PART III: RESILIENCE, THE BASICS

What Is Resilience?

The first 9 videos of this series made the case that, regardless what we as a society do at this point, the remainder of this century will bring severe shocks from climate change, resource depletion, and population pressure. The result will be economic, social, and political instability. Nevertheless, what we do *now* matters a great deal: we can either *intensify* those shocks by continuing the individual and collective behaviors that have generated them, or we can *change* our behavior. In the next few videos, I will explain why one of the behavior changes that makes the most sense is to build *resilience*—and specifically at the *community* level.

Resilience is often thought of as the ability to withstand hard times or shocks, and to "bounce back" from a disaster. A town devastated by a tornado is called resilient when it is able to quickly return to how things were before. Similarly, a business that survives an economic recession, a person who successfully gets through an emotionally challenging period in life, and a forest that recovers from a fire are also considered resilient.

When discussing resilience it's important to recognize that we're talking about **systems**—and one way to think about systems is as groups of relationships. A town is a system of relationships between people, businesses, institutions, and infrastructure. A person's emotional health is determined by a system of relationships with loved ones, co-workers, neighbors, and so on. A forest is a system of relationships between plant and animal species, water and nutrient flows, and climate patterns.

So think of it this way: When the tornado-ravaged town recovers, we don't care if the buildings and bridges are rebuilt in exactly the same way. What matters is whether the key relationships remain intact. Are the people and the essential institutions that made up that system able to recover? Are residents

able to stay in their neighborhoods, or are they forced out because their homes have been foreclosed on? Are the shops and factories able to re-open, or have contracts and supply lines broken down beyond repair?

The field of ecology adds further dimensions to our understanding of resilience. In ecology, resilience is seen as the ability of a system to **absorb disturbance and still retain its basic function and structure.** In other words, a system that's resilient can adapt to change without losing the qualities that define *what it is* and *what it does*—which together comprise that system's "identity."

Think of a specific ecosystem—say, a Ponderosa pine forest. The forest is made up of certain kinds of plants and animals, it has certain patterns of soil chemistry and weather, and it cycles water and nutrients in certain ways. All these parts, patterns, and relationships don't run like gears in a machine—they interact with each other in ways that are not always predictable, and they change over time. The system isn't just complicated—the way a sophisticated machine, for example, is complicated. It's what ecologists call a **complex adaptive system**.

The forest might experience a drought, an infestation of beetles, or even a small wildfire—but if it's sufficiently resilient it will recover from those incidents with essentially the same species, soil and weather patterns, and other qualities that characterize it as a Ponderosa pine forest ecosystem. If it *isn't* sufficiently resilient, if it's brittle instead, one of these incidents could be so disruptive that the system *doesn't* recover as a Ponderosa pine forest; instead it becomes a different system—maybe an arid grassland—with a different set of species and soil and weather patterns that will respond to future disruptions in different ways. The system's identity has changed.

So what is it that makes a system resilient? It boils down to an ability to adapt to both short-term disruption and long-term change while retaining the system's essential identity. Resilience in an ecological system might be

described in terms of general qualities like having a diversity of species and ample nutrient reserves, plus specific adaptations like the ability of certain tree seeds to survive wildfire and sprout soon afterward.

Resilience in a system where *humans* play a role may also involve general qualities like diversity (say, of revenue sources) and redundancy (say, of transport options), plus qualities related to *human decision-making* like openness to new ideas, trust, and strong social networks.

Now that we have a rough idea of what resilience is, we can start to apply the concept to the systems we care about, by encouraging resilience-*building* characteristics and discouraging resilience-*reducing* characteristics. Of course, in doing so we'll change the way the system works; ironically, we might even somewhat change its identity! That's because building resilience starts with decisions about **what we value** about a system.

Say we're a small city of 10,000 people that has one main employer—a shoe factory. If that shoe factory suddenly goes out of business, hundreds of people will be unemployed with few prospects for new work, and the local economy will take a big hit. It's not a very resilient situation. But in what ways, and to what ends should we try to make it more resilient? It depends on the circumstances and on the people. So imagine two scenarios:

- Here's Scenario 1: "Shoemaking is a centuries-old tradition in our city. It's celebrated in public, taught to generations of families, thoroughly infused in our culture. So to build our resilience we'll help the workers buy out the factory and invest in shoe-focused tourism."

- Here's Scenario 2: "Shoemaking is a relatively new thing in our city. The factory was built here twenty years ago by a foreign company and it's been polluting our river ever since. So to build our resilience, we'll diversify our job base by courting new employers and training local workers for other kinds of jobs."

In these two scenarios, efforts to build resilience would likely proceed along very different lines.

We've seen that efforts to build resilience in human societies can take advantage of principles identified in natural systems. Here are a few additional concepts that spring from the study of resilience in ecological systems.

One is the ***adaptive cycle***; this describes the cycle of resource organization, growth, conservation, and release that complex adaptive systems have been observed to follow. For example, in our Ponderosa pine forest the collective behavior of plants and animals organizes itself in a predictable pattern. First, following a disturbance, hardy and adaptable "pioneer" species of plants and small animals fill in open niches and reproduce rapidly. Over time, those species that can take advantage of relationships with other species start to dominate. These relationships make the system more stable … but at the expense of diversity. Resources like nutrients, water, and light are so taken up by the dominant species that the system as a whole loses its flexibility to deal with changing conditions. Finally, these trends accumulate to make the system susceptible to a crash—say, a wildfire. Many trees die, releasing their nutrients, opening the forest canopy to let more light in, and providing habitat for shrubs and small animals. The cycle starts over.

As we saw in video 9, where we looked at the tendency of agrarian societies to pass through phases of expansion and decline, the adaptive cycle also applies to civilizations. If you are attempting to build resilience in a community, it would be helpful to know which stages of the adaptive cycle the community, its components, and the larger system of which your community is a part are all in.

This relates to another important concept called ***panarchy***[1], which is the idea that systems exist at multiple scales of space and time, and the interactions across those scales help determine what's happening within the

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[1] http://www.resalliance.org/panarchy

system you're studying. Think of our small city with the shoe factory. That city doesn't exist in a vacuum: it is part of a larger-scale system like a regional ecosystem and a national economy; and it's made up of smaller-scale systems like a city government, lots of individual businesses, and even more individual households. And of course, the things that happen in all of those systems affect the city generally. Moreover, things that happened in the past—like the construction of the shoe factory—and plans that certain people have for the future also affect the city in the present.

In systems thinking, one of the first steps is to draw a boundary around the system you want to consider. Everything is interconnected, so you need to decide what you're going to focus on.

Resilience building works the same way. The resilience of any one system is influenced by the resilience of everything around it. For example, the resilience of your household is affected by the resilience of the larger economy—and vice versa. Naturally, we aim to build resilience in the systems we care most about or have the most control over. But we still need to be sensitive to ways in which influence cascades down from global systems, to nations, cities, households, and individuals—and also back up those same hierarchical levels.

With efforts to build resilience in human communities there's never one right answer. But there are also many ways to get it wrong. In video 15 we'll explore some ideas for how to approach community resilience building despite the challenges.