Brattleboro Food Co-op

Preliminary Report

Preparing the Ground for a Regenerative Market and Marketplace

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1. Introduction

The Brattleboro Food Co-op is planning a change in its physical facilities. In practical terms this means relocating the store or renovating / rebuilding the store on the existing site. Because of the implicit and explicit philosophies underlying a natural / organic food co-operative the Board recognized a responsibility to design the new facility with sustainable or green concepts.

In April 2002, the Board invited Michael Singer, Bill Reed and others to address the members of the Co-op at the Annual Meeting about their work in the design of green buildings and sustainable communities. The Board was interested in the conceptual framework of thinking beyond the usual green design approach of doing-less-damage, to a more substantive one of regenerating the health of the larger network of interconnected systems. The interrelationships of the various systems in nature – forests, soil, habitat, water, and more – provide us with clean air, potable water, healthy soil and therefore our food. Our buildings, cities and lifestyles impact the interconnectedness and the health of these systems. Simply slowing down the damage to these systems by creating a new building that is more resource efficient misses the more significant issue supporting the health of these life support functions.

The Board and Management invited Natural Logic to a meeting in March of 2003. The purpose of the meeting was to address the practical implications of regenerative thinking in the context of needing to have a green grocery store designed. The primary insight gained in this meeting was that the Co-op's biggest opportunities to save energy, improve water quality, reduce the toxins entering the environment, reduce resource use, and so on were not in the building itself. The most significant opportunities lay in reducing the tremendous amounts of energy used to transport the nutrients sold in the Co-op (a low estimate is 1,300 miles per bite). (*Appendix A: Summary of Discussions in March of 2003* contains a more complete description of the points of discussion during this meeting)

The cascading impact of burdens on the ecosystem from food transport affects society in many more ways than energy expenditure and global warming. By reconnecting the Co-op with locally based nutrient sources multiple benefits can accrue. Rethinking sustainable building in these larger terms and then bringing the opportunities close to home (the Place we call Brattleboro) is ultimately the only way for the Co-op to be sustainable and meet its Ends Policy of being "a sustainable community for a growing number of stakeholders." This report is intended to open the door to this fundamental restructuring of how we think about this place – leading to understanding and the discovery that the people and place can be engaged in a reciprocally beneficial relationship. (*Appendix C: Background on Regenerative Design* contains a more detailed explanation of these opportunities)

Natural Logic proposed a process intended to create a mindset shift that will help the Co-op more closely embrace its Ends Policies and thus influence the design and function of its central place—the store.

The purpose of this report is to start the **process** of a Co-op generated road map - a map to help guide a **process** of engagement with place. This map will assist in guiding the Co-op to meet its Ends Policies. From an understanding of what is important about the activities of the Co-op in relation to sustainability, the right questions can be asked about the nature of the Co-op store and the marketplace within which it operates.:

a. How do the activities and material and energy input / output of the store reflect or depart from the Ends Policies of the Co-op?
b. What are the Life Cycle Costs (dollars) and the Life Cycle Assessment (environmental impact) of the activities of the Co-op?
    i. Can the regional and planetary cost of these activities be quantified so that the Store operations can be adjusted accordingly?
c. What are the opportunities in the design of the store relating to the following:
    i. The range of activities desirable to support a community engaged in regeneration activities?
    ii. The types of products sold?
    iii. The source of these products and their delivery / storage method?
    iv. Does the design of the store, site plan, and its interface with the community (e.g., transportation, waste, etc) visibly demonstrate model concepts that the community can learn from and take home to practice? Is it a place that can catalyze ideas?
    v. What are the advanced, but cost effective, synergies that could be developed through design that would reduce operation costs and improve the health of the store's immediate locale?

This report is a preliminary report. It is not a final document. Certainly, at some near point the site will have to be purchased and a building designed. However, the process of regeneration will be ongoing and the flexibility required will be reflected in the building. Just as natural systems evolve, the Co-op will need to evolve as it gains understanding of its role in the natural systems surrounding it

What follows are the beginnings of the study of the "story of this place" - the important connecting fabric of **human and natural system processes and relationships.** This report can be seen as creating a container for holding information, knowledge, and ultimately understanding of these relationships. The timeline, diagrams, maps, and descriptions of place contained here are intended to represent processes rather than a final static product. The form and scope of this container will undoubtedly evolve as community understanding of the story of this Place evolves.

Through an understanding of the relationships that make up the fabric of Place, the Co-op can begin to visualize the opportunities available to create a regenerative relationship with its place. This preliminary report is meant to prepare the ground for the essential community engagement phase, which will then lead to a design of a facility that supports and even catalyzes a **process** of healthy evolution.

2. The Viability of the Co-op

To be viable means that an entity is able to maintain its life. What makes an entity viable is its relevance to the larger whole that connects with it through reciprocal relationships. For example, the Co-op has reciprocal relationships within the larger whole of the community that patronizes it and the entities that it buys its products from. If it ceases to be relevant to either group, it will no longer exist.

We see three challenges to the viability of the Co-operative in the short and long term:

Corporate Competition

Like food co-operatives all across the country, the Brattleboro Food Co-op is faced with the possibility of competition: corporate-owned marketing chains entering the natural/organic foods market. These corporate entities have access to greater capital, and the capability to outperform smaller ventures in transportation and shipping efficiencies. If one of these corporate entities were to seek a share of the Brattleboro market, even though the Co-op is still profitable and growing, the picture could change rapidly and dramatically. The question could easily become: how can the Co-op remain relevant to its market in the face of corporate competition within the natural and organic foods distribution industry?

Vulnerability to Disruption of Supply Lines

What will it take for this place called Brattleboro to continue to have a sustainable source of food long into the future? This needs to be considered in the face of the vulnerable technical systems and social connections we operate with today. No matter your political or philosophical stance on trade and globalization, the longer our supply lines and the more dependent we are on resources coming from places over which we have limited control, the more vulnerable we are to external political and economic circumstances. Will the flow of products be sustained if oil flow is interrupted or becomes too costly? Will the ability to feed ourselves be at risk if there is a trucking strike? Will we be sustainable if there is an economic collapse of the global marketplace?

Degeneration of Surrounding Systems

Although the resilience of the natural systems surrounding the Co-op may seem only indirectly related to its financial bottom-line, the people who form the market for the Co-op's products are affected by the quality of the surrounding environment. Deterioration in air quality, water quality, soil quality, forest health, etc. affects the satisfaction and health of the human community in the area, and even imperils livelihoods.

In spite of attempts to halt environmental degradation, as in most places worldwide the natural systems surrounding the Co-op face threats to their viability. The history of the region since European contact consists of repeated cycles of resource extraction, collapse (as disturbance levels exceed the capacity of the system to cope), and partial recovery. However, recovery has never approached levels of complexity achieved before contact. (*Appendix B: Timeline of Significant Events Affecting the Region around Brattleboro*, page 27, for specific events in this process.) It is important to note that human culture and

nature dynamically interrelate, regardless of our awareness of the relationship. Thus, industrial culture has had the effect of a sustained catastrophic event for systems in our local watersheds and across the planet.

Our initial assessment of the area around the Co-op revealed a number of processes that currently rob this Place of resilience. Primary processes decreasing resilience include:

- The deforestation of Vermont which destroyed thousands of years of accumulation of biomass
- The extinction or extirpation of keystone species that performed important system functions
- Loss of diversity in functional links in the system
- Overabundant resources / pollution

Other processes contributing to decreased resilience include:

- Flashiness of systems, where resources are lost from the system because holding capacity is low. Examples include excessive runoff and flooding in the watercourse and exportation of the resource base through mining, quarrying, extractive agriculture, logging, and manufacturing economies heavily dependent on sales elsewhere.
- Loss of human resources from the region
- The impacts of warfare and war-based economies
- Disease and blight
- The impact of climate change, leading to increased levels of disturbance in systems worldwide
- The impact of hurricanes on systems with compromised resilience
- Local fires, potentially affecting both town and forest

These processes often relate with each other in a way that compounds the overall degenerative effect on the whole. For example, deforestation causes soil loss, which means that forest re-growth doesn't have the same resource base to draw on. This resource-base functions like a sponge that holds water and nutrients in place long enough to be converted into vegetation and trees. Without this sponge, water runs off much faster, especially in downpours, resulting in a "flashy" system. Increased runoff contributes to more erosion, nutrient loss, and pollution of waterways. Lack of vegetative cover causes much greater temperature fluctuations both daily and seasonally, and soils become increasingly droughty. A degrading system results in loss of land and aquatic habitat for key species, and when they become extinct or endangered functional connections decrease. (For example, salmon and passenger pigeons no longer carry nutrients such as potassium, phosphorus and nitrogen to the top of the system, where it can be recycled through the watershed again and held longer to nurture system growth.) In a large disturbance event such as a hurricane, a degrading system will show less

resilience—it will sustain greater damage, and will be less able to rebound in response to the event. Additionally, climate change can be expected to intensify the effects of other degenerative processes. In this way, degenerative processes can interact to create exponentially greater losses that dramatically affect diversity, resilience, and system health.

A more detailed discussion of the various stressors depleting the resilience of the natural systems in the area appears in *Appendix B: Degenerative Processes and Events Affecting the Whetstone Brook Watershed*, page 23.

3. Aspirations of the Co-operative

According to the Co-op's publication, *Our Baskets at the Crossroads*, the Co-operative has shifted its self- definition from "It's a store" to "We are a community". The Co-op developed this Ends Policy to guide its planning: "To be a sustainable community for a growing number of stakeholders." There are startlingly few organizations that hold such a visionary policy relating to sustainability.

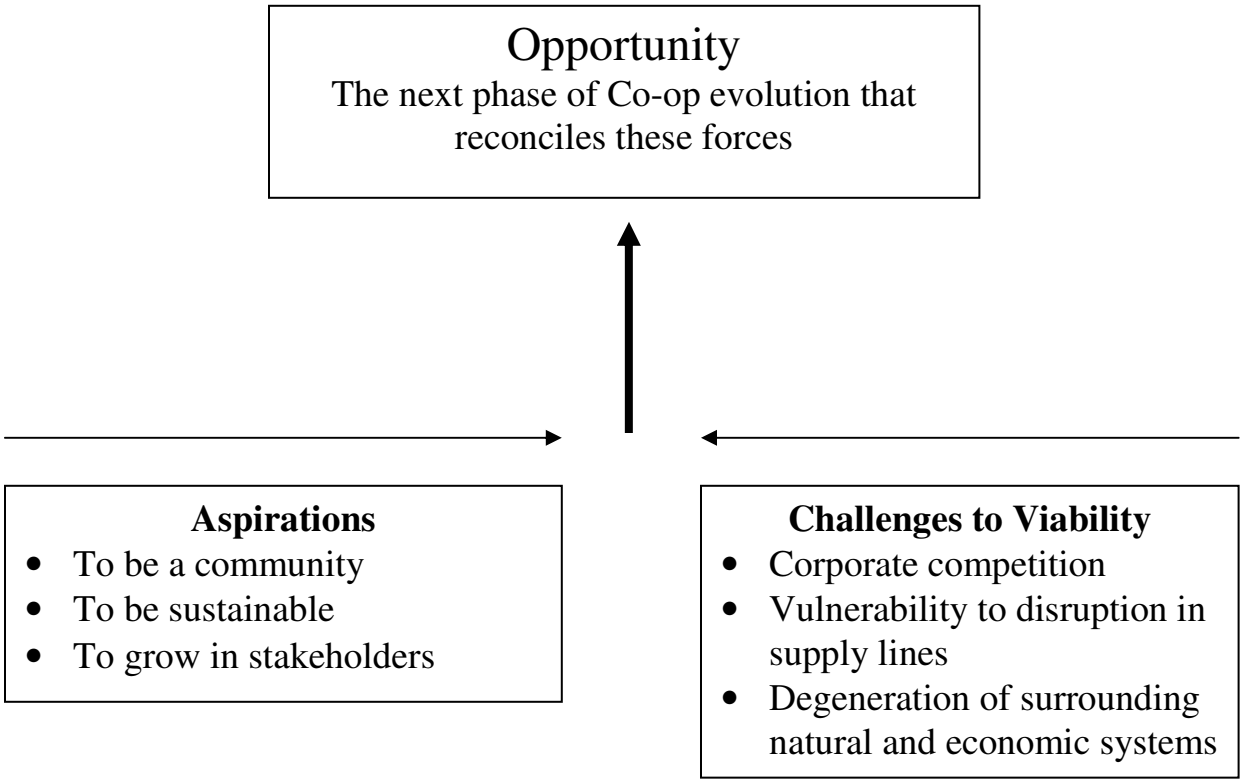
As the Board and management of the Co-op explored the implications of this policy, questions surfaced:

> "What is sustainability?
>
> Where does our food come from?
>
> What do our values really mean?
>
> What are our responsibilities-—to the community, to education of Co-op members, to the health of the natural world?"

In exploring these questions, the Co-op has recognized that it is approaching a crossroads in its life as an organization.

4. Evolution

Opportunity for evolution comes from dynamic tension between two opposing forces: 1) the challenges the Co-op faces to remain viable into the future and 2) the vitality that comes from its hopes, dreams, and aspirations. Evolution begins by envisioning a state of being that reconciles these two forces. The question is: What would the Co-op need to be in order to take an evolutionary step that eliminates the threats to its viability while realizing its hopes and dreams?



We suggest that a powerful possibility for the Co-op would be to aim for regeneration rather than sustainability. While sustainability focuses maintaining a steady state, or at the very least doing less damage, regeneration focuses on learning, innovation, and continually unfolding into higher orders of complexity. In this context, increased complexity represents increased richness and wealth of beneficial interrelationships that provide overall system stability and the ability to survive in dynamic and challenging conditions.

From a regenerative perspective, the world is a living, self-organizing being in which humans and nature interrelate and co-evolve. In this view, living beings nest in organic

hierarchies and move dynamically in a world of constant change. Disturbance (change) is seen as the driver of learning and innovation, the generator of opportunity for system evolution.

Diversity is a threshold condition for utilizing disturbance to move toward regeneration. One type—*functional diversity*—occurs when a variety of entities perform a particular function within the system. For example, various plants, mammals, fish, birds, amphibians, insects, invertebrates, and even specialized fungi can all carry out the function of concentrating or delivering nitrogen in a given living system. Another type—*response diversity*—refers to the variety of ways that entities respond to change or disturbance. An example of response diversity can be seen in the response of a resilient forest system to a catastrophe like a crown fire. Some plants regenerate from their bases or from root fragments, others have seeds that germinate readily in open sunlight or alkaline soils, and many of these have the capacity to be distributed by the wind. Some plants inoculate sterilized soils with beneficial organisms already carried in their seed coats. Certain specialized plants may need to have their seed coats treated with heat to germinate in great numbers, while some seeds are transported to clearings by birds and animals that require this type of space to thrive. In this way a diverse system can begin to re-cover itself with life after a catastrophic event.

Both types of diversity are important for resilience, which allows a system to absorb the effects of disturbance without disintegrating. If resilience is pervasive in the system, change becomes the opportunity for learning, innovation and evolution. (For a more thorough discussion of the conceptual basis for regenerative design, see *Appendix C: Background on Regenerative Design*, page 30.)

Human beings depend on a foundation of nested hierarchies of other living beings for our survival. For our culture to be regenerative we must be deeply connected to Place—the unique array of interrelated Life that surrounds us.

In order to begin to think and plan regeneratively we suggest that the Co-op expand its view of community to include Place so that people and the living system they inhabit work together symbiotically.

- What does it mean to interrelate with Place as a community? What connections and exchanges are now possible?

- What does co-operation mean if we include Place in the community?

- What do the Co-operative Values now mean and imply?

As we begin to relate to Place in this way we see that Place also has aspirations, and that relating with Place means perceiving and listening to those aspirations, and finding resonance between our aspirations and the aspirations of Place. As Wendell Berry put it:

> "Industrial agriculture . . . has dealt with nature . . . in the manner of . . . an orator. It has not asked for anything, or waited for any response. It has told nature what it

> wanted, and in various clever ways has taken what it wanted. . . . On the other hand, an agriculture using nature, including human nature, as its measure, would approach the world in the manner of a conversationalist. . . . On all farms, farmers would undertake to know responsibly where they are and to 'consult the genius of the place'. They would ask what nature would be doing there if no one were farming there. They would ask what nature would permit them to do there, and what they could do there with the least harm to the place and to their natural and human neighbors. And they would ask what nature would help them do there. And after each asking, knowing that nature will respond, they would attend carefully to her response."

There is another level of interaction beyond what Berry has described in this passage. We could also ask how human beings, working in the service of evolution of the larger whole, could use their minds to potentiate what nature is doing in a Place, and how that could enrich nature as well as the human community and economy. This requires integrating everything we have learned about the power of reasoning and analysis with our growing awareness of the interrelatedness of all life.

The land use practices of indigenous people in New England before European contact provide an example of this type of co-evolutionary relationship between people and Place. (For a more complete picture of the co-evolutionary activities of native people, see *Appendix D: Indigenous Practices*, page 34) We look to these kinds of models not for prescriptive solutions, but for an example of a way of being in relationship. Each community's relationship with Place will necessarily be unique to that time and that Place.

Looking back at the threats to the Co-op's viability defined earlier, we can assess how envisioning the Co-op as a regenerative community would meet these challenges.

Corporate competition. If the Co-op defines itself in relationship to Place, every time people buy a product they will be strengthening and enhancing their local environment and economy. No corporate entity can compete effectively on this playing field. The Co-op will have developed distinctiveness in the marketplace that is extremely resilient in the face of corporate competition. An entire marketing campaign could be built around this distinctiveness.

Vulnerability to disruption in supply lines. Linking Co-op product offerings directly to Place eliminates this threat by increasing the resilience of the Co-op, the community, and the Place in the face of large-scale political and economic disruptions.

Degeneration of surrounding systems. Again, this threat to viability would be eliminated. A regenerative community would not only halt degradation, it would regenerate natural systems, with benefits in the quality of life for all inhabitants.

The bottom line is that shifting the Co-op's focus to regeneration can greatly reduce the current threats to the Co-op's viability by making the Co-op more resilient. By building

regenerative capacity, the Co-op is more likely to evolve and thrive in the face of disturbance rather than simply surviving.
The next question is whether being a regenerative community fulfills the aspiration of the Co-op to be a sustainable community for a growing number of stakeholders. Clearly, a regenerative community would continually grow opportunities for larger numbers of stakeholders. It would also develop greater richness and depth in stakeholder relationships with the Co-op.

5. An Example of Regenerative Thinking

We can see how thinking regeneratively might work for the Co-op by applying it to developing a new concept for the existing parking lot. We would first assess the present assets and liabilities of the parking area.

Current Assets and Liabilities

Assets of the current parking area include:

- The site is in close proximity to downtown businesses.
- The site is already impacted by development.

Liabilities of the current parking lot design include:

- Runoff from the parking lot is close to 100%, making considerable contribution to the conditions that would generate flash floods in Whetstone Brook (flashiness).
- The space performs no useful function in relationship to the watershed, and is currently detrimental to the health of the watershed.
- Pollution (salt, suspended solids, chemicals from tires, and petroleum-based toxins from autos) is currently flushed directly into the brook by runoff.
- No shade or protective cover currently exists (heat island impact).
- Space is ineffectively utilized as parking spaces are hard to align with circulation patterns due to acute triangular shape of lot.
- Space has only one use.
- It has no functional relationship to pedestrian traffic and is currently a pedestrian hazard.
- Made of toxic, non-porous material which is continually degrading and leaching toxins into the brook.
- Requires maintenance with limited return on investment.

Aspirations of Place

We can view the existing liabilities as an opportunity for envisioning the parking lot in beneficial mutual relationship to the Co-op complex and the Whetstone Brook watershed. We would first ask what the aspirations of Place are at this location. Some answers to this question:

- The Co-op lies just above the confluence of Whetstone Brook and the Connecticut River. It also lies at the confluence of several transportation corridors, and on a wildlife corridor. This means that it lies at a place that is an edge upon an edge upon an edge. Since edges are places with great potential for exchange, this is a place naturally suited for trade and exchange.
- The natural evolution of Place here is to grow forest. This allows it to hold, retain, and gradually release the 40+ inches of water resource it receives each year. This place wants to grow trees and build a biologic sponge that will act as a dynamic storage for this water resource.

Human Needs

Additionally, we would want to define the human needs that this parking area will meet. Ideally, the parking lot would:

- Provide effective parking space for peak level of use
- Provide easy ingress and egress for cars, delivery vehicles, and pedestrians
- Need a minimal amount of maintenance; facilitate clearing and stockpiling of snow
- Provide for human comfort and safety.
- Support the human desire for exchange and conviviality
- Generate economic and community benefits

Linking Place and People

In order to be regenerative, the new parking lot needs to connect the fulfillment of these human needs to the aspirations of Place in a way that turns present liabilities into assets. One way to think about how to do this is to look for the leverage point in the situation. A leverage point exists where the most can be achieved using the least resources.

In this situation, the leverage point lies in thinking of the parking lot as a system that regenerates the watershed—a place to hold and store resources, rather than as a place to park cars. Ideally, the parking lot would perform the same functions as an unpaved segment of the watershed in this stretch of the brook. Re-shaping the lot to fulfill this vision would cost very little and would yield a tremendous return on the investment. (See *Investing in Regeneration*, page 30)

Imagine a series of terraces that direct runoff to gentle infiltration swales—sinuous depressions in the ground between the terraces. There would be no curbing to stop water

flow, only wheel stops or interrupted granite curb sections. Snow removal is accomplished by pushing smaller piles within these vegetated swales to reduce water pollution during melting. These swales support fast growing canopy trees and berry bushes that shade the terraces while separating them into parking areas. Now imagine community activities like celebrations, farmer's markets, harvest fairs, and art fairs taking place in the shelter of the trees. Imagine this living parking space providing a cool warm-season spot for people to interact while coming from or going to their cars. Imagine the parking lot as the genetic dispersal point for blight-free elms and other species that currently are extirpated from Southern Vermont. Envision the character of the space and the effect it will have on members and visitors.

In this image of the parking lot, the space serves a number of functions in connecting the watershed, the community, and the local economy. The parking lot now:

- Provides convivial open space for farmer's markets, cultural events/celebrations, outdoor classrooms, etc.
- Slows traffic, making a safer environment for kids and pedestrians
- Supports a canopy of vegetation composed of key riparian species like blight resistant American Elm; provides a source of genetic material for dispersal to other areas
- Filters pollutants. (salt use should be avoided, use cinders/sand instead)
- Provides an aesthetic community asset
- Creates habitat for local wildlife
- Reduces the flashiness of a portion of the site by virtually eliminating runoff to the brook from the parking lot
- Contributes to the health of local waterways by cleaning pollutants biologically and by using alternative ice control method
- Serves as a model for regenerative living practices

Another option would be to consider the new town parking lot as a major resource for parking for the Co-op. If the new bridge can be made permanent and even widened for an electric or bio-diesel shuttle the town parking lot can double as a resource for the Co-op and shops in the downtown area. We can also think of this new bridge as an adjunct cultural site providing space and surfaces for exhibitions and communication. This will reduce pressure on the Co-op site for more advanced and pleasant uses as outlined above.

6. Possibilities and Potential

The same type of regenerative thinking process used with the parking lot can also be applied to the most immediate project facing the Co-op—the design of its new facility. But we also want to think beyond the immediate future to what the Co-op could become as the relationship with Place co-evolves to richer levels of complexity. By modeling and promoting regenerative thinking through its choices and activities, the Co-op could inspire and actually give birth to other regenerative enterprises in the area. Eventually, the Co-op could be part of a resilient network of businesses, all co-operating with each other inside of a regenerative vision of Place.

In order to build a resilient network, links with other businesses and organizations need to be reciprocal in nature. A co-operative network could achieve considerable cost savings by sharing information, facilities, and the cost of investing in new structures.

The Co-op could also inspire other co-operatives outside its boundaries, and ultimately extend regenerative thinking throughout the co-operative network worldwide. Thus, while starting with the most immediate project of a new store facility, the Co-op could ultimately have a planetary impact.

The following recommendations represent some of the possibilities for the Co-op's expression of a regenerative relationship to Place in the context of a co-operative mission. They are currently grouped under headings according to the nature of the activities listed. A powerful exercise for a Co-op planning group would be to use regenerative thinking to prioritize these activities in terms of a time sequence that will address leverage points. To start that process, we have **color-coded green** those actions that could be undertaken now as the first steps in a sequence.

Ground the Co-op in Awareness of Place

Regenerative thinking depends on a heightened awareness of Place. The Co-op could commit itself to increasing the community's awareness of Place through all its actions.

Begin an ongoing assessment process.

An assessment process geared toward providing a basis for regenerative planning collects and holds information about Place in a way that makes it accessible. In one of our earlier meetings, a Co-op's Board member pointed out that the story of this Place should come from the people of the community. The story will be elaborated throughout time as understanding develops. This report is the first step in that process.

We are used to developing knowledge by analyzing and cataloguing parts. The process of regenerative design involves looking at relationships, and maps reveal relationships. The map in *Appendix G*, page 41, shows how existing information can be collected and overlaid to provide a basis for regenerative design. A Compact Disc is also included that has an Adobe Photoshop file with multiple levels of information that can be used to evaluate the patterns and relationships in the Brattleboro region – see the Windham

Regional Commission and other sources listed in the appendix to develop an understanding of important relationships

A timeline is another kind of map. Interactions of people with Place over time reveal the character and quality of Place. A timeline often shows what is possible in a Place. The timeline on page 27 is like the bones of the understanding of the Place's evolution over time, a kind of armature that will be fleshed out as the story develops in richness and detail.

> **Recommendations:** Charge a core strategic planning group with developing and holding information about Place in a way that it can inform the planning process for the new building and other Co-op activities as they evolve over time. Utilize the wealth of local knowledge about Place currently held by members of the Co-op community.

Build community understanding and cohesion around Place.
Understanding a system is more than knowing about the parts of a system. It comes from looking at knowledge of the parts in the context of the Whole. Traditionally, people have used stories, dance, songs, and art to convey a kind of distilled essence of their understanding of their relationship with Place. As understanding develops, appreciation and cohesion can develop around our involvement in this unique being called Place.

> **Recommendations:** Look for opportunities to take the information being generated in the assessment process and convey it to the community as a whole. Begin to build an ever-evolving picture of Place, using diverse vehicles for conveying information—some possibilities are Co-op publications, film, storytelling, art. . .

Incorporate the concept of regeneration into the interpretation of Co-operative Values, and act out of those values in building the new facility and conducting Co-op business. Actions flow from our values. Recognizing its relationship with Place in the interpretation of the Co-operative Values would be a powerful step toward aligning the Co-op's actions with regeneration**.** (See ***Section 5: Example of Regenerative Thinking and Appendix E: Possibilities and Potential for the Building and Site)***

> **Recommendations:**
> - Model and feature regenerative investment at the store, in the parking lot, in buffers, in furnishings and appliances, in materials and contractors chosen, in consumption practices. Buy locally-produced materials. Use USGBC LEED™ guidelines - as a minimum level of performance attempt to achieve a LEED Platinum rating.
> - Recognize producers' contributions to Place. For example, post signage recognizing a producer's participation in such programs as the Wildlife Habitat Improvement Program (WHIP), the Conservation Reserve Program (CRP), and the Vermont Land Trust (VLT).

Diversify the Role and Expression of the Co-op

The Co-op could build to higher levels of resilience by sponsoring additional co-operative enterprises that would diversify its expression. It would then become a community of aligned businesses—a co-operative association. Opportunities for co-operative businesses exist in the following areas:

Urban Agriculture

Urban agriculture utilizes the space around homes and schools, and in vacant areas to produce local products. Home-based market gardeners could be selling gourmet and specialty value-added produce, such as conserves, baked goods, salad dressings, herbs, greens, flowers, essential oils, vinegars. . .

> **Recommendations:** Find ways to link with urban home-based producers, such as selling value-added products in the store, hosting farmer's markets where they can sell produce, etc.

Regenerative Forestry

A regenerative forest builds in complexity each year. Food forests could be developed very effectively by following logging with a multi-story permacultural model featuring desirable cultivars. Early-progressional elements such berries and stone fruit would be followed by nuts and acorns. Such forestry businesses would provide multiple benefits to the watershed and the local economy.

> **Recommendations:** Initially, the Co-op could work with existing agencies and established programs to expand their effectiveness. Work for enhancement of VLT, WHIP, and CRP programs to encourage regenerative forestry practices. The Co-op could support regenerative forestry practitioners by carrying their food products or utilizing other products in their operations or building expansion phases.

Regenerative Agriculture

Regenerative agriculture generates more biomass, fertility, soil, and health than is removed from the system for sale each year. It is probably easier to achieve in systems that are primarily perennial, or systems that generate their revenue from extensive value-added processes, such as fermentation processes, fungal production from waste materials, etc.

> **Recommendations:** Help raise the bar on "organic" and "sustainable" agricultural practices by providing a distribution outlet for and recognition of businesses practicing regenerative agriculture. Work to create links with forestry management incentives such as WHIP and CRP by addressing current restrictions in the regulatory structure (see *Work for Change in Regulatory and Taxation Framework*, page 17); to support market incentives for participating farmers; and to create financial structures that stabilize cash flow for farmers (see *Develop a Place-Based Economy*, page 17). Support or initiate efforts to connect those with

dormant farmland with those who want to farm regeneratively, perhaps through lease arrangements.

Regenerative Industries and Services

In a regenerative industry there is no waste. It constantly generates more yield on several levels—economic, material, nutritional, and energetic. It creates more than its requirement for input, and has the potential to evolve to higher orders of expression. In a natural systems context, evolving to higher orders of expression might look like the progression from grassland to shrubs, to multi-level forest. In a business context, the progression might look like cooperative store to association of cooperative businesses, to cooperative association with active links to the education system, the finance system, the arts community, etc., under a framework of mutual commitment to regenerative investment of resources. (See Appendix C, *Background on Regenerative Design*, page 30) A regenerative service—consulting, counseling, or educational services, for example— would create capability in its clients such that they would not be continually dependent on the service. It would constantly be evolving its role ahead of the capability of its client base—thus pulling the whole community toward higher levels of expression.

> **Recommendations:** We suggest that the Co-op consider the possibility of evolving into the nucleus of a co-operative network of regenerative industries. It could act as a business incubator, founding and developing co-operative relationships with local aligned industries and services. It could also pass on its learning about regenerative community to other communities through the existing co-operative network. It would then be a cooperative at the highest level of effectiveness and resilience.

Develop a Place-Based Economy

In recent years, more and more people have become aware of the interconnections between financial capital, social capital, and natural capital. Currently, we place financial capital first, and only address social and natural capital insofar as they directly affect our ability to realize a return on our financial investment. A regenerative community would ask instead how financial and social capital could support the viability of our ecosystems. In such a community, economic success would be so closely linked to the health of natural systems that the community would take great care to preserve and enrich this vital cornerstone of its economy.

Investing funds locally creates a dynamic storage of resources, holding currency in the community. It stops the bleeding of capital resources from the system, and makes it possible to invest strategically in regenerative enterprises. This kind of investment can create the kind of transformational shifts that move the whole system forward in evolution. (See *Investing in Regeneration,* page 30.)

People in a regenerative community would see that as the local culture and the local ecosystem became stronger and more vibrant, local economic wealth would increase as a direct result. For such a community, it would be foolish, unthinkable even, to engage in

or persist in actions that would threaten or undermine the source of its success, like killing the goose that lays the golden eggs.

Work for Change in Regulatory and Taxation Framework

The current regulatory and taxation framework constrains even current conservation practice, much less regenerative practices.

> **Recommendations:** Become a voice for incentives for regeneration as opposed to penalties through fees and taxes. Remind regulators of why codes were created and promote innovation and investment in that spirit.

Co-operative Credit Union/Bank and Local Currency – this is an excellent way to keep investment local, relevant and aligned with regeneration. Local currency provides a way for local trade and exchange to continue during hard times, and encourages the development of reciprocal relationships in the community. A financial institution can help co-operative business establishment and offer business planning and consultation services. It could eventually offer local investment opportunities for members, with dividends to members.

> **Recommendations:** For both local currency and a co-operative credit union/bank, look for the leverage point in time when enough cohesion around regenerative community exists to support the idea, and when the establishment of one would potentate the greatest growth for the least effort.

Co-operative Land Trusts

These are integrated land use trusts with a regenerative philosophy, allowing everyone opportunity to hold land and establish a reciprocal functional relationship with the Place they inhabit. Several different businesses could operate on one piece of land, each networked to the others by generating yield from the waste of the others. For example: Someone could compost manure from a dairy operation using worms, selling the worms and worm casings; the compost could support an orchard that provided overstory for pasture for the dairy animals (a viable design option in some places using specific breeds of cattle and specific types of trees); a bee operation could pollinate the orchard while producing honey, bee pollen, and queen bee nectar, etc. A design process would determine which types of plants, animals, and insects can co-exist in beneficial relationship.

> Recommendations: The Co-op could begin by working to expand the scope of regenerative practices allowed in existing public programs (Wildlife Habitat Improvement Program (WHIP), the Conservation Reserve Program (CRP), and the Vermont Land Trust (VLT)), and to improve the economic viability for participants in these programs.

7. Road Map

The following is a simple road map toward getting the membership aligned and active around the variety of actions required to realize a regenerative community and marketplace.

1. Assemble a Strategic Planning Group of diverse activists and leaders within the community or the Co-op itself. Use the concepts embodied in this report and consider the array of possibilities toward realizing the Ends Policies.
    a. Purpose of this Strategic Planning Group (this could be the Board, Management Team, or any other group as long as it is diverse and representative):
        i. Receives complex information and digests it.
        ii. Learns about leverage points and connections in the system.
        iii. Transmits knowledge and understanding (distinct perspectives) to the Board and other affinity groups in the region.
        iv. Works with the architect and design team.
2. Purchase the existing site.
    a. The current site is a fine choice with the only qualification that of raising the lowest floor due to flood potential and the reconsideration of parking in relation to the larger automobile use and parking plan for Brattleboro. (See *Section 5: Example of Regenerative Thinking* and *Appendix E: Possibilities and Potential for the Building and Site*)
3. As a community, develop a compelling and inspiring Vision Statement that will move people to action.
    a. The Ends Policies as written are really not a 'vision.' The Policies are excellent objectives. A 'vision' has behind it the power of imagination. A vision is a simple, basic and strong statement that forms the underlying framework for all future activity. A vision is easily grasped by those people to whom it is most important. It should be derived from the perspective of those who live and work in the Co-op community. From conversations with a few members it seems that the significant and life changing ramifications of the Ends Policies – most of them directed towards 'sustainability' – are not truly understood. For the Ends Policies to be an effective driver there is needed a simple and easily grasped vision(s) from which all detailed decisions can be evaluated and explained. It thereby becomes a catalyst that causes positive change.
    b. Re-evaluate the Ends Policy for its resonance with the newly articulated Vision Statement. Evolve as needed.
4. Develop an array of possibilities toward realizing the Ends Policy. (From a large scale perspective, what needs to be done to realize this policy? What do we need to change? Don't get lost in "practicalities". Blue sky thinking at this point.)

a. Evaluate possibilities for how they address leverage points in the Co-op system. Choose which to pursue.

b. Develop objectives toward realization of the possibilities. Prioritize them.

c. Set goals in time, and articulate commitments.

d. Consider the concepts embodied in this report and the array of possibilities inspired by the Ends Policies to create an action plan to:

    i. Develop the next five year course of regenerative activities

    ii. Develop a **building program and objectives** based on this course

    iii. Begin the building design process.

5. Bring others along and expand the knowledge base of the Strategic Planning Group.

Appendix A: Summary of Discussions in March of 2003

The following points summarize a two hour discussion and follow-up conversations with the representatives of the Board and Management:

- The Coop has an Ends Policy that deeply embraces environmental responsibility and health – both social and natural system health.
- Any activity the Coop engages in, including planning a new building, needs to be based on the Ends Policy – the ultimate basis from which to evaluate if an activity or assignment has been successful.
- As part of the design of a sustainable project it is necessary to evaluate and prioritize where the biggest opportunities are to save energy, improve water quality, reduce the toxins entering the environment, reduce resource use, and so on.
- With a food store, it is likely that global and transcontinental food transport alone burn more fossil fuel than that which would be saved by an energy efficient grocery store. An additional burden is that commercial agriculture processes are intensely fossil fuel dependent both for energy purposes and fertilizer.
    - A percentage of food the Co-op sells (how much TBD) is part of the Global Economy. The average distance a bite of food travels is a minimum of 1,300 miles (1969 Defense Department Study) - apples from New Zealand, strawberries from Chile and California, etc. A California organic strawberry with 5 calories of food energy requires 435 calories of fossil fuel energy to get to Vermont (Pollan, Orion, 7,8/03)
    - Before the industrial revolution food traveled an average of 20 to 30 miles.
    - Human waste used to be brought back to the fields in pre industrial society – in effect, a closed loop system. Today our waste is sent miles away and indirectly into the ocean. Our soil needs constant replenishment and gets it now from ineffectual and costly additives and fertilizer extracted from fossil fuel.
        - "We have constructed the most energy-inefficient food production and distribution system in human history. And each year, we increase the energy usage in and greenhouse gas emissions from, our food system. Its energy-inefficiency (and inefficiencies in every other sector of our economy and society) now threatens to destabilize the natural systems upon which food production is based and dramatically reduce the amount of food available to Canadians and to people around the world." *Climate Change in Canada- a Brief to the Stranding Senate Committee on Agriculture and Forestry, by the National Farmers Union, Feb. 2003*
- Beside the obvious need to make the store energy efficient and environmentally responsible in its design it was apparent that greening the store's products and purpose for being (i.e., the nutrient cycle) would have much more significant long range impact than looking at the Store by itself – after all, everything is connected.
- Before building a store that is green we need to ask ourselves, what impact do the activities of the store and Co-op have outside the store in relation to the responsibility of meeting the Ends Policies? And the corollary, how might the

design of the store be influenced by, and influence, a deep understanding and willingness to engage in the direction the Ends Policies point us?

- This systemic change requires more than a band-aid of simple green building concepts. It requires that we become engaged in how our entire nutrient, or energy, delivery system works.

This requires that in addition to the designers and managers involved in the decision process an effective percentage of the community needs to be engaged in a shift in priorities and perspective. What will it take to rethink: the way we supply our food, the things we buy, the use of the land, and whether we support its health or continue to degrade it?

Appendix B: Degenerative Processes and Events Affecting the Whetstone Brook Watershed

Currently, the watershed around the Co-op faces a multitude of forces and events that rob it of resilience, assaults mirrored on a larger scale across the rest of the planet. The diagram on page 26 shows how these degenerative processes and events interact with each other, with arrows representing cause and effect relationships. Numbers on the list below correspond to numbers on the diagram. The timeline that follows can be viewed as the beginning of defining the "bones" of the story of Place, a story that reveals the qualities and character inherent in this Place. It can be developed further over time with input from community members and stakeholders. . It indicates the major events that demonstrate the way the nutrients and energies have left the system and how resilience has been compromised by the compounding effects of all of these processes.

Key events and processes contributing to decreased resilience include

- **Deforestation** of Vermont in the early 1800s destroyed thousands of years of accumulation of a rich and thick sponge of biomass. (Virtually the whole state was cleared.) This sponge was a significant component in the web of elements capable of buffering a watershed from the annual 40+ inches of precipitation, and the occasional extreme weather event, such as a hurricane.
- **Keystone Species Extinction/Extirpation** in a living system is akin to multiple organ failure in humans. By extending the forest canopy to 150 plus feet, species such as elm and chestnut added structural dimension to the forests of southern Vermont, while providing food and shelter for many other elements. Migrations of passenger pigeons and runs of Atlantic salmon carried nutrients against gravity back to the top of the system. Beaver, which were once extirpated from this system, were credited with controlling the flooding and erosion in parts of New England during the 1938 hurricane—an extreme event.
- **Loss of Diversity** is perhaps the most significant threat to any living system. Loss of species diversity or diversity of enterprises is significant, but loss of diversity in functional links or *connections between individual system elements* is most threatening to the dynamic stability and resilience of the whole. For example, salmon and passenger pigeons performed the function of carrying nutrients to the top of the system. When they disappeared, the nutrients they transported (phosphorus, potassium and nitrogen) were not being replaced, and were essentially bleeding out of the system.
- **Overabundance of Resources** in a living system occurs when more resource is imported into or generated by that system than can be dealt with in the system. Pollution is the entropic effect on the system that results from an unused or currently unusable resource. For example, overpopulation of whitetail deer has been a liability since the 1960s, and is currently causing a significant loss of tree species diversity in the recruitment of the young forest in southern Vermont. Another example of a pollutant is excess precipitation. This system co-evolved with people in this specific climate to make the most of 40+ inches of precipitation annually. The export, loss, and waste of the accumulated sponge of biomass essentially reset the clock to an earlier stage of development. Heavy precipitation is now, effectively, a pollutant like the whitetail deer because the watershed system cannot intercept, hold and use it in a

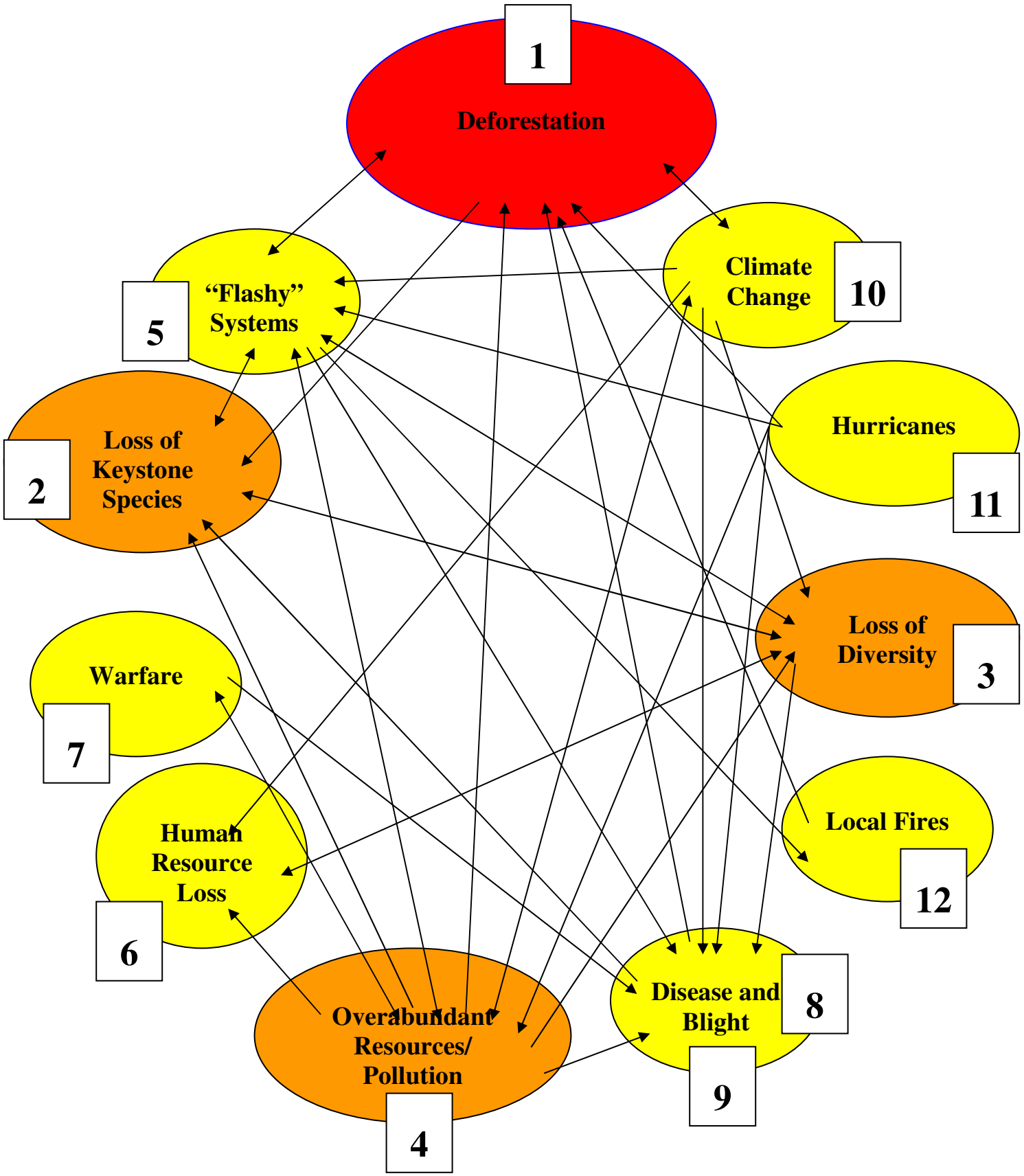
dynamic and effective fashion. More commonly recognized pollutants in the Whetstone Brook watershed include lead, mercury, chromium, *e coli*, PCBs, acid rain, carbon dioxide, heat, noise, and light. Future research will likely also find herbicides, hormones and antibiotics. Overabundant resources can result in a devolutionary progression of imbalance, instability, entropy and system collapse.

Secondary events and processes contributing to decreased resilience include

- **Flashiness of Systems** indicates dysfunction in the pattern of relationships in those systems. It results from overly simplified relationships between companion elements, causing a short circuit between wherever resources enter, are generated, or are held in a place and where they are lost to that system. Flashiness is like a hemorrhage of resources. Flashiness can be seen in economic systems when large-scale quarrying, logging, manufacturing, herding, and farming for export puts investment, future resource base, and livelihoods at the mercy of external markets and economic trends. Selling off locally acquired resources, especially non-renewable or slower-to-renew resources, predisposes the system to boom and bust cycles. In hydrologic systems, flashiness is shown by the system's inability to cycle water repeatedly through the whole of the watershed before it is lost. Tight cycles of flood and drought correspond to the boom and bust cycles in a flashy economic system. In a flashy watershed like the Whetstone, flood and drought are extreme events. Such extremes are likely to be exaggerated by climate change associated with global warming.
- **Regional Human Resource Loss.** The loss of valuable and productive individuals (often the youth) from the community is a problem that relates to loss of connective diversity, and overabundant resources.
- **Warfare** is an example of boom and bust in a socioeconomic context. War is often the result of one system either depleting or extending beyond its resource base, and needing to acquire resources elsewhere. (One example is our own country's behavior at the approach of peak worldwide oil production, after which oil will be more and more expensive to extract and refine.) Reduced resilience in an ecological system may lead to the loss of livelihoods, leading to conflict over critical resources. A common denominator for many of the wars in Africa, South Asia, and Latin America during the last decade has been lost livelihoods, often caused by or exacerbated by environmental degradation. Whatever the source of conflict, the ramifications of war are widespread in a system. Even when conducted elsewhere, warfare extracts a heavy social and economic toll on the fabric of communities.
- **Disease** has repeatedly decimated human populations in the Connecticut River Valley. Usually the disease organism arrived from somewhere else and raced through populations that had little or no resistance to it. In every epidemic, those with compromised resilience or health are most vulnerable. Examples include chicken pox in 1616-17, smallpox in 1633, influenza in 1907, polio in the 1940s-1950s, AIDS in 1989-90. New diseases are currently emerging: West Nile virus in 2000, SARS and monkey pox in 2003.
- **Blight** is another form of disease that affects botanical species. As with human disease, the most vulnerable are those whose resilience or health has already been compromised. A plague of blights is symptomatic of systemic entropy and impending collapse—much like auto immune deficiency syndrome in humans. Examples include

gypsy moths on oaks in the 1870s, beech bark scale disease in 1890, chestnut blight in 1904, white pine blister rust/apple rust in the 1920s, Dutch elm disease in 1930, white ash yellows in the 1970s, butternut canker in the 1970s, and red oak crown dieback in 1990.

- **Climate Change** has repeatedly affected the system here throughout time. The difference now is the speed with which change is occurring. Like deforestation, climate change not only impacts the expression of life in a place, it also potentates the effects of other stressors. Worldwide, human impact is increasing levels of disturbance, leading to increased levels of surprise, uncertainty, and change.
- **Hurricanes** have long been one of the most powerful disturbance events in the Vermont forest system. These disturbance events return the progressional development of the forest to infancy. Historically, hurricanes have frequently visited New England. (See Timeline, page 27) Powerful as they were, their impact on an intact, resilient forest system was limited. With global climate fluctuations, Category 4 and 5 events will be able to make landfall much farther north, intensifying and multiplying the impact on a less resilient forest system.
- **Local Fires** have repeatedly had a catastrophic effect on sections of the socioeconomic system in Brattleboro. Fire appears to be a principle design consideration for the Co-op. Additionally, prior to European contact, fire was used by native people as a tool to shape the character and productivity of the land along the Connecticut River and its larger tributaries. Although the evidence in the Brattleboro region is not as extensive as in other parts of the eastern forest (due to lower levels of development and consequently fewer digs), archeologists speculate that indigenous practices here weren't significantly different than elsewhere, just at lower levels due to smaller population densities. (See *Appendix E: Indigenous Practices* for more information on burning practices.)


1
Deforestation
"Flashy" Systems
5
Climate Change
10
Loss of Keystone Species
2
Hurricanes
11
Loss of Diversity
3
Warfare
7
Human Resource Loss
6
Local Fires
12
Disease and Blight
8
9
Overabundant Resources/ Pollution
4

Timeline of Significant Events Affecting the Region around Brattleboro

This preliminary timeline is a tool-in-process. It will evolve with use, as people in the community add their knowledge and build their collective understanding of the story of this Place. The timeline is not intended to be a finished product, but rather a kind of a bulletin board that outlines patterns of current understanding until it is embodied in an epic song, or some other more sophisticated or relevant form of patterned expression. The timeline will never be done; the song will never end.

Members of the Co-op community have suggested that it is most appropriate for the community to tell its own the Story of Place. The timeline could contribute to development of the story by stimulating questions: How did these events affect the balance of life and livelihood in Brattleboro? How did they affect prosperity and available resources? What other significant events occurred around this time?

A tool like the timeline can reveal many things. It can show cycles of change—of ebb and flow, boom and bust. It reveals changes that have come with increasing frequency and magnitude. It shows the relationship between events and processes in the preceding diagram in the context of time. The timeline could be viewed as a map of nutrient and energy flow through time, a map that reveals both connection/relationship, and dis-connection/missed opportunities.

Date	Event
BCE	
18000	Peak of last ice age
13000	Ice sheet retreats from all of New England except northern Maine
12000	First human presence in New England; mass extinction of Pleistocene megafauna begins; arctic tundra covers central New England
10000	Boreal spruce and fir forest dominates central New England
9000	Dramatic warming trend results in pine, oak, birch-dominated forest in central New England
5500	Peak of warming during Holocene; earliest evidence of use of fire for forest management by native peoples in central New England
1000	Forests in central New England have developed present composition
AD	
1000	Natives of New England adopt maize agriculture; coastal prairies and riverine intervales created by agriculture combined with use of fire.
1524	Giovanni de Verrazano travels the New England coastline
1616	Major epidemic (probably chicken pox) decimates native population, killing 95% of coastal New England natives
1633	Smallpox affects native population of Connecticut River Valley

1636	Dramatic escalation of trapping by Natives for British trade after a fur-trading post is established at Springfield, Massachusetts
1654	First recorded cutting of "mast pine", giant white pine, for the British Navy.
1675	First battles between central and northern Vermont Algonquin tribes begin 85 years of warfare over control of the region; Algonquins are backed by the French.
1691	Mast pine populations dwindle; the Crown marks trees in an attempt to keep colonists from cutting them.
1756	French and Indian War begins; continues for seven years
1760	British settlement in central New England begins after French defeat at Montreal brings an end to Native warfare
1761	Hurricane affects New England
1776	American Revolution begins and lasts for seven years
1792	Hurricane affects New England; American system of coinage is established
1810	Thirty years of "sheep fever" begins; beaver is now extinct from central New England
1812	War of 1812
1815	The Great September Gale causes extensive blowdowns in parts of central New England
1820	Life expectancy at birth 40 years in US and western Europe
1821	Hurricane affects New England
1825	The Erie Canal offers access to the Ohio River Valley
1825	Hurricane affects New England
1840	In central new England, sheep industry and rural population levels peak; mass migration to Ohio River Valley and points west begins
1846	Hurricane affects New England
1860	Gypsy moth introduced to Massachusetts; escapes into New England's forests
1861	Civil War begins and lasts for four years
1878	Hurricane affects New England
1890	Beech bark scale disease accidentally introduced to Nova Scotia
1898	Spanish American War begins
1900	White pine re-establishes itself on abandoned pastures and becomes the region's most important timber species; sustainable yield concept developed in American forestry
1902	Model T Ford introduced
1903	Hurricane affects New England
1904	Chestnut blight accidentally introduced into New York; ravages eastern chestnuts for the next twenty years
1907	Influenza epidemic

1914	World War I begins and lasts for four years; life expectancy at birth 50 years in US and western Europe
1916	Hurricane affects New England
1920	White pine blister rust/apple rust
1921	Beaver reintroduced into central New England
1929	Great Depression begins and lasts until WWII
1930	Dutch elm disease begins killing American elms in Ohio; long distance truck transport begins
1938	The Great Hurricane
1939	World War II begins and lasts for six years
1940	Polio epidemic
1941	Hurricane affects New England
1944	Two hurricanes hit New England
1950	Korean War begins and lasts for three years
1954	Three hurricanes hit New England
1960	Hurricane Donna
1963	Vietnam War begins and lasts for thirteen years
1970	• (decade) white ash yellows
1970	(decade) butternut canker
1972	Hurricane Agnes
1976	Hurricane Belle
1981	AIDS
1985	Hurricane Gloria
1988	New canopy-decline research in New England follows defoliation of five thousand acres of Vermont forest by pear thrips
1990	In the next ten years, human populations in rural central New England increase to 1840 levels; life expectancy at birth 75 years in US and western Europe
1990	Gulf War I; red oak crown dieback
1991	Hurricane Bob
1995	Global warming trend beginning in mid-nineteenth century pushes temperatures close to those of the warmest period of the Holocene interglacial in 3500 BCE; mean global temperature is warmest ever recorded
2000	West Nile Virus
2002	War in Afghanistan
2003	Gulf War II, SARS, monkey pox

Appendix C: Background on Regenerative Design

Currently, most of our human-created systems are designed from the dis-integrated viewpoint that we are outside of nature and thus free to act on it with only limited consequences. Our scientific, technological, industrial, and economic systems encourage human activity that undermines the self-organizing, self-healing, and regenerative capability of natural systems. The apparent success of the industrial revolution is based on our exploitation of the natural wealth (natural capital) that has accumulated over the several billion years that life has existed on Earth. We have depleted this natural capital to an extent not previously seen in human history. To continue to thrive we need to redesign our systems to obey the laws of nature, including the laws of gravity, thermodynamics, biology, and ecology. To design regenerative systems we need to better understand both the basis of the regenerative capability of natural systems and how human systems have ignored those principles.

From Sustainability to Regeneration

Current practice in sustainable or green design focuses primarily on minimizing damage to the environment and human health, and using resources more efficiently; in effect, just slowing down the degradation. A much more deeply integrated systems approach to the design and construction of buildings and human settlements (and nearly all other human activities) is needed. An approach not only to reverse the degeneration of the earth's natural systems, but to create systems that can co-evolve—evolve together with us in a way that generates mutual benefits and greater overall expression of life and resilience.

What does this mean? Mutual benefit means that people would interact with natural systems in a way that benefits nature, and natural systems would interact with people in a way that benefits human life and culture. For example, people could benefit nature by extending the forest edge and providing increased habitat while nature could (and does) benefit people by cleansing water and air through its forest systems, by providing food and other resources, etc.

Evolution means that both human systems and natural systems can grow and change into richer forms. For example, to get a sense of evolution in natural systems, compare a young forest growing back from a clearcut to an old growth forest that is hundreds of years old. To get a sense of evolution in human culture, compare the culture of Colonial America with the American culture of today in the realm of communications technology.

Co-evolution happens when people and natural systems evolve together in a way that serves the overall evolution of each partner, as well as the evolution of the larger Whole that includes both. For example, people could evolve in their understanding of how to grow their food, grow their living materials, build their buildings, etc. in a way that extends and enriches natural systems. Correspondingly, natural systems could evolve in ways that inspire growth in human learning and culture. As the forest evolves in beneficial relationship with people, it would offer more opportunity for the evolution of more sophisticated symbiotic human industries. These niches of opportunity would then engage the mind and spirit of human beings, furthering the expression of human culture,

understanding and expression. How might we use computer technology, for example, to further the co-evolution of people and Place? What forms of expression might develop? Co-evolution can be seen as a feedback loop that forms not a closed cycle, but a spiral through time, growing to ever-greater, richer, and deeper levels.

This requires a shift in thinking and in language, as most modern languages lack words to describe humans as an integral element within nature. And most of the terminology of the "green" or "sustainable" building and development movement blurs rather than sharpens our understanding of the challenge we face. We use the term “regenerative” because it suggests the self organizing, self healing and self-evolving properties of living systems. Another useful term, “re-integration”, offers a meaning that might be akin to re-membering—which can have three meanings here: recalling a past state, re-awakening to something we already know, or perhaps most important in this context, consciously becoming a member again, rejoining the community of life.

Shifting Paradigms

The challenge is not just technological. It requires altering assumptions, attitudes, and understanding. Across the disciplines—from physics, to natural resource management, to farming, to economics—a shift in the way we see the world is underway. It can be summed up as a shift from seeing the world as a machine composed of parts, to seeing the world as a self-organized continuously evolving living being composed of other self-organized living beings, nested in relationships with each other. It invites us to move from our current view of standing apart from and using nature to being part of, participating, and co-evolving with nature. It invites us to discover the aspirations of Place and to find resonance between those aspirations and ours.

Rather than trying to stabilize natural systems by brute force, or to create a uniform steady state that we can manage, we would seek to achieve dynamic stability by building increased capacity for resilience in the face of constant change. Instead of seeking to maximize the value we extract from nature’s resources, we would seek to improve the viability of the natural systems that maintain these resources to ensure their ongoing generativity. And to fulfill our role in the co-evolution of the whole, we would seek to regenerate living systems, enabling them and us to realize increasingly higher order potential from their existing resources through developmental versus material growth processes. To distinguish between development and growth, Russell Ackoff compared a graveyard, which grows but does not develop, to Einstein who continued to develop long after he stopped growing.

We *Are* Nature

The first step toward regenerative design is to really understand ourselves as integral with nature. This means understanding our past relationship to nature and the potential of this relationship in the future. The western view of humans as separate from nature must ultimately change for our species to survive. In reality humans have been actively influencing nature around the world for 30,000 years. We need to get beyond the widely held belief that we are only capable of doing harm to natural systems. This shift doesn't

give humans justification to destroy living systems, or to abandon the protection and care of wild places. It will allow us to see ourselves as partners with other living systems, seeking the deeper roles and exciting possibilities of co-evolutionary relationships—relationships whose end results or outcomes are not controlled or predetermined by humans for strictly human ends. This understanding of interconnectedness is essential if we are to create regenerative systems that will empower a more abundant future.

Change Is

Within this new worldview, change is inevitable and the only certainty is surprise. By its nature, energy moves, producing change. Paula Underwood put it in *A Native American Worldview*: "The indigenous scientific approach understands Universe—or All Things—as constantly in motion. Even particles are "dancing," already moving toward the Flow State." A group of ecologists writing about resilience and sustainable development put it another way: "we are facing 'permanent white-waters' which demands strategies for adaptation to uncertainty . . ."

Life Wants to Unfold into Greater Resilience

Nature appears to unfold as a result of uncountable interactions between countless actors, in relationships that change and evolve constantly at every scale from the atomic, to the micro-organism, to the living individuals, to communities, to the global and beyond.

Diverse relationships give systems resilience: the ability to absorb the effects of change without falling apart. They have the capability, the depth, to withstand the shocks and blows of disturbance. Like a tree that bends in the wind instead of breaking, they respond with flexibility to fluctuations and maintain their integrity. The greater their resilience, the larger the disturbance they can withstand.

But what gives system resilience? In a word, diversity, but not just any kind of diversity. Two types are especially significant for resilience: functional diversity and response diversity. Functional diversity means redundancy or overlap in the number of entities performing the same function, and response diversity means that there is variability in the response of entities within the functional groups to environmental change. The presence of both kinds of diversity provides insurance for the system in the face of upheaval.

One interesting aspect of diversity is that its value is only manifested in the presence of relationships—the open flow of information and resources through the links in a network. Without this capacity to co-operate, diversity can become a source of friction, conflict, and even violence. So variation in co-operative relationships, not just of elements, is key to resilience.

If resilience is present, disturbance can become an engine of learning and innovation. Life wants to unfold into more complex networks. When greater depths of resilience exist, a system can not only sustain itself (maintain existing levels of complexity while maintaining its essential integrity within a changing environment), it creates the threshold conditions within which the system can evolve itself to more complex levels. Developing

the capacity for resilience is necessary for a system to then develop the capacity to move toward a regenerative state—a state that goes beyond sustainability in that it fosters learning and innovation to a degree that allows a shift or transformation into a more complex phase of evolution.

Designing for Regeneration

Because we are a keystone species dependent on the place-based nested hierarchies of life supporting us, the design of regenerative systems will always be Place-based. And each Place is unavoidable unique. This is why prescriptive design solutions are inadequate.

Regenerative design is the process of bringing our creations and activities into resonance with the evolutionary forces inherent to the unique Place we inhabit—fitting our creations to Place in a way that potentiates evolution of the Whole. This requires identifying the key systems (living, climatic and geologic) involved in a "place" and understanding what permits these systems to maintain viability over time and evolve in relation to each other (a continuous birth, life, death cycle). Place-based design requires an awareness of what gives health to a place—using the smallest watershed as a basic unit. And finally, creating Place-based design requires an awareness and acceptance of continuous change as the basis for evolution. Some questions that would be asked during a regenerative design process include:

- What are the aspirations of the Client/Community? Of Place?
- What are the needs or restraints of the natural system?
- How would we conceptualize a "new" living system that reconciles apparent conflicts in a win-win process of reciprocal relationship? How could human beings, working in the service of evolution of this new system, use their minds to potentiate what nature is doing in this Place, and how could that enrich nature as well as the human community and economy?
- How would looking at the Client/Community and the natural system(s) as a "new" system contribute to their capability to continue to evolve?
- What is valuable in this system/relationship and what are the hierarchies of value?
- How can each investment of time, capital, materials, energy, et cetera, be leveraged from a functional, maintenance, or requirement level to a regenerative contribution to building a generative field that enables Place (including community) to continue to develop in richness? (See *Investing in Regeneration* below.)
- Where and when can this investment be best placed to achieve the most for the Place from the least of what is available?

Investing in Regeneration

One way to look at the value of a potential action for building regenerative capacity in a system is to distinguish it as one of three types of investment:

- **Degenerative** investments that begin to degrade as soon as they are created. A stereo is an example, or a car, or a house. It is possible to offset the degenerative nature of such an investment by choosing components that will endure, or that are made from renewable resources that biodegrade benignly, readily, etc.
- **Generative** investments that can build or repair other elements, such as tools. Things that conserve resources like insulation or erosion control structures also fall in this category. A library or a database falls into this category. Design or choice of elements can enhance investments made in the previous (degenerative) category so that they serve a generative function. A good example is a roof that is built of materials that not only endure, but also is designed to capture clean storm water in support of an evolving living system.

Regenerative *investments that have the capacity to evolve over time to higher and higher expressions of value to the larger Whole, and that have the capacity to contribute to the capability of the Whole to continue to evolve. Examples here would be urban forestry projects, or the development of relationships in data that would create a higher understanding. A broad array of mutually beneficial links that simultaneously support sub-systems, such as the watershed and the socioeconomic system, are hallmarks of regenerative investment. They nourish and are nourished by the systems they inhabit.*

Appendix D: Indigenous Practices

This look at how indigenous people co-evolved with Place in New England in the not-so-distant past is intended to contribute to a dialog on how humanity today—with all the tools developed during our pursuit of rational and analytic inquiry during the Industrial Age—can use these tools in the service of the overarching vision of a regenerative path forward. The goal is to look at the past for lessons and examples, not attempt to return to a romanticized view of an idyllic past. The following material is offered in this spirit.

In the aftermath of the last ice age, as glaciers retreated, a complex evolutionary dance between soil, plants and animals began in the warming climate. This eventually resulted in highly productive forests carpeted with a deep layer of humus.

The interesting thing is the role human culture appears to have played in spreading the chestnut/oak/hickory forest communities through their land use practices. Inside of a worldview in which they saw themselves as interrelated with nature inside of a larger Whole, nature and humans co-evolved to greater levels of complexity. That is, they each adapted to the other in a way that evolved human culture and forest ecosystems.

One way that people co-evolved with forests was through the use of fire as a land management tool. Fire was used to clear land for annual agriculture where the soils were prime for that practice. Cool, fast-moving fire converted litter to nutrients and removed brush. It was used in hunting practices, and encouraged the growth of nut and berry producing plants that provided high-quality food for people and game animals. Archeologist Scott Dillon from the Vermont State Division of Preservation states that recent studies show that fire was used to manage the riparian area around the Connecticut River near Brattleboro. Although the broader landscape has not been extensively studied, archeologists speculate that fire was probably used in the fabric of the Connecticut River watershed as it was elsewhere in the eastern forests.

At the time of first European contact, this co-evolution had resulted in the elegantly managed, highly productive food production systems seen by early explorers, who portrayed them in their journals:

> "[We] journeyed a full league in garden-like lands where there were many trees, both those which bore fruit and others; and among these trees one could travel on horseback without any difficulty, for they were so far apart that they appeared to have been planted."

And William Penn noted:

> "The fruits that I find in the woods are the white and black mulberry, chestnut, walnut, plums, strawberries, cranberries, hurtleberries, and grapes of divers sorts. . . Here are also peaches very good, and in great quantities, not an Indian plantation without them."

Within this rich perennial agriculture, annual agriculture played a minor role, like a few threads weaving through the fabric of sustenance, not the whole cloth. The backbone of

this food production system was the great chestnut, a “tree grain” that was a major source of palatable carbohydrates.

Beginning around 1600AD, as disease decimated native populations and European settlement dispersed the survivors westward, this rich agroecology was abandoned. Ironically, viewing what they found through a worldview of “man separate from and dominating nature”, the significance of this highly evolved food production system was almost completely missed by European settlers.

Appendix E: Possibilities and Potential for the Building and Site

The same type of regenerative thinking process used with the parking lot can also be applied to the most immediate project facing the co-op—the design of its new facility.

Looking at the most degenerative processes and systems in the typical building can inform us where the best leverage points are to optimize expenditures and at the least, decrease our impact on the ecosystem and at the highest level, increase the opportunities to regenerate the health of a variety of natural systems.

As far as the physical plant is concerned - a general list of potential and achievable green building attributes can be listed. However, these will need to be reconsidered and augmented later in the building design process. The reason these attributes should not be considered in detail now is that the technologies and products available are continuously changing. The green building field is in a developmental and transitional stage. Products specified for a building design and technologies for lighting and mechanical systems may be unavailable or disproved after only six months.

The following are some simple examples that will need more study to evaluate their effectiveness as part of the whole:

- How can the energy bill of this facility be minimized by design? Can it be eliminated, or, can the building eventually be a net energy producer?

  There are technologies and design concepts to minimize the need for heating/cooling. Positioning of building for solar gain, insulation, alternative materials (Straw bale, Cob) would offer insulation that also is supporting material, and is biodegradable. The trick is to develop the answers to these ideas by stacking functions. The fundamental question: How do we achieve a solution by moving the investment in every decision as close to regenerative as possible?

  - Renewable energy in the form of Photovoltaics, bio-diesel, passive solar techniques, solar hot water or a combination of cost effective uses of these techniques may prove desirable. If nothing else, accommodation should be made for adapting these technologies in the future.
    - The parking lot or building might utilize solar thermal or photovoltaic collectors – in the form of canopies and shelters - to melt snow and produce electricity.

- Using the proper amount of daylight and windows to reduce heat from the electric lighting without overheating the building during the summer and adding heat to the building during the winter;
- Cascading the heat from refrigerator units so that these units provide heat in the winter and do not add heat to the store in the summer – heat exchangers and other techniques may be used to capture this "waste" energy.
- Utilize co-generation technologies to produce lower cost electricity and heat at the same time. This can provide income to the Co-op if the electric production is greater than the need of the store at times.
- Utilize small scale hydro-electric power from the brook. Investigate technologies that require no damming and minimal diversion of water flow.
- "Right sizing" the mechanical units so that the store is not burdened with larger unit sizes than required (most buildings have equipment oversized by 30-50%) this adds expense and less operating efficiency.
    - It is likely that a radiant floor heating system can be used with great efficiency in this store – liquids transfer heat approximately nine times more efficiently than an air system.
    - Compressive air conditioning is only required in Vermont if the building is improperly designed. This energy intensive conditioning can be avoided: by utilizing the waste heat from refrigerator units to augment absorptive refrigeration or a cogeneration power unit (at a minimum let it escape from the building during the summer); by reducing electric lighting significantly through the judicious use of daylighting; by using natural and fan induced ventilation to remove heat; and by gentle air movement through the use of ceiling fans to reduce perceived temperature.
    - If humidity is a problem for baked goods in the store, then a desiccant dehumidification system could be considered in lieu of using compressive air conditioning as the dehumidifier.

- Designing the wall sections so that they breathe properly and provide high levels of insulation without allowing mold to grow.
- Considering material selection in relation to their embodied energy, ease of maintenance, ability to be recycled, and overall Life Cycle Assessment that looks at toxicity impact in addition to the former issues listed.
- Avoid overly complex design. An example of overly complex design is the use of curbs, underground pipes, and catch basins to move storm water on a site. Sometimes these are necessary, often they are not. We recommend and often achieve designs that use no pipes – just many small practices that in sum reduce the run-off to that which the site can handle without extraordinary measures.

Some of Best Management Practices are the use of vegetated swales, rain gardens, living roofs, permeable paving (even in the northeast), and cisterns (that store water for toilet flushing and irrigation).

But we also want to think beyond the immediate possibilities of green design techniques to what the co-op could become as the relationship with place co-evolves to richer levels of complexity. By modeling and promoting regenerative thinking through its choices and activities, the co-op could inspire and actually give birth to other regenerative enterprises in its area. Eventually, the co-op could be part of a resilient network of businesses all cooperating with each other within a regenerative vision for Place.

- If the Co-op decides to build on the present site and embrace the concept of an extended network of co-operative businesses then these thoughts on regeneration might be considered:
    - The current relationship between parking, ingress/egress, delivery and building is awkward. It's also inefficient and ineffective. Where on this unusually-shaped lot would be the best place to position the building in relationship to ingress/egress for building's users? The question is what would that relationships look like ideally? Where would the position of the building be in relation to street, pedestrian bridge, and public parking, and the proposed functions of the new parking lot? How could the expression of these relationships also support the larger whole of the watershed?
    - General Issues to be considered when designing the building and site plan:
        - Determine how much onsite parking is needed considering the new parking structure in town
        - Determine the effective spatial relationship between the building and parking for nutrient and energy management
        - Ingress and egress needs for delivery
        - Consider a stoplight @ the Bridge St, Canal St, Main St, Co-op intersection given the hazard that poses to pedestrians and motorists moving each way. We assume that this has been studied extensively and rejected for some reason but felt the need to create a place holder for it.
        - What would the highest expression of this space be in a healthy natural system, and how can that be realized or exceeded by what we are creating?
        - How can runoff not only be eliminated, but regeneratively utilized by the facility and the watershed.
    - How high above ground level should the first floor be to prevent damage from a catastrophic, unprecedented storm event—for example, if the Place received 15 inches of rain in a day? How high would the water be? Place the first floor above that. Two design issues: The highest level of flooding previously recorded (1938) water reached nearly 40 feet above the

Connecticut River. If we were to look at a Category 4 hurricane, what levels of flooding could we expect? (Need to consider that the bridge and abutments create a restriction on the brook, so with the river at 40 feet plus above normal surface levels, Whetstone Brook is going to be backing up behind the bridge.)

- What would the shape of this building be to separate delivery activities from pedestrian ingress/egress?
- How many stories would be most effective?
- Should the food co-op occupy the first floor with office and meeting rooms on the second?
- Currently the roof is poorly designed, both from the standpoint of snow and ice loading, and from the standpoint that it performs no other function. Couldn't dining occur here seasonally? Can waste treatment happen here (Yes, even in conjunction with dining)? Of what materials should the roof be made? Currently they are petroleum-based, and they affect the quality of water discharged from the roof and the health of the watershed. Currently the roof requires a significant amount of maintenance—periodic resurfacing because water stands on it. (There are actually plants growing on the roof.) The roof currently is as dysfunctional as the parking lot from the standpoint of its role as part of a living watershed. It contributes to the flashiness of and pollution of the brook. Designing a method of retaining the roof water for gradual release, and making the roof of materials that would discharge cleaner water is important. How could you do this in a way that also performed other functions, like holding up the roof, or providing thermal mass to buffer outdoor living space?
    - An example of making a degenerative roof system regenerative is to utilize a living roof to hold stormwater, filter it, reduce the heat from the roof, add habitat, and reduce UV damage to the roof surface. Even though initially more expensive the living roof will save land area by reducing the size of storm water management structures, clean the water, and potentially triple the life of the roof – a net cost saving and a very good return on investment.
    - The storm water captured on the roof can be used to supply the toilets in lieu of using city or well water to flush human waste.
    - Sewage can be treated on site, perhaps even on the roof (it has been proposed in Manhattan for instance). Constructed wetlands technologies are very inexpensive to build and operate as well as having the ability to treat human effluent to potable water standards.
- A Co-operative business incubator: what kind of space would be needed in the building to support synergistic enterprises Should other space be utilized in the Town? Could the Co-op rent space to aligned organizations initially? The building may be able to carry its own costs with this

approach. The building could produce a yield, a profit on its own every year. How will it have the capability to evolve with the organization and the community?

Design Team Selection and Design Process

In selecting the design architect for this facility we recommend that the firms demonstrate experience in working with their consultants and the client in such a way that they have achieved cost effective high performance buildings. These architects should recommend engineers, landscape architects, civil engineers who have demonstrated advanced design techniques that emphasize the simplest solutions rather than those that are unnecessarily complex - unnecessary complexity and expense often occurs in architecture, civil engineering and mechanical system design (see above). We can assist the Co-op in providing Request for Proposal language and an evaluation framework if needed.

Most important, it is essential - we will repeat - it is essential - that the building design process utilize an integrated systems design process to achieve cost effective high performance design. The design team should have a full understanding and commitment to this process. This is similar to the way natural and social systems are being considered in relation to the Co-op's larger mission of sustainability. Simply adding highly efficient technologies to a building will have limited benefit. The major gains are achieved by optimizing the systems in relation to each other (i.e., not too large, not too small and using one or two actions to perform the function of many systems – see the living roof as a good example of this).

Appendix F: Sources of Information

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Appendix G: Maps

We are providing the Co-op with a CD containing a digital map reference consisting of multiple layers of different types of information. Different layers can be selected to appear while others are hidden. We present one version of this map here in order to illustrate the kind of foundational patterned information for regenerative design that can be obtained from these maps.

The map following this page contains three layers:

1 An agricultural lands map

2 A map of prime agricultural soils

3 A population density map of Brattleboro Township

The layered map juxtaposes these three types of information and allows identification of two different areas suited for different regenerative practices:

- The best sites for urban agriculture. (Ironically, the graveyard has some of the best agricultural soils in town.)

- The best agricultural lands in the township.

This information enables at least two things:

- Protection of essential and significant agricultural areas from being lost to development

- Concentration of energy and resources on leverage points for regenerative agricultural activities