

# Modeling the Resilience Adaptive Cycle

By Alan A. Lew

Department of Geography, Planning & Recreation  
Northern Arizona University, Flagstaff, Arizona, USA

=====

You may freely use this images for academic and educational purposes, and if you fully cite this blog post as the source. This blog post may be cited as:

Lew, A.A. (2017). Modeling the Resilience Adaptive Cycle. Collaborative for Sustainable Tourism and Resilient Communities Blog (21 January). Retrieved from <http://www.tourismcommunities.com/blog/modeling-the-resilience-adaptive-cycle>.

If you have any questions about these, feel free to send Professor Alan Lew an email at <[alan.lew@nau.edu](mailto:alan.lew@nau.edu)>

=====

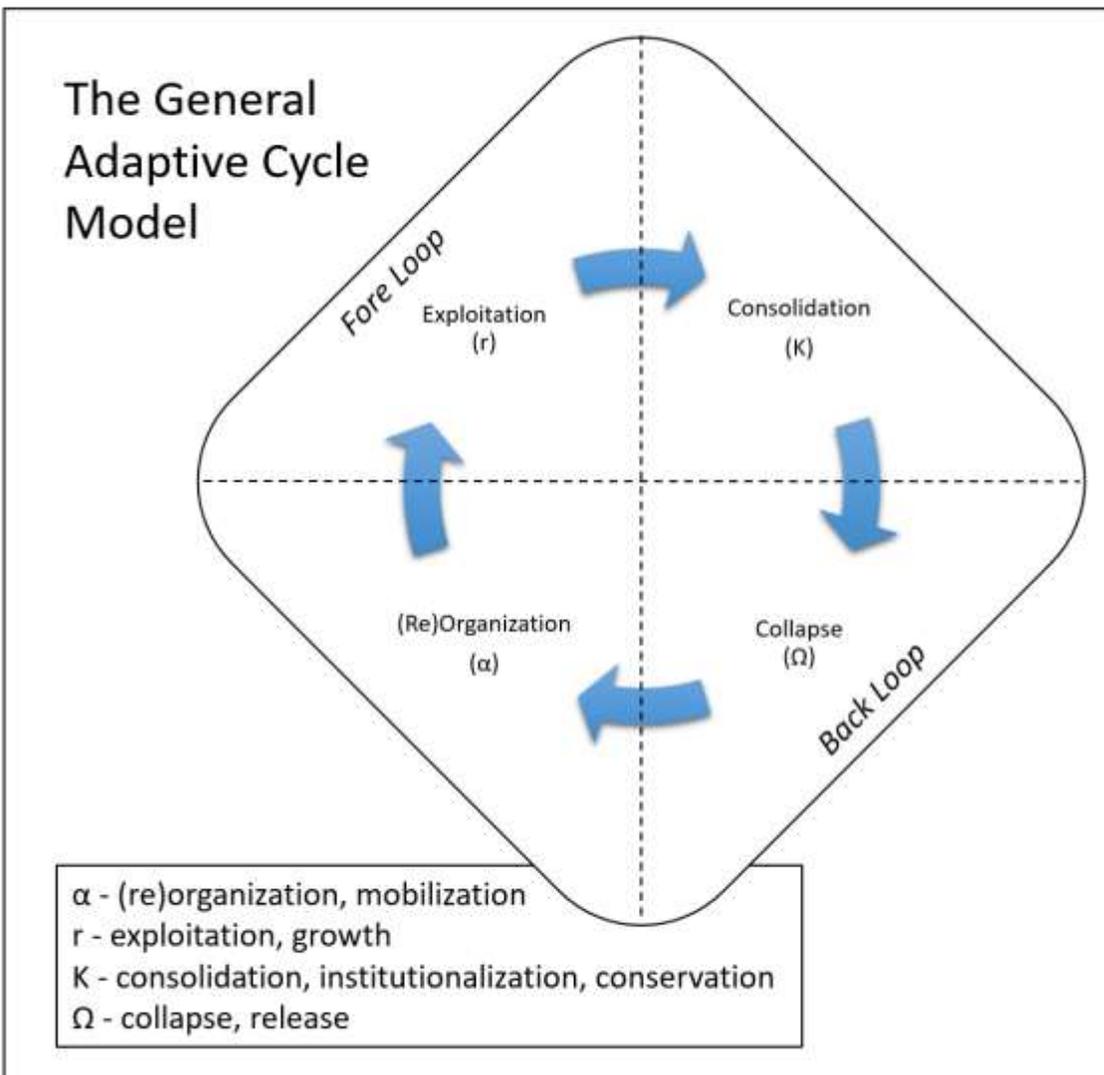
Creative Commons Copyright CC BY-SA 4.0. <<https://creativecommons.org/licenses/by-sa/4.0/legalcode>>



## The Adaptive Cycle

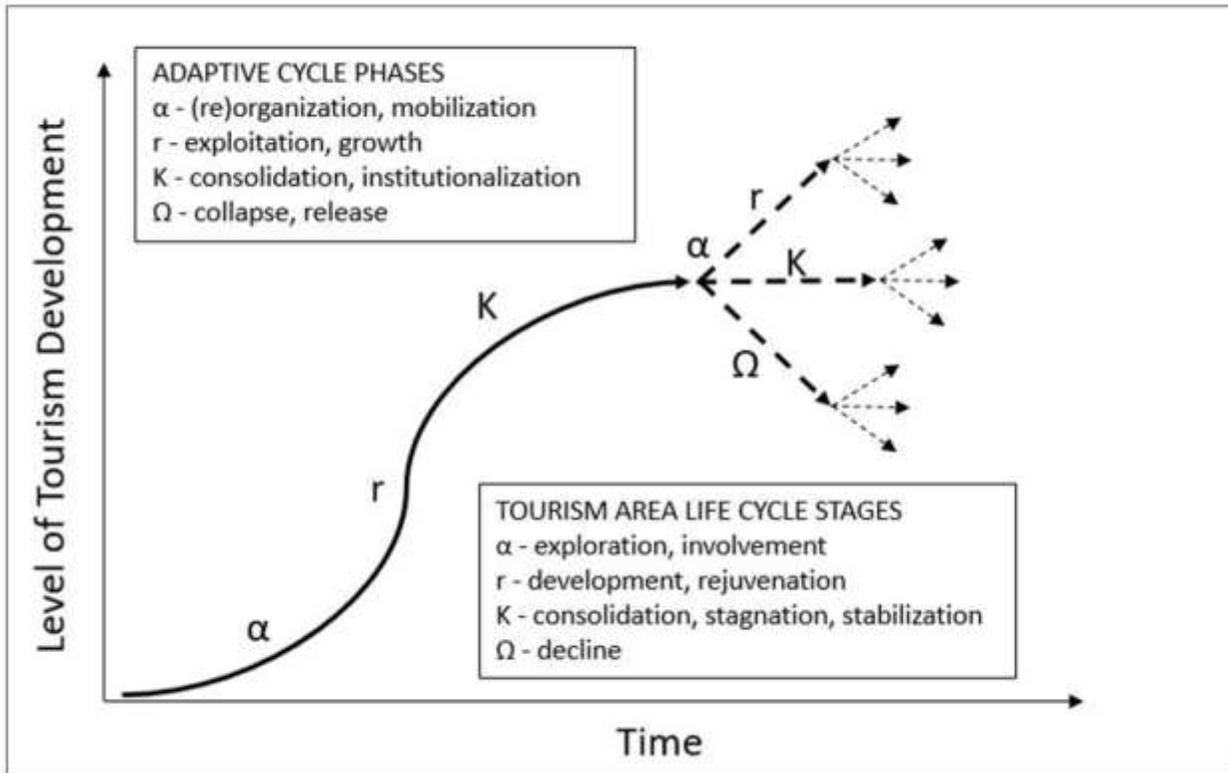
The Adaptive Cycle was one of the early resilience theory concepts that captured the imagination of many researchers. Holling (2001) introduced the Adaptive Cycle as part of his systems approach to resilience theory using a 3-dimensional diagram, with the cycle moving in a roller coaster pattern among the three key variables of resilience, potential, and connectedness (see below). I think that this was probably too complex for many people to conceptualize, and so he simplified it into a two-dimensional diagram that showed the cycle as a figure 8 pattern, and which should be well known to most anyone interested in resilience theory and thinking.

While visually compelling, the figure 8 is still unnecessarily complicated and makes implications that need to be explained away in one way or another. I personally prefer the more simple circle diagram what was introduced by Walker and Salt (2006). I have reconfigured their diagram below, which has the advantage of showing more clearly the Fore Loop (moving from (re)organization to exploitation to consolidation) and Back Loop (moving from consolidation to collapse and again back to (re)organization).



Tourism researchers have often pointed out similarities to between the Holling's Adaptive Cycle and Butler's Tourism Area Life Cycle (TALC) model. Here I attempt to show the comparison in a diagram (based on Butler, 1980 and Holling, 2001).

In addition to being posted here, with a creative commons copyright, this diagram will appear in: Bakti, L.A., Lew, A.A., and Kim, Y-S. (2017). A Resilient Approach to Collaborative Coral Reef Conservation on Gili Trawangan, Indonesia. In A.A. Lew & J. Cheer, eds., *Understanding Tourism Resilience: Adapting to Environmental Change*, pp. (forthcoming). London: Routledge.



In the same book chapter cited above, I try to summarize how the different phases of the Adaptive Cycle relate to the variables of Resilience, Potential and Connectedness, which were part of the 3-dimensional diagram that Holling introduced in 2001. I found the best definitions of these three variables (shown below) in Allison and Hobbs (2004).

Table 1. The four stages and three variables of the Adaptive Cycle.

Adaptive Cycle STAGE		VARIABLE		
		<i>Resilience</i>	<i>Potential</i>	<i>Connectedness</i>
1. (Re)Organization	$\alpha$	Increasing	High	Low
2. Exploitation; Growth	$r$	High	Low	Increasing
3. Consolidation; Conservation	$K$	Decreasing	High	High
4. Decline; Collapse	$\Omega$	Low	Low	Decreasing

Notes: *resilience* = capacity to innovate and adapt

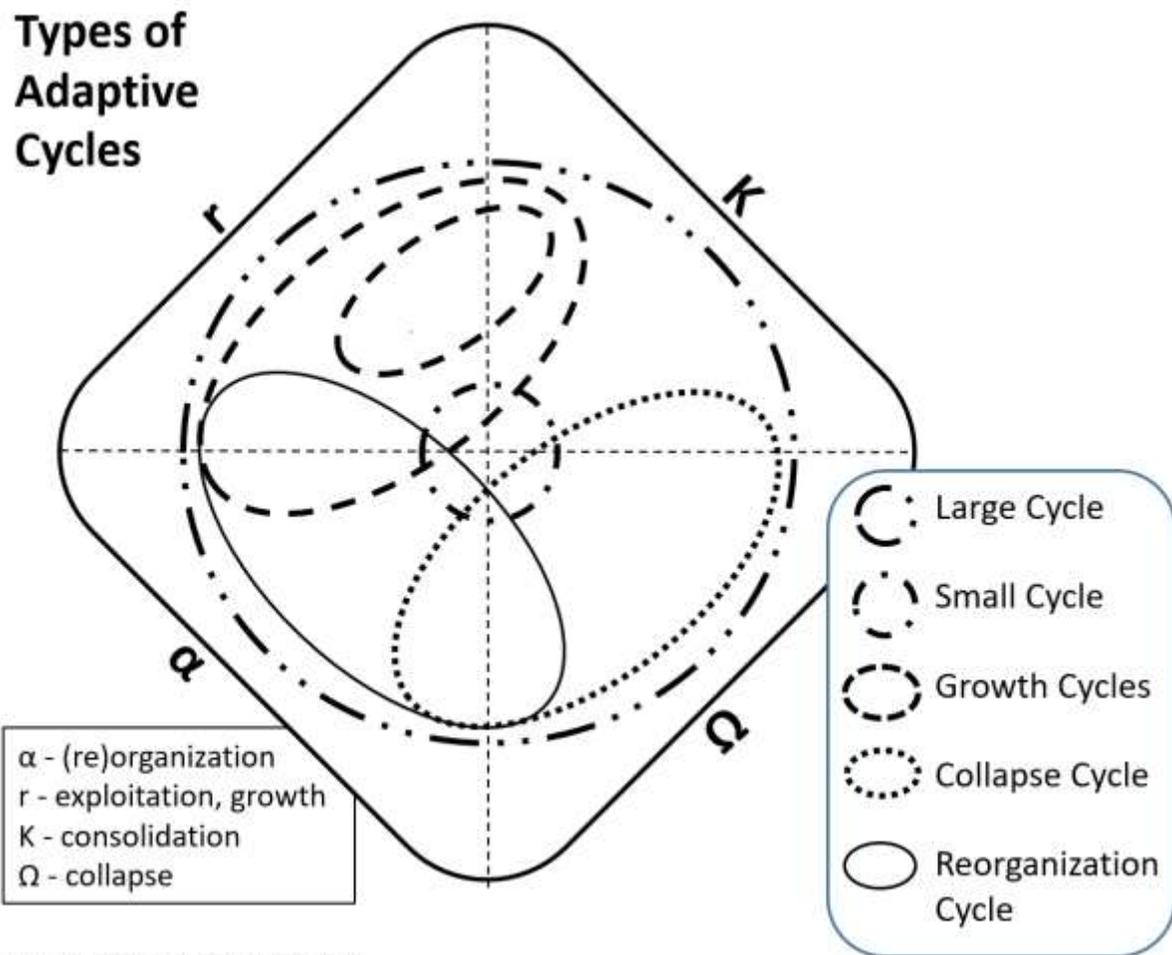
*potential* = capacity to change using accumulated resources

*connectedness* = capacity to control and manage

Source: based on Holling (2001) and Allison & Hobbs (2004)

One of the issues that different diagrams of the Adaptive Cycle share is the misinterpretation that all systems must go through all stages of the cycle. It needs to be continually reinforced that this is not the case. Returning to the General Adaptive Cycle model diagram above, I try to show optional adaptive paths that systems could experience. These figures have not yet been designated for use in any of my articles, other than this blog post.

The first figure below shows all the likely paths that human social systems can take over time as they adapt to changing conditions. They may experience all four stages of the adaptive cycle, or they may only experience two or three of the stages. The major types that result are shown in three successive figures.

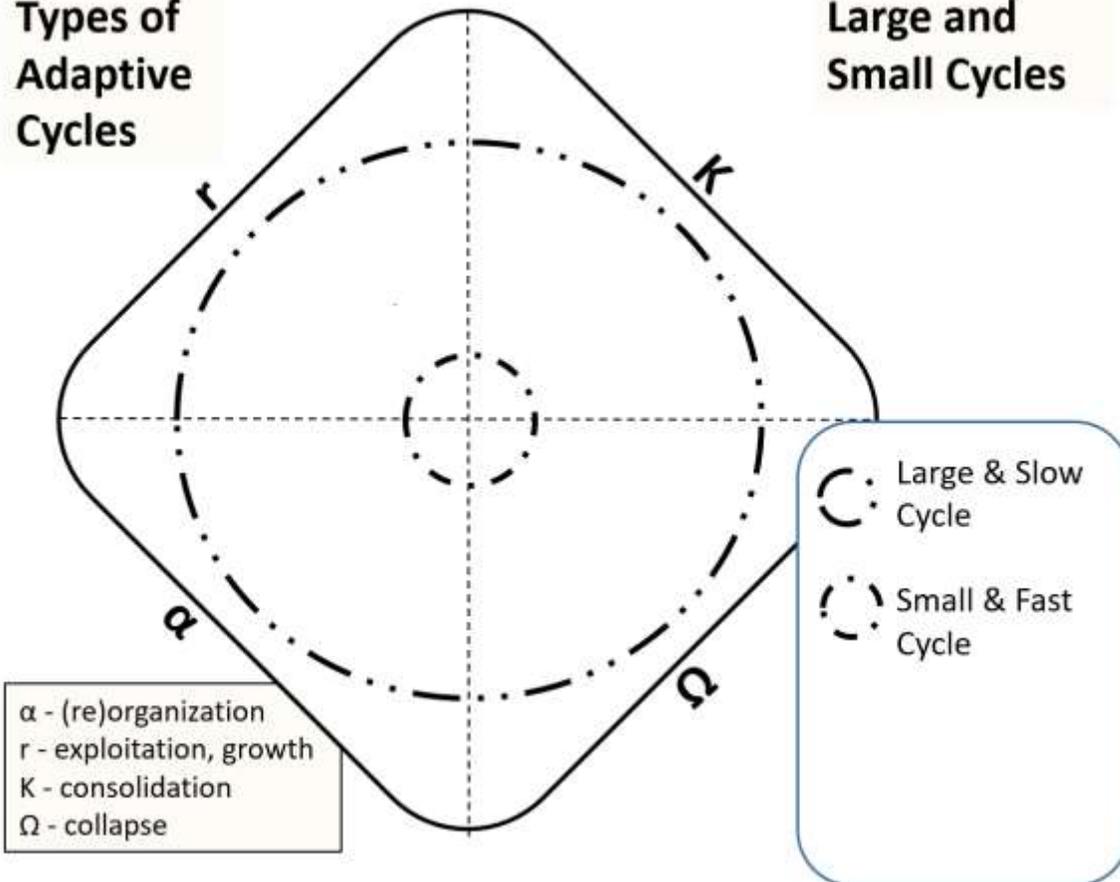


The Large and Small Cycles figure illustrates how some systems and processes move slowly through the four stages, possibly encompassing large amounts of resources and influences, while other are very

quick to the point where they may be largely imperceptible. The Large and Small Cycles figure illustrates how some systems and processes move slowly through the four stages, possibly encompassing large amounts of resources and influences. These large and slow cycles are also sometime associated with slow, controlling variables. Other systems may move very quickly through the adaptive cycle stages, to the point where they may be largely imperceptible.

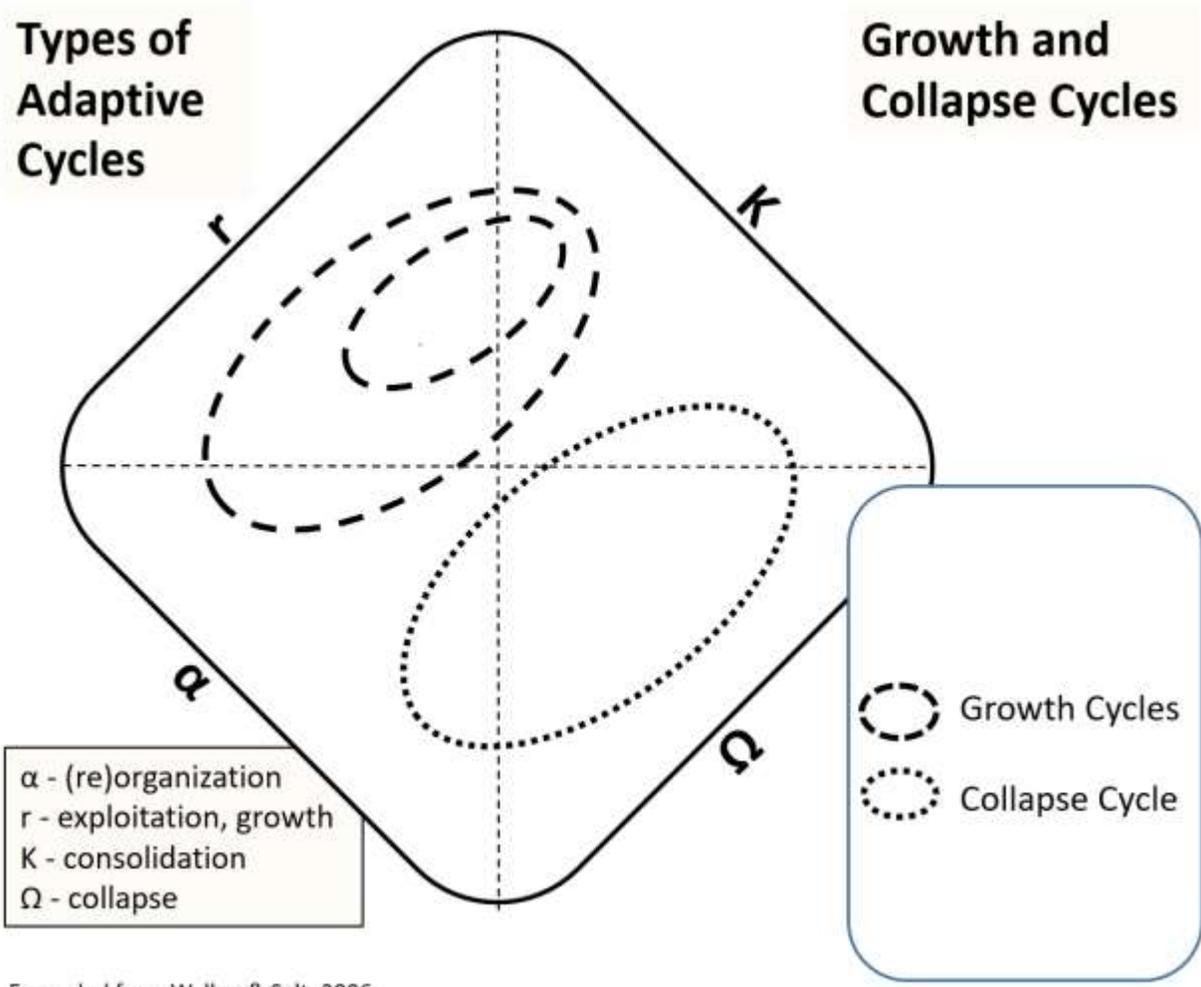
### Types of Adaptive Cycles

### Large and Small Cycles



Expanded from Walker & Salt, 2006

The Growth and Collapse Cycles figure shows how some stages may be completely avoided. A growth cycle occurs when the system anticipates vulnerabilities that may lead to collapse and plans for them by moving directly from the consolidation phase to the reorganization phase. If successful, this results in continual adaptation to changing conditions, as suggested by the 'evolutionary resilience' concept (Davoudi 2012). The collapse cycle is just the opposite. It is like the 'poverty trap' described by Allison and Hobbs (2004), in which a system is unable to effectively escape a constant state of decline. Efforts to reorganize are quickly coopted into rigid consolidation structures that collapse before a growth stage can ensue.

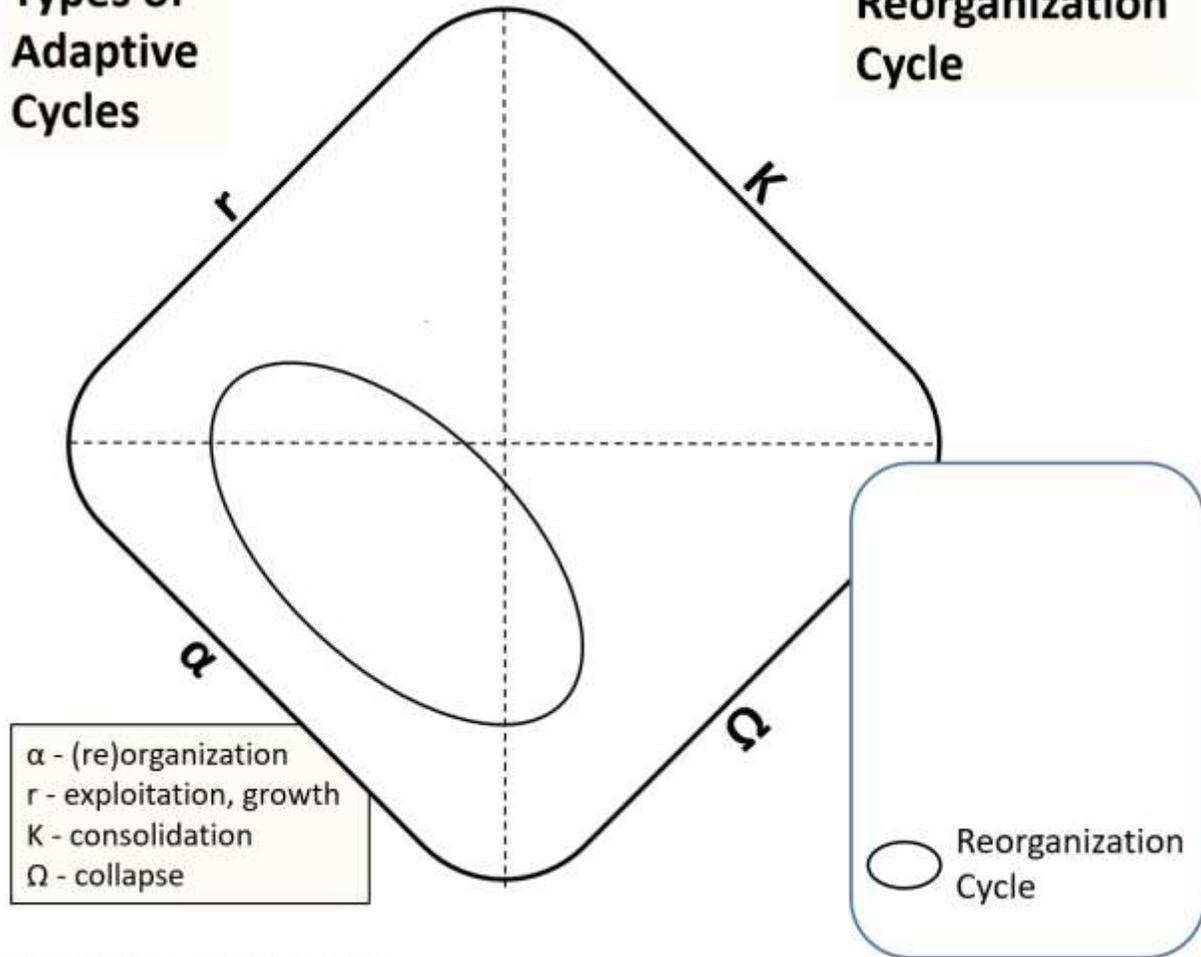


Expanded from Walker & Salt, 2006

The final theoretical form that modeling the adaptive cycle in this way results in is a reorganizational cycle. Here the system never reaches a stage of consolidation, but is instead continually reorganizing itself. While it does experience growth, it is not able to enjoy the fruits (or consolidate the benefits) of that growth, but immediately turns a reflexive eye toward restructuring itself. This might be an extreme version of evolutionary resilience, and while I do not have a good example, it seemed theoretically possible.

### Types of Adaptive Cycles

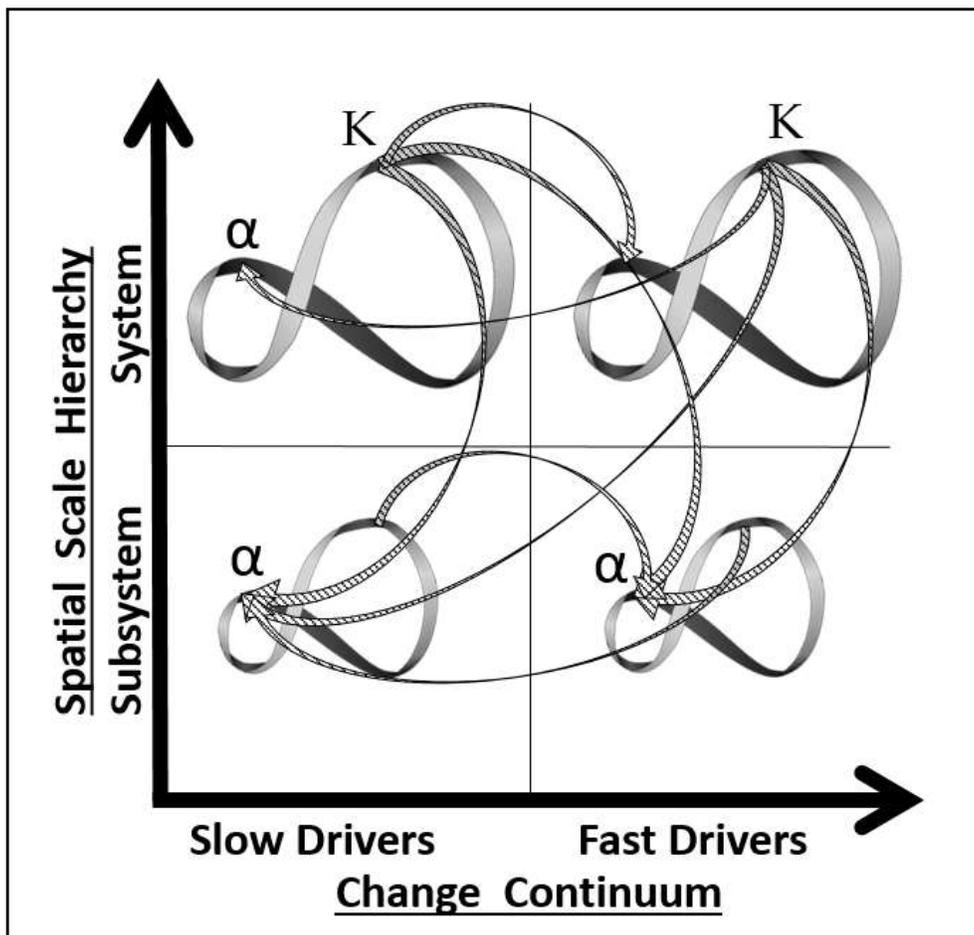
### Reorganization Cycle



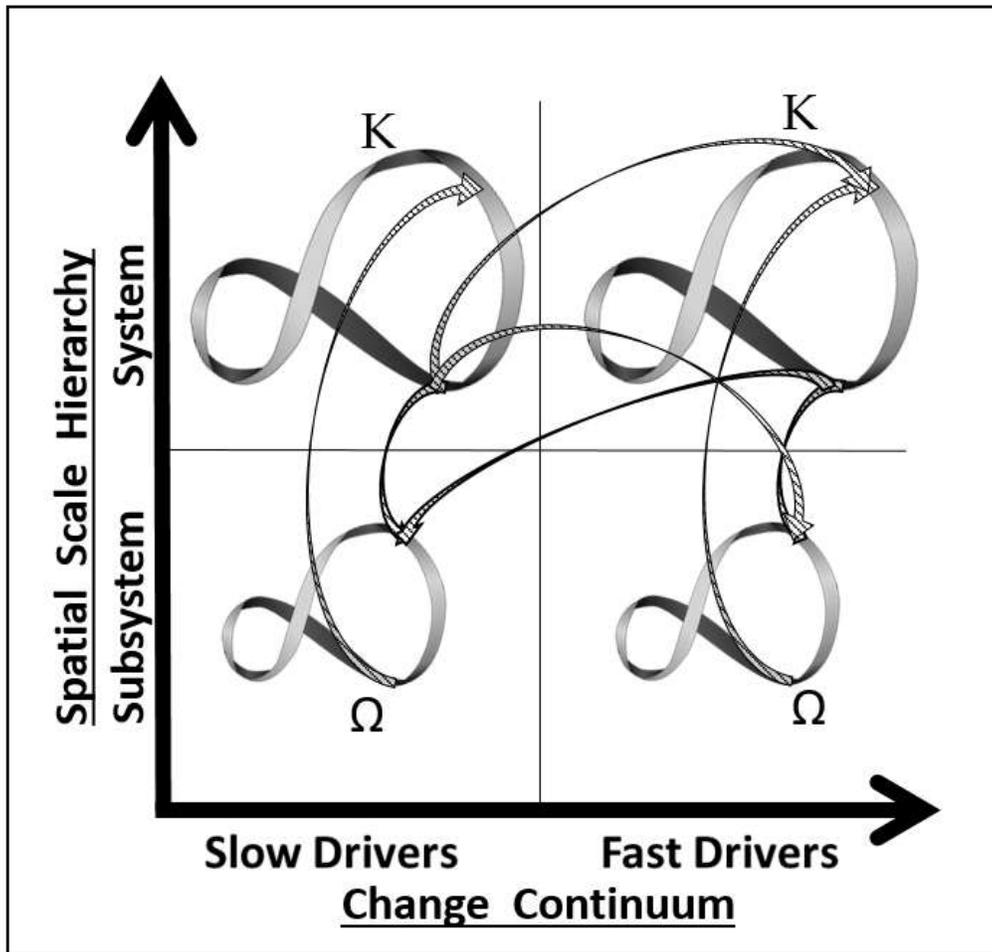
Expanded from Walker & Salt, 2006

This final set of two figures are not yet designated for publication in any articles that I have been associated with, other than this blog post. The figures show how different systems (each represented by an adaptive cycle infinity diagram) influence each other through “memory” (aka “remembering” or “path dependence”) and through “revolt” (aka “path divergence” or “path creation”). These are the only two ways that systems influence one another in resilience theory. The figures show nested systems (smaller subsystems that operate within a larger system) and parallel systems. I also place these within the framework of my Scale, Change and Resilience (SCR) model (Lew, 2014), although I am not sure if that is more confusing than helpful. ☺

## Parallel and Nested Adaptive Cycles with Potential Memory Influences



# Parallel and Nested Adaptive Cycles with Potential Revolt Influences



## References Cited

Allison, H.E. and Hobbs, R.J. (2004). Resilience, adaptive capacity, and the “Lock-in Trap” of the Western Australian agricultural region. *Ecology and Society* 9(1): 3. Online at <http://www.ecologyandsociety.org/vol9/iss1/art3>

Butler, R. (1980). The Concept of a Tourist Area Cycle of Evolution: Implications for Management of Resources. *Canadian Geographer*, 24(1), 5-12.

Davoudi, S. (2012). Resilience: A bridging concept of a dead end? *Planning Theory and Practice*, 13(2): 299–333, <http://dx.doi.org/10.1080/14649357.2012.677124>

Holling, C. S. (2001). Understand the in Complexity of Economic, Ecological, and Social Systems. *Ecosystem*, 4, 390-405.

Lew, A.A. 2013/2014. Scale, change and resilience in community tourism planning. *Tourism Geographies* 16(1): 14-22. DOI:10.1080/14616688.2013.864325.

Walker, B.H. and Salt, D. (2006). *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Washington: Island Press.