nisms for approval of different state programs, which have varied widely in their approach and dedication to regulation of strip and mountaintop mining. Some states have little effective regulation and enforcement, whereas others have strict rules that are carefully monitored. Even an active reclamation state can have problems – in Wyoming, for example, where, on the one hand, the town of Rock Springs is replete with past mining sins, subsidence, and sink hole history, while on the other hand, mega-scale coal mining, such as that found in the Powder River basin, is carefully regulated.

Clearly, as Hall argues, and in view of the recent coal ash sludge disaster in Harriman, TN, coal combustion wastes (CCW) – including ash, slag, and particulates from flue gases – are a major problem. Currently, the US Environmental Protection Agency (EPA) categorizes such wastes as "special waste", and exempts them from hazardous waste designation under the Resource Conservation and Recovery Act (RCRA). Given the preliminary analytical data, whether those regulations properly address handling and disposal is obviously another grave question. The EPA has authority to regulate CCW disposed of in landfills and surface impoundments under the solid waste regulations of RCRA, but the EPA – despite years of study – has yet to pass comprehensive rules. CCW used to fill surface or underground mines ("minefill") is generally regulated under SMCRA, albeit insufficiently to protect groundwater and inadequately with regard to issues of disposal management. However, the states take widely differing views of ash disposal – some have only perfunctory regulations, whereas others have complex and onerous rules. The National Academies of Science have roundly criticized the methods of disposal of CCW – but to no avail. Finally, in 2008, Representative Nick Joe Rahall of West Virginia introduced a bill in Congress – the Coal Ash Reclamation, Environment and Safety Act of 2009 – that called for sweeping changes to the coal ash dam practices. At least that is a start.

The irony is that better control of particulate and mercury emissions at power plants, for instance, has led to alarmingly high residues of heavy metals in ash. Some are suggesting that plasma arc technology (whereby ash is transformed into a reusable glass matrix) may ultimately provide a solution.

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doi: 10.1890/09.WB.002

Beetle-infested forests are not "destroyed"

Near the scenic resort communities of Grand Lake and Winter Park (Grand County, CO), thousands of lodgepole pines (*Pinus contorta*) have been killed by a native bark beetle, the mountain pine beetle (*Dendroctonus ponderosae*). According to US Forest Service aerial surveys, more than 600 000 ha of Colorado's forests have been affected by this insect since 1996. Newspaper articles describe how vast acreages of forest have been "destroyed" or "lost". These accounts, state-wide mortality maps (eg http://csfs.colostate.edu/pdfs/MPB_AllForestSpecies.pdf), and the mountain slopes covered with red, dying trees leave the casual observer with the impression that the beetles are killing every lodgepole pine in their path, and that these once green forests are gone, perhaps forever.

A closer look, however, reveals that the beetle-caused mortality and the changes in stand structure are extremely heterogeneous (Figure 1). Although some patches have almost no surviving canopy trees, such patches are actually fairly rare. Other patches contain only a few dead trees. The largest patch we could find with complete (100%) mortality of overstory trees was only about 0.4 ha; all areas larger than this had at least some surviving canopy trees. Survivors are present almost everywhere, which is important, because these will be the nucleus of the new forest that will emerge in the wake of the outbreak.

The beetles have selectively killed the larger trees, whereas most smaller trees and saplings have survived. Often obscured by the red crowns of the larger dead or dying trees, small trees usually are at least as abundant in a surviving understory as dead trees are in the overstory. All of these diverse stand structures are grouped together, however, in the reported acreages of "destroyed" forest.

Our intent is not to downplay the ecological importance of the bark beetle outbreaks that have exploded across western North America (Raffa *et al.* 2008). The consequences – for some forest types, such as high-elevation whitebark pine (*P albicaulis*; Logan *et al.* 2003), for global carbon dynamics (Kurz *et al.* 2008), and for future wildfires (Lynch *et al.* 2006; Jenkins *et al.* 2008) – could be substantial and, in many cases, negative. Rather, we suggest that reseachers need to adequately and accurately document the actual patterns of forest change and the spatial heterogeneity of those patterns in a variety of forest types across western landscapes.

Information about the variation in mortality is important for at least four reasons. First, the public is poorly served when we convey the idea that Colorado's lodgepole pine forests have been entirely "lost" because of the outbreak. Second, management options and priorities (eg protecting watersheds and homes from fire, ensuring a sustainable timber supply) differ

Figure 1. *Large swaths of mostly dead canopy lodgepole pine intermixed with patches of green trees (survivors) in Kawuneeche Valley, Rocky Mountain National Park.*