Conference Wrap-up

Richard E. Miller

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My purpose is twofold: to review key messages from previous speakers and to offer some concepts that may help you link recently acquired information.

When Mt. Mazama erupted about 7,000 years ago, its airborne ash and pumice fell on a wide variety of existing soils. This Mazama tephra was a new parent material for soil development (fig. 1). At some locations, the original deposition was redistributed by: gravity, wind, water, plants, or animal activities, including those of humans. Soil at any specific location in the Inland West is a result of these soil-forming factors and their many possible interactions.

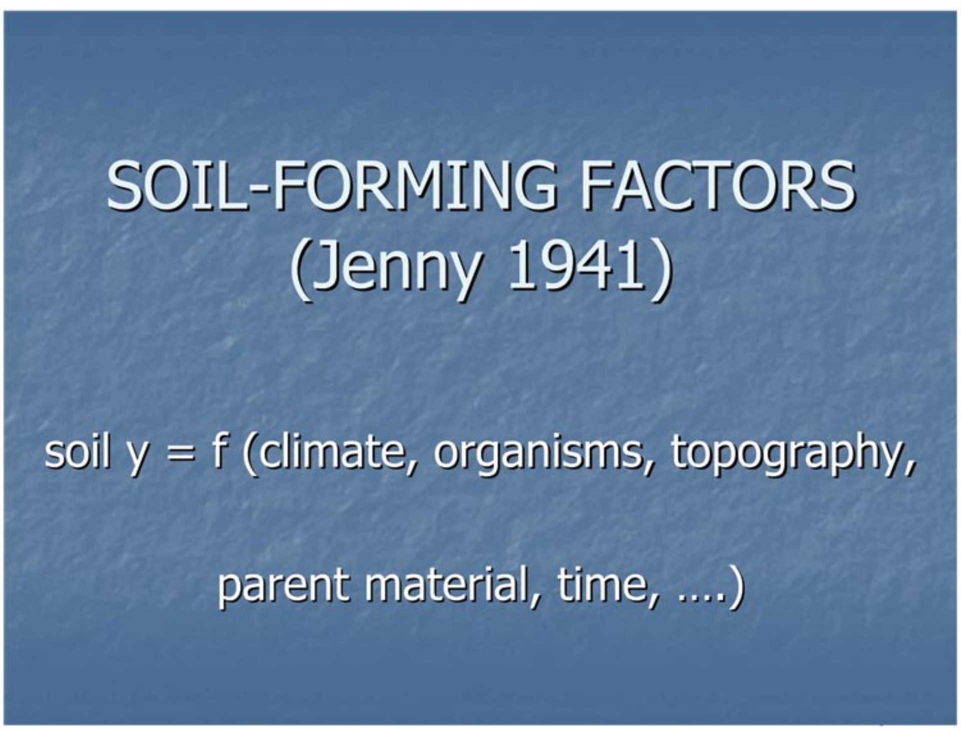

Figure 1—Soil-forming factors (Jenny 1941).

Major Take-Home Messages

1. Ash-derived soils are extensive, variable, and different from soils derived from other parent materials.
2. Activities (equipment, fire) can change soil properties and functions.
3. Consequences of soil changes for vegetative growth or soil erosion are uncertain, because they are seldom quantified.
4. Hence, optimum allocation of preventative or restorative efforts is uncertain.

What is a Forester to do?

Assuming your intent is to protect and manage soil at specific locations, how will you use information gained at this conference? Can you state facts and explain relationships among these facts? Will this new information change or affect your future decisions about prescribing or controlling activities on ash-derived or ash-influenced soils?

Most foresters and land managers are concerned about yield…of wood, forage and protective vegetation. Most recognize that yield at a specific location depends on numerous factors and their interactions (fig. 2). Several speakers reviewed the effects on soil properties of either heavy equipment used in harvesting or of wild and prescribed fire. You should recognize that a change in soil properties is a change in one of several factors that contributes to yield. Despite visually apparent or measured changes in soil characteristics (for example, bulk density, resistance, organic matter) or functions, however, yield may not change. Other factors that also affect yield at a given location can be enhanced by or compensate for the

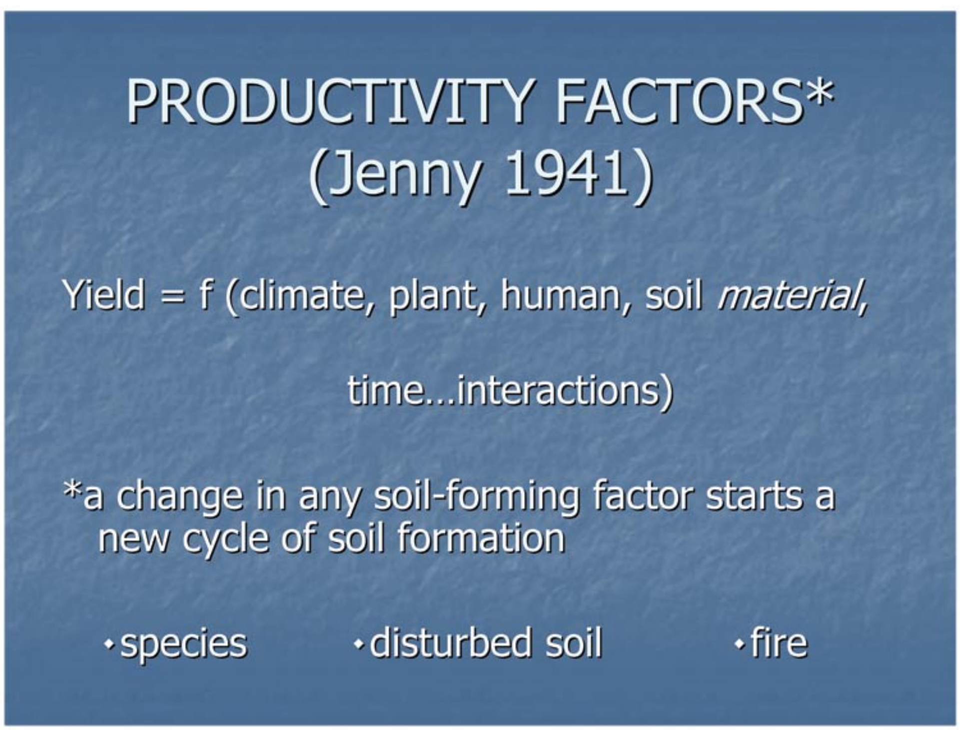

Figure 2—Factors that set productivity or yield (Jenny 1941).

potentially negative effects of soil changes on yield. Factors controlling yield also interact. For example, soil disturbance may reduce vegetative competition for trees. Consequently, this indirect effect of soil disturbance on competing vegetation can enhance tree growth or compensate for direct, potentially negative effects of disturbance on tree growth.

When you propose to harvest trees or prescribe fire, can you predict likely consequences on soil properties and subsequent plant yield? The components of this practical and important question are displayed in figure 3. You, as the agent, propose to use ground based equipment at location Y. Do you recognize that each location has a unique combination of soils, climate, and other factors that determine the severity of soil disturbance and the practical consequences for tree or vegetative growth? Therefore, do not anticipate the same effects on soil or growth at all locations. Refer to current research results and explanations, for example, Gomez and others (2002); Powers and others (2005) for justification of your decisions and remember your A, B, C's (fig. 4).

The concept of ecological stability also applies to soil stability (fig. 5). Soils differ in their initial resistance to heavy equipment traffic. For example, compare visual effects of traffic on a sandy soil containing 70- to 90-percent gravel and cobbles by volume in the top 3 feet with that on a deep silt loam soil that is stone-free. These two soils differ in their weight-bearing capacity and in shear strength, especially when moist or wet. Soils also differ in their resilience or rate of recovery after disturbance. Rate of recovery of soil properties and functions depends largely on interactions among climate, above-and-below ground organisms, and soil properties. For example, recovery is hastened in climates that cause soil to have cycles of thawing and freezing, wetting and drying, or climates that promote rapid growth of plants and other organisms.

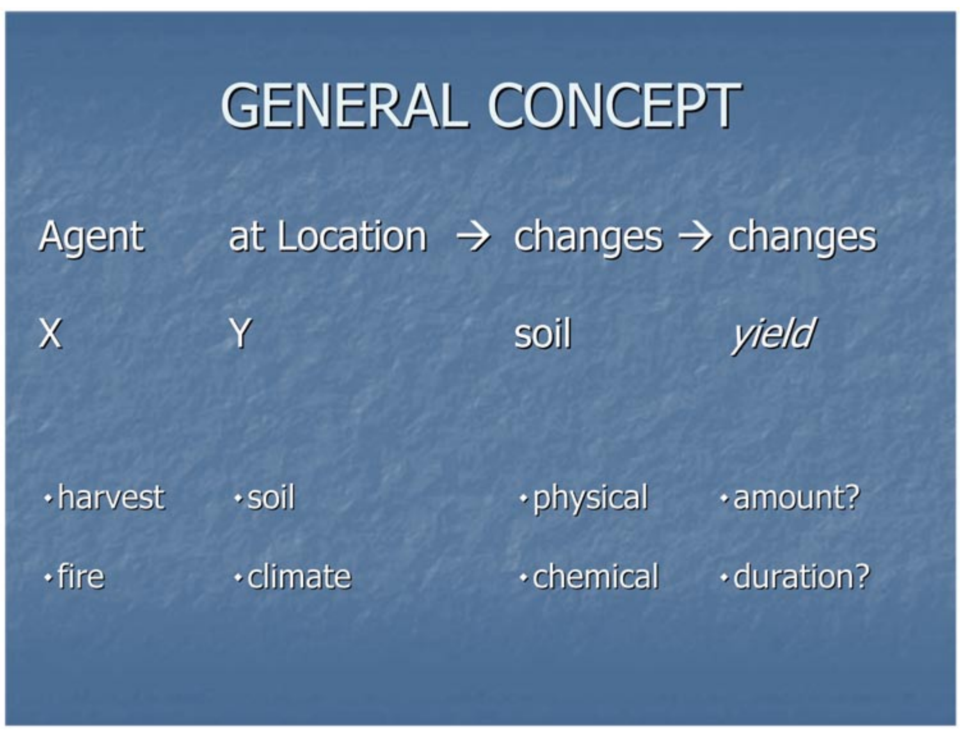

Figure 3—A general concept of actions and consequences.

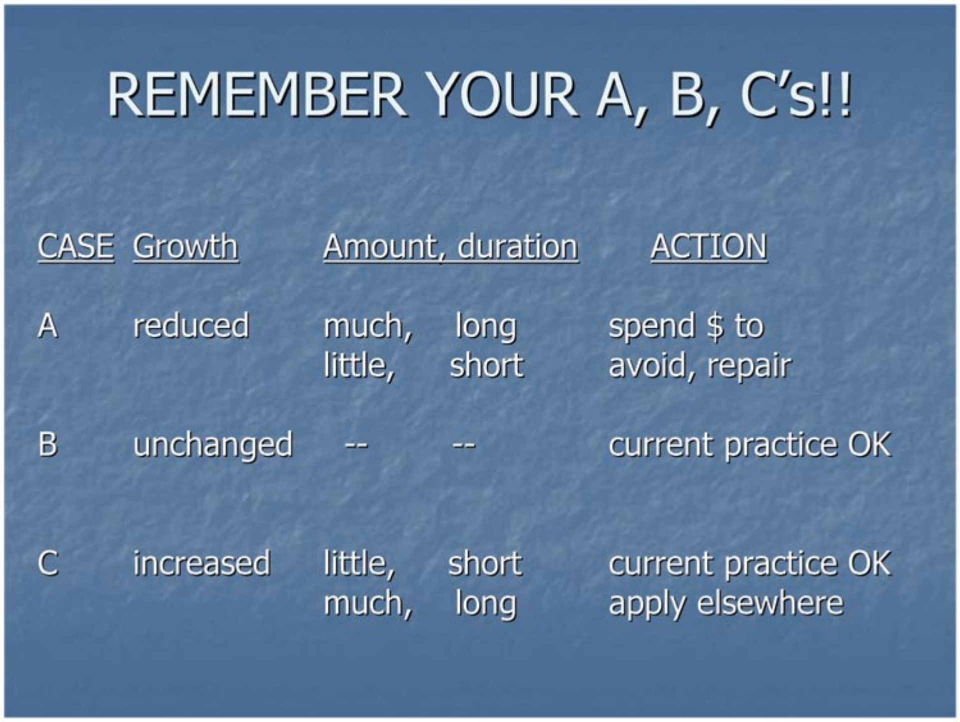

Figure 4—Locations (sites) differ: Remember your A, B, C's.

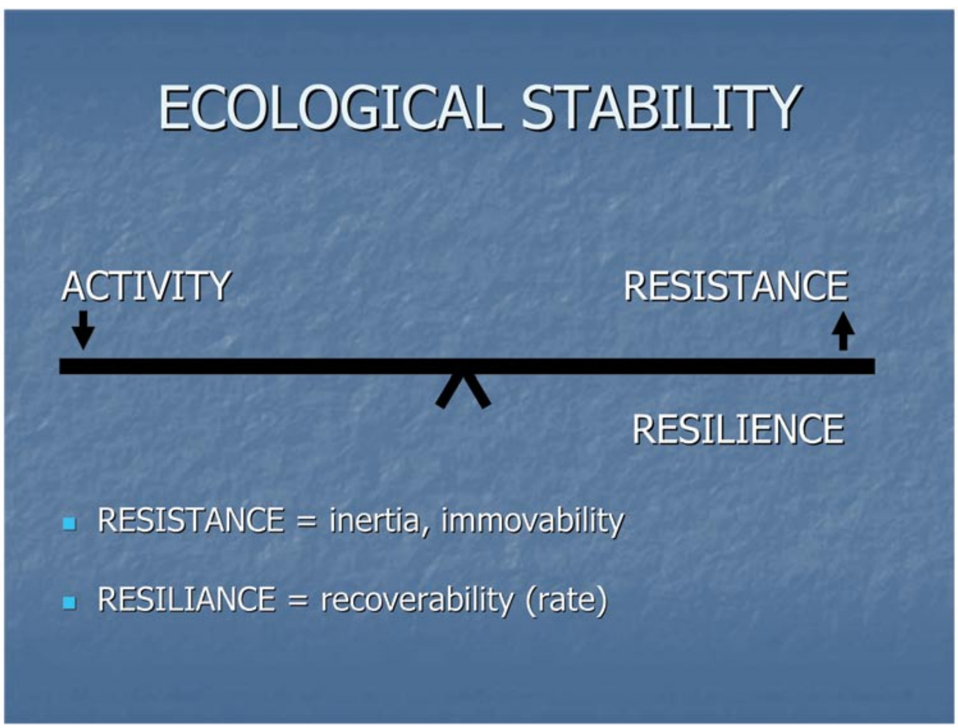

Figure 5—Ecological stability: response depends on resistance; recovery depends on resilience.

Among the many combinations of soils and micro- and macro-climates in the Inland West, we need to identify our A-, B-, C-locations. Recall a similar urging by our after-dinner speaker, Larry Ross: "go forth and stratify forestland;" then fit the practice to the soil.

Soils and climates differ. Soils and climates interact to create varying consequences of soil disturbance or fire for yield (fig. 6). Your considering differences in soil depth like differences in bank accounts will be helpful: Equate shallow soils to a $100 account and deep soils to a $1,000 account. Thus, your prescribing ground-based equipment or fire to reduce fuels will most likely result in reduced growth and subsequent yield on shallow soils or soils with shallow ash caps. Moreover, presence of coarse, non-weathered rock fragments further reduce effective soil depth or the "bank account." Finally, remember interactions: where equipment or fire degrade soil for plant growth, anticipate stronger reductions in plant growth where climate is harsh and less favorable for plant growth.

Final Take-Home Messages

1. Do not assume negative "consequences" for vegetation yield on all soils and locations (soils differ… climates differ…hence, tree response differs).
2. Help others to identify Case A, B, C locations by measuring tree response to disturbance.
3. Know your A-, B-, C-soils/sites.
4. Allocate time and dollars at Case A locations (where activities reduce growth).
5. Save time and dollars at Case B and C locations (where activities have no effect or improve growth).
6. In short, allocate your protective and restorative efforts… to achieve favorable benefit/cost ratios.

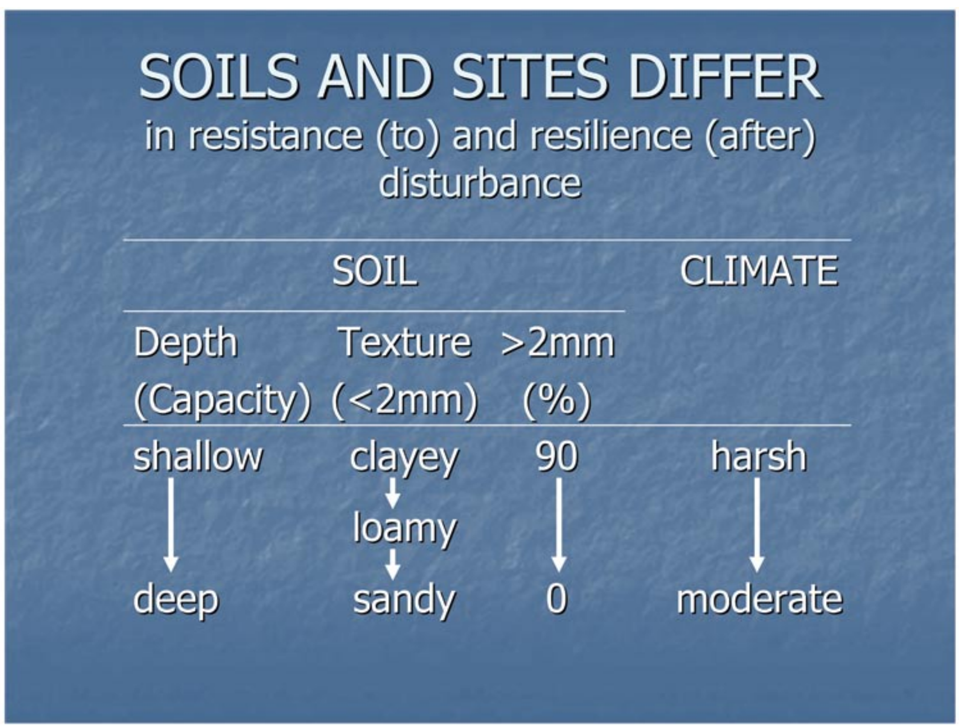

Figure 6—Soils and site differ in resistance and resilience.

Literature Cited

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