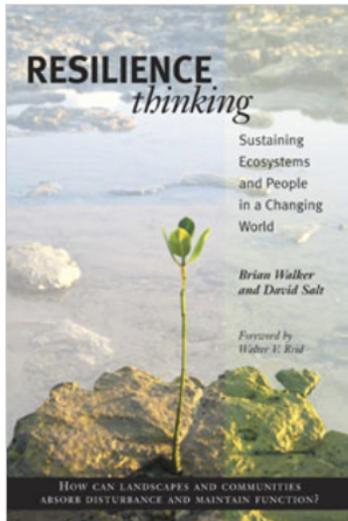


BOOK REVIEW

***Resilience Thinking: Sustaining Ecosystems and People in a Changing World* by Brian H. Walker and David Salt; Island Press, 2006, 192 pp., \$28 (paperback), 2012 (E-book edition), \$27.99**



<https://islandpress.org/book/resilience-thinking>

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... "Why is it that, despite our best intentions, some of the world's most productive landscapes and many of our best-loved ecosystems are in trouble?" The question is expanded through the course of the book to include social systems, business enterprises, and social-ecological systems. ...

Resilience Thinking offers a different way of understanding the world and provides a new yet practical guide to understanding resource-management within complex and dynamic ecosystems that view human and natural systems as interwoven entities, continually adapting through cycles of change. The lessons from this book are applicable to any investor seeking to understand natural resource scarcity, and the implications for companies and organizations grappling with the challenge.

Resilience Thinking outlines the impact of an expanding human population and associated consumption and depletion of finite resources such as water and agricultural land, and offers an updated perspective and approach on sustaining eco-systems. The genesis of this book was the research of an association called the Resilience Alliance (RA), an international network of organizations and individuals involved in the multidisciplinary aspects of ecological, social, and economic research that formed in 1999. The members of the Research Alliance collaborate across disciplines to advance the understanding and practical application of resilience methodology, adaptive capacity, and transformation of the dynamic aspects of societies and ecosystems (www.resalliance.org). The mission of Resilience Alliance network is twofold, both the development of science and communication of that science. Over three decades of research undertaken through this

network has resulted in the development of a new paradigm for understanding and managing the environment referred to as “resilience thinking.”

The shrinking world is stretched to capacity

The book beams a spotlight on a serious issue facing our global community - “the world is shrinking: the human population is growing while its resource base declines.”

Increasingly, the capacity of ecosystems to sustain our planet's well being are being dangerously stressed, and the world is facing a broad range of serious and worsening resources issues. Undoubtedly, the human species is living beyond its means and human-demand has far exceeded the earth's capacity to supply. Population growth is now expanding by approximately 75 million per year and the United Nations projects the global human population at 8 billion in 2025.

Moreover, the solutions put forth to address the impact of this systemic stress are largely "more of the same", and are the very protocols that contributed to this situation in the first place. To be clear, the impact of resource consumption associated with the expansion of the human population continues to have devastating and long reaching consequences given current institutionalized resource management strategies. Approximately 85% of agricultural land has areas of degradation due to a myriad of factors such as soil erosion, and rising salt levels, while water consumption levels continue largely unchecked expected to lead to an estimated 50% of the world population living in water-stressed river basins by 2025.

Another way in which our world is shrinking is in loss of biodiversity - reducing the variety of species, the genes they contain, and the ecosystems that comprise them, ultimately limiting our options. A good case in point is the importance of genetic diversity in agriculture and our vulnerability to pathogens and increased risks to our food supply as industry focuses on fewer and fewer animal and plant species, selecting for easily managed, bigger, faster-growing species (Heal et al. 2004).

In *Resilience Thinking*, scientist Brian Walker and science writer David Salt provide a conceptual overview along with five real-world case studies to illustrate the positive impact of an innovative approach to resource management. They begin by asking, "Why is it that, despite our best intentions, some of the world's most productive landscapes and many of our best-loved ecosystems are in trouble?" The question is expanded through the course of the book to include social systems, business enterprises, and social-ecological systems.

Resilience Thinking - a new paradigm in resource management:

So, what exactly is “**resilience thinking**”? Simply stated, “resilience thinking” offers a different way of understanding the world and a new approach to managing resources. Through this insightful book, the authors provide a practical guide to understanding ecosystems in an ever-changing world and a new approach to resource-management within complex and dynamic ecosystems. This approach views human and natural systems as interwoven entities continually adapting through cycles of change, and it endeavors to evaluate the qualities of a social-ecological system that must be maintained, or enhanced to achieve sustainability.

The authors explain the key principles of resilience without oversimplification, building on the extensive data and case studies undertaken through the Research Alliance. The book endeavors to communicate to a broad audience perspective, offering insights and a framework of the emerging field of “resilience thinking.” The authors point out that concepts of resilience have been around for decades and it is only recently that an interdisciplinary approach has been taken by researchers from well-known organizations such as the Resilience Alliance and the Santa Fe Institute, given the urgency of the situation.

Many underlying causes are contributors to the decline of the earth’s resource base:

Walker and Salt stress that there are a broad spectrum of underlying causes contributing to the decline of the earth’s resource base. They have grouped these causative factors into three categories: “**no choice**” category which relates to problems associated with large populations coupled with poverty where it is a matter of survival; “**willful**” resource degradation due to a short-term exploitative approach to produce and consume with disregard for the future; and “**ignorance and misunderstanding**” where despite enormous funds being invested to understand and achieve sustainability in an ecosystem the data shows otherwise. Author’s Walker and Salt emphasize, “it isn’t just the amount of knowledge - details about species and ecosystems - it’s also the kind of knowledge. It’s the way we conceive of resource systems and people as part of them. The way we currently use and manage these systems is no longer working, and yet what we hear most of the time is that the solution lies in more of the same.”

The book focuses on the third driver of unsustainability, claiming that the first driver (poverty) can only be resolved by addressing the other two drivers. The second driver (willful consumption) is revisited in the final chapter to be addressed/resolved through the expanded influence of resilience **thinking** when solving real world social-ecological system problems.

“Optimization” a legacy management approach yielding less than optimum results:

Current **“best practice”** in resource management is based on a legacy approach referred to as the **“optimization”** of the delivery of products (goods or services). The optimization approach aims to achieve and sustain an optimal state, with the goal of delivering a maximum sustained benefit. This is sometimes referred to as a **“maximum sustainable yield”** or **“optimal sustainable yield paradigm.”** Practitioners of the optimization approach construct models that generally assume the optimal state may vary under different conditions, and work to find the optimal path to achieve the maximum sustainable yield for that system. But there is a significant drawback of the “best-practice” optimization approach because it ignores the dynamic nature of social-ecological systems where change is not “incremental and linear (cause - and - effect changes).”

Walker and Salt make a strong point that “while minor changes are often incremental and linear, the really significant ones are usually lurching and nonlinear - like mouse plagues in Australian wheat crops, insect pest outbreaks in forests in North America, and the sudden change from a clean, clear lake to one dominated by an algal bloom.” The authors underscore the paradox that exists between **“optimization”** and the resulting **“efficiency,”** because optimization is applied to a narrow range of values and a specific set of interests. The focus on optimization and the resulting efficiency certainly can lead to the “elimination of redundancies - keeping only those things that are directly and immediately beneficial” but inevitably leads to unwanted outcomes such as lack of diversification. This can render a system vulnerable, as it does not have a diversified pool of solutions to draw from in case of an external system shock or an extreme event.

Another negative outcome of optimization is the compression of the time horizons of resource management programs to a couple of decades - which are more aligned with the timeframes for most commercial investments. Moreover, the authors state that optimization “demotes unquantifiable and unmarked values, such as the life support, regenerative, and cleansing services that nature provides (collectively known as ‘ecosystem services’) that do not have property rights or are publicly owned do not generate wealth, gain little support, even if they involve a critical ecosystem.” And lastly, the “optimization best -practice” approach does not account for the complexity of social - ecological systems.

Walker and Salt stress that “the ruling paradigm - that we can optimize components of a system in isolation of the rest of the system - is proving inadequate to deal with the dynamic complexity of the real world. Sustainable solutions to our growing resource problems need to look beyond a **“business as usual”** approach.” They believe that optimization and greater efficiency cannot solve resource problems over the long term because it creates the risk of vulnerability to changes in the environment that shuts down

options. Applying resilient thinking strategies can offer constructive alternatives that provide greater optionality and long-term sustainability.

Three step approaches to “resilience thinking”:

A three-step approach outlined in the book provides a framework for applying resilience thinking: establishing the foundation; outlining the essential elements of the research approach; and exploring the application of resilience thinking to real world challenges.

“**Step one**” of Resilience thinking applies a comprehensive view that humans are an integral component of a complex system within nature, referred to as social-ecological system. Within these adaptive systems, resilience is the key to the sustainability unlike traditional resource management approaches that utilize a compartmentalized “**command-and control**” approach.

Step two outlines the two key themes that underpin resilience thinking: “Thresholds” and “Adaptive cycles.” The **thresholds concept** outlines the social-ecological system changes that cross a threshold and begin to manifest different structures and feedbacks between its components otherwise referred to as a “**regime shift.**” The **adaptive cycle** addresses the system’s dynamic nature - how the social-ecological system changes over time in terms of four phases: rapid growth, conservation, release, and reorganization.

“**Step three**” examines the application of resilient thinking to the real world and how resilience thinking can be applied to the various components of a socio-ecological system such as its operations, cost, policy and management. An approach can be formulated using the principles of resilience thinking to offer resource management solutions in creating social-ecological systems that facilitate continued functionality, while implementing positive changes that work in concert with the changing nature of the respective regions.

A system as a “call in the basin” & adaptive cycles:

The authors use a ball in a basin as a metaphor for a system seeking equilibrium. The ball wants to drop to the bottom of the basin but the shape of the system is constantly changing. Therefore, the question arises about the extreme changes in a system that can lead to the ball falling out of the basin. This is described as a threshold event or a system change that is irreversible and fundamentally changes the nature of the system such as the eutrophication of a lake leading to massive algae growth and the decline of all marine life. As we noted earlier, the **adaptive cycle** comprises the four phases of a social-ecological system: rapid growth, conservation, release, and restructure.

The early or growth phase is where a system experiences **rapid growth** and exploits as many resources as available, much like the explosive growth of a successful early stage company. Within eco-systems, these tend to be weeds as they thrive in cleared lands. In the **conservation** phase, the ecological systems increase in biomass like companies specializing or reaching economies of scale. During this phase, the growth rate may slow down, efficiencies increase, and flexibility may decline. An example is the application of JIT systems approach where efficiency is high but the system is vulnerable to changes in supply. In an ecological system, this phase can often be characterized by loss of diversity of species, as species are cultivated for specific characteristics.

The **release** phase can happen suddenly and systems that stay in the conservation phase are more vulnerable to shocks. A company or an entire industry may be derailed to the emergence of a new technology. An ecological system may be vulnerable to extreme weather events or a specific disease type that can completely decimate specialized species.

In the **reorganization** phase, the system may be thrown into chaos due to shocks from the preceding phases. New opportunities can emerge creating favorable conditions for a different species that may become invasive cycling the system into a new and disruptive growth phase. New players may take over existing structures due to emerging opportunities or fractures within the system. The ability of an ecological system to overcome these changes without reaching a system threshold that fundamentally changes the nature of the system is characterized as its **resiliency**.

Real world case studies illustrate the effectiveness of the “resilience thinking” in resource management - “creating space”:

Five western hemisphere case studies illustrate the effectiveness of resilience thinking when applied to real-world circumstance and the value it provides in assessing the factors underlying the changes in social-ecological systems. You may be wondering as we did, why Walker and Salt choose only western hemisphere regions? The authors explain that these regions have varying levels and types of populations engaged in different enterprises coping with a range of different challenges. What is consistent among these five regions is that each is faced with the issue of managing their natural resource and social challenges that have serious implications for their inhabitants and surrounding regions. Lastly, each region has been well studied by the Resilience Alliance at the time of the book’s release.

These scenarios serve as examples of **threshold** change and the lack of **resilience** due to lack of knowledge and misguided efforts in addressing long-term ecological sustainability. The findings of the case studies establish that the current “optimization/business as usual” approach in resource management aka selectively increasing efficiency, increase control over change, and reducing waste to optimize the systems we manage, which they contend

has only made the situation worse. They believe that each of these five regions have many potential pathways, and emphatically point out that “being more efficient, or extracting greater profit are constraining the future options of the people living in them”. They emphasize the need to create more options, and advocate for the utilization of a resilience framework to “create more space.”

1. The **Florida Everglades** has suffered a loss of its natural habitat, declining water quality, which has resulted in a new eco-system dominated by the invasive cattail vegetation, leading to a loss in biodiversity. “Creating space requires releasing the legislative gridlock to enable a partial reestablishment of natural flood regimes for critical processes and a focus on ways to minimize phosphorus inflows.”
2. In **Australia, in the Goulburn-Broken Catchment**, the time has passed for relying on adaptive capacity, as the area has witnessed an increase in level of saline groundwater, threatening the entire agriculture sector. “The social-ecological system has crossed a hydrological threshold into a new regime, creating space in this situation requires transformation... requiring the people of this region to reinvent their social-ecological system. They need to find a new way to make a living.”
3. The **Caribbean** coral reefs have seen a 90% decline over the last 30 years, leading to a loss in the tourism-dependent economy. “Creating space in the Caribbean involves the restitution of several functional groups of organisms to allow the coral reefs to regenerate.” The challenge lies in the social system of the Caribbean, which has limited resources and lacks the necessary coordination and thus adaptability to execute an effective program to restore the reef system.
4. In **Wisconsin, the Northern Highlands Lake District (NHLD)** is under massive stress from the increasing population and human activity. Creating space may be possible as a range of local stakeholders are exploring options, enhancing adaptability, building networks, enhancing diversity, while avoiding the need for transformation and thus changing the trajectory of the NHLD.
5. In **Sweden, the Kristianstad** region’s water quality and biodiversity have experienced significant decline, and constant conservation efforts are needed to prevent further damage. The residents of this region had a very clear vision of what they wanted and needed - higher adaptability of the social domain, which was developed through leadership and social networks that allowed for new forms of experimentation.

Resilience thinking is a work in progress

Walker and Salt state that “by focusing on the resilience of a social-ecological system you create space for safe changes in the ecosystem because the system can absorb more shocks and disturbances without crossing a threshold into a new regime. A resilient system has

the capacity to change as the world changes while still maintaining its functionality. Resilient systems are forgiving of management mistakes and miscalculations.” The authors point out that although they have chosen case studies at a regional level, resilience thinking principles can be scaled to social-ecological systems at all levels, including national and global scales. (Tainter 1998; Diamond 2005). A much broader range of Research Alliance case studies can now be found at: <https://www.resalliance.org/key-concepts>

Emphasizing the importance of the broader themes that underpin the framework of resilience, which revolves around humans coexisting with linked social and ecological systems, resilience thinking is a work in progress and to be successful it must be applied at the local level. These systems “are complex adaptive systems, and attempts to control or optimize selective parts of these systems without consideration of the corresponding responses within the broader system are fraught with risk. Resilience thinking moves us to a holistic approach and the authors stress that it is not a panacea for all the world’s problems, it does provide a foundation for achieving sustainable patterns of resource use.” They invite the readers to send their suggestions and offer a list of what they believe a resilient world would value.