



Stability is the concept of dynamic balance. All systems have feedback loops, acting to maintain the system in a relatively stable state. Small fluctuations around the optimal system variables keep the system within tolerance limits. Go beyond these limits and the system can alter forever.

Dynamic balance of a system is maintained through positive and negative feedback loops working together. If a warm summer results in algae growth in a pond, some species of fish may flourish and breed more, the population could increase (positive feedback) and they begin to deplete the algae. Once the food source is gone, the fish will begin to die out (negative feedback). As the fish population drops, the algae will recover and expand again. In this way the original disturbance generates a fluctuation around a feedback loop, which eventually brings the fish / algae back into a stable dynamic balance.

Source: Capra F. & Luigi Luisi P. (2014) The Systems View of Life

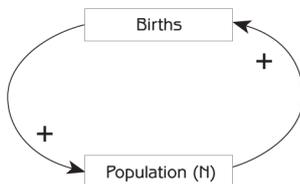
Resilience is the capacity of a system, to absorb disturbance and still retain its basic structure and function. More diversity in a system creates more resilience. So for example, in an ecosystem, organisms might do different things for that system. One group might fix nitrogen and another might break down waste. Diversity within these functional groups is what creates the most resilience. In one ecosystem there might be a range of species that break down waste in different ways.

More information: Stockholm Resilience Centre
<http://www.stockholmresilience.org/21/research/what-is-resilience.html>

In a forest, the many plants and animals are **interdependent**; they depend on one another in various ways. Not one can exist in isolation. So animals depend on plant photosynthesising for their energy needs and plants depend on the carbon dioxide produced by animals and on the nitrogen fixing bacteria at their roots. The exchange of energy and resources is co-operative.

All living things in an ecosystem are also **interconnected** through networks of relationships.

Positive feedback is a process in which the effects of a small disturbance on a system are amplified. As an example consider that there is a surplus of food, space and other resources that allows a animal population to grow. More population leads to more births which leads to more population, which leads to more births. This feedback on its own can lead to suddenly reaching the limits of the ecosystem to provide resources and absorb pollution. Positive feedback if not balanced by negative feedback becomes a force for change in a system regime.



Negative feedback regulates change in a system, aiming to maintain the dynamic balance. The function of negative feedback is to keep the parts of a system within limits that are necessary for survival.