

Evolving Institutional and Policy Frameworks to Support Adaptation Strategies

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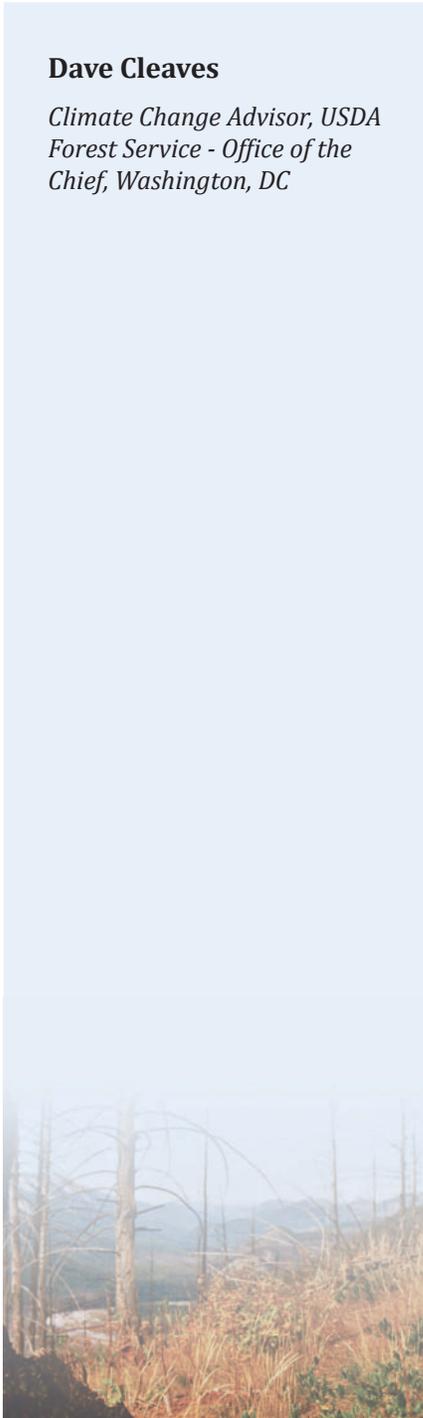
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***Abstract:** Given the consequences and opportunities of the Anthropocene, what is our underlying theory or vision of successful adaptation? This essay discusses the building blocks of this theory, and how will we translate this theory into guiding principles for management and policy.*

INTRODUCTION

Gifford Pinchot in 1911 defined conservation as “the application of common sense to the common problems for the common good”. To reach this ideal in the future, we will have to adapt approaches we take in resource management. The new normal is that there is no normal. The challenge will be more about how we go about the adaptation process than about particular adaptation measures or adjustments. Finding common sense, defining common problems and the common good will become an intense and dynamic engagement.

As systems change and human influences become even more pervasive, the roles of leadership in aligning policies and institutions and helping change human behavior will become more critical. Without some guiding framework, we will be always in motion, like the mythical ghost ship Flying Dutchman doomed to sail forever, never able to make port. We need a working theory as a shared framework for learning as we gain experience and scientific discovery. Without such a framework, we can fail to recognize events as lessons. A working theory should embody notions of success—how we should characterize and measure progress, set goals, and reshape pathways of change. It should also promote flexibility and itself be adaptable, not a source of new dogma. It should help to codify the advances that are occurring as managers and landowners experiment and struggle with changes already impacting them. It should include the seeds of its own adjustments, allowing the working theory to catch



up with practice and innovation as well as scientific advances, or we risk defaulting to a passive or reactive model of adaptation, defining uncertainties always as downside risks and scrambling to minimize losses without seeing opportunities and lessons that change sends our way.

DIMENSIONS OF A WORKING THEORY FOR ADAPTATION

The building blocks of such a theory include (1) climate-smart decision making, (2) active management and adjustment, (3) public engagement and expectations discovery, and (4) landscape-scale conservation.

Climate-smart decision making

We have few actual “climate change” decisions to make. We have thousands of land management decisions that influence and are influenced by the changing climate. Our decision processes can be made more adaptive to climatic and other changes. The Forest Service uses the following principles of climate “smartness” to refine its decision processes:

- match analysis detail to the level of climate-sensitivity;
- test expected outcomes of alternatives in multiple, plausible futures (scenarios);
- use information about relative vulnerability to stressors (climate and non-climate together) in designing and choosing alternatives and ranking actions;
- challenge traditional assumptions about future change;
- build in flexibility and adaptive responses; and
- consider carbon and GHG implications; compare and display the nature and levels of uncertainties.

Active management and adjustment

In a world put in motion all around us by human/ecosystem interactions, can we really steer anything if we are not actively involved? Hope is a necessary but insufficient component of proactive adaptation. We cannot just pause for an adaptation break with a sign—“Do Not Disturb: The System is Adapting”. Human elements are already at work. We have to understand them and try to work with them in all systems in the Anthropocene. Trying to keep human activity out of systems in the name of resilience won’t work. Building human activity into the concept of resilience, as a necessary function rather than an external force to turn up or down, can contribute to the resilience of whole system. The concept of sustainability is often perceived as the triple bottom line—what we want out of systems in ecological, economic, and social terms. But the concept can also be used to visualize these dimensions as three components of every adaptive adjustment.

Coupled human/natural systems comprise a mosaic of adaptation opportunities. The nation’s forests for example offer gradations from rural to urban, from “working” to “protected”, and all in various frames of response to climate impacts. Our working theory should call for more deliberate approach to human actions, favoring those that (1) avoid waiting for “complete” science that never arrives, (2) boost learning by blending science and experience, (3) create “controlled”

disturbances to reduce irreversible costs and losses of inevitable disturbance episodes, (4) respond to stressor complexes—climate and non-climate rather than single hazards, and (5) buy lead time and reduce panic responses.

Public expectations

Our theory must guide us in helping prepare citizens to deal with change and to share in adaptation. This will involve defining resilience of the human/system interface and the role of citizens, integrating the science of human behavior and social systems, communicating transitional issues, and recovering from more frequent and intense events. We may have to work with citizens to more strongly infuse dynamics into the concept of sustainability, and institute terms such as “desired futures” to replace the notion of a single desired future condition.

We may have to revisit and rewrite social contracts to better wrestle with new realities of change. We must confront the public’s underlying expectations of institutions and policies to provide surety in an increasingly uncertain world. These expectations are embedded in our policies in words that derive from the Latin “se-cure” or “without care”. For example:

- Assure—remove doubt or anxiety, create confidence
- Ensure—guarantee an event or condition will happen, implement and create reliability
- Insure—compensate for liability, create recourse
- Secure—take possession, create ownership

The cumulative effect of so many policies, prohibitions, and checks in the name of assuring some particular condition should be a major topic of policy analysis. How does it influence our ability to try different approaches or adjust to changes? We cannot yet say.

Landscape-scale conservation

Landscape scale conservation as an overarching approach to adaptation begs to be defined, refined, and pressed into service. It has a solid ecological background, but is less well codified or appreciated as a business and social change approach to place-based adaptation. Landscape-scale conservation relies on concepts and skills of collaboration, sustainable resource management, climate adaptation, and risk management. It means using the scalability of the landscape itself to employ a range of risk management mechanisms that include, but not necessarily limited to: spreading out exposures to moderate systemic risks; balancing diversity with the scales of operations needed for economic activity, regeneration success, habitat connectivity, and others; planned redundancy and preservation of multiple adaptive options; reserves from which to cushion shocks, restart regeneration, resist invasion; and building cushions for experimentation with emerging novel systems.

Our working theory will have to fully integrate landscape conservation as an orchestration mechanism to deploy collaboration, analysis, and social engineering to manage multiple, interacting hazards. In landscape scale approaches to adaptation, the social, economic, and institutional elements can become parts of the “baseline” and the system’s adaptive capacity. Different institutional arrangements in landscape scale collaborations influence important abilities to think, innovate, predict, anticipate, collaborate, and self-regulate.

CHANGING THE POLICY “FABRIC” IN THE ANTHROPOCENE

A wide variety of policies—environmental, land use, economic and taxation, estate, and others at federal, state, local, and organizational levels all interact to influence the decisions of land owners and managers. As a body, they shape problem frames, goals, information availability, options, analysis requirements, risk postures, and other elements of adaptation decision processes. They also introduce their own sources of uncertainty and barriers to the processes of adaptation. These various policies may not be aligned to support adaptation, sending mixed or conflicting signals to land managers. They may be aligned all too well in the wrong direction, limiting flexibility for adaptive responses, presenting structural barriers and imposing transaction costs that discourage responses to new information or experience. There is no magic policy pill, but can we adapt our policy mix to encourage adaptive behavior? What blend of existing and new policies could best support a future of adaptive challenge and response?

Sorely needed is a cohesive policy package and framework organized around active management. It should integrate climate change mitigation goals (management of the forest carbon) with adaptive responses to climate impacts. Active forest conservation, restoration and management are critical interventions in preserving and improving the ability of forests to uptake carbon, adapt to a changing climate, and provide associated ecosystem services such as water, wood products, wildlife habitat, biodiversity, and recreational opportunities.

A policy framework to support proactive adaption in forest systems could be built on three archetypal actions—*retention*, *restoration*, and *reforestation*. Retention involves keeping forest as forests in face of disturbance and land use pressures. Restoration involves repair and recovery of health to key system functions. Reforestation includes bringing new or returning forest systems to unforested land or forests degraded by abuse or disturbance.

Policies and initiatives to support these actions should focus on developing *markets* for ecosystem services, wood products, and carbon sequestration; facilitating public/private *partnerships*, establishing *principles* (rather than rules) for adaptive response, and setting *priorities* for treatment based on science-based observation and analysis.

Markets enable action through economic activity by provide better information and assistance, reduce transaction costs and gridlock, and reallocate cost and risk-bearing. Partnerships tap into new sources of investment and human resources and assure diversity of perspective. Policies should support a diverse array of different types of partnerships, including research/management, public/private, interagency, landscape coalition, and supply chain partnerships.

Changes to the policy mix should be formed more around principles rather than around new rules, which tend to become rigid and expensive to monitor and enforce. These principles would reduce the influence of the “precautionary principle” and its “if in doubt, don’t” interpretation in favor of a more realistic “cautionary action” principle. The focus would be on monitoring and analysis at appropriate scales across a wide range of actions.

In an age in which all systems are being influenced by humans through the changing climate, the “no-action” option should not be the universal standard. At a large enough spatial and temporal scale and under the ubiquitous influence of humans, there is really no such thing as “no-action”.

We should reframe problems to allow collaborative retreat from the old battlegrounds of “action vs. no-action”. We need instead to create policies to give future decision makers the capacity to adapt across a range of interventions. These policies should promote neither “no-action” nor “action-for-action’s sake”. We must focus precious energy on how to wisely implement pro-active management, create incentives for looking ahead, and wrestle with surprise and unintended consequence.

Some of the best thinking on policy and institutional change has been captured in the Resources for the Future report series “ Reforming Institutions and Managing Extremes—U.S. Policy Approaches for Adapting to a Changing Climate (Morris et al. 2011). The authors described how effectiveness for the future could be enhanced with the following:

- Provide specific guidance for federal rulemaking.
- Create connections and synergy with other policy areas.
- Address inefficiencies in current federal legislative and regulatory policy.
- Supply information and data to enable policy makes to better understand risk and uncertainty.
- Embed flexibility and responsiveness into management structures.
- Address equity and social justice concerns.

I cannot begin to address the policy needs at the level presented in this and other scholarly and penetrating investigations. However, we can start to develop a list of preparations for adaptation policy.

Aligning Institutions to Support and Build Adaptive Capacity

Do institutions have resilience? Do they create resilience? Are some institutions too resilient or perhaps too rigid for the good of the systems they were designed to shepherd? Resilience is the ability of a social-ecological system to reorganize and retain necessary functions in the face of change and disturbance. Adaptive capacity is the ability of an individual, organization, or social-ecological system to adjust to changes, to moderate potential damages, to take advantage of opportunities, and to cope with consequences. In other words, adaptive capacity is the ability to manage or influence resilience. Institutional resiliency is the ability to self-organize and adjust not only to *uncertainty*, but also to other manifestations of a changing climate—increased *complexity and conflict*.

Adaptive capacity derives from assets and resources (such as knowledge, networks, human capital) and governance mechanisms that enable the mobilization of resources to transform and adapt. Intangible attributes and behaviors are also critical capacities, including learning to live with change and uncertainty, nurturing diversity for resilience, combining different types of knowledge for learning, creating opportunity for self-organization towards sustainability, and alertness to patterns of change, especially those that challenge the underlying assumptions that drive current strategies and programs (Berkes et al. 2003).

It may be useful, if perhaps painful, to reflect on elements of our institutional approaches and structure and how they are performing as the demands for adaption grow. Authoritarian approaches are giving way to more self-organized arrangements that tap into local leadership and

attachments to places. The newer institutional arrangements are more like evolving institutional ecosystems, and the roles of government agencies in these evolving structures are changing from authority and intervention to providing services and enabling self-organized solutions. It may be helpful in this period of institutional readjustment to consider what Elinor Ostrom (1993) and other social scientists have referred to as principles of institutional design. Ostrom's list of principles are organized around user participation in setting boundaries for use, equalizing costs and benefits, making collective choices about operating policies, monitoring and enforcement through graduated sanctions, resolving conflicts, and nesting work efforts. These insights might help us better deliver government services to support self-organized adaptation and resilience building.

New institutional forms include (1) large scale, place-based, citizen-led collaborations, (2) forms of ownership and management such as land trusts, community forests, non-governmental owners, private timber investment and management and real estate investment trusts (TIMO's and REIT's), and (3) government configurations focusing on delivering actionable science such as USGS's Climate Science Centers, USDA's climate adaptation and mitigation hubs, NOAA's Regional Integrated Science and Assessment Centers (RISA's); or convening stakeholders and science providers toward adaptation action, the most prominent being DOI-Fish and Wildlife Service's Landscape Conservation Cooperative (LCC) system. These new players are nestling into regional and landscape level adaptation efforts, interacting with traditional institutional players. Existing institutions can be part of this evolution by removing lingering barriers to collaborative adaptation efforts. Areas of improvement are discussed below.

Coordination

Adapting to change is energy-intensive. Land owners and managers cannot afford to waste energy sorting through confusing arrays of information, programs, and processes. More information, well-intentioned as it is, can still create high transaction costs for people making adaptive adjustments. Organizations that provide adaptation services—information, technical, financial, and others—need to work toward “one-stop shopping” by organizing their multiple programs into packages that can be easily used and customized to local needs. This is the aim of the 7 new USDA Climate Change Hubs—virtual networks of USDA agencies to coordinate regional delivery of risk management information and services.

Boundary management

The limitations of “silo” functional structures are becoming more evident. Not only do dwindling financial resources make it less feasible to maintain internal “empires”, the inefficiencies of communicating across boundaries and the needs for rapid integration and flexibility by managers are combining to pressure organizations to dissolve functional boundaries.

One of the most pernicious boundary-based barriers to adaptation is found in budget structures. The ability to blend different sources of funds to accomplish adaptation objectives is becoming more critical, despite pressures to account for every dollar in its narrow program category. Adaptation-friendly budget structures include the Forest Service's new Integrated Resource Restoration (IRR) fund that combines 7 separate program budget lines, and the Collaborative Forest Restoration Program (CFLRP) which funds large scale projects with multiple budget codes.

Risk management

Adaptation involves the need to deliberately consider multiple risks, develop options for managing them, and wrestle with the difficult decisions of who should pay. Institutions need to develop skill sets for diagnosing patterns of risk and intervening in the most cost-effective ways. Many individual stressors are actually linked through system functions and processes as well as their common ties to the changing climate, so it is becoming more important to understand and manage systemic or connected risks. Tradeoffs and costs to be incurred at the scale of these risk complexes may demand different decision skills and tools than we have relied on to independently manage each stressor. It may also require institutional adjustments that support more sophisticated and explicit ways to approach complex risks.

Risk behavior is already woven into our institutional fabric. Many government and private sector institutions are founded to transfer risk-bearing from one party to another. But how do these institutional arrangements act as a barrier to adaption by shielding us from the consequences of our actions? How long will these institutions (e.g., subsidized insurance) hold up under the changing patterns of intense events? Risk-based thinking should drive us to reconsider our own behavior in the face of a changing risk context.

Knowledge management

Approaches and technologies for creating, sharing, and applying knowledge are being transformed. New social and institutional structures for exchanging information have so rapidly developed, that institutional assumptions about how people access and use information to make adaptation decisions may be outdated. Communities of practice, such as The Nature Conservancy's fire learning network, may become the knowledge management institutions of the future. More scientific organizations are using "crowd-sourcing" methods that expand their reach to diverse investigations and that may involve citizens in providing data. These represent new sources of knowledge that are less dependent on "go-to" agencies and "official information", and more oriented to blending knowledge of different types, sources, and vintages. They combine collaborative learning with the powers of social media to give place-based meaning to information as it emerges. We may have to find new ways to nourish these networks with actionable science and lessons gleaned from adaptive management.

Our worries about the effectiveness of technology transfer and the health of the science/management interface are now part of a bigger question of how institutions participate in the relationships and networks that manage knowledge. Can the research community provide tools and platforms with which managers can investigate their own hunches, and blend their tacit knowledge with broader scientific findings? How can we better involve practitioners and citizens in the development of the science base? These and other new questions have emerged in the Anthropocene.

Performance management

Adaptive actions and programs will be increasingly scrutinized for effectiveness and efficiency. They will have to compete rigorously with other uses of public and private capital. Measures of resilience and adaptive capacity are now being brought into some agency budget discussions, a good start. We must be able to articulate, quantify, and realize returns on investment. Adaptation

investments must (1) frame both future positioning and ecosystem outcomes as returns on investment, (2) distinguish among inputs, outputs, outcomes, and range of future options in “value chains”, (3) estimate the true costs of conservation practices, including the benefits and costs of collaboration, and (4) establish performance measures that are meaningful to the individuals and organizations who would work together to make the adaptation successful.

The challenges of measurement and program evaluation will no doubt stimulate a lot a creative thinking about the business of adaptation in the new few years. How do we incorporate attributes of adaptive capacity such as flexibility, social license, preservation of options, learning, and scalability along with measures of ecosystem outcomes into measures and program goals? How do we track the cycle of moving science into action and back, or the cycle of learning from field experience to adjustments in practice? Measuring only parts of the science application and learning cycles fails to provide the whole performance story.

The U.S. Forest Service has since 2011 been using a balanced scorecard approach to measure progress in incorporating climate change into sustainable forest management programs and practices. The FS Climate Change Scorecard is comprised of performance hurdles and guidance in four dimensions: (1) organizational capacity; (2) partnerships, engagement and education; (3) adaptation; and (4) mitigation and sustainable consumption. Each of the 155 National Forests and 20 National Grasslands complete the scorecard report annually. A national network of 130 collateral duty climate change coordinators evaluate the utility and the insights provided and exchange lessons learned to improve the state of climate response practice. Three years of measurement and narrative reports are providing a clearer and more useful picture of what is needed to make adaptation to climate successful.

Leadership in the Anthropocene

As waves of baby boomer retirements and agency downsizing meet, organizations are undergoing important changes in their workforce—capacity reductions, losses in experience, and rapid repopulation of leadership ranks. This is a great opportunity to adjust leadership development and rewards to support adaptive decision making. We need transformational leadership that can help an increasingly diverse citizenry through ill-structured problems and uncertainty, and to take actions that improve learning. This leadership will help people confront their own expectations and wrestle with situations where the changing climate and their own responses can lead to unexpected losses and gains. It is a form of leadership ideally as a ubiquitous quality of the workforce and partners themselves, as practiced by all employees, not an exclusive set of titular leaders in hierarchical structures. What knowledge, skills, and attitudes should we promote in this new “gene pool” of leadership?

Managing change

Leaders of adaptation will have to be experts in managing organizational and social change. They will have to turn big ships (institutions) more sharply than they were designed to turn, and challenge organizational, political, and others barriers to flexibility. Communication and engagement skills will become more critical in helping stakeholders become partners, wrestle with issues of risk transfer, and adopt new behaviors for living “up close and personal” with extreme events. Communication will need to evolve beyond media talking points into true engagement,

and toward better understanding of how people respond to risk and how to avoid “pseudo-certainty” in a rapidly changing world.

Leaders of the future will have to understand the science of decision making, as well as the science of ecosystems. They must deal with human judgment in the myriad functions and decision processes of land management, and be able to adjust decision process to improve learning and respond to new information. We are the benefactors of major advances in behavioral economics and decision science and an evolution in decision practices in many fields. New models are emerging that involve clear shifts in decision processes: choosing robust rather than optimal solutions; from single decision maker to consensus choices; from reliance on published science to wider varieties of evidence; from solving problems to coping with conditions; from information-starvation to information overload; from averages to extremes.

Risk-based thinking and dealing with extreme events

Extreme events can create social and organizational chaos, divert resources (e.g., witness the wildfire issue) and attract political scrutiny and reputational risk. These events are no longer rare. Our landscapes are being shaped by both climate and human-driven disturbance and it seems that we should learn how to recover from or use the disturbance to create more resilient conditions rather than just be “clean up” the damage. We can continue to view extreme events as “natural” disasters even though we know that damages emanate from exposure caused by human choices. But we can also view them as punctuation marks in the bigger narrative of unrelenting change. They can be teachable moments and political opportunities to nudge the process of organizational learning and change.

Leadership will do well to emphasize opportunism, flexibility, and recovery after these events. Can we use these “unscheduled” disturbances to guide larger scale adaptive transitions? How nimble are we in jumping expected cycles of ecological succession into new ecosystem states? We may have to rethink our translations of management “control” theory from business and the factory floor to the management of increasingly dynamic ecosystems. We need new landscape scale science, as well as new theories of management under turbulence, to guide our quest for resilience.

Foresight skills—dealing with alternative futures

Theodore Roosevelt said, “In utilizing and conserving the natural resources of the Nation, the one characteristic more essential than any other is foresight ...”.

Adaptive capacity includes developing foresight to understand key uncertainties and identify emerging issues, deal better with surprise, anticipate unintended consequences, decrease reaction time to rapid change, clarify multiple external perspectives about trends and plausible futures, and shape preferred futures and future pathways (Bengston et al. 2012).

Leaders must create the organizational space and appreciation for exploring alternative futures. This includes insight from projections, models, scenarios, futuring exercises, and expert judgment, while maintaining balance between these sources of information and history, experimentation, and other forms of evidence. Foresight does not mean obsessing over forecasts. The

current yearning for finer resolution climate model projections is understandable, but must be tempered lest it grow into illusions of precision, excuses for inaction, or anchoring choices to individual forecasts. A keen understanding of the craft of foresight development and the caveats of using forecast information and managing cognitive biases must be built into our leadership skill bank.

Leading inquiry about the roots of resilience

We search for new implications and recommendations in each new study or report from the field. Our emphasis on uncertainty, new discoveries, and new tools may at times divert us from fully using what we already know about systems and their adaptive mechanisms. It may be time to relearn from some of the “old” science in light of the adaptation challenges ahead. There may be fewer secrets to be found than there are principles and basic understanding to be applied to new situations. Are there roots of resiliency hiding in plain sight in these classic studies and science findings? We may have to reinterpret what we think we know with an adaptative “going forward” perspective. Leadership can sanction and direct this reflection with appropriate questions. What problems were the scientists who created this knowledge responding to? What did they observe about climate-forest interactions that could guide our expectations about possible futures? What about this information might be relevant to vulnerability and resilience issues being surfaced today?

REFERENCES

- Bengston, D.N.; Olson, R.L.; DeVaney, L.A. 2012. The future of wildland fire management in a world of rapid change and great uncertainty. In Proceedings of 3rd Human Dimensions of Wildland Fire, April 17-19, 2012, Seattle Washington. International Association of Wildland Fire, Missoula, MT.
- Berkes, F.; Colding, J.; Folke, C. 2003. Navigating social-ecological systems: building resilience for complexity and change. Cambridge University Press: Cambridge, U.K. 393 p.
- Morris, D.F.; Macauley, M.K.; Koop, R.J.; Morgenstern, R. 2011. Summary Report. Reforming Institutions and Managing Extremes; U.S. Policy Approaches for Adapting to a Changing Climate. Resources for the Future: Washington, D.C.
- Ostrom, Elinor. 1993. Design principles in long-enduring irrigation institutions. *Water Resources Research*. 29 (7): 1907-1912.

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