INTRODUCTION

The Bumblebee That Changed the World

Övertorneå — the first eco-municipality in Sweden

In the mid-1980s, the little town of Övertorneå (Eu-vehr-tawr'-neh-aw) in northern Sweden received a national prize as the Municipality of the Year. In his speech at the award ceremony, a prominent county official, Councilman Jan-Olof Hedström, compared Övertorneå to a bumblebee. As lore has it, the famous aeronautic engineer Sikorsky hung a sign in his office lobby that reads: "The bumblebee, according to our engineers' calculations, cannot fly at all, but the bumblebee doesn't know this and flies."

This was the regional and national establishment's view of Övertorneå. Changes were happening in the town outside the envelope of what was then regarded as business-as-usual community development. The municipal government and its larger community had made a commitment to develop in a way that was in harmony with nature. Övertorneå residents and town officials sought a win-win-win relationship between humans, society, and nature. Residents and officials were coming to understand that investing in ecological approaches to meet community needs could also bring about an economically positive future. To characterize its transformation, Övertorneå began to call itself an "eco-municipality."

Övertorneå was discussing and practicing ideas such as mobilizing people, taking a bottom-up approach to community planning, collaborative community development, cooperating across department and industrial sector boundaries, investing in local culture, and taking into account the local informal economy. Such ideas were foreign to conventional Swedish town planning and community development practices at that time. What the

regional and national establishments could see, without understanding why, was that these strange ideas evidently produced remarkable results — for example, over 200 new business enterprises producing several hundred jobs in a small town of barely 6,000 inhabitants. These county and national agencies considered new jobs and businesses to be the most important indicators of successful community development.

BACKGROUND

Övertorneå was located in the Swedish region hardest hit by the 1980 economic recession that brought about a 20 percent regional unemployment rate and subsequent out-migration. Övertorneå's population dropped 25 percent from its level 30 years earlier. Apathy and lack of trust in the future typified local attitudes. Social experts predicted the region was doomed to die, since no possible solutions were apparent.

In this seemingly hopeless situation, Övertorneå and its municipal government decided to explore what other future scenarios might be possible besides the prevailing bleak view. This decision was the town's first step toward becoming Sweden's first eco-municipality. It also was the first step toward changing both the perceived negative future and the actual negative conditions of hard economic times and population loss. In the six years following this decision, over 200 new companies in Övertorneå developed and prospered. These new enterprises included organic farms, beekeeping, fish farms, sheep husbandry, and eco-tourism enterprises.

Figure 0.1: This idyllic scene of Övertorneå countryside belied its former depressed economy and community spirit.

Key to these successes was widespread community participation. The citizens of Övertorneå took on their own community development work to become the town they wanted. Over 600 residents took part in special study circles discussing regional development issues and future possibilities. Out of these study circles emerged village development associations that took charge of the ideas sprouting and gradually taking form. The ecological perspective blossomed in a municipal government investment in biofueled district heating, support for ecological farming such as farmer education and municipal purchasing of organic foods, establishing

a "health home" and building an ecovillage to attract new families. Övertorneå's municipal government and town planner held continual training events and seminars explaining the ecological perspective to citizens, businesses, farmers, and the other interests in Övertorneå, gradually raising the community's awareness of the importance of ecology and the environment. New postsecondary education courses, elementary school education, and childcare taught with an eco-perspective started up. Marketing and outreach of this emerging "eco-region" brought about a surge of tourist interest and subsequent birth of new tourist-oriented businesses.

At the same time, local culture was undergoing a renaissance. Revival of the local Finnish minority dialect, establishment of a local theater, and start-up of music groups, among others, brought about a cultural revolution in Övertorneå and its region where pessimism transformed into trust in the town's future, its traditional culture, and its development potential.

The transformation continues to this day. Övertorneå currently has the lowest incidence of sicknesses in Sweden, measured by the proportion of absence of long-term illness, as one example. The community's good health is considered to be due in large measure to consistent municipal investment that supports public health.

The municipality of Övertorneå has become 100 percent free of fossil fuel use in its municipal operations and is working for community independence from fossil fuel as a heating source by 2010. The town has converted all five of its oil-based village heating plants to wood pellet-burning facilities. The town government and many citizens have purchased cars that run on ethanol, a grain-based alcohol, instead of gasoline. Now there are ethanol gas pumps in town. The town has made all public transportation available at no cost. This decision increased public ridership by 700 percent. The town designed and constructed new schools based upon ecological principles.

News of Övertorneå's transformation spread throughout the country over the next several years. Inspired in part by Övertorneå's small village revitalization, a national rural movement of 3,300 similar village development groups evolved, where hundreds of thousands of village inhabitants began to take part in developing their communities in the direction of a future they wanted.

In the early 1990s, scores of other Swedish cities and towns signed onto the idea of becoming an eco-municipality. At the same time, similar eco-community development was going on in Norway, Denmark, and Finland. Collaborations among these Nordic eco-cities and eco-towns brought about a combined Nordic eco-community presentation at the 1992 United

Nations Conference on Environment and Development, held in Rio de Janeiro. This conference, also called the 1992 Rio Summit, established an action plan for local sustainable development that has come to be known as Agenda 21. Much of the contents in this world guide to local sustainable development emerged from the Nordic eco-municipality contributions to the Summit, when many conference participants realized that they offered one of the few serious examples of sustainable community development in the Western world. Thus, the United Nations' world guide to local sustainable development urges communities to begin to work in the same manner as Övertorneå began to work ten years earlier.

Since the 1992 Rio Summit, all municipalities in Sweden have begun local development work using this United Nations sustainable development guide. More than sixty of these cities and towns have declared themselves as eco-municipalities. The eco-municipality concept also has spread to other countries, such as Japan and New Zealand. The little bumblebee that couldn't fly has evidently influenced matters far outside its own boundaries!

I Compass for Change: The Natural Step Framework for Sustainability

CHAPTER 1

Introducing and Using the Natural Step Framework

Why a framework?

For starters, why is a framework of sustainability principles needed? For those already interested in community adoption of sustainable development, there are plenty of good examples out there now. These include green building programs, walkable New Urbanist communities, transit-oriented development, smart growth approaches, climate change initiatives, bike trails, electric buses, solar panels, windmill energy, and sustainability indicators. Why not just pick one or more of these and get to work making them happen in a given community? Scores of cities and towns in North America and around the world have already completed these types of environmental initiatives and sustainable development projects.

But what happens when committed and well-intentioned people can't agree on what sustainability or sustainable development means, let alone how to move in these directions? What about communities where local officials and citizens really don't understand, or care, what sustainability means in the first place, or why we all need to think about it?

Or, how about those situations in communities where environmental, social, and economic initiatives and goals conflict? Do we use limited public funds to protect diminishing open space or to build affordable housing for those in need? Do we save the forests, spotted owls, fish, or the jobs of the loggers and fishermen who depend on these resources?

Then, some cities or towns have adopted an environmental practice in one branch of government, only to find another department operating at cross-purposes. For example, one New England community became one of the first

in the region to adopt a municipal integrated pest management policy aimed at reducing and eventually eliminating the use of chemical pesticides in public parks and school recreation fields. Within months of doing this, another branch of local government sprayed most of the city with pesticides in an effort to kill mosquitoes that might be carrying the West Nile virus.

Next, there are the cases where an environmental initiative in one area has created unsustainable conditions in another area. An example of this is the well-intentioned effort, begun in the 1970s' oil "crisis," to construct buildings in a more energy-efficient way. And so we did — creating public and private buildings so airtight and well-insulated that they sealed us in with substances like volatile organic compounds emitted from carpets and pressboard cabinets, mold and dirt in air ventilation systems, all of which contribute to what is now known as sick building syndrome. Solving one problem while quite unintentionally creating another.

So, debates and arguments occur in trying to define what is sustainable. Issue-oriented or project-oriented sustainable priorities can conflict. Community actors can work at cross-purposes. We solve one environmental problem, only to create another. Many citizens and local officials still are not aware of the seriousness of what is happening at the global level or do not understand how this is directly related to the well-being of their own communities. Those who are aware often feel paralyzed and helpless in the face of seemingly overwhelming trends. These minefields can impede or stop the journey to community sustainability or even one well-intentioned project initiative.

Consider the case of a soccer team. All players on that team have their own roles and responsibilities. Each player may be doing something very different from the next on the field at any given second. Often, players have no idea what will happen next. If there were no shared understanding about the goal of the game, or the rules of play, there would be chaos on the field.[1]

So it is with a community team. The municipal government of a community, for example, has team members that can include public works, roads and highways, administration, purchasing, planning, conservation, recreation, fire and safety, public health, planning, code enforcement, community development, economic development, education, and housing.

The larger community team includes citizens from many walks of life, neighborhoods with their own special character, businesses of many shapes and sizes, public and non-profit institutions. Team members have their own set of responsibilities, activities, functions, areas of authority — sometimes regulatory authority — within the municipal government and the larger community.

If there already exists a shared set of playing rules in municipal government, these are usually implicit and have more to do with rules and expectations about budgetary constraints, public service provision, and politics than how to move toward a common desired future. In a way it is no wonder that city government, town government, and community affairs in general can often seem, if not actually be, chaotic.

Dr. Karl-Henrik Robèrt, founder of the Natural Step, coined a motto about the Natural Step approach to sustainability — "Find fundamental principles of indisputable relevance, and thereafter ask the advice of others on how to apply them."

Just suppose, for a minute, that all the departments, boards, and agencies of a city or town, and all the sectors of the larger community have a common vision about a sustainable community future and a shared understanding about a new set of playing rules for how to get there. Even though these "team members" carry out widely differing functions, responsibilities, and activities, their differing functions, like those of soccer players with differing positions and responsibilities, are aimed toward the same end goal.

What type of vision and playing rules can possibly bring this about?

Introducing the Natural Step framework

A little background

It was this type of chaos on the playing field within the scientific and environmental communities and a single-issue approach to handling environmental problems that led a group of scientists in Sweden to seek a better way. In 1988, Dr. Karl-Henrik Robèrt, a practicing clinician and specialist in cancer research, contacted other members of the Swedish scientific and environmental community. He asked these scientists and professionals to join him in an open dialogue about the bigger picture — what was happening that was unsustainable — and to help develop a set of principles that could guide human action toward a more sustainable path regardless of the starting point.

Together, they developed an educational manuscript of basic principles of science and natural law that could serve as a basis for scientific agreement and societal cooperation. Over the next year, the dialogue broadened to include government officials, business leaders, trade union representatives, members of national non-profit organizations, entertainers, and eventually the King and Queen of Sweden. Some fruits of this expanded circle were a TV program and a tape-and-booklet mailing to every household in Sweden. This experience prompted Robèrt to coin a phrase for the modus operandi and overall motto of the Natural Step approach — "Find

fundamental principles of indisputable relevance, and thereafter ask the advice of others on how to apply them."[2]

In his continuing journey to outline basic conditions that needed to exist for a society to be sustainable, Robèrt encountered a man who he later described as his multi-disciplinary mentor — Karl-Erik Eriksson — and his brilliant physics student John Holmberg.[3] Eriksson was a professor of theoretical physics at Chalmers University in Göteborg; Holmberg was a doctoral student studying materials flows. These three individuals, who were to collaborate closely in the evolution of the basic system conditions, came together at a 1990 conference in Orsa, Sweden. This conference was also the first gathering of the Swedish eco-municipalities, described in Chapter 4. Combining understanding of thermodynamics with knowledge of the biological conditions necessary for life, Robèrt, Holmberg, and Eriksson developed the model for a sustainable society that is the basis for the fundamental principles or system conditions for a sustainable society.[4] These principles, further developed by Robèrt and Holmberg, are the centerpiece of the Natural Step framework for sustainability.

To understand the basis for those principles, it helps to first move back and take a look at the bigger picture — what is happening at the global level that is unsustainable.

Looking at the big picture

At the global level, two trends are converging. On the one hand, natural systems of the earth are deteriorating, and the rate of this deterioration is increasing. Since 1945, 11 percent of the Earth's vegetative surface has been degraded. The loss of species is estimated to be the sixth most massive extinction in Earth's history. The world's supply of freshwater and its ecosystems have been seriously diminished.[5]

At the same time, population and consumption are rising exponentially, and disproportionately in the developed versus the developing worlds. Population is growing faster than food supplies in 64 of 105 developing countries. In the next 25 years, over one-third of the world's population will experience severe water shortage.[6] Twenty percent of the world's population now consumes 70 percent of its material resources and holds 80 percent of world wealth. The ecological footprint of the average citizen in the United States is 24 acres (9.7 hectares), compared to that of the average world citizen's footprint of 5.6 acres (2.8 hectares)[7]

These two trends — declining natural systems, and rising population and consumption — are like two sides of a funnel that are converging upon each

other. The time available for stabilizing these trends — the margin for action — is diminishing. And it is not known at what point irreversible effects will occur.

THE FOUR SYSTEM CONDITIONS FOR SUSTAINABILITY

The Swedish colleagues worked to identify what human activities were unsustainable over time and flaunted basic laws of physics, biology, and ecology. Based upon a clearer understanding of these unsustainable trends, agreement emerged about four conditions that all need to be met in order for a society to be sustainable. These system conditions, as they have come to be called, are as follows:[9]

1. **In the sustainable society, nature is not subject to systematically increasing concentrations of substances extracted from the Earth's crust.**

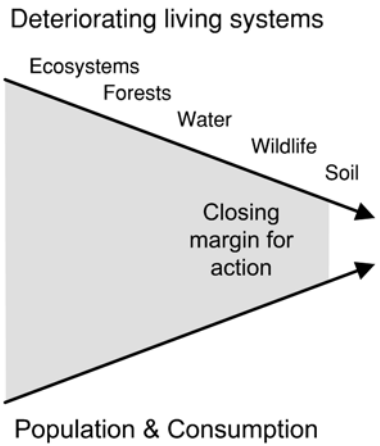

Figure 1.1: The funnel of converging trends[8]

REASON: Human society mines and brings into use substances from below the Earth's surface. These substances include heavy metals, such as cadmium, lead, mercury, minerals such as phosphorus, and fossil fuels. These substances and their emissions, such as carbon dioxide and nitrogen oxide created by burning of fossil fuels, have been steadily accumulating both in human society and nature at levels far greater than their natural occurrences. Because these metals and minerals are elements, they cannot break down further. Many of these substances, such as mercury, lead, and cadmium, already are known to be toxic.

While scientists argue about the toxic levels of other heavy metals and minerals, no one argues that natural systems, including humankind, can withstand continually increasing concentrations of these substances. The first law of thermodynamics says that energy can neither be created nor destroyed. The same goes for matter in normal chemical reactions. In practical terms this means we can't get rid of anything. Once these heavy metals and minerals are out and about in society, they are here to stay.

2. **In the sustainable society, nature is not subject to systematically increasing concentrations of substances produced by society.**
   REASON: Human society also has been manufacturing synthetic substances — chemicals and other compounds that do not occur in nature — faster than these materials can be broken down. The U.S. Environmental Protection Agency now lists over 70,000 chemicals that are in common use.[10] Many of these chemicals are persistent, meaning they do not break down easily or quickly, and they can spread far from their places of origin. For example, chemicals used to make flame-proof furniture upholstery are also known to interfere with brain and thyroid development and are found to be increasing exponentially in the flesh of Arctic seals, porpoises, crabs, and fish.[11]

   Synthetic chemicals also are accumulating in our own bodies. According to the U.S. Environmental Protection Agency, every U.S. citizen's fatty tissue contains at least 700 chemical contaminants.[12] To study the toxicity of the interactions of just 25 chemicals would require over 33 million experiments at a cost of about US$3 trillion.[13] To study the interactions of 11,000 chemicals would require 10^{3311} experiments,[14] a number greater than that of all the stars in the galaxies. Is it really feasible, then, to wait for scientific research to discover which and what combinations of those tens of thousands of chemicals are responsible for the many cancers, reproductive disruptions, and species extinction?
3. **In the sustainable society, nature is not subject to systematically increasing degradation by physical means.**
   REASON: Human activity also is breaking down natural systems — land, water, forests, soil, ecosystems — by depletion and destruction faster than these natural systems can renew themselves. Nearly one-half of the Earth's original forest cover has been lost. Two of every three species is estimated to be in decline.[15] Already, the demand for fresh water exceeds the world's supply by 17 percent.

   While we enjoy nature in the form of trees, open space, forests, babbling brooks, and singing birds, we often forget that nature also is our life-support system. It is the green plants, vegetation, trees, and ocean algae that produce the oxygen we breathe, absorb the carbon dioxide we give off, and produce the sugars and carbohydrates — through the process of photosynthesis — that are the basis of all the food we eat. The green cells of plants are the only cells in nature that can convert the sun's energy to these life-sustaining substances.

4. **And, in the sustainable society, human needs are met worldwide.**
   REASON: If people around the world cannot meet their basic human needs, the first three system conditions will not be met. For example, farmers in Brazil will keep burning the rainforest if they cannot meet their needs for subsistence any other way. The control of 80 percent of the world's wealth and resources by 20 percent of the population is an unstable condition that can lead, if it is not already leading, to social unrest and conflict. This inequality will continually undermine achievements toward the first three conditions.

   The basic human needs — air, water, food, shelter — should take precedence over provision of luxuries. Within our communities, our needs include a means of livelihood, mobility, equal treatment, equal access, safety, participation in decisions that affect our lives, the right to peaceful enjoyment of life, and a connection with nature. They also include a need for psychological and spiritual connection and meaning.[16]

   Needs cannot be substituted for one another. For example, having a roof over our heads will not satisfy our body's need for water. Having enough water to drink does not meet our need for shelter. In the same vein, having a "monster house," SUV, TV and CD player in every room, and expensive running shoes cannot substitute effectively for unmet needs in other areas.

New "playing rules"

Four guiding objectives emerge from the system conditions of the Natural Step that, used together, can help a city, town, or region systematically develop policies and practices toward sustainability. Please see these guiding objectives on the next page.

While action in the direction of any one of these objectives is good, it is those practices that simultaneously move in the direction of all four that can be relied upon to truly move toward sustainability. Applying all four objectives in generating a plan of action or strategy for a particular context or topic area essentially assures that a systems approach will emerge for that topic, as opposed to a single-issue or project-oriented approach that may solve one problem but create others.

DEVELOP POLICIES AND PRACTICES THAT ULTIMATELY …

Guiding Objective[17]	Type of Practices
1. Eliminate our community's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals.	Transit and pedestrian-oriented development; development heated and powered by renewable energy; mixed-use development; public transit, alternatively fueled municipal fleets; incentives for organic agriculture that minimizes phosphorus and petrochemical fertilizers and herbicides.
2. Eliminate our community's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances.	Healthy building design and construction that reduces or eliminates use of toxic building materials; landscape design and park maintenance that uses alternatives to chemical pesticides and herbicides; municipal purchasing guidelines that encourage low- or non-chemical product use.
3. Eliminate our community's contribution to encroachment upon nature (e.g., land, water, wildlife, forests, soil, ecosystems).	Redevelopment of existing sites and buildings before building new ones; building "from the inside out" development and infrastructure policies; open space, forest, and habitat preservation; reduced water use and recycling of wash water; sewage treatment by plants.
4. Meet human needs fairly and efficiently.	Affordable housing for a diversity of residents; locally based business and food production; using waste as a resource; eco-industrial development; participatory community planning and decision making.

The Natural Step system conditions and four guiding objectives provide a compass for reorienting human actions from unsustainable directions to sustainable ones. Using these objectives as a compass, we can change course to actions that can level out the converging and unsustainable trends of the funnel and eventually move to restorative actions.

Planning by objectives — a little demonstration

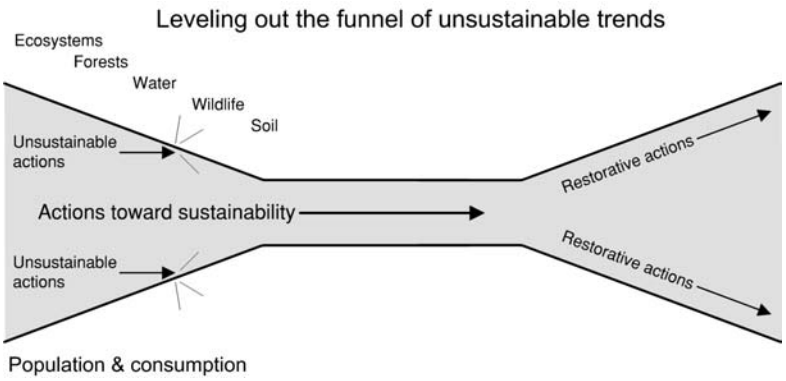

Figure 1.2: Leveling out the funnel of unsustainable trends [18]

So, that is the framework. Now, how do you go about using it to guide action? How can you get from the level of these objectives to specific action toward sustainability in a specific area?

The best way of answering this question is to see for yourself.

As an experiment, invite a group of colleagues or neighbors over to have a short brainstorming session on one or more particular topics or areas of interest. Examples of such topics might include: household living choices, office purchasing policies, designing or renovating a home or building, or a hypothetical strategic plan for sustainability in your particular field of interest and influence.

Taking one of these topics at a time, or splitting into groups that each address a different topic, pose each of the four sustainability objectives in turn as a question for that topic. For example, in what ways can household choices reduce wasteful dependence on fossil fuels, scarce, toxic metals such as cadmium, mercury, and minerals such as phosphorus? Reduce dependence upon persistent chemicals? Reduce encroachment upon nature? And in what ways can a household meet human needs — its own, and the needs of others — more fairly and efficiently? (You will, of course, need initially to give your friends an introduction to the four objectives and/or system conditions and some background about them). When everyone is done — particularly if different groups are working on different topics — it is interesting and elucidating for all to hear what other topic groups have come up with.

By going through this exercise, you have completed in miniature a process already performed by large and small corporations, as well as citizens

and municipal employees in small towns and large cities. These corporations and communities have used this framework as a guide to figure out what steps they need to take to move in the direction of sustainability. What you have just experienced is also a microcosm of the second part of the Natural Step approach to sustainability that combines use of the four system conditions framework with a strategic planning process for organizational change and decision making. This strategic planning process, known as the A-B-C-D analysis, is discussed in Part III.

After you do this exercise and hear what people have come up with, some observations about the use of this framework might reveal themselves to you. First, how relatively quickly and easily people — normal, everyday people with perhaps no more than average knowledge and expertise in a given topic — can develop action ideas for that topic that are aimed in the right direction.

You might also observe that the sustainability objectives, and probably most of the strategies the participants have generated from them, address issues at their root — or through an upstream approach — as opposed to a downstream approach. A downstream approach to dealing with hazardous chemicals, for example, might be to focus on how to manage their storage and disposal. An upstream approach would be to find alternatives to use of those chemicals in the first place.

Then, you might notice how the collection of actions for a particular topic, when taken as a whole, starts to look remarkably like a comprehensive approach to moving that topic in the right direction. That is, an approach that goes beyond addressing just one aspect of the topic. For example, in the case of a household, looking at ways to reduce dependence upon fossil fuels might encourage that household to go beyond a single focus on home energy efficiency to a larger array of actions that might include choices to drive less, switch to eco-cleaners, plant trees, and recycle more solid waste.

Next, you could also observe how the same set of objectives (or system conditions) has been used in very different contexts — in this example, household decisions, office purchasing policies, home construction or renovation. Applying the objectives to each topic or context has generated, in each case, a very different set of action strategies. However, while these strategies differ widely among themselves, they are aimed in the same direction.

This is a practical demonstration of taking a systems approach to change — very different from dealing with issues on a one-by-one basis. You and your neighbors or colleagues just applied a set of basic first order principles to a range of complex function areas and came up with a set of strategies that, while differing widely among the topic areas, are aligned in the direction of

a common set of sustainability objectives. You and your colleagues just experienced a planning approach that might be called planning by objectives — sustainability objectives.

A municipal government and the community it serves are complex systems.

Why useful for municipalities?

A city or town and its municipal government are complex systems. Municipal governments preside over a wide range of functions, services, planning, and regulatory activities. In the service category, municipalities usually are in charge of solid waste disposal, street and road maintenance, recreation and park maintenance, among other responsibilities. Some municipalities have water departments or electricity-generating facilities, or both. In the planning category, municipalities have responsibility for setting policies for present and future land use, transportation, economic development, location of infrastructure (roads, water, sewer), housing, natural and cultural resources, among others. In the regulatory category, municipalities have the authority for guiding land use and development — both the location and quality of that development. In the United States, municipalities

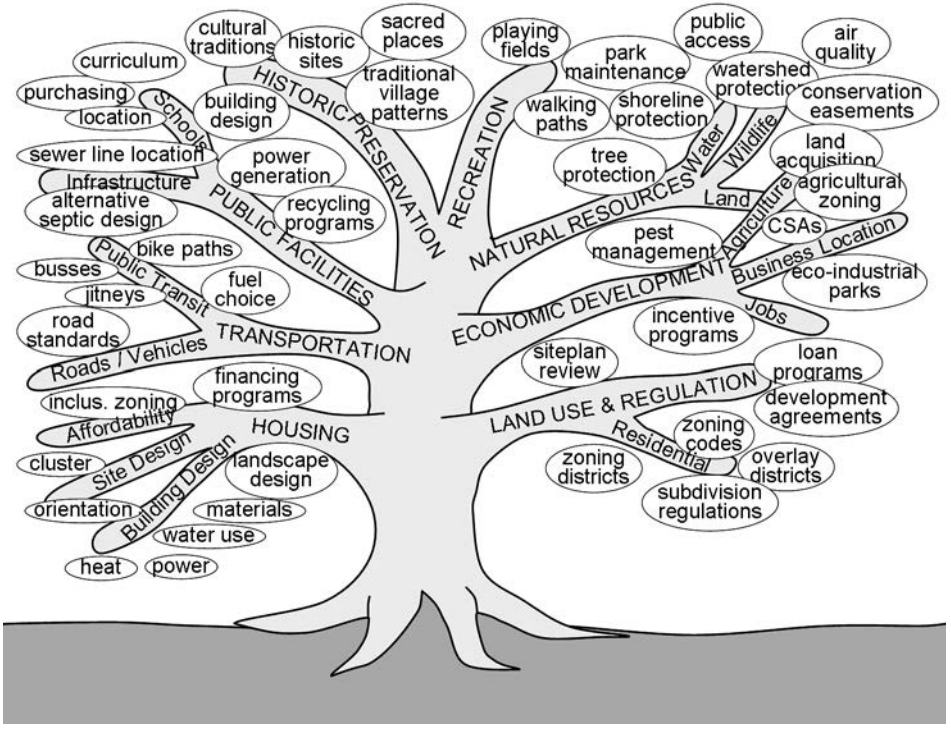

Figure 1.3: A municipality "tree".[20]

— with some notable exceptions[19] — have the primary authority for guiding and regulating land use and development.

An image of a tree can help us to get our minds around that complexity and to begin thinking about how to bring change to the complex system of a community. The limbs of the tree might represent the different service, planning, and regulatory areas of that city or town. The branches and leaves could depict the countless functions and actions that are taken by the various departments, boards, and agencies within those areas. For example, housing development policy might be one limb. On that limb are branches that represent differing components of housing development, such as building design, site design, and affordability. And then on those branches are found the many leaves, specific tools and techniques that affect those components of housing development, such as cluster design or inclusionary zoning.

Is it any wonder that local government can seem chaotic and fragmented from time to time?

Now, how about trying to introduce change into this complex collection of the countless activities and policies — the branches and leaves? What

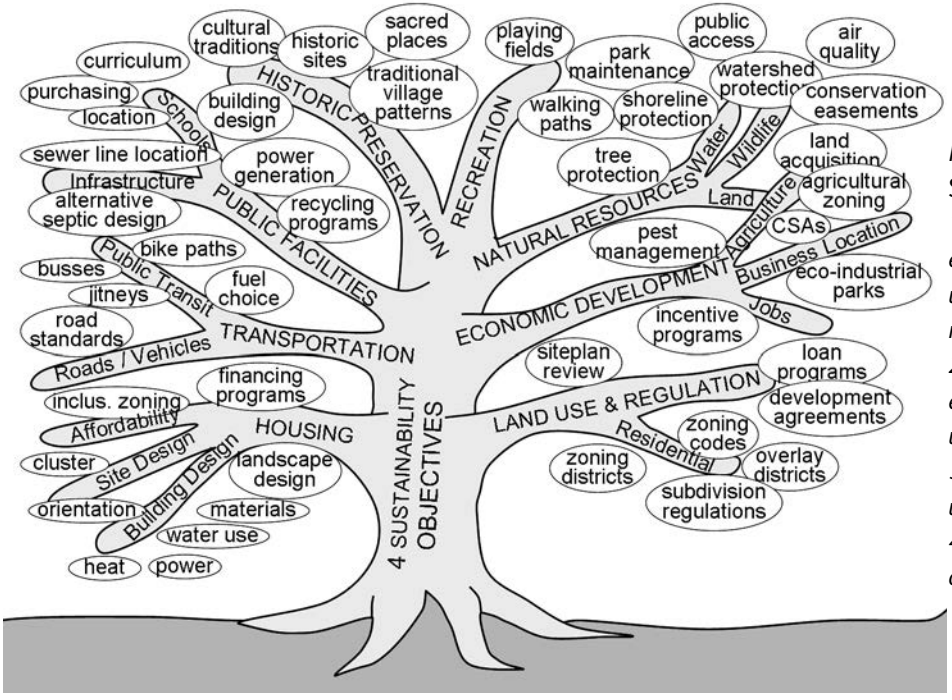

Figure 1.4
SUSTAINABILITY OBJECTIVES:
1.Reduce wasteful dependence upon fossil fuels, underground metals and minerals.
2. Reduce wasteful dependence upon chemicals and unnatural substances.
3. Reduce encroachment upon nature.
4. Meet human needs fairly and efficiently.

happens if we tried to change each leaf and branch one-by-one? How long would this take? Would it even be feasible?

If the tree is thirsty or ill, we apply treatment not to each leaf or branch but at the roots. The remedy then would travel up the trunk, out the limbs, and throughout the entire tree system. If we want change toward sustainable practices to occur throughout the system of limbs, branches, and leaves of a municipality and the community it serves, the best place to begin is at the level of the roots and the trunk — the starting point for policy direction and decision making. We can make this happen through planning by sustainability objectives.

Taking this approach means that the sustainability objectives are used as a compass that guides planning and decision-making processes for every limb and branch of municipal government — municipal departments, agencies, and regulatory boards. In this way, these objectives can guide the countless and diverse policies and practices that are the leaves of the municipal tree. As the trunk, these objectives can align the limbs, branches, and leaves of our municipal tree toward a common goal — a sustainable community. In this way, municipal departments and boards can work together as a team toward that common goal, with the shared playing rules discussed at the beginning of this chapter. Using a shared set of sustainability objectives can also help reduce conflicts and arguments between department policies and practices — the branches and leaves of the tree.

Some remarkable changes toward sustainable practices in communities that use new playing rules is the subject of Part II. Just exactly how a community might go about doing this is the subject of Part III.

CHAPTER 2

Sustainability: The Trouble We Have Talking About It

There are now many definitions, conceptual models, and sets of principles that characterize the idea of sustainability. How does the Natural Step framework relate to them? How is the Natural Step framework for sustainability different from, or alike, other models? Can it be combined with other sustainability conceptual models and tools? Why are any of these questions of relevance to towns and cities and the practitioners who work within, and for, them?

Let's start with the last question first. Why should practitioners — people interested in implementing sustainable development in communities — be concerned with varying definitions and conceptual models of sustainability? Can't we all just get on with it?

Well, of course, yes, we can just get on with it. But remember from our earlier discussions some of the minefields that can beset the path to implementation of sustainable development. One such obstacle is getting stuck in arguments about what sustainable development is and what sustainability means. This can come from an inability to get beyond current philosophical definitions of sustainability, relying upon vague definitions of sustainable development, or using sustainable development as an unspecified label to mask unsustainable activities — otherwise known as green-washing.

Philosophical and conceptual definitions of sustainability

When we first introduce the concept of sustainability to someone who is unfamiliar with it, we often are pressed to come up with a 25-word-or-less sound bite that can get the idea across to that person quickly and succinctly.

Frequently used for this purpose are some common philosophical characterizations such as the Brundtland Commission definition or the commonly used "three-legged stool" image that characterizes sustainability as the merging of environmental, economic, and social objectives.

These general concepts are useful because they quickly convey some key differences in how to look at decisions and activities. The Brundtland Commission definition of sustainability reminds us that our present-day actions have long-term results, and that what we do in the present will affect the future well-being of our children and grandchildren. Using the three-legged stool image to explain the concept of sustainability helps connect conceptually separated tracks of environmental action, economics, and social welfare in our thinking process. For example, if one leg of the stool is missing, the stool will collapse.

BRUNDTLAND COMMISSION:[1] Sustainable development … meets the needs of the present without compromising the ability of future generations to meet their own needs.

As useful as these concepts are in introducing the idea of sustainability, we still need direction for how to actually go about changing to more sustainable courses of action from where we are at present.

ALTERNATIVE LABELS FOR SUSTAINABILITY

In well-intentioned efforts to present and package sustainability concepts in an understandable way, substitute names have been offered to replace the terms sustainability or sustainable communities — for example, the term livable communities. Whatever the name substitution offered for the desired state may be, there still remains the job of figuring out how we get there from here. At some point, we have to get down to the business of figuring out precisely how we can make sure that our children and grandchildren inhabit a livable world or how we actually combine economic, ecological, and social objectives in one project or plan. So, even with alternative labels, such as livable communities, we still need a mental model to guide the change process toward it.

GREEN-WASHING

Another minefield stemming from unclear or differing understandings of sustainability is the growing practice of "green-washing." This means labeling conventional development as sustainable development for a particular purpose, such as attracting funding. This practice is easier to pull off when there is no pre-agreement about a definition of sustainable development or when the definition is vague. Or, invoking the mantra of sustainable development may be an attempt to deflect attention from aspects of a project or business that are environmentally or socially unsound. For example, a business that

showcases environmentally beneficial practices in one area of its operations could deflect public attention from other activities such as use of sweatshop labor. Installing solar panels on the building might serve to enhance the public image of a gambling institution, diverting attention from the social costs of its revenue source. Using a precise set of scientifically based principles such as the Natural Step framework to define sustainable development and applying these to all aspects of operations can help deter the practice of green-washing.

Talking from different levels

Another obstacle to a clearer understanding of sustainability and sustainable development is the confusion of sustainability principles with sustainability policies, strategies, actions, or tools. Examining some of the arguments about what sustainability means frequently unearths this type of mix-up.

"Promoting economically self-sufficient communities" or "encouraging green development," for example, are policies and strategies that — to go back to our tree image — are found at the level of the branches. This means that while they may be appropriate sustainability strategies for one or two limbs of the tree, such as economic development or building design, the policy or strategy may not make sense when applied to other departments. For example, "promoting economically self-sufficient communities" may be an appropriate goal for a municipal planning and economic development department but may not make much sense as a policy goal for a public works department.

Further confusion is often brought about through using sets of overlapping principles to guide a change process can create even more confusion. For example, the green building program of an agency includes one "principle" to encourage use of environmentally preferable products and another "principle" to enhance indoor air quality. While these are certainly worthy goals, does not using environmentally preferable products contribute to enhanced indoor air quality? And do either of these "principles" help guide program designers to understand what "environmentally preferable" means or how "enhanced indoor air quality" is achieved and by how much? These are the types of confusions that can lead potential implementers of sustainable practices to discount the entire idea of sustainability as a viable guiding vision.

When one seems to be mired in debates and confusion about the meaning of sustainability and sustainable development, it can help to determine from what level the debaters are speaking. Are they speaking at the level of strategies or actions — for example, should we spend money on open space

preservation or affordable housing? Is one person advocating a tool, for example, ecological footprint analysis or sustainability indicators, or, rather, advocating guiding principles for moving toward sustainability such as the Natural Step system conditions? These types of debates may make it seem as if these models were competitive or contradictory, but they are simply perspectives from different levels within the overall picture.[2]

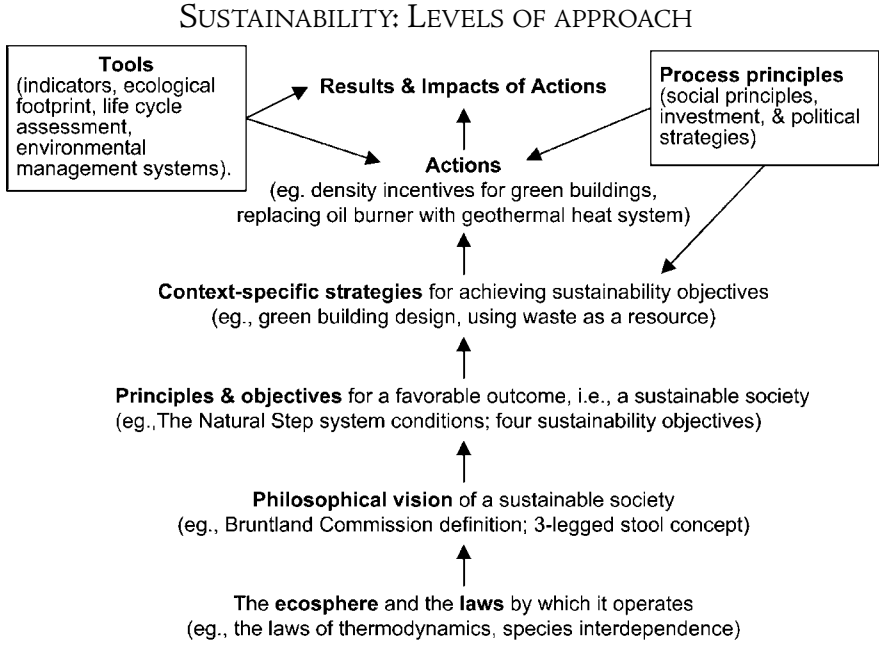

Figure 1.5: Sustainability: Levels of Approach

This section, Compass for Change, has focused on sustainability *principles and objectives* and how these can be used to achieve context-specific strategies. The next part, Practices that Changed, will present examples of *strategies, actions, and results* — the successful outcomes of the Swedish eco-municipalities. The last part of the book, How Communities Can Change, will present a *process* for successful strategies, actions, and results.

OTHER SUSTAINABILITY MODELS

Studying a range of sustainability models, although potentially confusing, can enrich and deepen understanding, stimulate creative thinking, and help us look at old problems in new ways. Some of these models tend to mix principles and strategies, philosophy and process, or use principles that overlap with each other. The different levels of approaches illustrated in Figure 1.5

can help in applying these differing models and principles and bring clarity to discussions about sustainability in general.

Here are some snapshots of a few of those models. We leave it to the reader to explore these and other models more deeply and determine what levels of approach to sustainability their model components address.

Ahwahnee principles

The Ahwahnee principles consist of about two dozen items that promote walkable, compact community design, and regional and implementation strategies to reduce urban sprawl. They were developed by a group of New Urbanist designers and presented to an audience of local government officials at a 1991 conference held at the Ahwahnee Hotel in Yosemite. They have been used by cities such as Pasadena and San Jose, California, and in a U.S. Department of Housing and Urban Development publication.[3]

Hannover principles

These nine principles, co-developed by architect Bill McDonough, are aimed at the built environment but are also applicable to a range of contexts including business and planning. They were developed as a set of guiding design principles for the 2000 World's Fair in Hannover, Germany, intended to deepen the design community's understanding of the issues inherent to green design, as opposed to an issue checklist approach. They have been adopted as guiding principles for sustainability by such organizations and agencies as the International Union of Architects and the U.S. General Services Administration (GSA).[4]

CERES principles

The CERES principles are ten guiding principles of the Coalition for Environmentally Responsible Economies — a group of businesses and corporations devoted to practicing environmental stewardship in their business operations. They have voluntarily adopted these principles as a commitment to environmental protection on an ongoing basis. Investors and others use these principles as a set of criteria to assess corporate environmental performance.[5]

AtKisson principles

Alan AtKisson, author of *Believing Cassandra*, has identified seven principles in his book for developing a new life perspective and crafting a path toward sustainability. Either individuals or organizations can practice these principles.[6]

CHAPTER 3

The Natural Step Approach: Why Is It Useful?

Figure 3.1: Scandic Hotels, with facilities throughout Scandinavia and Europe, moved from bankruptcy to a leading market position through changing to sustainable practices with the Natural Step framework as a guide.

A concrete example: Scandic Hotels

Corporations and communities around the world are using the Natural Step framework to bring about across-the-board change to practices that are sustainable throughout their policies and operations. One of these businesses is a Swedish-based hotel chain called Scandic Hotels.

In the early 1990s, Scandic was on the verge of bankruptcy. The company's board of directors hired a new CEO to try to steer the company back to economic health. This CEO had heard of the Natural Step approach and asked Karl-Henrik Robèrt to address Scandic's top management staff. Shortly afterward, Scandic embarked on a company-wide education program, introducing the Natural Step framework to thousands of its employees throughout the company's departments and locations. Over the course of the next few months, teams of employees in all departments worked to apply the Natural Step framework to

their particular department's functions and practices, making over 1,500 suggestions for how those practices could be reoriented to meet the four system conditions. Less than a year after Karl-Henrik Robèrt met with Scandic's management staff, the company began carrying out the action plans created by its own employees, guided by the four system conditions of the Natural Step. One example was plan for completely refurbished guest rooms that met the system conditions. Staff suggestions included changing to furniture and furnishings made from all-natural materials instead of plastic and synthetic ones and to natural wood floors instead of synthetic carpeting; wastebaskets to separate types of rubbish; and a temperature regulator for the shower to reduce waste of hot water.

Through this overall reorientation of its operations to sustainable practices, Scandic also was able to change its financial bottom line from red to black. It is now one of the most successful hotel chains in Europe. Its experience in finding that sustainable practices also make for sound business practices, and financial gain has been echoed by companies, such as Sånga Säby Conference Center and the Interface Company. Scandic's reorientation to sustainable practices, using both the Natural Step framework and a democratic, bottom-up implementation process, mirrors the Swedish eco-municipalities' approaches and the how-to strategy described in Part II.[1]

Other companies that have used the Natural Step framework to guide change toward more sustainable practices include McDonald's of Sweden, Electrolux, Mitsubishi Electric, IKEA, and the Collins Pine Company.

Figure 3.2: Hotel staffers came up with this guest room wastebasket design to make it easy for guests to separate recyclables and organic waste from their trash.

Cities and towns around the world have adopted the Natural Step framework and are using it as a guide to reorienting to sustainable practices. Christchurch, New Zealand, has adopted the four system conditions as their guiding framework and is presently in the process of implementing it. A Japanese city and town have done the same. The Whistler community in Canada is reorienting to sustainable practices with the Natural Step framework as a guide.[2] The City of Santa Monica, California, has used sustainability objectives based upon the Natural Step to integrate sustainability policies throughout its General Plan. And over 60 municipalities in Sweden — whose accomplishments are discussed in the next part of this book — have adopted the Natural Step framework and have brought about across-the-board changes toward sustainability.

Advantages at a glance

There are by now many definitions, frameworks, and sets of principles that can help deepen our understanding of what sustainability means and why it is important. While each of these models provides important perspectives about a challenging topic, the four guiding objectives of the Natural Step approach provide a particularly useful sustainability framework for municipalities and the communities they serve.

DEALS WITH COMPLEXITY

A municipality and its community are complex systems. The various departments, boards, agencies, and land use and planning policies generate countless actions and day-to-day decisions that can go in either sustainable or unsustainable directions. This complexity often results in actions or policies that can work at cross-purposes or compete with each other. It resembles how a sports team might behave if there were no agreement among the players about the rules or objective of the game. This complexity and potential for chaos, conflict, and competition among policies challenges us to go beyond the one-issue-by-one-issue, or piecemeal, approach in changing toward sustainable practices. As a set of first order objectives that can provide guidance whether they are applied in a land use, economic development, public works, or for that matter, any context, the Natural Step framework can serve as a new set of playing rules. These new rules can help guide the countless municipal and community team players to work from their differing starting points toward a common goal — a sustainable community.

TAKES AN UPSTREAM APPROACH

While well-intentioned, many municipal initiatives to improve the environment and community well-being are measures that focus on the downstream side of problems. For example, in dealing with hazardous materials, cities and town regulations customarily focus on regulating onsite storage or disposal of toxic substances. As important as these measures are, they do not address the continually increasing introduction of hazardous chemicals into our homes, businesses, bodies, and ecosystems.

The Natural Step framework helps us look for upstream approaches, such as finding alternatives to using toxic chemicals in the first place. Transportation policies often focus on mitigating the problematic effects of increasing traffic — better access management, installing more lanes or traffic lights. While these measures are important, they do not address steadily

increasing trip generation that over time will require more and more lanes and traffic lights and access management. Use of the Natural Step framework challenges us to find ways of reducing that traffic in the first place. Even recycling programs, as beneficial as they are in re-using and diverting waste from landfills and incinerators, address the downstream end of the waste problem. The Natural Step framework prods us to find ways to reduce that waste in the first place and even come to think about it in a new way — as a resource by which our needs can be met more efficiently while encroaching less on nature.

Use at any level, in any geographic region

As helpful as many of the current sustainability models are, it is challenging to find one that could be applicable to any city or town in any geographic region of North America or the entire world. The Natural Step framework can be used equally well by a regional or state government or agency as by a local municipality and even a national government. As first order principles, the Natural Step framework lends itself as a guide to sustainable action in all of these contexts and more. A densely packed city of millions and a village of 200 people each can use the Natural Step framework to design and guide a change process toward sustainability. A desert community in Arizona can use it just as easily as can a mountain town in Colorado, Canada, or a traditional New England village. Further, each of these dramatically differing communities, while using the same framework of principles, can generate their own strategies that, while they move in the same direction, fit their own context, geography, and political situation. The form of those strategies might be voluntary or mandatory. They might involve use of "carrots" or use of "sticks." The Natural Step framework allows its user to design a self-determined, situation-appropriate path toward sustainability — but a path that is assured of moving in the right direction.

THE NATURAL STEP SYSTEM CONDITIONS [3]

In the sustainable society, nature is not subject to systematically increasing:

1. concentrations of substances extracted from the Earth's crust
2. concentrations of substances produced by society
3. degradation by physical means

and, in that society,

4. human needs are met worldwide.

Results in across-the-board change

When the Natural Step framework is used as a guide throughout all departments, agencies, boards and policies of a municipality, it can result in across-the-board change to sustainable practices. This is very different than

the one-by-one issue approach that is more commonly used in cities and towns that have undertaken sustainability initiatives, as well-intentioned and worthy as these are. Using the Natural Step framework as the trunk of the municipal tree as would happen, say, if the top officials voted to adopt it as a guide for the entire city or town, can allow that "medicine for change" to flow through the limbs, branches, and leaves of the municipal tree, helping to align all the countless department land use and other policies in the same sustainable direction. This means that reorientation to sustainable practices can ripple through the entire complexity of operations and planning approaches of a city or town, aligning these to complement each other, rather than to work at cross purposes, and addressing conflict among competing priorities at an upstream, rather than downstream, point. This type of an approach could be called a systems approach.

THE FOUR SUSTAINABILITY OBJECTIVES

1. Reduce wasteful dependence upon fossil fuels, scarce metals and minerals that accumulate in nature.
2. Reduce wasteful dependence upon chemicals and synthetic substances that accumulate in nature.
3. Reduce encroachment upon nature.
4. Meet human needs fairly and efficiently.

Derived from the Natural Step system conditions.

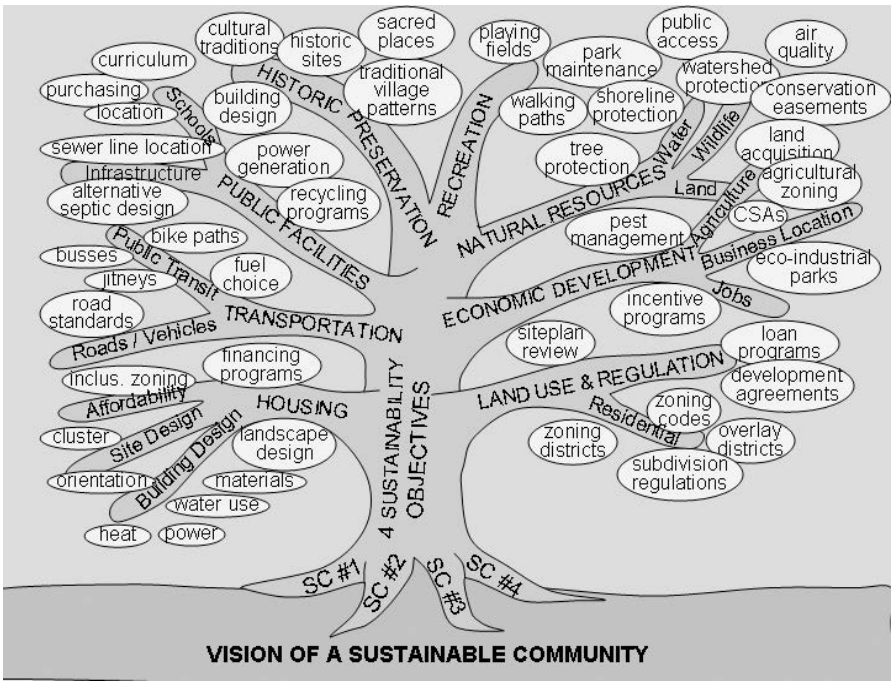

Figure 3.3: Guiding the municipal system

Demonstrates success

All this might sound like pie-in-the-sky dreams if it were not for the scores of cities and towns in Sweden, businesses, and organizations that have achieved these very results. These pioneering eco-municipalities and businesses show us that using the Natural Step framework to bring about across-the-board reorientation to sustainable practices is not a pipe dream, but an achievable reality. The next section of this book, Practices That Changed, will demonstrate those results.