested within PANs at the small landscape and watershed levels. These consist of representative ecosystems, unique habitats, rare ecosystems, biodiversity nodes, old growth nodes, ecologically sensitive areas, riparian ecosystems, and cross-valley linkages. Regional and community economies that are based on human use areas are designed as PLNs are established.
   - *Protected ecosystem networks (PENs)* are nested within PLNs at the site level in areas that are selected for consumptive human activities (the *matrix*). PENs consist of a finer scale version of PLNs and include protection for ephemeral riparian ecosystems; live and dead tree structures; and small areas of ecologically sensitive areas, representative ecosystems, rare ecosystems, unique habitats, and old growth forest.

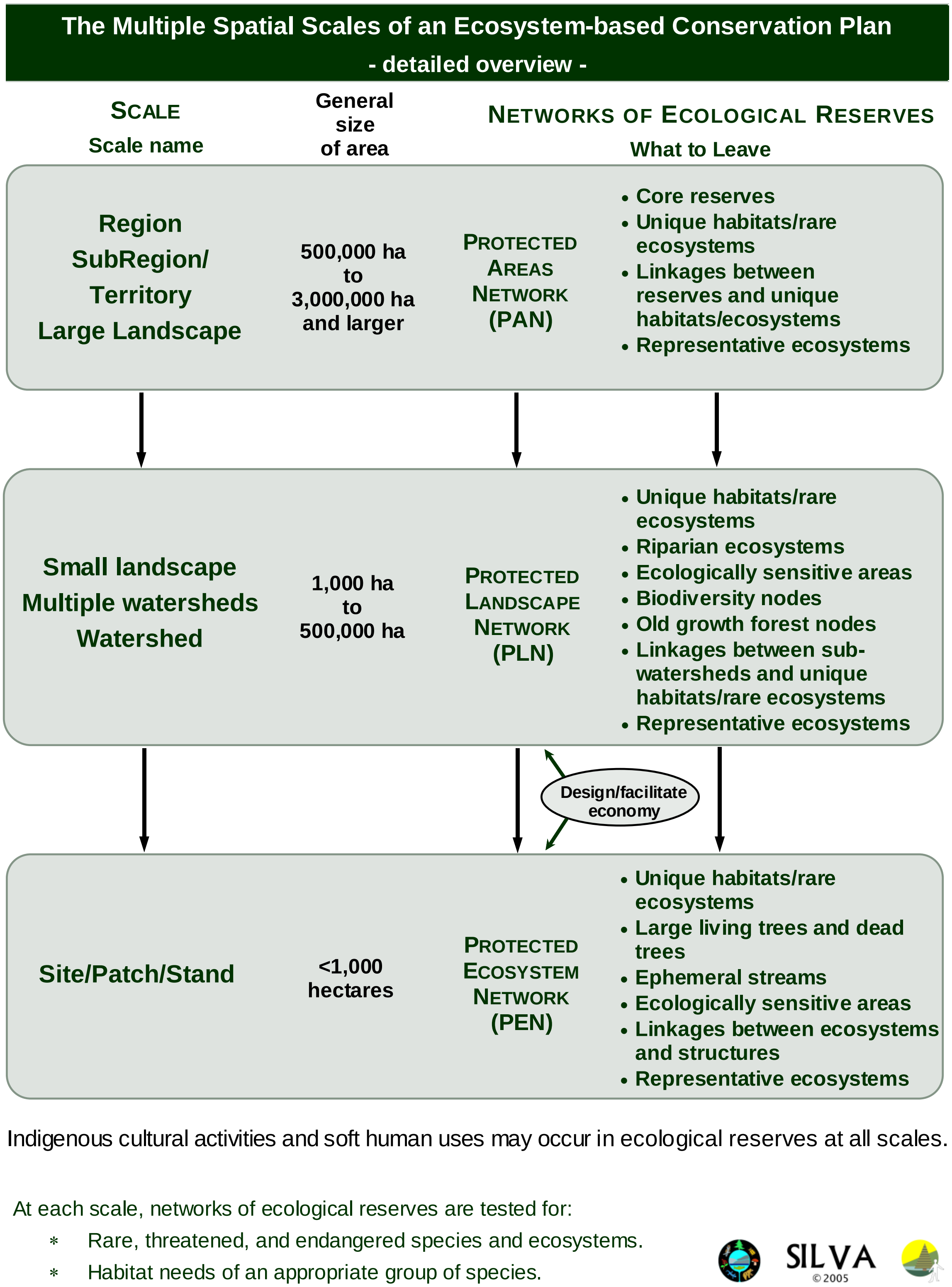

Figure 4: An EBCP is carried out at multiple spatial scales.

5. **Facilitate the protection and/or restoration of Indigenous land use.**

   Ecosystem-based conservation planning encourages Indigenous people to map and describe their land uses or cultural activities. Under the guidance and control of Indigenous people, this information may be combined with ecological reserve design (*see Principle 4*) to ensure the protection and/or restoration of Indigenous land uses through the establishment of protected networks of cultural areas, or used in other ways appropriate to the Indigenous culture(s) in the plan area.

6. **Ensure that the planning process is inclusive of the range of values and interests.**

   Ecosystem-based conservation planning provides for full discussion and debate of issues, based upon the best available information, by participants who represent the spectrum of values and interests that may be affected by the plan. Those representing various interests assume responsibility and accountability for accurately representing their interest, consulting with their constituencies, and assuming responsibility for the outcomes of an ecosystem-based conservation plan. Shared decision-making by all participants characterizes an ecosystem-based conservation planning process and provides an egalitarian approach to planning.

   An inclusive, community-based approach to planning ensures that people affected by the plan are active, full participants in the development and implementation of the plan. The primary purposes of an ecosystem-based conservation plan are to ensure the maintenance or restoration of ecological integrity, and to provide for healthy communities within the plan area. These goals can only be achieved when affected communities develop, and take ownership in, a plan. Because ecosystem-based conservation planning, including the development of community economies, is often a shift from the status quo, public education and community acceptance of the definition and principles of ecosystem-based conservation planning are necessary for the success of a plan.

7. **Provide for diverse, ecologically sustainable, community-based economies.**

   To be sustainable and provide for social equity, economies need to facilitate a diverse range of activities that focus on fulfilling individual and community needs, and on protecting and maintaining natural capital—ecological integrity. Healthy communities both depend upon and sustain healthy and diverse ecosystems.

   A healthy global economy is built upon development of healthy local or community-based economies. Hence, ecosystem-based conservation plans for local landscapes constitute the foundation for healthy global economies that both maintain ecological integrity and provide for human well-being.

Figure 5: What is a community?

8. Practice adaptive management.

Within the constraints of the precautionary principle and ecologically responsible actions, a variety of activities may be included as part of an ecosystem-based conservation plan. However, all activities are continuously evaluated for their success in maintaining or restoring ecological integrity, including biological diversity, and in providing for healthy communities. The results of evaluations are incorporated into future plan modifications and activities.

Adaptive management is a systematic approach to improving management and accommodating change by learning from the outcomes of human activities. It involves gathering and incorporating new information. It is more than trial and error, or learning by our mistakes, because it involves careful design, monitoring, evaluation, and feedback in order to improve management. Adaptive management can be practiced in a variety of ways, on a continuum from passive to active approaches that differ in their intensity, commitment, and cost.

3 The Process: Multiple Spatial Scales

Ecosystem-based conservation planning is applicable at the full range of spatial scales from large sub-continental and regional landscapes to small watersheds and individual patches or ecosystem types. In order to protect ecosystem health and biodiversity at all scales through time, ecosystem-based conservation planning needs to begin with as large a landscape as possible. The reason for this is to ensure that ecological processes are maintained throughout the region as planning proceeds to landscapes of multiple watersheds, to individual watersheds, and eventually to patches or individual ecosystem types.

Silva develops ecosystem-based conservation plans so that the protected networks of ecosystems designed at each scale nest within those designed for larger areas. This approach not only provides for the most effective way to protect ecosystem health and biodiversity, but also results in an efficient planning system in terms of data interpretations, field assessments, map design, and structuring planning tools like geographic information systems and aerial photo interpretation.

Note: The terms *protected networks of ecosystems* and *networks of ecological reserves* are interchangeable and have the same meaning.

The design of protected networks of ecosystems or networks of ecological reserves employs the same set of six **primary (key) variables** at each spatial scale:

1. **Representation**

   . . . *included because the natural pattern and range of ecosystem types need to be protected to maintain a wide range of ecosystem functions*.

   - vegetation types
   - enduring features
   - successional phases with reference to range of natural variability

2. **Unique or special features**

   . . . *included because these areas are infrequent and, therefore, provide important ecological functions across a planning area.*

   - rare ecosystems and species (natural and anthropogenically rare)
   - habitats like bear dens, caribou calving areas, heron rookeries
   - deep, rich soils

3. **Focal species**

   . . . *included to provide the range of habitats needed for a range of species to persist*.

   - needs of a group of representative species. This group should reflect the diversity of species found in the planning area, and thus reflect the range of habitats found in the planning area. For example, the group should include wide ranging species like grizzly bears and wolverines; dispersal-limited organisms like salamanders and frogs; ungulates like caribou and deer; diverse birds like songbirds and raptors; and small mammals like pine marten and flying squirrels.

4. Ecological sensitivity

. . . included because many human activities easily degrade ecological integrity in ecologically sensitive areas and in adjacent areas.

- areas with ecological limits, like very dry areas, very wet areas, shallow soils, cold soils, steep slopes, and broken terrain.

5. Connectivity

. . . included because undisturbed/unmodified landscapes had few restrictions to movement of plants, animals, and microorganisms. Therefore, in managed landscapes we need to provide at least minimal levels of connectivity at each planning scale.

- designed for a species or group of species
- adequate unmodified habitat types across scales
- riparian ecosystems at all scales
- few/no barriers to movement for the species anticipated to use linkage

6. Natural disturbance regimes

. . . included because the type, frequency, location, and characteristics of natural disturbances determine how ecosystems function over short and long periods of time. Natural disturbances include fire, wind, insects and decay.

- Range of natural variability shows how frequently different disturbances change vegetation cover and associated ecosystem composition, structure, and function.
- Frequency and size of natural disturbances determine the minimum size of core reserves that are necessary to maintain ecological integrity and biological diversity following extensive disturbance(s).

The expression of each of these six primary variables varies, depending upon the scale of planning. For example, at the large landscape level, an entire watershed may be a unique feature because it is the last unmodified area with the full range of grizzly bear habitat. At the patch level, large snags and fallen trees of a particular species may be unique features. Along with the six primary variables listed above, each ecosystem-based conservation plan utilizes specific variables that reflect the characteristics of the planning area and the overall objectives of the plan.

Designs for protected networks of ecosystems/ecological reserves at each scale are developed from a combination of interpretation of various databases, field assessments, and expert opinion. Each design is subject to modification based upon a field assessment and peer review of the design.

The three **primary scales** that we employ in the ecosystem-based conservation planning process are described below. However, the reader is cautioned that there are often intermediate scales, where plans are produced that fall between these primary scales. The precise structure of a multiple spatial scale ecosystem-based conservation plan depends upon the ecological characteristics of the area being planned and the objectives for the plan.

3.1 Sub-continental & regional/large landscapes: Protected Areas Network (PAN)

A protected areas network (PAN) consists of **core reserves** and **linkages** that provide for connectivity between core reserves and throughout the landscape being planned. Core reserves and linkages need to be spatially well distributed across the planning area, and be inclusive of the six primary variables listed above.

If the planning area is large, consisting of multiple landscapes, a PAN may be developed for the entire area, with finer scale PANs developed for landscapes within the large planning area.

The common scales for analysis and map production of PANs range from 1:500,000 to 1:200,000.

3.2 Landscapes and multiple watersheds: Protected Landscape Network (PLN)

A protected landscape network (PLN) is designed for a medium-size landscape that will be modified by human activities. The design of a PLN is followed by development of human use areas for the landscape and design of an economy for the planning area.

Considering the six primary variables described above, specific components of a PLN include:

- old growth or late successional forests;
- riparian ecosystems, from large to ephemeral features;
- wetlands and wetland complexes;
- ecologically sensitive areas;
- naturally rare ecosystem types;
- linkages or corridors that provide connectivity between and within ecosystems, groups of ecosystems, and ecological communities;
- ecosystems that provide habitat for rare, threatened, endangered genetic strains, species, and ecosystem types often termed biodiversity nodes; and
- ecological communities that are representative of the landscape.

The common scales for analysis and map production of PLNs range from 1:200,000 to 1:20,000.

3.3 Ecological communities and patches: Protected Ecosystem Network (PEN)

A protected ecosystem network (PEN) is designed at the community or patch level to maintain ecosystem composition, structure, and function in areas modified by human resource extraction and/or other forms of human development. The design of a PEN is part of the development of a prescription for human use in a particular ecological community or patch.

Considering the six primary variables described above, specific components of a PEN include:

- large living and dead tree structures,
- small ecologically sensitive areas,
- ephemeral streams and wetlands, and
- linkages between structures.

The common scales for analysis and map production for PENs range from 1:20,000 to 1:500.

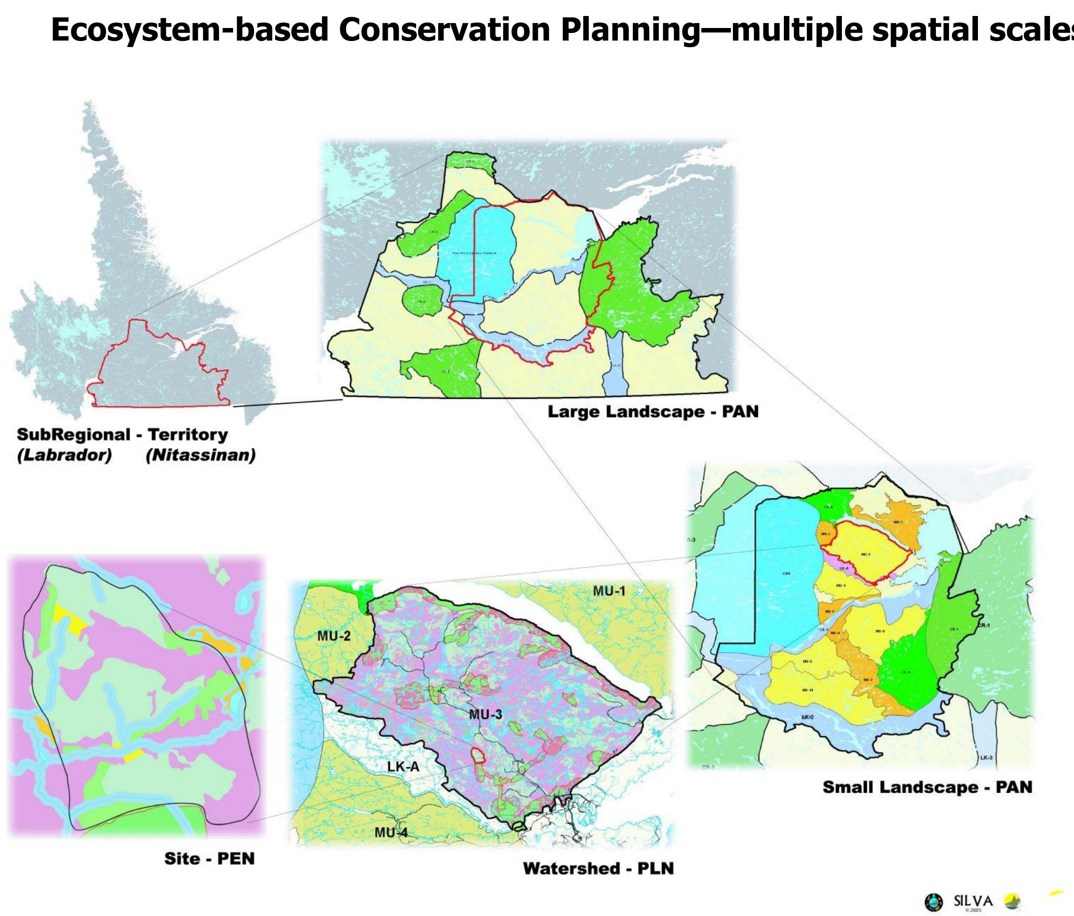

Figure 6: Ecosystem-based conservation planning—multiple spatial scales.

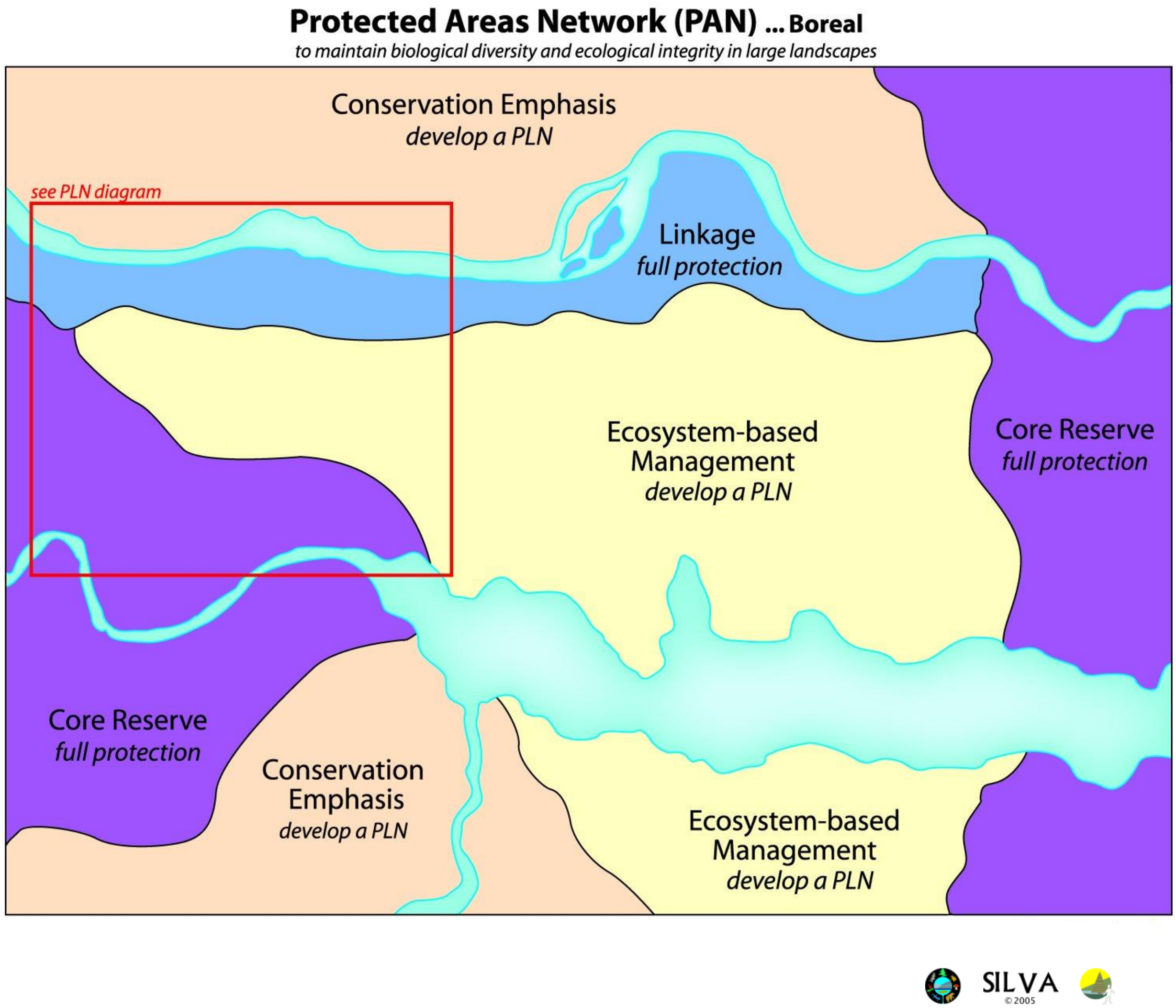

Figure 7: A Protected Areas Network (PAN) – Boreal.

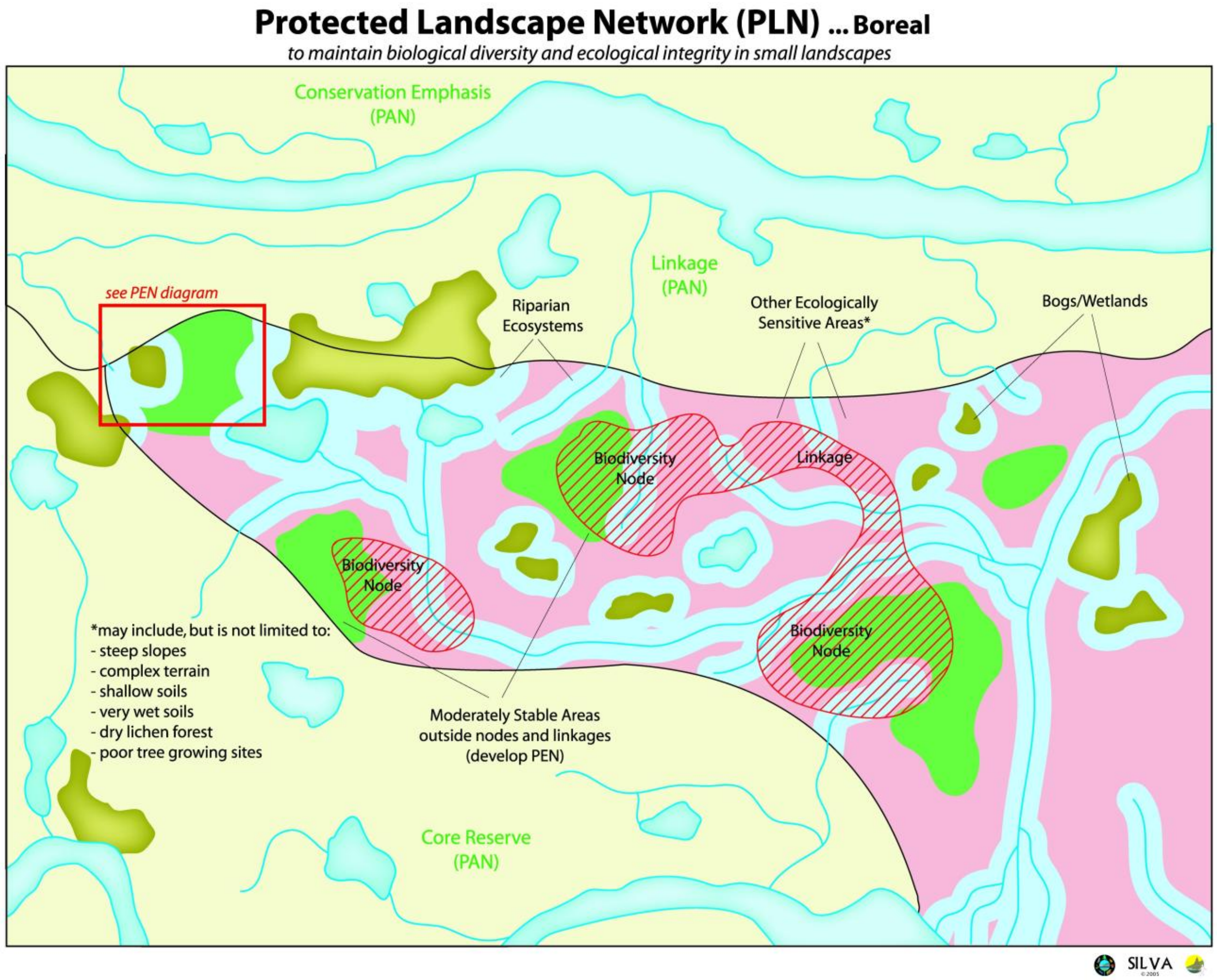

Figure 8: A Protected Landscape Network (PLN) – Boreal.

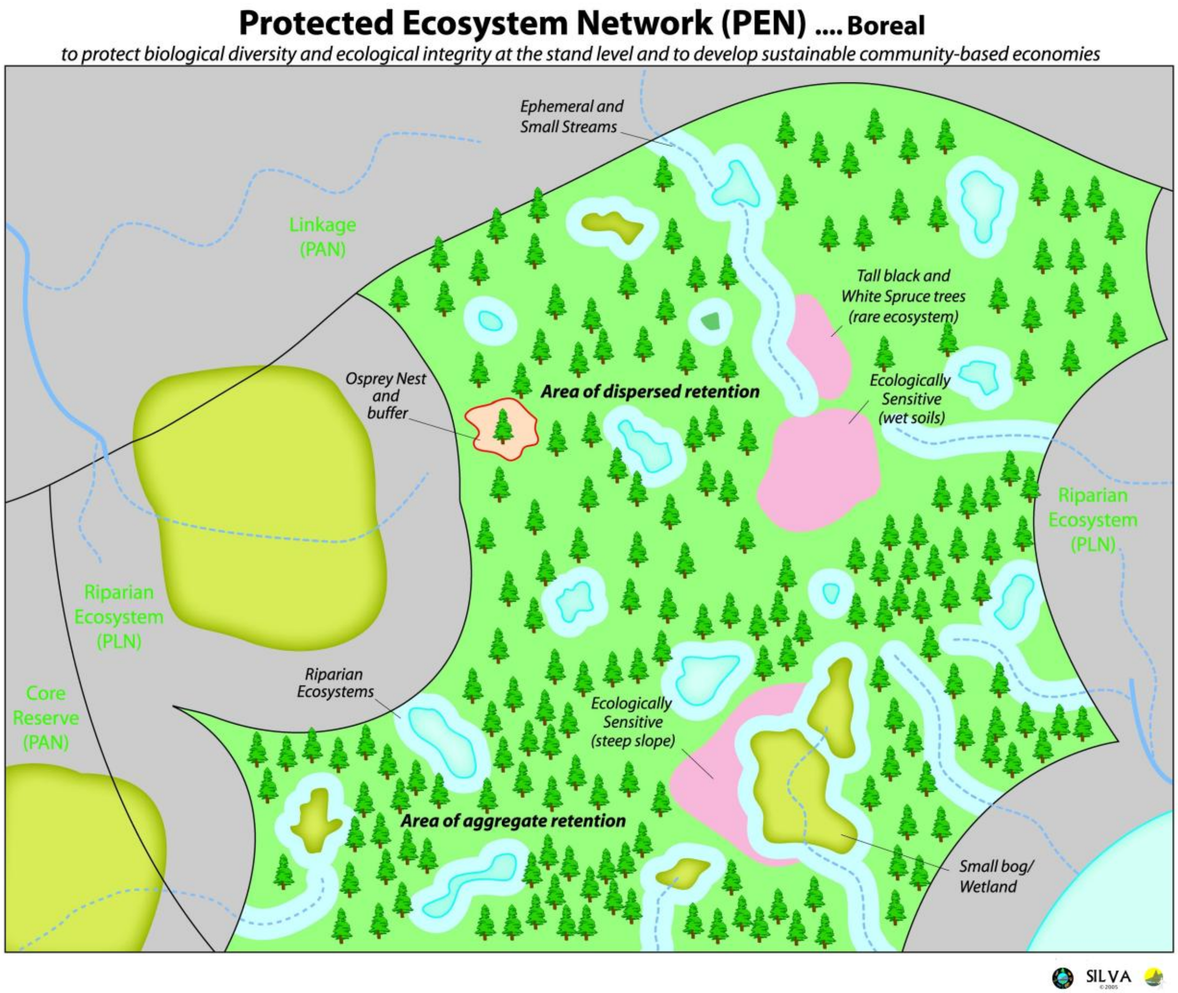

Figure 9: A Protected Ecosystem Network (PEN) – Boreal.

4 The Process: Major Steps

First Nations and local communities are full participants in the process described below. Accommodation of First Nations aboriginal title and rights is a major factor in designing and implementing an ecosystem-based conservation planning process. Community interests that participate in an ecosystem-based conservation planning process are required to have a significant constituency, a clear means of regularly communicating with their constituency, and a clear means of being held accountable to their constituency and to the broader community. Industrial interests, along with other interests, need to be comfortable with, and adopt the philosophy and principles of an ecosystem-based approach to planning.

STEP 1: Describe the *character* and *condition* of the planning area, including:

1.1 **the ecological landscape, and**

1.2 **the human communities within or dependent upon the ecological landscape.**

The **character** of the ecological landscape refers to the natural[1] composition, structure, and function at all scales of the landscape. In other words, describing the character of the landscape means describing what it is and how it works. The character of human communities can be described in a similar way by understanding the residents, or composition, institutions or structures, and means of operation or functioning.

The **condition** of the ecological landscape refers to how the natural ecological composition, structure, and function have been modified or impacted as a result of human modification from resource exploitation, settlement, and other human activities. Similarly, the condition of human communities may be described by a variety of indicators, including: distribution of resources among community members and groups; meeting needs as opposed to acquiring wants; and whether people have meaningful and satisfying work.

STEP 2: Identify what to leave—what parts of the landscape need to be protected—by:

2.1 **Determining *ecological sensitivity* and identifying *ecological limits*.**

Species, ecosystems, and landscapes, which are easily degraded or perturbed are **sensitive to disturbance.** Certain animal species, for example, are sensitive to disturbance because they have very specific habitat requirements. Soil communities on steep, wet slopes are also sensitive to disturbance because they are likely to slump or slide, resulting in soil erosion and stream siltation. The **ecological sensitivity** of these species and systems is determined by assessing biophysical characteristics such as slope gradient, slope complexity, moisture regimes, and overall soil depth, or by assessing habitat requirements and population dynamics.

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[1] *Natural* is defined as the composition, structure, and function of ecosystems before industrial modification of landscapes and their component ecosystems. Therefore, in North America, *natural* conditions would be defined largely as the period before European contact. Note that *natural* does not mean without human modification and includes Indigenous Management Systems.

Species, ecosystems, and landscapes that are sensitive to disturbance have biophysical, climatic, or abundance thresholds. Serious ecological degradation, including species loss, may occur if these thresholds or **ecological limits** are exceeded by human activity. For example, inappropriate timber cutting in forests growing on cold and/or thin soils will result in long-term loss of habitat and degraded nutrient cycling. Similarly, excessive harvesting of a mammal or fish population will result in catastrophic decline or extinction. Ecological limits can be identified by the presence of characteristics such as cold climates, cold soils, terrain with steep and/or broken slopes, very wet or very dry moisture regimes, heavy snow packs, low numbers of a naturally occurring species, and the habitat requirements for a particular species.

Ecological sensitivity and ecological limits of species, ecosystems, and landscapes define areas that require high levels of protection at all spatial and temporal scales.

2.2 Identifying naturally or ecologically rare ecosystems.

Within any landscape there are unique ecosystem types that comprise only small portions of the landscape and/or occur very infrequently in dispersed patterns, throughout the landscape. Rare or unique ecosystem types require protection, from the patch to the large landscape level, in order to maintain ecological integrity.

2.3 Identifying landscape pattern, representative ecosystem types and natural disturbance regimes.

The landscape pattern or mosaic is defined by the distribution, frequency, size, and shape of the **ecosystem-types** comprising the landscape. Ecosystem types are commonly defined by variability in vegetative communities in combination with topographic features. Homogeneous patterns and heterogeneous patterns within the planning landscape result in identifying different representative ecosystem types, and ultimately in designing different protected networks of ecosystems/ecological reserves. The nature, size, frequency, and shape of natural disturbances determines how the landscape pattern changes through time. Protected networks of ecosystems/ecological reserves need to be designed to accommodate these changes without loss of ecological integrity.

2.4 Defining a protected areas network (PAN), consisting of core reserves and linkages or corridors between reserves.

The design of the PAN, including the location, size, and configuration of core reserves and linkages/corridors, needs to consider:

i. *The character of the landscape*. . .Core reserves and linkages/corridors need to be well distributed across the landscape, need to encompass special features and naturally rare ecosystem types, need to contain good representation of ecosystem types, need to meet the needs of focal species, and need to anticipate natural disturbance frequency and patterns. These aspects of core reserves and linkages/corridors are determined from the description of the character of the landscape, and theme maps developed during this description.

ii. *The condition of the landscape* . . . as much as possible, core reserves and linkages/corridors need to be unmodified by industrial human development.

However, if key ecosystems and/or key geographical areas have been modified, these areas need to be included in an ecosystem-based conservation plan as large landscape reserves and/or linkages/corridors, with the provision that active restoration will occur in these areas.

iii. *Keystone and/or umbrella species* . . . large landscape reserves and linkages/corridors need to ensure, within the limits of our understanding of ecosystem functioning, persistence (as opposed to mere existence) of keystone and umbrella species. **Keystone species** provide unique functions within ecosystems. Without keystone species, key aspects of ecosystem functioning, like nutrient cycling and photosynthesis, are damaged. **Umbrella species** are those whose health (i.e. population and condition of population) reflect the condition of a broad range of species in both individual ecosystem types and large landscapes. Large landscape reserves and linkages/corridors need to accommodate the needs of both keystone species and umbrella species.

iv. *Rare, threatened, and endangered genetic strains, species, and ecosystems* . . . refers not only to *naturally rare* genetic strains, species, and ecosystem types, but also to genetic strains, species, and ecosystem types which have *been made rare, threatened, or endangered* by human modification of ecosystems and landscapes. Necessary habitat for rare, threatened, and endangered genetic strains, species, and ecosystem types need to be accommodated by large landscape reserves and linkages/corridors.

2.5 **Test for the habitat needs of a range of species**.

At this point in developing an ecosystem-based conservation plan, a network of protected ecosystems/ecological reserves is emerging. Depending upon the size of the area being planned, this network will be a PAN, a PLN, or a PEN. In order to ensure that the network maintains composition, structure, and function at the spatial scale it has been designed for, the network of protected ecosystems/ecological reserves needs to be tested to ensure that the needs of various species are met. Population data and habitat needs for a variety of species, a **group of species,** are used to test the effectiveness of the protected network of ecosystems/ecological reserves to identify “holes” or flaws in the design. The wider the range of species and the greater the number of species that can be used to test the protected network, the more confidence the planner can have that the ecosystem-based conservation plan will protect and maintain ecosystem composition, structure, and function at all scales through time.

Note: The process outlined in STEP 2 above is generally followed for the development of protected landscape networks (PLNs), as well as PANs.
The primary difference is that design of PLNs requires a finer network of protected ecosystems than a PAN. For example, riparian ecosystems and old growth forest nodes appear in a PLN, but not in a PAN, while core reserves are central to a PAN, but are not usually designed in a PLN. Also, the linkages/corridors in a PLN are smaller and more frequent than the linkages/corridors in a PAN.

The process to define a protected ecosystem network (PEN) is a finer scale version of the process to define a PLN, and also depends upon the characteristics of the specific patch or ecosystem type where human activities are planned. For example, instead of defining old growth nodes, as in a PLN, a PEN defines individual trees, snags, and fallen trees for inclusion in the PEN.

As described in STEP 3 below, the design of PLNs and PENs is an integral part of developing an ecologically sustainable economy.

STEP 3: Develop diverse, ecologically sustainable community-based economies by:

3.1 **Defining *Protected Landscape Networks* in landscapes that will be modified by ecologically responsible human use.**

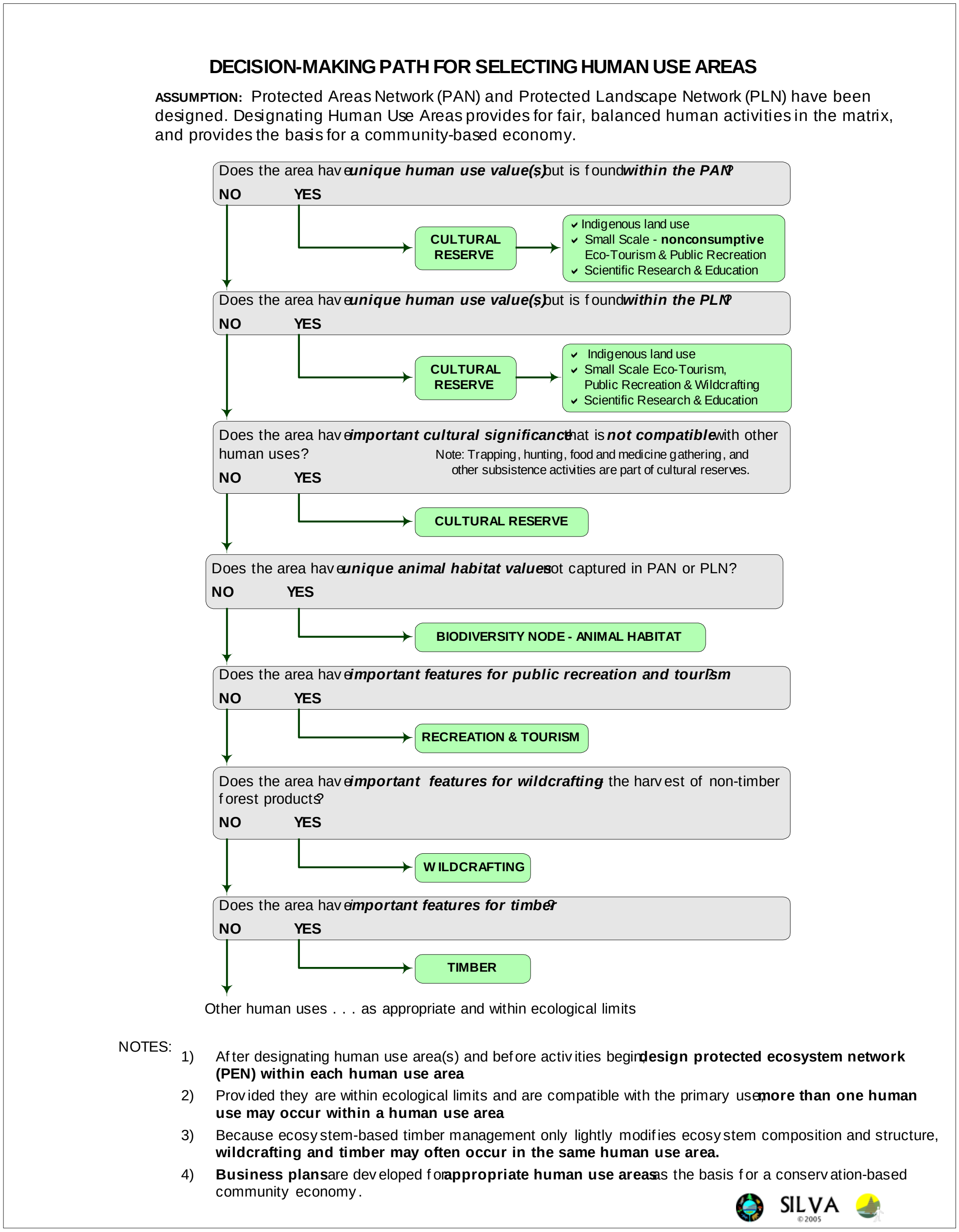
Protected landscape networks will contain the parts described earlier in **The Process: Multiple Spatial Scales**, and will be defined through the same process as that used in defining large landscape reserves. The process of ecosystem-based conservation planning progresses from the large landscape or regional level to the small patch level where human modification for cultural and economic reasons occurs. Protected landscape networks and protected ecosystem networks maintain the composition, structure, and function of the **matrix**, the portion of the landscape actively used for human economic activities. Keeping the matrix healthy is necessary to ensure the protection, maintenance, and where necessary, the restoration of ecological health and protection of biological diversity of the entire landscape, including the PAN.

3.2 **Establishing human use areas.**

Respecting the PAN and PLN, communities use an inclusive, participatory process to identify areas where various kinds of human activities will be carried out. Many of these will directly contribute to economic well-being, while others will provide for social and cultural well-being.

The least consumptive activities and the activities that depend upon essentially unmodified ecosystems are designated first to ensure that these activities are protected from more aggressive land uses. Overall, the goal is to provide for fair, balanced use of the landscape being planned, while maintaining ecological integrity. In other words, all land users are entitled to an adequate, protected landbase to meet their needs.

Note: Steps 3.4 through 3.7 describe factors that need to be incorporated into the process of selecting human use areas.



Note: The human use areas shown above are only examples of potential human use areas. All human activities that respect ecological integrity may be included in the process of selecting human use areas.

Figure 10: Decision-making path for selecting human use areas.

3.3 **Defining *Protected Ecosystem Networks* in patches that will be modified by ecologically responsible human use.**

Protected ecosystem networks are small-scale versions of protected landscape networks, which ensure protection of individual trees, including snags and fallen trees; small riparian ecosystems, including ephemeral streams, wetlands, and ponds; small ecologically sensitive areas; and unique habitats in patches that are modified by human use.

3.4 **Protecting natural capital.**

Protecting natural capital means pursuing **ecologically responsible** economic activities that protect, maintain, and, where necessary, restore ecosystem composition, structure, and function at all scales. The first priority of these activities is to maintain natural capital (i.e. avoid causing soil degradation) and the second priority is to restore natural capital where it has been degraded (i.e. in previously logged mature forests, use techniques that assist in the restoration of snags and fallen trees to restore natural animal habitat and soil functions).

3.5 **Developing a diversity of *ecologically responsible activities*, which focus on quality and adding value, as close to the source of resources as possible.**

Ecosystems are diverse at all scales and, therefore, economies that are based on a diversity of ecologically responsible activities tend to be more successful in maintaining ecosystem health and biodiversity. Therefore, diverse economies are more ecologically sustainable than economies that are based on only one or a few activities. A diversity of activities also promotes economic stability by avoiding economic problems when one part of the economy is weak. Focusing on producing high quality, value-added products and services means increased employment and wealth can be generated for a given quantity of natural resources used. Thus, the production of high quality, value-added services and products, as close to the source of natural resources as possible, is a key ingredient in developing ecologically sustainable, *community-based* economies.

3.6 **Providing for sufficiency and quality livelihoods.**

Ecologically sustainable economies focus on fulfilling needs rather than satisfying wants, and on providing meaningful, involved, and valued work that links people to their ecosystems. Economies and jobs that produce high income levels often impair rather than protect natural capital because they are based on *consuming* unsustainable levels of resources that exceed ecological limits. Economies that meet needs and provide quality work within ecological limits, on the other hand, promote human and community well-being, and serve to protect and maintain the ecosystems that support such well-being.

3.7 **Promoting the development of social capital.**

Social capital refers to the wealth of knowledge, skills, experience, and values that individuals and communities build over time. Collectively, these are the human resources that allow individuals, organizations, and communities to understand the ecosystems they live in, to solve problems together, and to adapt when social, economic, and ecological conditions change. Social capital is developed when community members participate equally in making decisions about how ecosystems, and the natural resources provided by ecosystems, will be used; about what goods and services will be produced; and about how those goods and services are distributed in the community or sold for individual and community revenue.

5 Some Large Challenges: scale, time, and restoration

1. **Scale:**

   Ecosystem-based conservation plans, need to be developed and implemented at all scales from the largest landscape to the smallest patch.

2. **Time:**

   Ecosystem-based conservation plans must, as much as possible, attempt to predict natural changes, and provide for succession and change, while maintaining the composition, structure, and function necessary to ensure the persistence of natural, healthy, and diverse ecosystems—ecological integrity. Establishing a PAN with core reserves and linkages of sufficient size to withstand large natural disturbances is a key aspect of developing ecosystem-based conservation plans that account for succession and change.

3. **Restoration:**

   Human beings have a basic obligation to work with nature to repair our ecological mistakes in exploiting ecosystems. Restoration must be understood not as a "quick fix," but as assisting nature to rebuild healthy composition, structure, and function in damaged ecosystems. Our commitment to restoration should not provide the rationalization to continue exploiting and damaging ecosystems, but should serve as a sober lesson to avoid ecological damage in our future plans and activities.

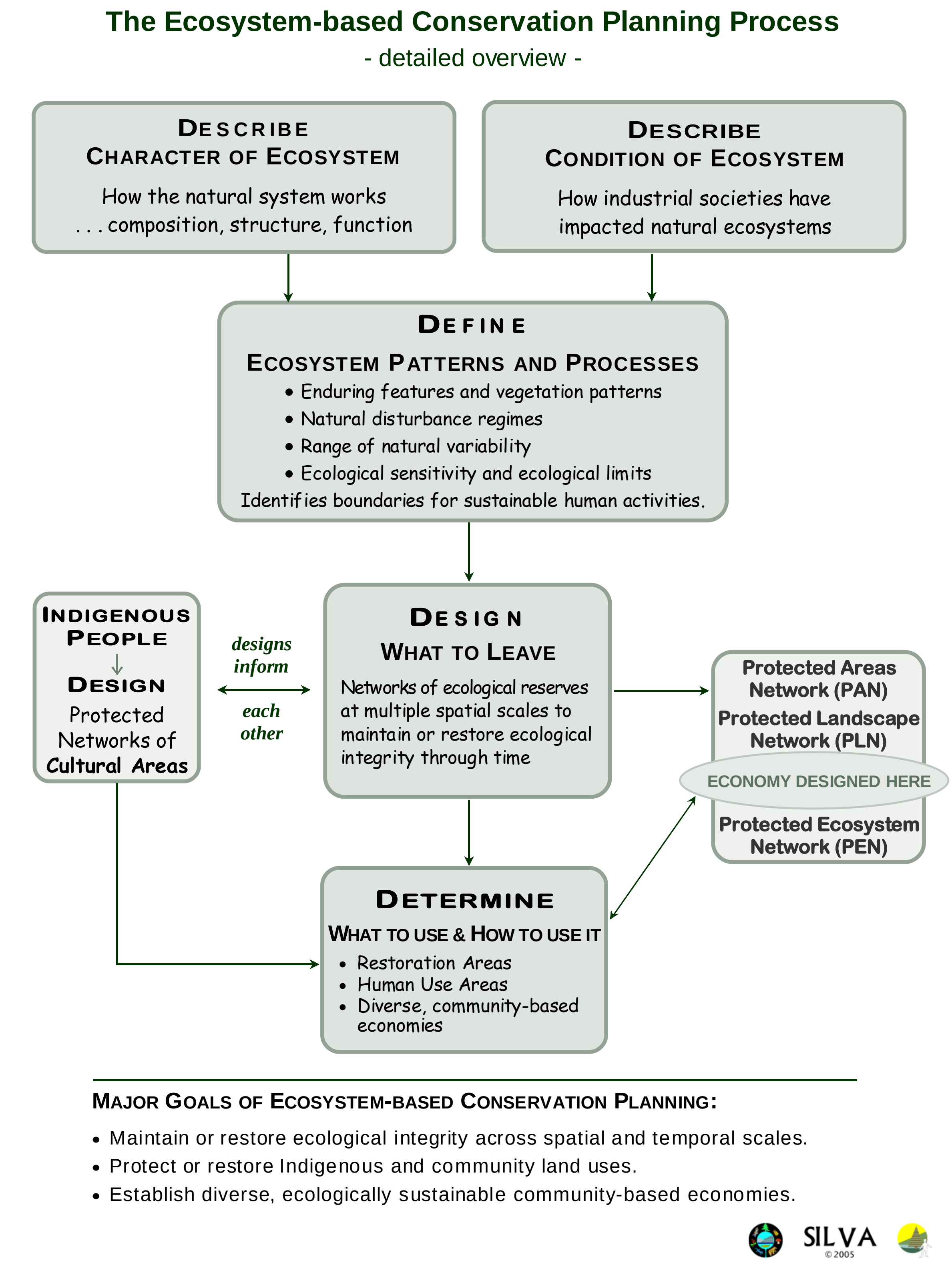


Figure 11: Ecosystem-based conservation planning – the process.

The Sequence of Logic for Ecosystem-Based Conservation Planning
General Components

This logic is applied at each spatial scale of planning.

Process carried out at MULTIPLE SPATIAL SCALES

(regions, sub-regions/territories, large landscapes, small landscapes, watersheds, sites/stands)

ASSESS . . . Obtain information . . . existing and new

CHARACTER . . . how natural system functions

CONDITION . . . impacts on natural system from industrial developments

☒ ECOSYSTEMS
☒ CULTURES
☒ COMMUNITIES
☒ ECONOMIES

DESIGN . . . Interpret information and develop options

* Ecological Reserve Networks at multiple spatial scales
    * Protected Areas Network (PAN)
    * Protected Landscape Network (PLN)
    * Protected Ecosystem Network (PEN)
* Healthy cultures and communities
    * community infrastructure and services
    * economic development
    * capacity building
    * institutional arrangements

INTEGRATE . . . Select design option(s) and bring together ecosystem, cultural, community, and economic information

* Select ecological reserve networks
    * Protected Areas Network (PAN): large landscape
    * Protected Landscape Network (PLN): small landscape/watershed
    * Protected Ecosystem Network (PEN): site/stand
* Select cultural reserves
* Designate human use areas: cultural protection, rediscovery, trapping, hunting, timber, non-timber forest products, subsistence, settlement, tourism, recreation . . . others as appropriate

IMPLEMENT . . . Establish networks of ecological and cultural reserves. Carry out human activities to maintain or restore full ecosystem functioning, maintain or restore cultures, and develop healthy communities and their economies.

* Determine restoration needs
* Conduct operations planning
* Fine-tune ecological reserve networks and cultural reserves
* Carry out activities that restore or maintain ecological and cultural integrity
* Monitor and evaluate results . . . adaptive management (passive and active)

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Figure 12: The sequence of logic for ecosystem-based conservation planning.

6 Data Sets Useful in Ecosystem-based Conservation Planning

There is a myriad of data sets that are useful for ecosystem-based conservation planning. This section only provides the reader with a description of common data sets useful in the process of ecosystem-based conservation planning.

Several general points can be made about data sets:

- Finding success at developing an ecosystem-based conservation plan is more about having the right data, than having all of the data that exists. Thus, carefully understanding the process of ecosystem-based conservation planning, and the objectives for a specific plan are necessary to identify the most useful data sets.
- First Nations traditional ecological knowledge is very valuable, and can be used to improve the accuracy of standard data sets, as well as provide data sets that are not commonly available.
- Anecdotal data needs to be tested for reasonableness and accuracy, but often provides data sets that are not commonly available and can be quite useful in designing ecosystem-based conservation plans.
- Because of the complexity of developing ecosystem-based conservation plans, much of the analysis and design work is assisted by the use of geographic information systems (GIS). Therefore, having data sets in a digital format is important. Silva has assisted groups to prepare ecosystem-based conservation plans for small areas, however, without the use of GIS.

Data sets that are usually available and useful for ecosystem-based conservation planning include:

> **Note: The data sets described below need to be of an appropriate scale for the spatial scale being planned, i.e. regional or large landscape, medium landscape or multiple watersheds, watershed, ecological community or patch.**

- Stereoscopic air photos
- Satellite imagery
- Vegetative and biophysical classification maps and data
- Landforms and soil maps and data
- Topographic maps
- First Nations' traditional use studies, or other eco-cultural data
- Resource inventories, including forest inventories, mineral potential, tourism potential etc., maps and data
- Animal habitat potential, and animal range maps and data
- Rare, threatened, and endangered species and ecosystems maps and data
- Resource extraction history and plans, both maps and data

7 "Looking forward . . . a healthy future for all"

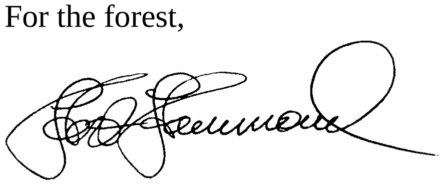
I believe that ecosystem-based conservation planning is needed and possible. I believe it is one very important way we can "let life be good." We understand the conservational techniques of conservation and design at different scales, balanced human use areas, protection of species and ecological processes, ecologically responsible land uses, and the use of soft technology and skillful marketing. With these and other components, ecosystem-based conservation planning can balance the rights of all people who need healthy ecosystems—which is to say, all people. Corporations do not disappear. Their role is redefined and their profits reduced but not eliminated. Workers (organized, unorganized, and management) continue to be employed. The nature of their tasks may be different but their rewards will continue to be substantial. Ecosystems, including forests, are protected. Human society is sustained . . . we all share.

The need for change is one of the most obvious aspects of common ground among all people. Our challenge is to combine different facts, different values to reach consensus about ecologically responsible use of the forest—of ecosystems. Our consensus needs to always be oriented towards the truth—essential reality. The way to change will often be difficult and confusing, but remember that stumbling is the gift of learning for the seekers of change. Even in the stressful atmosphere of disagreement, change is occurring—truth is emerging. Be consistent and persistent, yet open to all new ideas and information. Protect the dignity of all people. And, most of all, have heart. The truth cannot be suppressed by ridicule and opposition. With commitment, truth will become self-evident.

Lest we underestimate the task before us, we must understand that we are not talking about tinkering with the present system of forest use. We are not just talking about more parks and fewer clearcuts. We're not talking about changing political parties. We are talking about changing our ways of thinking. The change is a big one, but I think it can be summarized very briefly:

- You have as much power as you believe you have.
- Act, don't react.
- Think like the forest.

For the forest,



November, 2004

Appendix 1

Appreciative Inquiry
a practical approach to achieving community goals

Silva Forest Foundation uses appreciative inquiry (Ai) to work with groups that want to develop and implement a community vision, or change some aspect of what they are doing. Ai is a way of working with change in any human group—a family, a First Nation, a community, an organization, a business—by asking questions about the group when it functions at its best and designing a future that draws on the strengths uncovered.

The simple principles behind Ai are that in every group something works (if nothing at all were working, the group would not exist) and that no problem happens all the time. The group moves forward by identifying the factors that contribute to their success, rather than studying the reasons for their problems and their failures. The axiom is that what we look for, we get more of. Thus, if we look for what is wrong, we are likely to get more of what goes wrong. If we look for what goes well, we are likely to get more of what goes well.

Appreciative inquiry does not ignore problems; rather, it approaches them from a completely different perspective. The practical results of Ai sometimes look exactly like the results of good problem solving, with one profound difference: at every point in the process, Ai sustains a high level of commitment and energy among participants, rather than leaving them drained and demoralized, as problem-solving processes usually do.

On the other hand, the practical results of Ai often look nothing like the results of problem solving. Brilliant ideas are often generated that no participant (and certainly no outside expert) could possibly have anticipated.

Ai cannot guarantee a path to the future that is free of obstacles, but it can consolidate and sustain the vision and energy of the members of a group so that they face their future from a position of strength, confidence, self-knowledge, self-respect, and hope.

For a list of resources related to Appreciative Inquiry, contact Susan Hammond at **silvafor@netidea.com**.

Silva believes that appreciative inquiry can be a valuable approach for communities facing a variety of challenges, including the protection, restoration, and management of the ecosystems around them. By sharing stories of times when the community was at its best, people find ways of building on their successes in order to define their future. In the words of one of the Summit participants, "Appreciative inquiry sneaks up on you, providing possibilities you hadn't imagined."

Assumptions of Appreciative Inquiry

In every human situation, *something* works.

Reality is created in the moment and there are multiple realities.

What we focus on becomes our reality.

The language we use shapes our reality.

The act of asking questions influences the outcome in some way.

People have more confidence going into the future (unknown) when they carry forward parts of the past (known).

If we carry parts of the past into the future, they should be what are best about the past.

It is important to value differences.

From *The Thin Book of Appreciative Inquiry* by Sue Annis Hammond

Ai AT THE COMMUNITY SUMMIT**

“Appreciative inquiry sneaks up on you, providing possibilities you hadn’t imagined.”

Participants at the 2003 Community Summit *engaged in a one day appreciative inquiry to define what works in communities, and to begin to identify ways to move forward with ecosystem-based planning (EBP) in their communities and on a broader scale. Through interviews and group discussion, participants shared stories about inspiring or special times in the community and about what they value about individuals, their community, and ecosystem-based planning.*

Positive Qualities of Ecosystem-based Planning Identified by Summit Participants

Ecosystem-based planning in communities:

- links cultural and ecological planning.
- incorporates a wide range of values, interests, and beliefs.
- provides options for cultures, ecosystem conservation, and economies.
- provides a framework for resolving issues.
- is deeply satisfying because it considers whole ecosystems and whole cultures.
- belongs to everyone, and the knowledge is readily shared.
- builds connections with First Nations; builds friendships.
- has global applications because it is easy to understand and holistic.
- applies approaches and principles in diverse contexts, from forests and grasslands to rural communities and urban areas.
- provides hope both within the community and through outreach to others.
- empowers the community to direct itself and take responsibility for the land.

Summit participants were asked to imagine a community where ecosystem-based planning has bee implemented successfully for ten years. Based on the collective ideas of what a successful community look like, participants developed a **vision statement** for th community.

> *Our ecosystem-based community supports and restores the health of its people and environment, and has clean air, soil, and water. It provides a healthy home to all creatures.*
>
> *Decision-making is self-managed, responsible, and accountable.*
>
> *Activities are sustainable, respecting short- and long-term needs, providing economic, social, and spiritual benefits, locally and to the region. Our community is a centre for learning and research founded on traditional knowledge, and is open to all ideas and people.*
>
> *Our community celebrates its uniqueness and good fortur*
>
> *It is here forever.*

Summit participants then defined specific statements that guide actions within the ecosystem-based community. Some of these are:

- Effective and inclusive community decision-makin processes are used.
- Our ecosystem-based plans are periodically evaluat and revised to achieve our community’s vision.
- We remain positive, optimistic, and passionate about ecosystem-based planning and our communities
- We are actively restoring our degraded landscap in order to re-establish fully functioning ecosystem and contribute to a diversified community.
- We actively protect and maintain natural, healthy land scapes.
- We recognize the need to co-exist as peoples, and w are developing cooperative personal and working relationships between First Nations and the non-aboriginal communities.
- We actively support development of appropriate small local enterprise, including consumer support o local products.

These more specific statements and the vision statement form the basis for more detailed planning and provid the ‘touchstone’ for future decisions. ■

**Twelve communities across Canada have completed ecosystem-based conservation plans with Silva. In July 2003, representativ from eight of these communities sent representatives to a four-day Community Summit hosted by Silva in order to share their expe ences with others, learn from the successes and challenges of different communities, and define ways to move forward.