After the Fire:
Approaches to Revitalizing Ecosystem Resources

Fire Severity
Fire severity is a measure of the impact of fire on ecosystem resources — trees, other plants, soil, water, and wildlife. The degree of fire severity depends upon the nature of wildland fuels available for burning, combustion characteristics (flaming vs. smoldering), fire intensity and duration.

Fire Regime
A fire regime is an ecosystem's characteristics of fire frequency, intensity, spread pattern, and seasonality. Regime is determined by the nature and growth of fuels, climate, source(s) of ignition and landscape features.

Heat Pulse
Heat pulse is the flow of radiant, convective or conducting energy produced by a fire in a specific direction that causes ecosystem impacts. A below-ground heat pulse affects soil as well as aboveground vegetation, regeneration, and ecosystem function.

Costs & Benefits
Costs of fire and its impacts include traditional fire fighting and mechanical fuel reduction costs, as well as the values related to the changes to ecosystems, recreation value, and the contributions of pictorial views, wildlife habitat to the quality of rural living, or water quality and supply.

Wildfires have shaped plant communities and soils for as long as vegetation and lightning have existed on earth. Flora, fauna and soil native to a given ecosystem are adapted to the historic range of variation in the fire regime for that system. Since 1990, the number and acreage of fires outside this range has increased by 30-fold compared to historical data going back to 1910. High severity fires outside the historic range of variation can be especially costly, and may benefit from interventions that mimic nature. To adequately assess the impact of these disturbances, more integrated research on wildfires is needed.

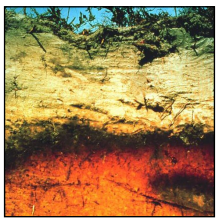
Integrated research that combines the physical, biological, and social sciences can help address how to manage the nation's ecosystem resources to minimize the negative impact of wildfire.

Revitalizing Ecosystem Processes and Services Following Severe Fires
Most fires do not necessitate post-fire interventions, which can be counter-productive to forest management. However, in recent decades human activities have changed the key factors that influence fire behavior and ecosystem impact--fuels, climate, ignition sources, and landscape characteristics. As a result, historically atypical fire regimes are now occurring with greater frequency. In these cases, some interventions such as seeding, mulching, etc may be useful in appropriate locations. Current findings show that it is best if interventions imitate nature, weigh short-term benefits against long-term costs, and account for inevitable uncertainties. In short, it is important to keep goals in mind when determining appropriate post-wildfire management.

Soil is the Earth's Skin
Forest soils filter rain water influencing water for people. High-severity forest fires are a particular concern for land managers, as they can cause water repellency, soil sealing and costly surface erosion. These effects negatively impact soil productivity, as well as water quality and endangered species habitat. Post-wildfire management techniques can minimize some negative impacts to watersheds and forest ecosystems by maximizing rainfall infiltration and soil function.

The Economics of Wildfires
The public often perceives wildfires as only having devastating effects on air quality, fauna, flora, soil, tourism, and water quality. Yet, fires can yield ecological benefits and alter the landscape in positive ways. An economic framework would manage the risks and impacts of wildfire by balancing the role that fires can have, both positively and negatively, on the values that society seeks over time and space.






Post-wildfire Management

- Burned Area Emergency Response (BAER) assessments
- Post wildfire erosion interventions
- Watershed hydrologic response models
- Fire severity assessments
- Water repellency measurements

Economic Principles

- Economics is not simply cost-benefit analysis of commercial values, such as timber and property damages, but also includes non-market values of ecosystem services (impacts on tourism, water or air quality, wildlife and others) that society values.
- Policy choices, at all governmental levels, can create both intentional and unintentional incentives for choices by managers and individuals that change the risk and cost of fire, both positively and negatively. Evaluation of incentives is critical to solutions.

Fire Severity

Rill and Gully Erosion

Soil Sealing

Water Repellency

Reseeding

Post-Fire Flooding

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Norm Christensen is Professor of Ecology and Executive Director of Duke University's Environmental Leadership Program. He chaired the Interagency Taskforce on the Ecological Effects of the 1988 Yellowstone Fires as well as the 2007 external review of the Forest Service's fire research program. Currently President of the Ecological Society of America, Dr. Christensen's research deals with patterns of disturbance, including fire.

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Stephen Swallow's research in environmental economics concerns methods to estimate the value of non-market goods, economics of ecosystem management, eco-friendly marketing, and forest management practices for the conservation of seasonal wetlands and sensitive species. Dr. Swallow was a member of the Fire Science Review Panel for the US Forest Service.

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Dr. Neary researches the effects of wildfires on hydrology, soil disturbances from prescribed fire and thinning, and the watershed-scale effects of wildfires prescribed fires. He is a past Fellow of the American Society of Agronomy (2004) and the Soil Science Society of America (2005). Dr. Neary has performed scientific exchanges in 18 countries over the duration of his professional career.