Controlled burn

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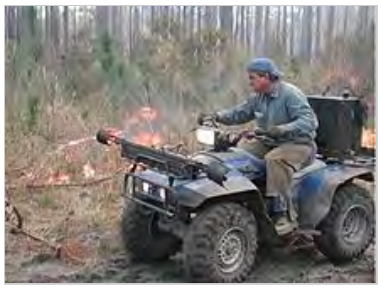
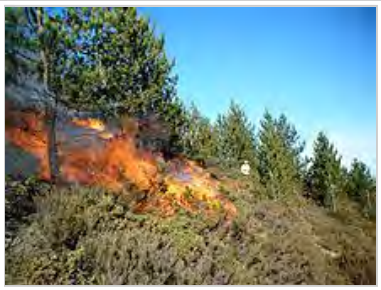
Controlled or **prescribed burning**, also known as **hazard reduction burning**[1] (HRB), **backfire**, or **swailing**, is a technique sometimes used in forest management, farming, prairie restoration or greenhouse gas abatement. Fire is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Hazard reduction or controlled burning is conducted during the cooler months to reduce fuel buildup and decrease the likelihood of serious hotter fires.[2] Controlled burning stimulates the germination of some desirable forest trees, and reveals soil mineral layers which increases seedling vitality, thus renewing the forest. Some cones, such as those of Lodgepole Pine and Sequoia, are serotinous, as well as many chaparral shrubs, meaning they require heat from fire to open cones to disperse seeds.

In industrialized countries, controlled burning is usually overseen by fire control authorities for regulations and permits. The party responsible must delineate the intended time and place. Obtaining a permit may not limit liability if the fire burns out of control.

An experimental burn in Canada; note the measuring equipment in front.



Firing the woods in a South Carolina forest with a custom made driptorch mounted on an ATV. The device spits flaming fuel oil from the side, instantly igniting the leaf litter.



A prescribed burn in a *Pinus nigra* stand in Portugal

Controlled burning of a field outside of Statesboro, Georgia, United States in preparation for spring planting

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History

There are two basic causes of wildfires. One is natural (lightning) and the other is people.[3] Controlled burns have a long history in wildland management. Pre-agricultural societies used fire to regulate both plant and animal life. Fire history studies have documented periodic wildland fires ignited by indigenous peoples in North America and Australia.[4][5]

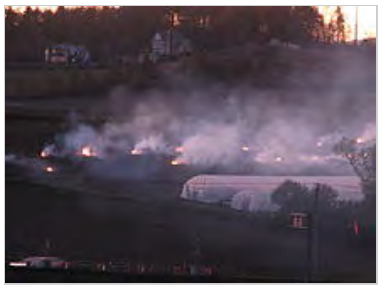
Fires, both naturally caused and prescribed, were once part of natural landscapes in many areas. Studies have shown that between the mid Holocene and the 17th century AD, wildland fires annually burned between 45.0% and 87.5% of present-day California's total land, for example. These practices ended in the early 20th century when US fire policies were enacted with the goals of suppressing all fires.[5] Since 1995, the US Forest Service has slowly incorporated burning practices into its forest management policies.[6]

Back burning

An aerial view of a controlled burn in Helderberg Nature Reserve in South Africa bordering the city of Cape Town. In South Africa controlled burns are important for maintaining the ecological health of indigenous fynbos as well as reducing the intensity of future burns.

Back burning[7] is a technique utilized in controlled burning and during wildfire events. While controlled burns utilize back burning during planned fire events to create a "black line", back burning or backfiring is also done to stop a wildfire that is already in progress. Back burning is a way of reducing the amount of flammable material during a controlled burn or wildfire by starting small fires along a man made or natural firebreak in front of a main fire front. It is called back burning because the small fires are designed to 'burn back towards the main fire front' and are usually burning and traveling against ground level winds. Back burning reduces the amount of fuel that's available to the main fire by the time that it reaches the burnt area. Firebreaks are often used as an anchor point to start a line of fires along natural or manmade features such as a river, road or a bulldozed clearing.[8]

Forest use



Japanese controlled burn (Hokkaido)

Another consideration is the issue of fire prevention. In Florida, during the drought in 1995, catastrophic wildfires burned numerous homes. But forestry managers in the Florida Division of Forestry noted that the underlying problem was previous cessation of controlled burning, resulting from complaints by homeowners. Each year additional leaf litter and dropped branches increased the likelihood of a hot and uncontrollable fire.[9]

Controlled burns are sometimes ignited using a tool known as the driptorch, which allows a steady stream of flaming fuel to be directed to the ground as needed. Variations on the driptorch can be used such as the *helitorch*, which is mounted on a helicopter, or other improvised devices such as mounting a driptorch-like device on the side of a vehicle. A pyrotechnic device known as a fusee can be used for ignition in nearby fuels while a Very pistol can be for fuels farther away.

For the burning of slash, waste materials left over from logging, there are several types of controlled burns. Broadcast burning is the burning of scattered slash over a wide area. Pile burning is gathering up the slash into piles before burning. These burning piles may be referred to as bonfires. High temperatures can harm the soil, damaging it physically, chemically or sterilizing it. Broadcast burns tend to have lower temperatures and will not harm the soil as much as pile burning,[10] though steps can be taken to treat the soil after a burn. In lop and scatter burning, slash is left to compact over time, or is compacted with machinery. This produces a lower intensity fire, as long as the slash is not packed too tightly.[10] However, soil may be damaged if machinery is used to compress the slash.

Controlled burning reduces fuels, may improve wildlife habitat,[11] controls competing vegetation, improves short term forage for grazing, improves accessibility, helps control tree disease, and perpetuates fire dependent species.[12] In mature longleaf pine forest, it helps maintain habitat for endangered red-cockaded woodpeckers in their sandhill and flatwoods habitats.[13] Fire is also felt to be a crucial element of the recovery of the threatened Louisiana pine snake in the longleaf pine forests of central Louisiana and eastern Texas.[14] However, many scientists disagree with such a simplistic approach, and indicate that each forest must be assessed on its own merit.

In the wild, many trees depend on fire as a successful way to clear out competition and release their seeds. In particular, the Giant sequoia depends on fire to reproduce: the cones of the tree open after a fire releases their seeds, the fire having cleared all competing vegetation. Due to fire suppression efforts during the early and mid 20th century, low-intensity fires no longer occurred naturally in many groves, and still do not occur in some groves today. The suppression of fires also led to ground fuel build-up and the dense growth which posed the risk of catastrophic wildfires. It wasn't until the 1970s that the National Park Service began systematic fires for the purpose of new seed growth. Eucalyptus regnans or Mountain Ash of Australia also depends on fire but in a different fashion. They carry their seeds in capsules which can deposit at any time of the year.

Being flammable, during a fire the capsules drop nearly all of them and the fire consumes the Eucalypt adults, but most of the seeds survive using the ash as a source of nutrients; at their rate of growth, they quickly dominate the land and a new Eucalyptus forest grows.[15]

Agricultural use

In addition to forest management, controlled burning is also used in agriculture. In the developing world, this is often referred to as slash and burn. In industrialized nations, it is seen as one component of shifting cultivation, as a part of field preparation for planting. Often called **field burning**, this technique is used to clear the land of any existing crop residue as well as kill weeds and weed seeds. Field burning is less expensive than most other methods such as herbicides or tillage, but because it does produce smoke and other fire-related pollutants, its use is not popular in agricultural areas bounded by residential housing.

In the United States, field burning is a legislative and regulatory issue at both the federal and state levels of government.

Controversy

In Oregon, field burning has been widely used by grass seed farmers as a method for clearing fields for the next round of planting, as well as revitalizing serotinous grasses that require fire in order to grow seed again. The Oregon Department of Environmental Quality began requiring a permit for farmers to burn their fields in 1981, but the requirements became stricter in 1988 following a multi-car collision[16] in which smoke from field burning near Albany, Oregon, obscured the vision of drivers on Interstate 5, leading to a 23-car collision in which 5 people died and 37 were injured.[17] This resulted in more scrutiny of field burning and proposals to ban field burning in the state altogether.[18][19][20]

In the European Union burning crop stubble after harvest is used by farmers for plant health reasons under several restrictions in the cross compliance regulations.[21]

Heathland use

The controlled burning or swailing of heathland is used in the United Kingdom and other countries as a conservation tool. In Scotland it is known as "muirburn".[22] Often it is used as a tool for creating fire breaks to reduce the risk of dangerous outbreaks but is also an important mechanism for preventing succession to woodier vegetation and plays an important role in the life cycle of heather species. Red grouse eat heather shoots and as grouse shooting has long been an expensive sport the landowners need to ensure a good crop of grouse so each year parts of the moor are burned of old heather to cause fresh shoots.[23][24]

Greenhouse gas abatement

Controlled burns on Australian savannas can result in an overall reduction of greenhouse gas emissions. One working example is the West Arnhem Fire Management Agreement, started to bring "strategic fire management across 28,000 square kilometres (11,000 sq mi) of Western Arnhem Land" to partially offset greenhouse gas emissions from a liquefied natural gas plant in Darwin, Australia. Deliberately starting controlled burns early in the dry season results in a mosaic of burnt and unburnt country which reduces the area of stronger, late dry season fires.[26] Also known as "patch burning". To minimise the impact of smoke, burning should be restricted to daylight hours whenever possible.[27]

Northern California fire crews start a backfire to stop the Poomacha fire from advancing westward.[25]

See also

- Agroecology
- Bushfire
- Fire ecology
- Firebreak

- Fire-stick farming
- Native American use of fire
- Shifting cultivation
- Slash-and-burn
- Wildfire suppression

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Further reading

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External links

Wikimedia Commons has media related to ***Controlled burns***.

- BBC News Devon Swailing (http://www.bbc.co.uk/devon/news/022001/23/swailing.shtml)
- Northern Arizona University (http://www.eri.nau.edu/cms/content/view/723/935/)
- Tall Timbers Research Center and Land Conservancy (http://www.talltimbers.org)
- U.S. National Park Service Prescribed Fire Policy (https://web.archive.org/web/20060520211341/http://www.nps.gov:80/yell/technical/fire/prescribed.htm)
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- http://www.epa.gov/oecaagct/tburn.html United States Environmental Protection Agency (EPA) article concerning air pollution consequences of controlled burning
- The Nature Conservancy's Global Fire Initiative (http://www.tncfire.org)
- Strategic fire management (https://web.archive.org/web/20081201022904/http://savanna.cdu.edu.au:80/information/arnhem_fire_strategic.html) West Arnhem Land Fire Abatement Project, Tropical Savannas Cooperative Research Centre
- Fire management and greenhouse gas emissions (https://web.archive.org/web/20081201022927/http://savanna.cdu.edu.au:80/information/greenhouse_emissions.html) West Arnhem Land Fire Abatement Project, Tropical Savannas CRC
- Fuel Characteristic Classification System (FCCS) for Wildland Fuels (http://www.fs.fed.us/pnw/fera/fccs)
- European Commission project: FIRE PARADOX - "Learn to live with fire" (http://www.fireparadox.org)
- "Controlled burn" from the Global Legal Information Network Subject Term Index (http://go.usa.gov/BEl)
- Pau Costa Foundation (http://www.paucostafoundation.org/ing/) on Fire Ecology and Management
- Forest Sciences Centre of Catalonia (CTFC) - Sustainable Forest Management Unit

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