**Pattern Languages and Sustainability**

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**“Current Challenges for Patterns, Pattern Languages, and Sustainability”**

Christopher Alexander and colleagues originated the concept of a *pattern language* as a method for breaking down complex design problems into replicable and coherently related individual components.[[2]](#footnote-0) The seminal work on this topic was conducted at U.C. Berkeley during the 1970s, partly under the auspices of the National Institute of Mental Health. Applications of pattern languages to widely diverse domains continue to multiply, including software[[3]](#footnote-1); information, communication, and social change[[4]](#footnote-2); and group facilitation[[5]](#footnote-3).

From 1999 to 2002, I led a research project at Ecotrust (an innovative Portland, Oregon based environmental NGO) to develop a pattern language that would capture the deep structure of sustainability within a particular *bioregion*. A bioregion may be loosely characterized as a contiguous area of about 100km to 1,000km extent with significant ecological and cultural continuity. At that time, Ecotrust’s work was focused on the coastal temperate rainforest bioregion of North America, one of the largest on the planet, stretching from northern California to southeastAlaska.

The project was driven by the following principles:

1. Use of pattern language methodology to develop a few dozen patterns and explicit linkages between patterns.
2. Use of bioregion as the organizing spatial unit of analysis.
3. Extension of original pattern language approach grounded in overlapping spatial patterns to explicitly include non-spatial social and economic patterns.
4. Use of a science-based framework for sustainability.
5. Publication of research in an open source format, allowing the user community to constantly update and enhance the content.

PATTERN LANGUAGE METHODOLOGY

The pattern language methodology was used to identify key recurring building blocks of a sustainable bioregion along ecological social, and economic dimensions. The goal was to develop several dozen patterns that would capture these dimensions to a reasonable level of detail, with the understanding that each terminal pattern could itself be expanded into its own pattern language if needed. Candidate patterns were drawn from the original pattern language research, Ecotrust’s own practical and theoretical work over ten years, and an extensive literature review of sustainability, city and regional planning, natural resources, sociology, economics, and other disciplines. Patterns went through several stages of peer review, editing, and refinement resulting in 57 patterns spanning Natural Capital, Social Capital, and Economic Capital.

The initial version of the pattern language was called *The Conservation Economy Pattern Language* and published as a website in 2001.[[6]](#footnote-4) A significant revision was published in 2002 and continuously maintained through early 2010. In 2010, Ecotrust made some slight changes to the content, placed it on a different website, and renamed the publication *The Reliable Prosperity Pattern Language.[[7]](#footnote-5)*

The website provides documentation for each of the 57 patterns including a problem statement describing the pattern context and field of forces; a short essay describing the pattern incorporating hyperlinks to other patterns; a concluding summary of the pattern’s approach; hyperlinks to case studies utilizing the pattern; hyperlinks to organizations utilizing the pattern; key references; and an image. All of this material is dynamically generated using a database server, making it easy to update the website by updating the underlying database.

For example, the pattern *A Conservation Economy* includes the problem statement:

“When the health of ecosystems and communities is not integrated into economic activities, all three suffer. In turn, economic dependence on destructive activities creates apparent conflicts between work, nature, and community. How can we create an economy that effectively meets human needs while regenerating natural systems? An economy which grows organically — and fills new niches — by working with nature and enriching human capacities?”[[8]](#footnote-6)

The pattern *A Conservation Economy* includes the following short essay setting the context for the project. On the website, the underlined phrases are active hyperlinks to other patterns.

In a world of reliable prosperity, [economic](http://www.reliableprosperity.net/capital.html) arrangements of all kinds are gradually redesigned so that they restore, rather than deplete, [nature](http://www.reliableprosperity.net/nature.html) and [society](http://www.reliableprosperity.net/society.html). This will create extraordinary opportunities for those who foresee and drive these changes. The [fundamental needs](http://www.reliableprosperity.net/fundamental_needs.html) of people — and the [ecosystem services](http://www.reliableprosperity.net/ecosystem_services.html) which sustain them — are the starting point for a different kind of economic prosperity that can endure generation after generation.

While reliable prosperity functions on a global scale, it can be imagined as a healthy mosaic of [bioregional economies](http://www.reliableprosperity.net/bioregional_economies.html) forged within coherent biological and cultural units. Even in a globalizing economy, diverse bioregional economies that are more self-sufficient in meeting their own needs will be more competitive and less vulnerable.

The examples and case studies we have chosen for this website are largely taken from the coastal temperate rainforest bioregion of North America, stretching from Big Sur, California to Kodiak Island, Alaska. The deeper patterns remain relevant for bioregions across the world, whether industrial and urbanized, rural, or sparsely inhabited.

We believe that individuals and businesses will flourish by seeking to align their interests with those of the communities and ecosystems around them. In the long-run, and most obviously, this involves getting price signals right by instituting [true-cost pricing](http://www.reliableprosperity.net/true_cost_pricing.html). In the short-run, this means creating new business models (e.g. [product as service](http://www.reliableprosperity.net/product_as_service.html)), adopting new strategies (e.g. [resource efficiency](http://www.reliableprosperity.net/resource_efficiency.html)), transforming legal or institutional frameworks (e.g. [fair trade](http://www.reliableprosperity.net/fair_trade.html)), or looking at multiple benefits in a synergistic manner (e.g. [green building](http://www.reliableprosperity.net/green_building.html)). Reliable prosperity is emerging in [cities](http://www.reliableprosperity.net/compact_towns.html), [rural areas](http://www.reliableprosperity.net/productive_rural_areas.html), and [wildlands](http://www.reliableprosperity.net/connected_wildlands.html); in for-profits, non-profits, and governments; in corner coffeehouses and vast corporations; among rich and poor. Individuals and organizations that see its potential and acquire the skills to build it will create ongoing and enduring economic opportunities. Individuals and organizations that continue to depend on the depletion of social and natural capital will face increasingly unpredictable global commodity markets, tightening laws and regulations, new taxes, public outrage, loss of motivation, and many other symptoms of economic transformation.

Despite the obvious depletion of Nature in the Pacific Northwest, this region retains enormous financial and ecological assets, skilled people, and technical capabilities. The great cities of the region along with its inventive smaller towns are beginning to show serious engagement with the patterns that underlie reliable prosperity. Significant trends toward better [agriculture](http://www.reliableprosperity.net/agriculture.html), [forestry](http://www.reliableprosperity.net/forestry.html), [fisheries](http://www.reliableprosperity.net/fisheries.html) practices, [renewable energy](http://www.reliableprosperity.net/renewable_energy.html), and [ecotourism](http://www.reliableprosperity.net/ecotourism.html) signal rapidly increasing investment in better forms of living.

Over the next few years, new investments, advanced learning processes, and significant political commitment will greatly accelerate this bioregion's transition to toward more reliable prosperity. It is now possible to imagine a tangible timeline — perhaps twenty-five years — within which we will achieve a fully functional reliable prosperity in the bioregion.[[9]](#footnote-7)

The pattern *A Conservation Economy* closes with the summary statement:

“Over the long-term, decrease economic dependence on activities that deplete natural or social capital. In the shorter-term, make investments with triple bottom line — economic, social, and environmental — returns. Harness both market forces and changes in laws, taxes, and policies that favor reliable prosperity.”[[10]](#footnote-8)

BIOREGION AS ORGANIZING UNIT

The bioregion was chosen as an organizing unit because it is large enough to reflect most of the complexities of a more resilient and locally self-sufficient economy; it naturally nests within larger ecological, continental, and global units; and its boundaries are by definition suited to generating more coherence between ecological, social, and economic dimensions.

The pattern *Bioregional Economies* explains further:

Bioregional economies reflect the capacities and limitations of their particular ecosystems, honor the [diversity and history of local cultures](http://www.reliableprosperity.net/cultural_diversity.html), and meet [human needs](http://www.reliableprosperity.net/fundamental_needs.html) as locally as possible. Bioregional economies are diverse, resilient, and decentralized. They minimize dependence on imports while focusing on [high value-added](http://www.reliableprosperity.net/valueadded_production.html) exports. Paradoxically, this gives them an important competitive advantage in a global economy, allowing them to trade on favorable terms without sacrificing their economic sovereignty in the process.

Bioregional economies recognize the need for [fair trade](http://www.reliableprosperity.net/fair_trade.html), refraining from importing or exporting goods produced unfairly or in an ecologically destructive manner. They make a transition to [true cost pricing](http://www.reliableprosperity.net/true_cost_pricing.html), building actual social and environmental costs into market prices. In order to provide independent certification of product attributes (e.g. sustainably harvested, fair trade, organic, shade grown, green power), they promote [product labeling](http://www.reliableprosperity.net/product_labeling.html).

Bioregional economies do not deplete their own [society](http://www.reliableprosperity.net/society.html), [nature](http://www.reliableprosperity.net/nature.html), or [capital](http://www.reliableprosperity.net/capital.html). They export only their sustainable surplus, most often taking the form of intellectual property or high-value products and services rather than bulk commodities. Their [sense of place](http://www.reliableprosperity.net/sense_of_place.html) becomes the key component of their brand identity. In the coastal temperate rainforest, products evocative of place include Copper River salmon, Tillamook cheese, Willamette Valley wine, and Walla Walla onions.

Bioregional economies are physically constrained by the network of [connected wildlands](http://www.reliableprosperity.net/connected_wildlands.html), the availability of [productive rural areas](http://www.reliableprosperity.net/productive_rural_areas.html), and the distribution of [towns and cities](http://www.reliableprosperity.net/compact_towns.html).

This allows them to substitute [ecosystem services](http://www.reliableprosperity.net/ecosystem_services.html) for more expensive imported alternatives. It also makes them attractive destinations for [ecotourism](http://www.reliableprosperity.net/ecotourism.html).

Bioregional economies can have vastly different mixes of local foods, energy sources, building materials, land-uses — all responding to the possibilities of place. However, their underlying design principles are remarkably consistent. Together they form an interdependent, mutually beneficial [reliable prosperity](http://www.reliableprosperity.net/reliable_prosperity.html) at the global scale.[[11]](#footnote-9)

INCLUSION OF NON-SPATIAL PATTERNS

In order to give an adequate account of the patterns underlying a sustainable bioregion, it was necessary to explicitly address non-spatial, but nevertheless conceptually generative, aspects of social and economic life. Starting with the pattern *A Conservation Economy,* three sub-patterns of *Natural Capital*, *Social Capital*, and *Economic Capital* form the core structure of the pattern language. The non-spatial patterns form lattices of grammatical relationships based on conceptual nesting, just as spatial patterns in a traditional pattern language form lattices derived from the relationship of physical nesting.[[12]](#footnote-10) This follows the practice of other pattern languages referenced in the opening paragraph.

*The Conservation Economy Pattern Language* contains the following 57 patterns:

A Conservation Economy

Natural Capital

Ecological Land-Use

Connected Wildlands

Core Reserves

Wildlife Corridors

Buffer Zones

Productive Rural Areas

Sustainable Forestry

Sustainable Agriculture

Sustainable Fisheries

Ecotourism

Compact Towns and Cities

Human-Scale Neighborhoods

Green Building

Transit Access

Urban Growth Boundaries

Ecological Infrastructure

Ecosystem Services

Watershed Services

Soil Services

Climate Services

Biodiversity

Economic Capital

Household Economies

Green Business

Community Benefit

Green Procurement

Renewable Energy

Sustainable Materials Cycles

Resource Efficiency

Waste as a Resource

Product as Service

Long-Term Profitability

Local Economies

Value-Added Production

Rural-Urban Linkages

Local Assets

Bioregional Economies

Fair Trade

True Cost Pricing

Product Labeling

Social Capital

Community

Cultural Preservation

Sense of Place

Beauty and Play

Just Transitions

Civic Society

Social Equity

Security

Cultural Diversity

Fundamental Needs

Access to Knowledge

Health

Shelter for All

Subsistence Rights

SCIENCE-BASED FRAMEWORK

*The Conservation Economy Pattern Language* was also designed to meet the four “systems conditions” for sustainability developed by The Natural Step NGO in Sweden in the late 1980s. These conditions were generated using a consensus process involving leading physicists, chemists, biologists, social scientists, and activists. They rely on fundamental scientific concepts and provide a clear and defensible framework for achieving sustainability at a variety of scales. These conditions state that[[13]](#footnote-11):

In a sustainable society, nature is NOT subject to systematically increasing:

(1) Concentrations of substances extracted from Earth’s crust (e.g. fossil fuels, metals).

(2) Concentrations of substances produced by society (e.g. synthetic compounds)

(3) Degradation by physical means (e.g. development, deforestation, overgrazing, roads)

And in that society …

(4) People are not subject to conditions that systematically undermine their capacity to meet their needs (e.g. poverty)

OPEN SOURCE

*The Conservation Economy Pattern Language* was intended to be an open source framework, freely available to all with content sourced from its community of users. It was published on a website that allowed users to submit comments, case studies, edits to pattern content, and new patterns. However, the website did not have a full self-updating capability like the new generation of Wikis, which themselves emerged from Ward Cunningham’s work with pattern languages. Next generation applications of web-based pattern languages have begun to employ Wiki platforms to explicitly facilitate broad co-authorship.

APPLICATIONS

Despite the lack of seamless updating, users submitted a wide range of comments. They reported wide applicability of *The Conservation Economy Pattern Language* to a diverse range of bioregions, suggesting that the framework does capture meaningful aspects of the structure of bioregional sustainability. The framework was extended to integrate geospatial data and news feeds and utilized for community planning for an island north of Vancouver, British Columbia.[[14]](#footnote-12) It was utilized to integrate regional sustainability efforts in a county in Oregon.[[15]](#footnote-13) The framework has been used for a wide variety of purposes including sustainability training, town and regional planning[[16]](#footnote-14), and strategic planning for sustainable businesses.

CONCLUSIONS

*The Conservation Economy Pattern Language* largely succeeded in its attempt to delineate the deep structure of bioregional sustainability within the scope of a few dozen patterns. It was also able to convey this structure effectively with a visual pattern map and associated pattern language interface. It was not able to elicit deep interactions with the user community. It is probably most successful in its spatial component, Natural Capital, and least successful in its social component, Social Capital, which remains poorly understood even in qualitative terms.

*The Conservation Economy Pattern Language* can be extended in many directions in future implementations. Its successors should use Wiki platforms to fully realize the original open source vision; integrate geospatial data so patterns can be directly visualized and applied on digital maps; integrate socioeconomic data; include monitoring and management capabilities; and so forth.

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