Brian Walker and David Salt.
Resilience Thinking.

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associated with managing for resilience have gone through much refinement but the two core areas remain at its heart: the fact that social-ecological systems can exist in different stable states and that they constantly move through adaptive cycles over many linked scales (which we discuss later in this chapter).

Fore Loops and Back Loops

Taken as a whole, the adaptive cycle has two opposing modes. A development loop (or "fore" loop), and a release and reorganization loop (or "back" loop) (see figures 9 and 10). The fore loop (sometimes called the front loop or forward loop) is characterized by the accumulation of capital, by stability and conservation, a mode that is essential for system (and therefore human) well-being to increase. The back loop is characterized

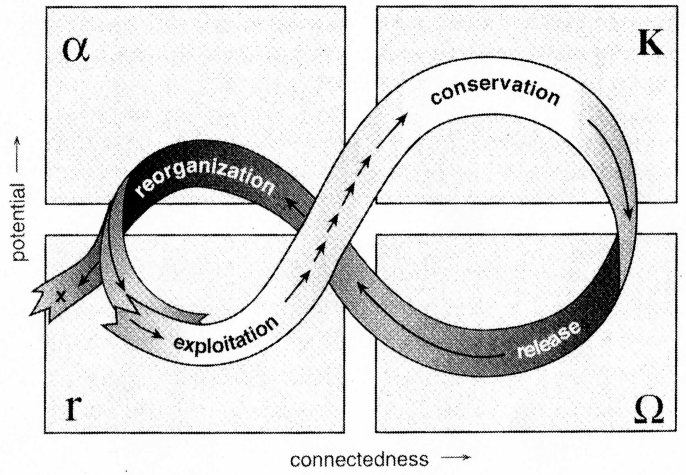

FIGURE 9 The First Version of the Adaptive Cycle

The first versions of the adaptive cycle pictured it as a figure 8 in two dimensions with the axes being connectedness and potential. Potential reflects accumulated growth and storage (biomass that is increasingly inactive like heartwood in trees or leaf litter). The use of the simpler loop, as shown in figure 10, has been adopted because it better reflects the passage from release to reorganization in some systems. However, because the adaptive cycle in the shape of the number 8 (as shown here in figure 9) was the original version it has iconic value, and it is often seen as a symbol of studies on resilience and adaptive cycles. *(From Gunderson and Holling, 2002.)*

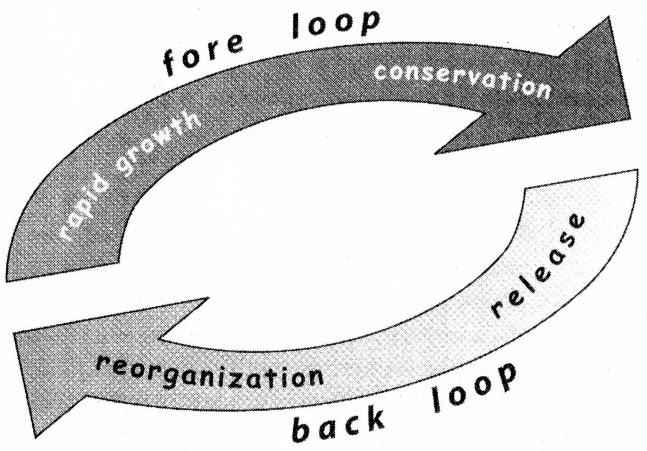

FIGURE 10 A Simple Representation of the Adaptive Cycle

The rapid growth and conservation phases are referred to as the fore loop with relatively predictable dynamics and in which there is a slow accumulation of capital and potential through stability and conservation. The release and reorganization phases are referred to as the back loop, characterized by uncertainty, novelty, and experimentation and during which there is a loss (leakage) of all forms of capital. The back loop is the time of greatest potential for the initiation of either destructive or creative change in the system.

by uncertainty, novelty, and experimentation. The back loop is the time of greatest potential for the initiation of either destructive or creative change in the system. It is the time when human actions—intentional and thoughtful, or spontaneous and reckless—can have the biggest impact.

It is important to reemphasize that the adaptive cycle is not an absolute; it is not a fixed cycle, and many variations exist in human and natural systems (see figure 11). A rapid growth phase usually proceeds into a conservation phase but it can also go directly into a release phase. A conservation phase usually moves at some point into a release phase but it can (through small perturbations) move back toward a growth phase. Clever managers (of ecosystems or of organizations) often engineer this in order to prevent a large collapse in the late conservation phase. That is, they avoid a release phase at the scale of concern (the whole forest or the organization) by generating release and reorganization phases at lower scales thereby preventing the development of a late *K* phase at the scale of concern.