

Conservation of Resilience, Renewal and Complexity in B.C.'s Forests

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Abstract

This improvement initiative of the Province of B.C. is an opportunity to rethink the concepts and methods of sustainable forest management. B.C.'s forests are now experiencing increasing internal and external stress from agriculture, beetles, dams, climate change, fires, logging, mining, pipelines, oil and gas exploration. An effective policy response is required to guide the way forward. *“Leaders are custodians of the future.”*¹

Achieving the twin forest policy outcomes of resilience and renewal in the context of complexity requires a paradigm shift in our thinking, so the capacity for solving the bigger problems we now face can be built. With climate change, all assumptions of stability and predictability no longer apply. The future will not be an extension of the past. Observing the “future that has already happened”, and by understanding these events and trends will help foresee what may occur. Historically, planning for change in forestry has focused on trees and stands of trees. The boundaries of this thinking must now be expanded to include climate, soil, water cycle, etc., so planners and decision makers have the knowledge to understand forests as a dynamic community of organisms that have always functioned together to provide the goods and services people enjoy.

¹ Rosenstein, Bruce .2014. Creating Your Future the Peter Drucker Way. Developing and Applying a Future Focused Mindset, McGraw Hill 202 pp.

The Nu Chun Nulth have shown the way. Their word, “heshook-ish tsawalk” means, “everything is one”. **Recommendations** are made in this report on the changes in legislation and policy needed to move successfully forward to ecologically, economically and socially sustainable forestry.

I Introduction

My gratitude for the opportunity to provide input to the May 2019 Minister of Forests, Lands, Natural Resource Operations and Rural Development, Doug Donaldson’s “ *Forest and Range Practices Act*’ Improvement Initiative: Renewal and Resilience. Discussion Paper. “²

This is very important work. The people of British Columbia own 94 percent of our magnificent province. The principal challenge to be faced is complexity (ecological, economic and social), and what this means for the prudent management of the “oikos” - the root Greek word for sustaining the “household” - the earth and all humanity. Important terms, concepts and definitions are:

- **Management:** the judicious use of means to achieve worthy ends;
- **Renewal:** the capacity of a forest to self restore resilience and ecological integrity following a natural (fires, insects, wind etc.) or human (logging) disturbance;
- **Resilience:** the capability of a system to maintain its structure and function in the face of internal and external changes.

Recommendation: Incorporate the ecological and economic concepts of “resilience” and “renewal” in legislation and policy

² <https://engage.gov.bc.ca/forestandrangepactices>

to build the adaptive capacity for improved forest management.

II Ends (Purpose) and Means (Practices)

Ends: The purpose of forestry is to secure the greatest continued benefits from forestland;

Means: Forest practices are a regime of actions performed by a forest practitioner, following a diagnosis of a problem and development of a management prescription.

Recommendation: Connect ends (outcomes) with means (best practices) in forest legislation and policy.

III Planning and Management at the Biogeoclimatic Zone (Ecoregion) and Landscape Level

“Ecosystem Principles and their Implications for Management:”³

- *Ecosystems are dynamic, evolutionary, and resilient;*
- *Ecosystems can be viewed spatially and temporally within organizational levels;*
- *Ecosystems have biophysical, economic, and social limits;*
- *Ecosystem patterns and processes are not completely predictable.”*

Improved planning and management is required to ensure all forest uses consistently sustain resource productivity and maintain ecosystem processes and function. This understanding equals ecosystem capability, the context and potential for considering options.

³ http://www.fs.fed.us/pnw/pubs/gtr_374.pdf

*“Sustainability = resource productivity + ecosystem maintenance = capability (potential)”*⁴

Implementation of forest policy flows from the general to the specific as illustrated in Figure 11.10.⁵ Ecoregion policy and strategy provides the direction for this planning process. Natural disturbance types (frequency, intensity and size) are different and specific to each Ecoregion. A USA Ecoregion is similar to a Biogeoclimatic Zone in B.C..

Significance to Ecosystem Management

Ecosystem	Management/Analysis
Ecoregion	Policy/Strategic (multiforest/forestwide)
Landscape Mosaic	Tactical (watershed)
Site	Operational (project)

Figure 11.10. Relationship of hierarchies.

Recommendation: Before conventional timber supply planning occurs, ensure that short and long term resilience and renewal patterns and processes are assessed, planned and managed at the ecoregion (policy) and landscape (watershed) level, before operational issues at the site level are addressed.

⁴ See Bailey, Robert G. 2009. Ecosystem Geography. From Ecoregions to Sites. Second Edition Page 7 and 8

⁵ Ibid, Bailey Robert G. Page 185

IV Managing Forest Complexity: State, Stock and Flow

Forest managers have historically developed tools and methods for manipulating forest stocks and flows without much attention to states. To improve, this must change.

“A given “state” (phase) supports various stocks and flows.⁶ “Stocks” are quantities of resources per unit area (e.g., number or volume of standing trees, density of spotted owls or pine martens, miles of trail).

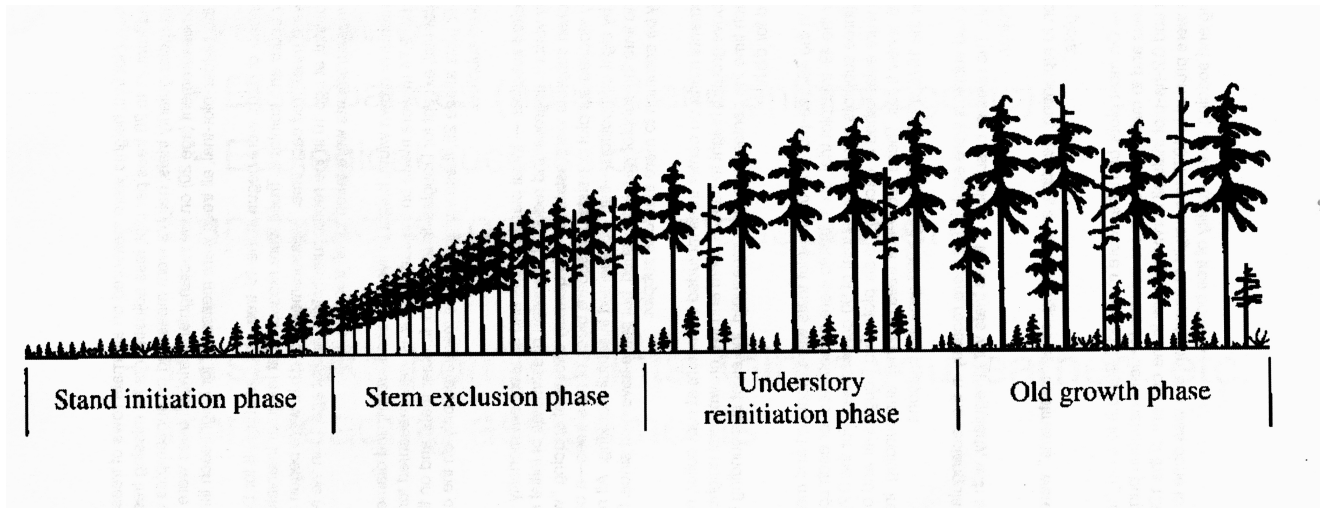
“Stocks” are likely to be among the attributes useful in defining a system’s state.

“Flows” are the periodic yields from the stock of the system (water or sediment discharge, annual production of timber, annual smolt escapement, forest-dependent jobs).

“Stocks” can be viewed as the “capital” of the system flows the income produced by this capital.

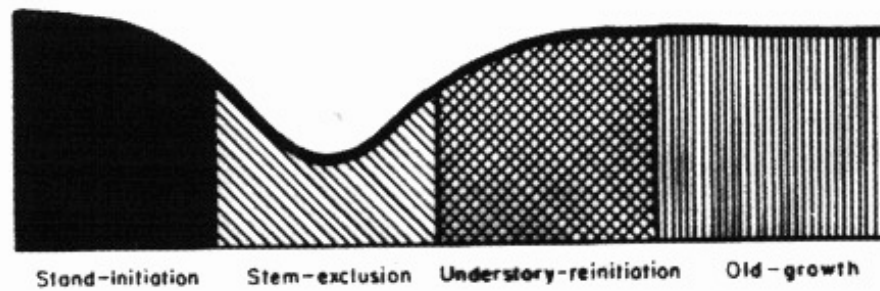
Given the wide range of issues encompassed by concerns over forests...a systems approach, which has a broad and deep tradition in ecology and economics, helps clarify complex issues and couches them in terms accessible to scientists and non scientists.”

⁶ http://wpg.forestry.oregonstate.edu/sites/wpg/files/bibliopdfs/92_Brooks%26Grant_II.pdf



Source: Chadwick Oliver

Different mammal species use different habitats in each phase of forest succession. In early succession, stand initiation is habitat for generalist species (deer, rabbits etc.). Late succession old growth is habitat for specialized species (caribou, woodpeckers etc.)



Mammal species use by structure.

SIMPLIFIED VIEW OF CHANGES IN FOREST STRUCTURE FOLLOWING DISTURBANCE, WITH ATTENDANT SPECIES USE .

SOURCE : OLIVER AND LARSON (1990)

V The Problem

Peter Duinker recently commented on the condition of Nova Scotia forests in their current review of their forest policy:⁷

“In sum, largely as a consequence of four centuries of forest exploitation, the forests of Nova Scotia have:

- (a) much greater domination by short-lived pioneer species,*
- (b) lower standing stocks,*
- (c) much greater domination by even-aged stands, and*
- (d) distressing levels of species at risk, both tree species and others.”*

These conditions are all symptoms of forests with low resilience and inadequate renewal. BC forest management on public land has been heading in the same direction since the end of World War Two.

⁷ https://novascotia.ca/natr/forestry/Forest_Review/Lahey_FP_Review_Report_ExecSummary.pdf

C.S. (Buzz) Holling, eminent Canadian ecologist said, *“Past efforts in resource management have been essentially trial and error approaches to coping with the unknown.”*⁸

“ When human engineers manage a forest solely to achieve a constant production of trees, the forest loses its resilience.”

“ Citizens and politicians are now frustrated because they are not hearing simple and consistent answers to the following key questions concerning present environmental and renewable resource issues:

- *what is going to happen?*
- *under what conditions?*
- *when will it happen?*
- *where will it happen?*
- *who will be affected? and*
- *how uncertain are we?”*⁹

Recommendation : use the state (condition) of the forest, not the flow (allowable annual cut) as the criterion for success in forest management. Where mixed species forests occur, the majority, favour well conducted, skilled selection logging over clearcutting. The latter will be the more effective silvicultural practice for conserving resilience, renewal and complexity.

⁸ Nikiforuk, Andrew. 2011. Empire of the Beetle, David Suzuki Foundation, Greystone Books. Page 200

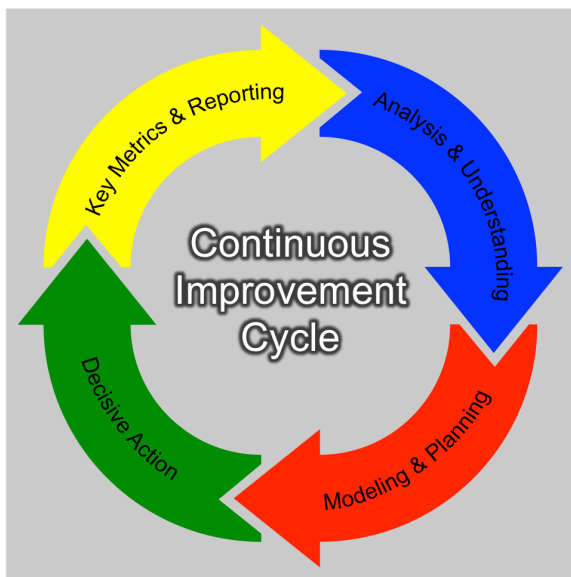
⁹ Holling, C.S. 1995. <file:///Users/ray/Desktop/What%20Barriers%20What%20Bridges.htm>

VI Good change (Kaizen)

Kaizen is a Japanese management philosophy of continuous improvement of working practices, and personal efficiency. Literally this term means “good change.”



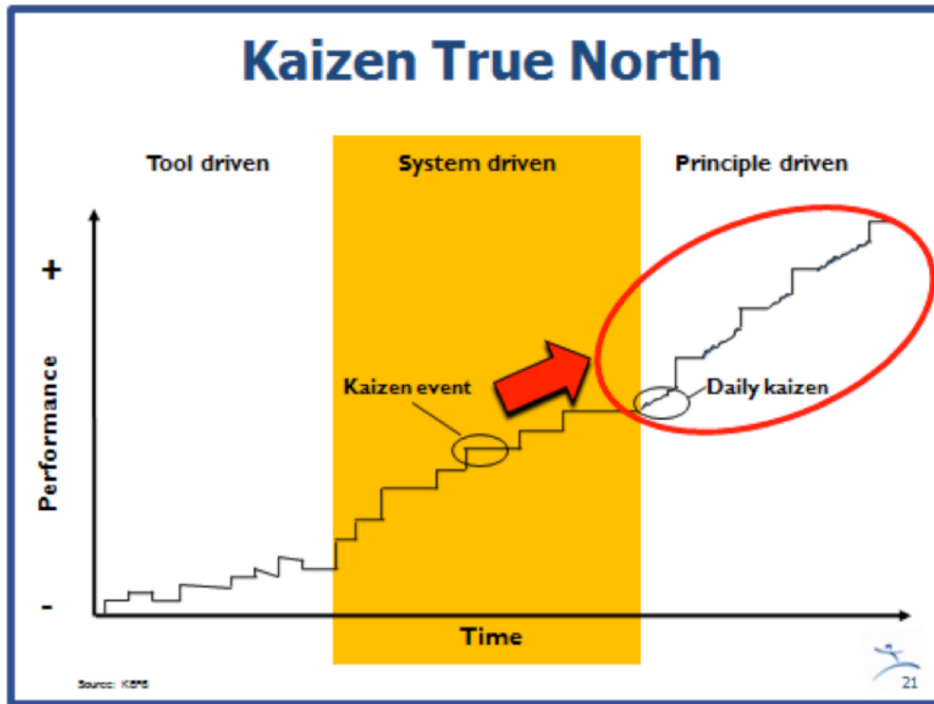
Source: slideserve.com



Source: wctgroup.com

Improvement in “kaizen” begins with tools (best practices),

and proceeds to systems driven thinking, and then principles.



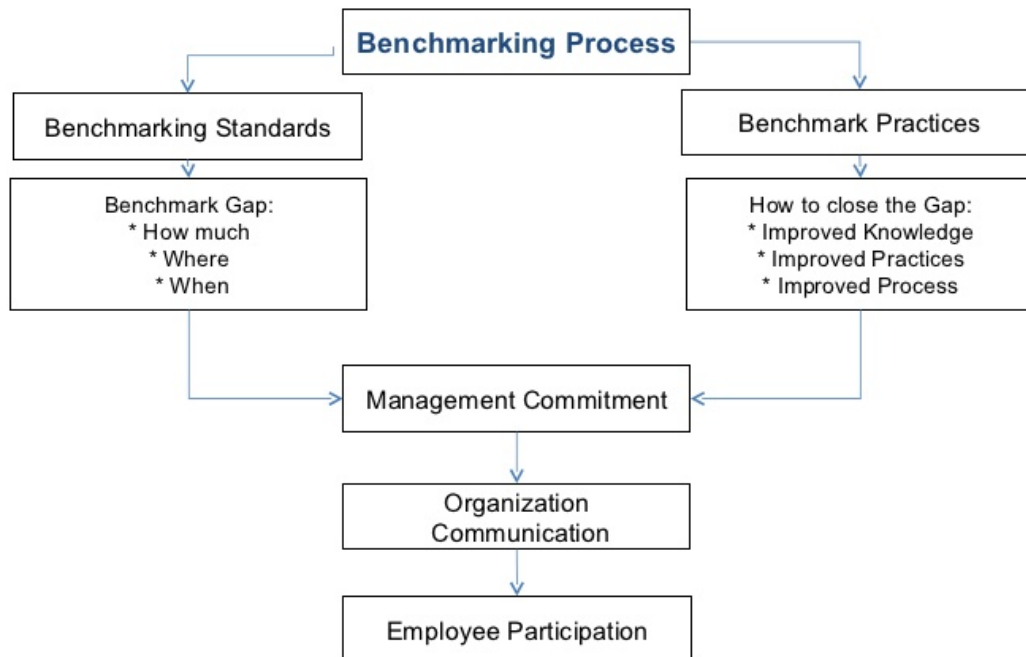
Source: pinterest.com

Recommendation : “Walk before we run,” with the confidence that continuous improvement (and learning) has the capability to improve performance from tool driven practices to systems driven, to principle driven.

VII Best Practices (Benchmarking)

Effective implementation is a process of searching out and adopting best practices. Benchmarking is the process of identifying, studying and implementing these best practices, the foundation of oversight in forest policy and practices.

Benchmarking Process



Source: slideshare.com

Examples of forests and organizations performing better for their owners and citizens, compared to BC, include:

- Collins Pine Corporation in California, Oregon and Pennsylvania;¹⁰
- Menominee Tribal Enterprises in Wisconsin;¹¹
- Nova Scotia, Ecological Forestry Implementation June 25, 2019 Update.¹²

¹⁰ <http://www.collinsco.com/certification/>

¹¹ <http://www.mtewood.com>

¹² https://novascotia.ca/natr/forestry/Forest_Review/

- State Trust Forests in Idaho, Montana, Oregon and Washington;¹³
- Swedish Forestry Model.¹⁴

Recommendation: Learn from these examples and help B.C. foresee what may happen in the future, especially in this time of climate change. Extend the BC Forest and Evaluation Program to assess the merits of these global policies and practices.

VIII Tools for Improvement

Key concepts to develop higher standards of best practices and continuous improvement include:

(a) Systems thinking (in contrast to linear thinking):

Linear Thinkers	Systems Thinkers
Break things into component pieces	Are concerned with the whole
Are concerned with content	Are concerned with process
Try to fix symptoms	Are concerned with the underlying dynamics
Are concerned with assigning blame	Try to identify patterns
Try to control chaos to create order	Try to find patterns amid the chaos
Care only about the content of communication	Care about content but are more attentive to interactions and patterns of communication
Believe organizations are predictable and orderly	Believe organizations are unpredictable in a chaotic environment

¹³ <http://www.glo.texas.gov/wslca/>

¹⁴ https://www.skogsstyrelsen.se/globalassets/in-english/forests-and-forestry-in-sweden_2015.pdf

Source: thesystemthinker.com

(b) Total Quality Control



A. V. Feigenbaum

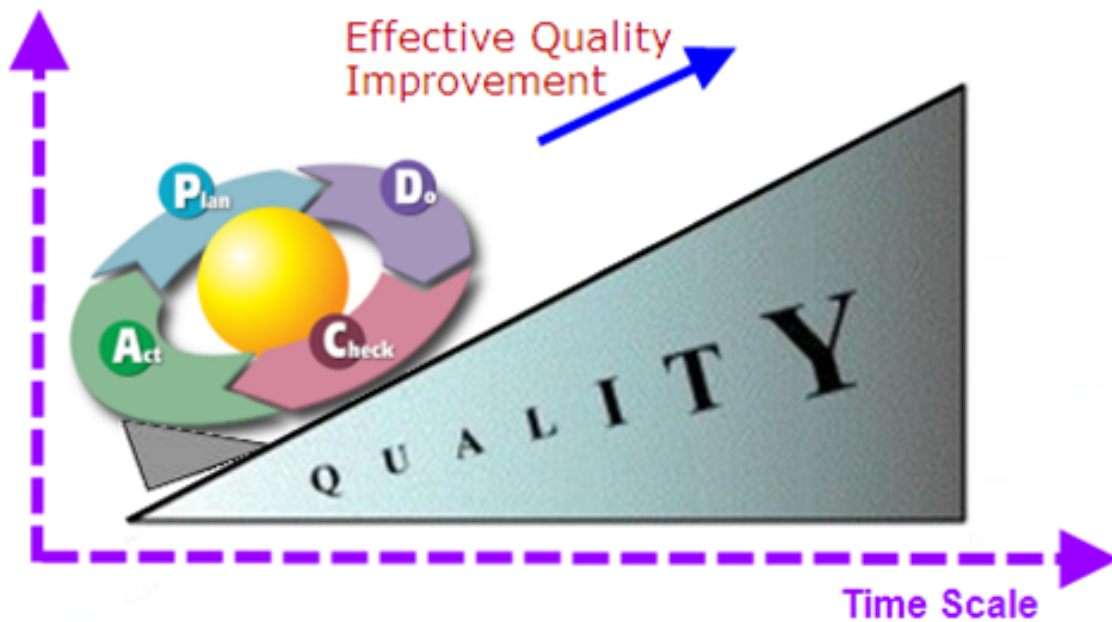


Feigenbaum defined total quality control as:

*"An effective **system** for integrating the **quality development, quality maintenance and quality improvement** efforts of the various groups in an organization so as to enable production and service at the most economic levels which allow **customer satisfaction**"*

Well done 

Source: slideplayer.com



Source: smartwebdevelopment.blogspot.com

Recommendation: Replace the existing quantity and volume forestry flow paradigm, with a quality and value whole systems (state) paradigm.

IX Principles for Forest Trust Legislation

The following five trust principles (adapted), have enabled forest institutions in other jurisdictions to design and conduct a high standard of forest management legislation, policies and operations: ¹⁵

- **Clarity:** The mandate under law of what is to be sustained must be exceptionally clear. A trust forest has an obligation of undivided loyalty to the beneficiary. The greater the resilience, renewal and complexity, the greater the asset value of a forest, at all scales;
- **Accountability:** This principle is central to sustainability. Clarity of mandate and the obligation of institutions to their citizen owners require full records to be kept. An annual score card will enable citizens to know what is being sustained, where, for how long and at what standard.
- **Enforceability:** This principle will protect forest managers with long and short-term responsibilities from politically pressured legislatures and other conflicting interests. When trust principles are not followed, they are enforceable in a court of law;
- **Perpetuity:** this principle has two dimensions, one is to perpetuate the productive capacity of the forest, and the other is to perpetuate the benefits. Organizations perform in two time periods, today and tomorrow. If forests are managed only

¹⁵Souder, J and S Fairfax. 1996. <https://www.amazon.ca/State-Trust-Lands-Management-Sustainable/dp/0700609393>

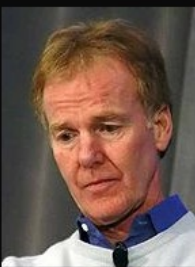
for today, eventually there will be no tomorrow. When forests maintain their capacity for resiliency, self-renewal and complexity, they can be sustained in perpetuity;

- Prudence: The standard of prudence requires decision makers to deliberate on the risks and benefits of alternative practices. This can maximize control over what can be controlled and minimize what cannot, especially when the connection between cause and effect is unclear.

Recommendation: Draft forest legislation and policy based on these trust principles.

X Learning Organization

Peter Senge said, *“Organizational learning is the most important intervention tool for Organizational development (OD). Learning reinforcement develops people and makes them capable of solving problems. Thus, a learning organization evolves in developing the organizational capability to respond to changes.”*¹⁶



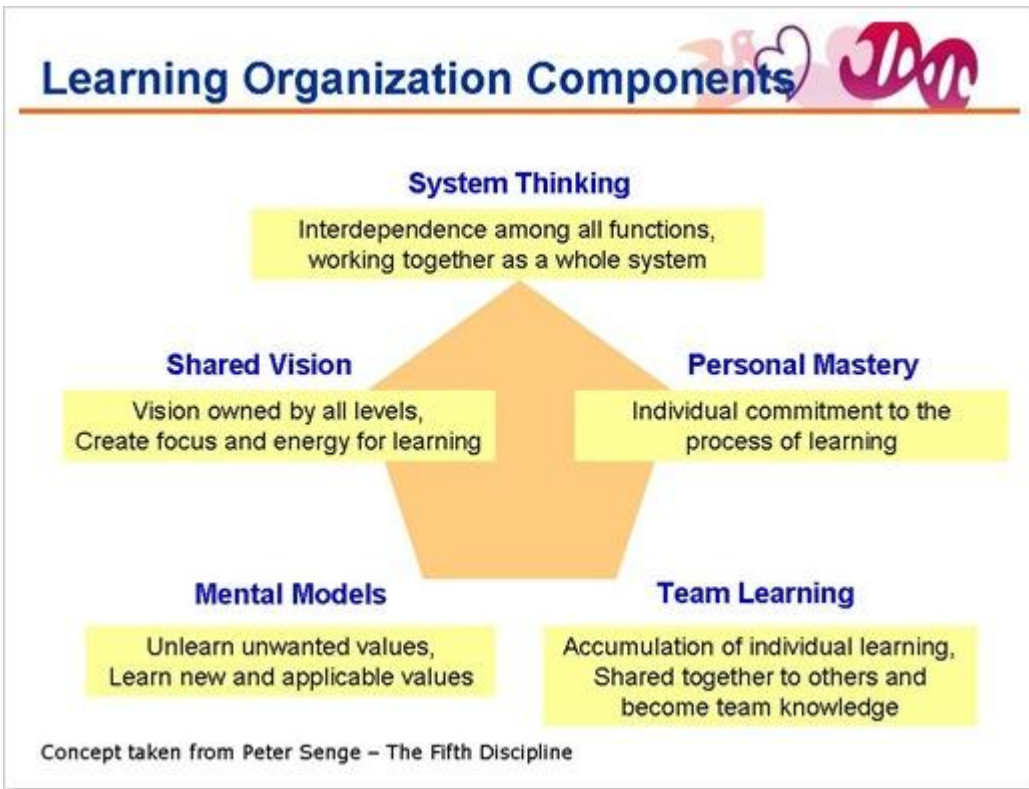
In a learning organization, leaders are designers, stewards, and teachers. They are responsible for building organizations where people continually expand their capabilities to understand complexity, clarify vision, and improve shared mental models – that is, they are responsible for learning.

(Peter Senge)

izquotes.com

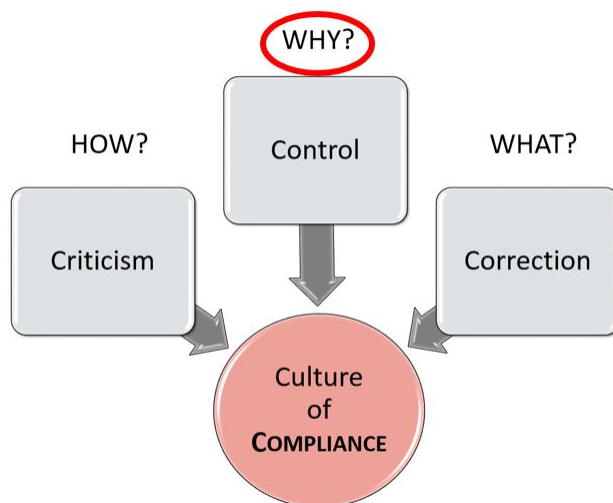
Source: askideas.com

¹⁶ <http://www.yourarticlelibrary.com/organization/learning-organizations-introduction-definitions-concepts-and-characteristics/45125>



Source: nilamhapsari.blogspot.com

- Culture of compliance



Source: continuosmile.32test.com

- Culture of commitment



Source: continuousmile.com

Why: The purpose of forestry is to secure the greatest continued benefits from forestland;

What: Conservation of resilience, renewal, and complexity;

How: Making good decisions, based on sound information, that can be effectively implemented, will have a positive impact.

- Menominee Tribal Enterprises have been managing their 94,000 ha forest in Wisconsin to this high standard for a hundred and fifty years; ¹⁷

- Menominee Forest Management YouTube (four minutes).

<https://www.youtube.com/watch?v=E6v1HXB7Pno>

Forester Marshall Pecore says the key is to “save all the pieces.”

¹⁷ <http://www.mtewood.com>

AS A LEADER, WHICH OF THESE DO YOU WANT?

	COMPLIANCE	COMMITMENT	
	"I have to"	"I want to"	
	Force	Choose	
	Acquiesce	Pledge	
	"It's my job"	"It's my opportunity"	
	Passive	Active	
	Get it done	Get it right	
	Neutral or negative energy	Positive Energy	
	TGIF	I'm ready for the week!	
	Follow the process	Improve the process	
	"There is a problem"	"I fixed the problem"	
	Follow orders	Take initiative	
	Mundane	Mission	
	Paycheck	Purpose	

Source: blog.kevineikenberry.com

Recommendation: Monitor on the ground performance to confirm what was intended to happen, does happen and if not learning and improved performance in the next plan can occur. This will build the organizational capacity to conserve resilience, renewal and complexity. The objective is continuous improvement of forest practice goals and standards.

XI Conservation of Resilience, Renewal and Complexity (Connect Legislated Outcomes and Best Practices)

The concepts and methods proposed in this report are a work in progress. The intent is to encourage a productive dialogue and rethinking of the existing forest management paradigm and while moving to a resilience and renewal paradigm.¹⁸

This means a change in thinking of forests as more than trees, or stands of trees. The boundaries of historical forestry must be expanded to thinking ecologically, so forests are understood as a complex community of organisms that have always functioned together to provide the goods and services people enjoy. As we think, so we manage.

This enlarged understanding of renewal, resilience¹⁹ and complexity will enable development of knowledge and skills to better anticipate the unexpected, including the capacity to:

- continued functioning in the presence of external and internal adversity;
- more quickly recover and bounce back when the ecosystem can absorb a stress and resist unwanted change, rather than collapse;
- learn and growth with each encounter.

The present linear model of forest management is failing to sustain ecological, economic and social benefits, not only in B.C.

¹⁸ Barker, Joel Arthur. 1989. *Discovering the Future, The Business of Paradigms*. ILLI Press Minnesota, 142 pp.

¹⁹ Weick, Karl E, and Kathleen M Sutcliffe 2007. *Managing the Unexpected, Resilient Performance in an Age of Uncertainty*. John Wiley and Sons. 194 pp.

but also in the US Pacific Northwest.

In “People, Forests and Change, Lessons from the Pacific Northwest” the editors Olson and Van Horne, informed by 57 resource professionals, commented on the state of the human-forest ecosystem in coastal Oregon, Washington and Alaska.²⁰ They see two paths (i.e. trajectories) to the future”

- Trajectory 1: “Status Quo and Diminishing Returns” The USA coastal (moist) forests are currently on a path of passive federal and regional forest planning of “business as usual”. The foreseeable consequences are diminishing returns for biodiversity, wood production and rural communities.
- Trajectory 2: “Adaptive Collaborative Vision” This path is built around the theme of adaptive management where monitoring feeds back into forest plans. This will build the foundation for trust and transparency. It will also provide for continuous improvement of best practices. .

Legislating the outcomes of resilience and renewal is an important first step to ensure a future sustainable forest. Managing complexity, successfully, will lead towards order and wisdom. Managing complexity, unsuccessfully, will lead towards disorder and uncertainty. We are all in this together,

The late Peter Drucker said, *‘The best way to predict the future, is to create it.’*

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²⁰ Olson, Deana H. and Beatrice Van Horne, Editors. 2017. People, Forests and Change, Lessons from the Pacific Northwest. Island Press. 331 pp.

