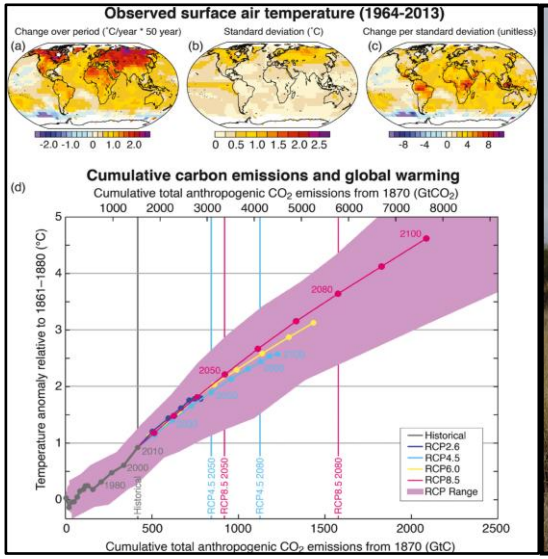
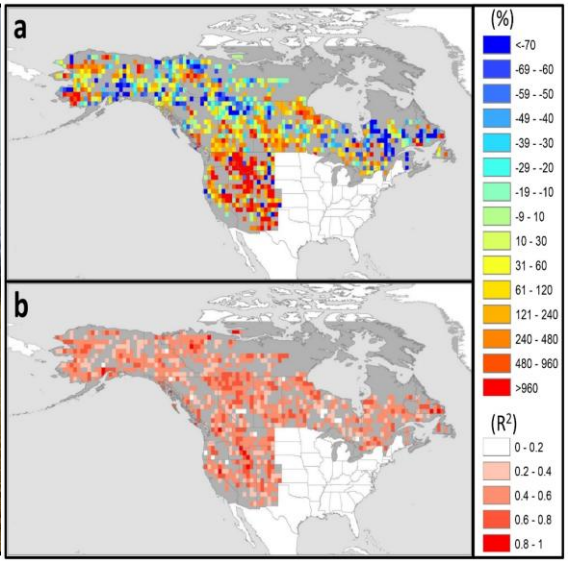
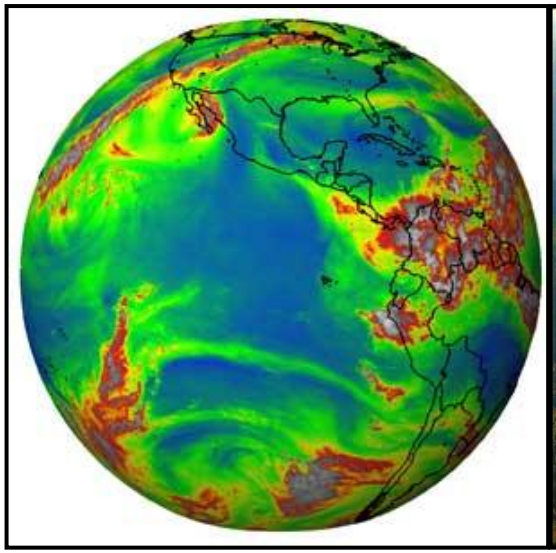
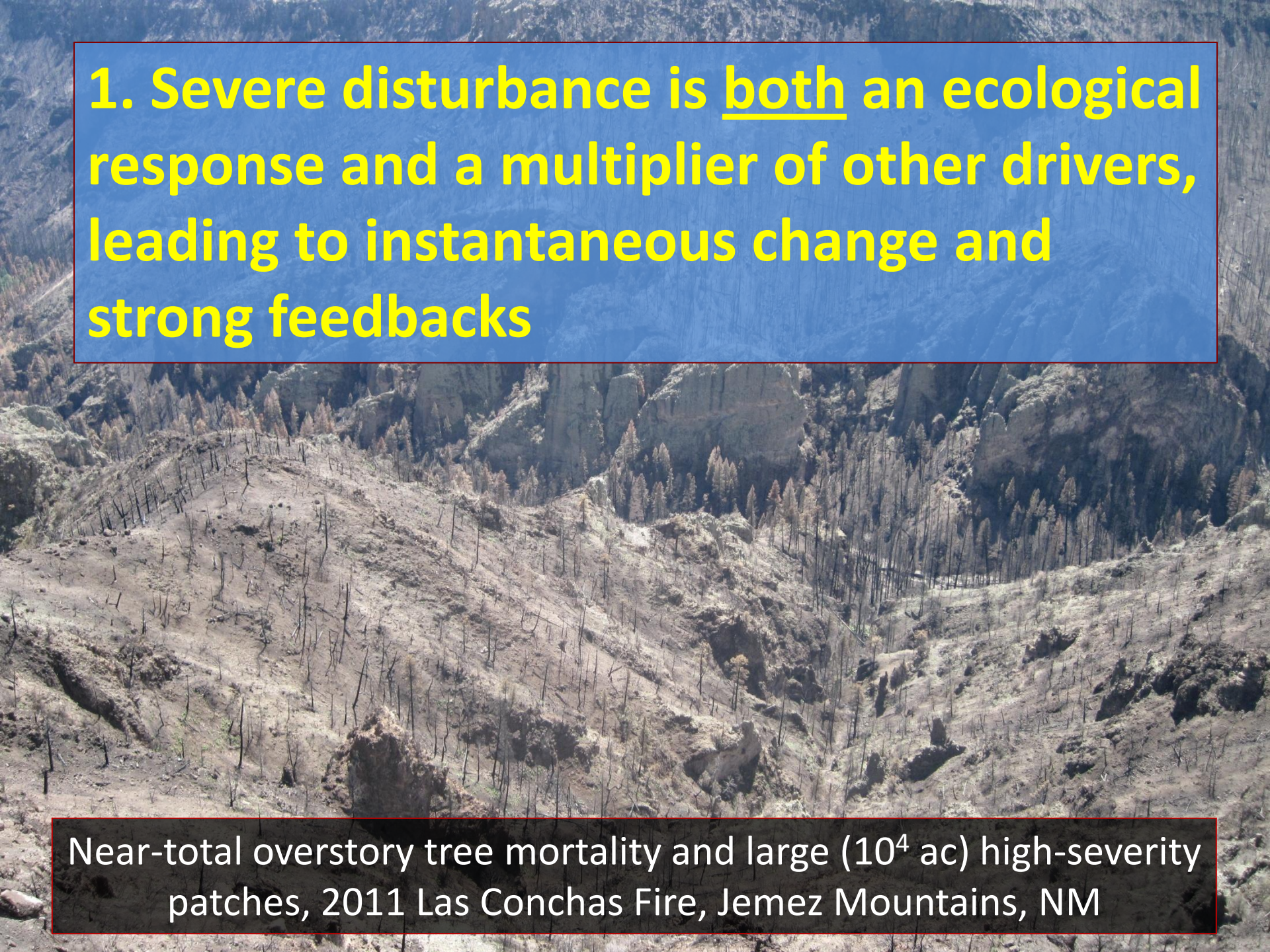




Why is resilience ecology a social science?

Don Falk

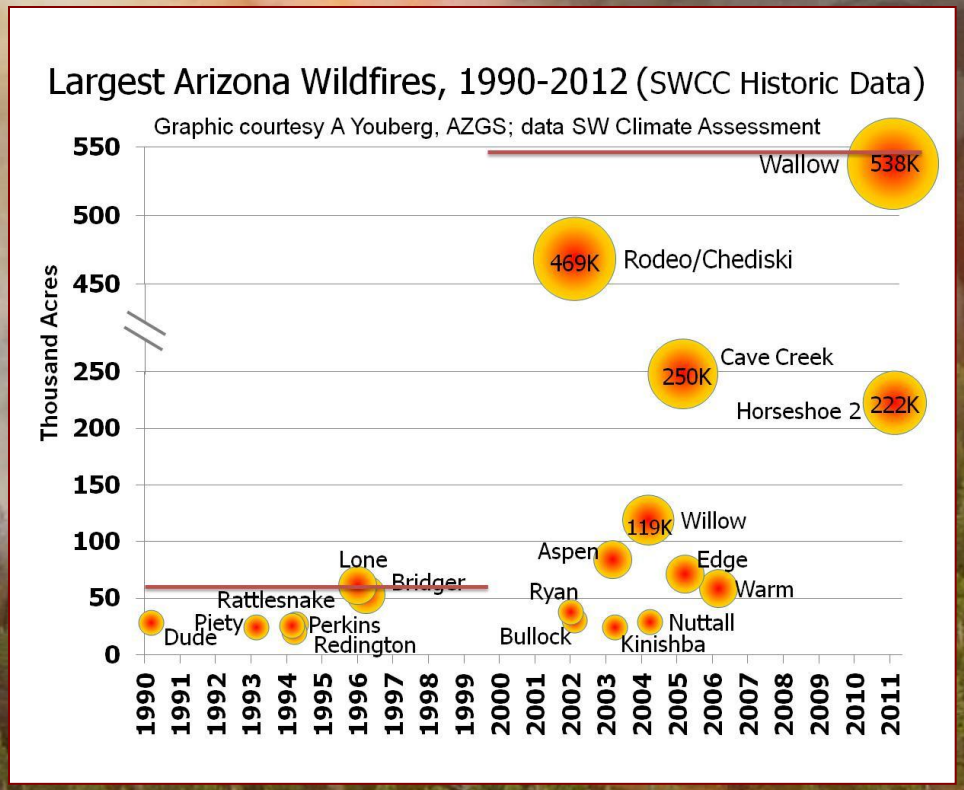




1. Severe disturbance is <u>both</u> an ecological response and a multiplier of other drivers, leading to instantaneous change and strong feedbacks

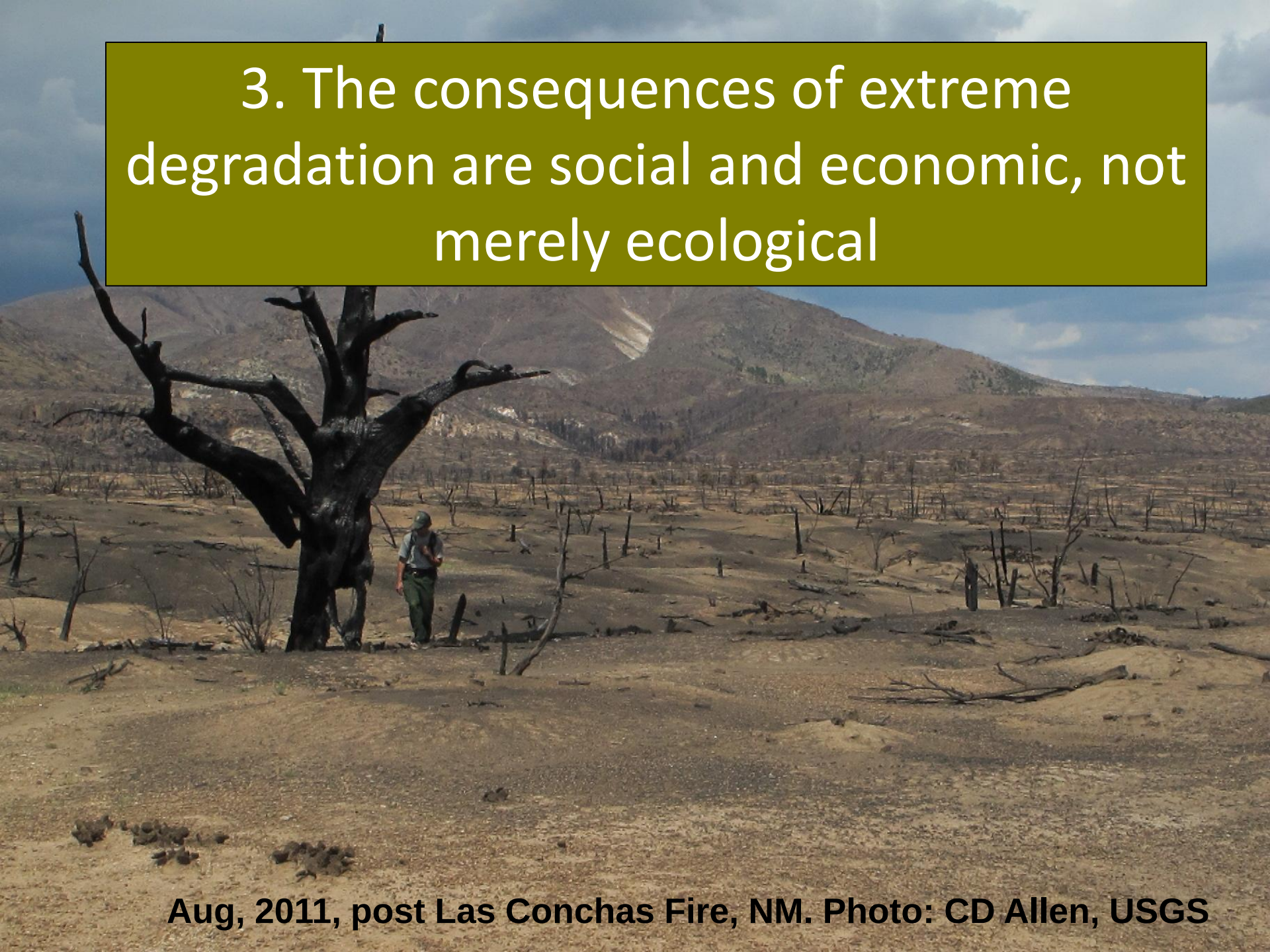
Near-total overstory tree mortality and large (10^4 ac) high-severity patches, 2011 Las Conchas Fire, Jemez Mountains, NM

2. Wildfire is a major wild card in ecological change, and largely the outcome of our land-management decisions and effects on climate



2006 Nuttall-Gibson Complex, Pinaleño Mts.
Courtesy USFS and SW Fire Science Consortium
Wildfire sizes courtesy Ann Youberg, AZGS

3. The consequences of extreme degradation are social and economic, not merely ecological



Aug, 2011, post Las Conchas Fire, NM. Photo: CD Allen, USGS

4. Even in a changing world, many of the reasons ecosystems are pushed beyond their limits are the old" causes of degradation

Titeux et al. 2016

5. Ultimately, we need to map the ecology of resilience onto ecosystem restoration and management – a social activity.

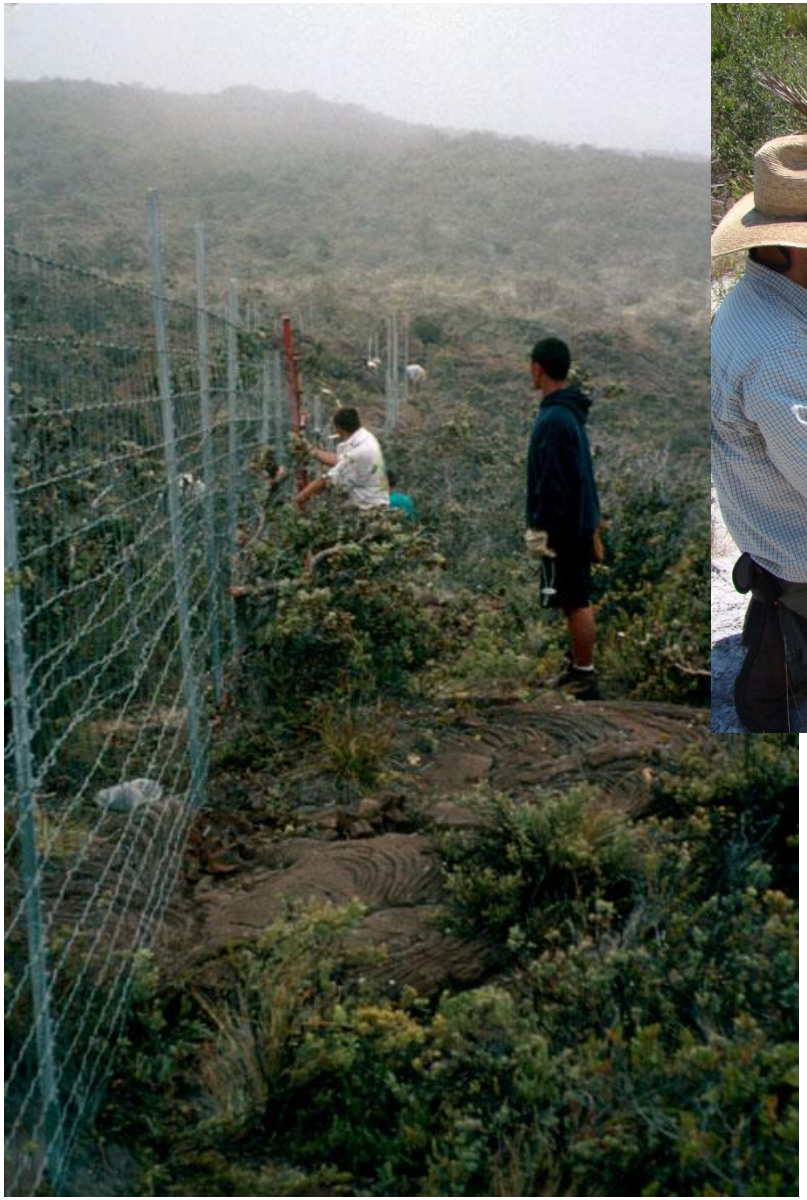
- Promote **resistance and persistence**
- Increase **recovery capacity**
- Assist ecosystems to **respond and reorganize**

Millar et al. 2007; Falk & Millar 2016

Ecological tipping points

1. Generally initiated by some **combination of climate stress, ecological interactions, and disturbance**
2. System moves into a **new metastable state** (e.g. forest to shrub- or grass-dominated ecosystem)
3. System is then **resilient in its new state**.

Same toolbox, different times and places?



From restoration to a resilience framework for ecosystem management

Do we fight or fold?

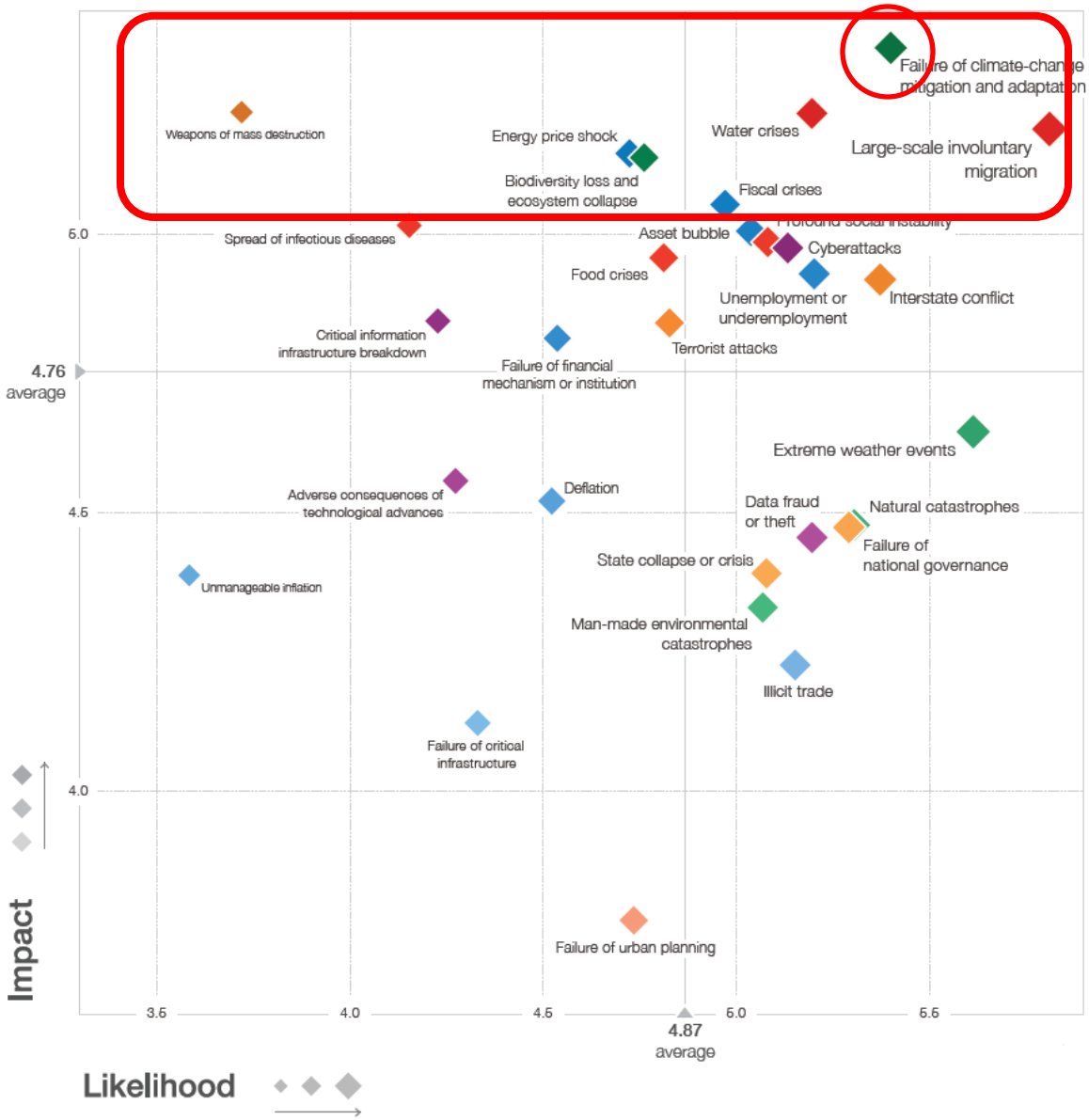
Not all stasis is **adaptive**; not all **change** is bad. Can we make the distinction?

Do we understand the **mechanisms of persistence, recovery, and reorganization** that govern ecological trajectories?

Can we **use restoration to expand the resilience space** in which ecosystems can adapt in rapidly changing environments?

Resilience ecology means accepting (and even promoting) adaptive change

1. Which kinds and degrees of **change** are **adaptive**, and which are **destructive** of biodiversity and ecosystems?
2. Can we anticipate ecological consequences well enough to inform **decisions and actions on the ground**?
3. Are we prepared to **let go of some current ecosystems**, or would doing so violate our core principles?

World Economic Forum, Global Risks Report 2016, Figure 1

https://www.weforum.org/reports/the-global-risks-report-2016/