Trial by fire

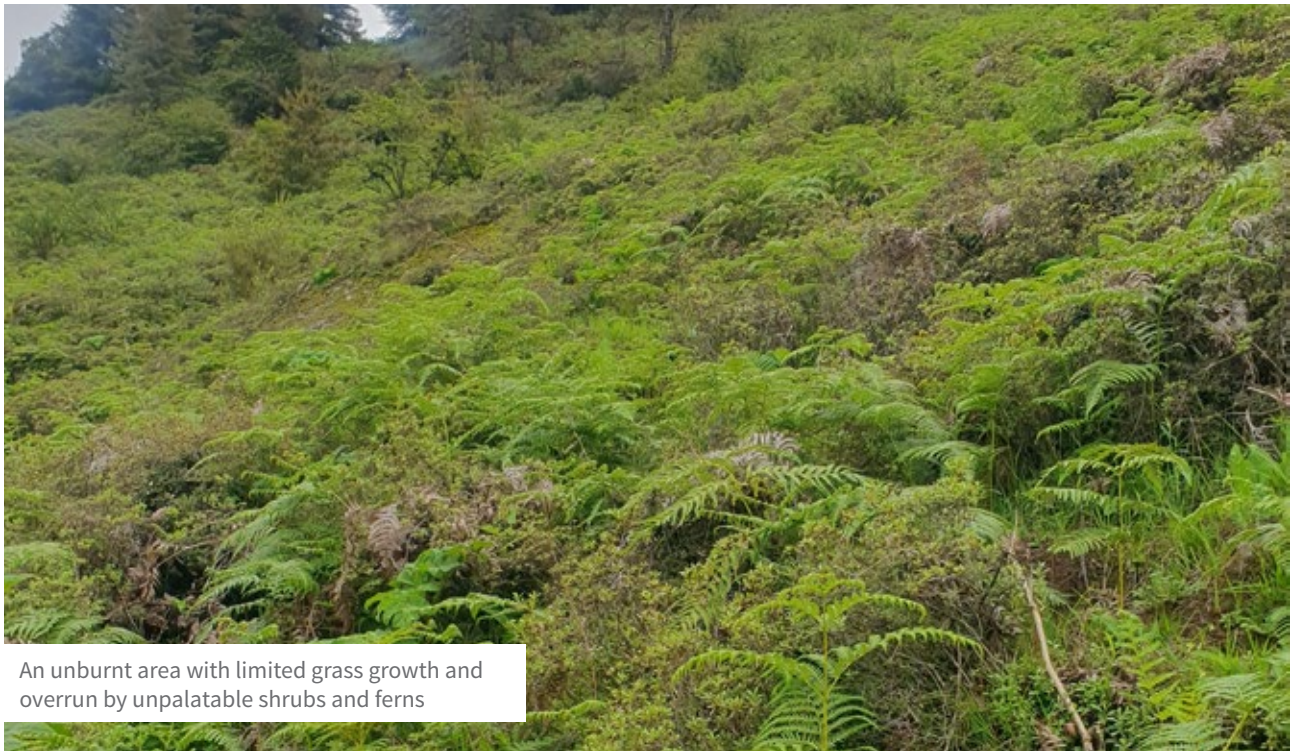
Managing weeds and invasive plants in the rangelands of Bhutan

SIGNIFICANCE FOR PASTORALISM AND WILDLIFE HABITAT

Rangelands play a vital role in preserving wildlife habitats and supporting pastoralism. For millions of pastoralists globally, these lands are crucial as they offer essential grazing grounds for livestock. Beyond pastoralism, rangelands provide sanctuary for numerous wildlife species, from herbivores like blue sheep and Himalayan musk deer to apex predators such as the iconic snow leopard. These ecosystems are fundamental in maintaining biodiversity and nurturing complex food webs. As a result, rangelands are indispensable in balancing ecological sustainability with human livelihoods.

CHALLENGES AND ISSUES

As climate change continues to make its presence felt, the vegetation in our rangelands is shifting dramatically. Species from lower altitudes are now thriving in high-altitude regions, changing the landscape in unexpected ways. Once lush and expansive, the sub-alpine and alpine rangelands are now being overtaken by these low-altitude invaders. Even the less prevalent species are expanding their territory at an alarming rate. This transformation is most evident in winter pasture lands, now heavily encroached upon by invasive and unpalatable species. It's a stark reminder of how interconnected and fragile our ecosystems truly are.



An unburnt area with limited grass growth and overrun by unpalatable shrubs and ferns

FIRE AS A TRADITIONAL MANAGEMENT TOOL

Throughout history, fire has been a trusted ally in managing land and forests. In Bhutan, yak herders have long used fire in their tsamdros to encourage the growth of grass species and to control woody shrubs. These age-old practices are backed by science: when used correctly, fire is a powerful management tool that can meet various land management goals. 'Prescribed' or 'controlled' burns alter the composition, structure, and fuel load of rangelands and woodlands, creating a patchwork of plant communities that benefit both livestock and wildlife. Fire enhances forage availability, stimulates seed germination, and helps control unwanted vegetation. It also manages woody growth and reduces the risk of large, destructive wildfires. In essence, fire is crucial for maintaining ecological balance and boosting biodiversity in rangeland ecosystems.

GOVERNMENT EFFORTS IN HABITAT MANAGEMENT

The Department of Forests and Park Services has embarked on a mission to restore the delicate balance of Bhutan's rangelands. With support from the Bhutan for Life Project, teams are working in protected areas and field offices. The objective is to reclaim the land from invasive, unpalatable species. The invasive plants are cut, collected and dried before controlled fires are set to clear the land. This operation is carefully planned to ensure that only the invasive species are affected, allowing native vegetation to thrive. However, the Department still lacks comprehensive guidelines for prescribed burning, particularly for the high-altitude rangelands across the country.

PRESCRIBED BURNING TRIALS

In the high-altitude rangelands near Tsaluney (winter pasture of Naro yak herders), under Thimphu dzongkhag, an ecological challenge began to unfold. The once vibrant pasturelands were being invaded by Rhododendron lepidotum, an evergreen shrub that grows between 20 to 150 cm tall. This unpalatable species posed a significant threat to the local ecosystem, prompting a team of dedicated foresters and technical officers from the International Centre for Integrated Mountain Development (ICIMOD), Nepal, to act. Their journey led them to a site named Tseko, where they witnessed firsthand the extensive encroachment of Rhododendron lepidotum. The team, combining global best practice with local indigenous knowledge, worked closely with the Department to trial prescribed burning to reclaim the land and restore its natural balance.

The first phase of this intervention took place on 16 March 2024, covering an area of 0.3-acres. On that day, the Department of Forests and Park Services embarked on a crucial intervention, following meticulously crafted guidelines. The team began by evaluating the site and drafting a comprehensive burn plan that outlined the crew and equipment requirements. A 4-meter-wide fire line was constructed around the burn area to prevent the fire from escaping into adjacent areas. At the crack of dawn, when the wind was at its calmest, the fire crew, led by their commander, executed the burning operation. Given the steep terrain, they employed a combined strip heading and backing fire technique. The ignition officer started from upslope, ensuring all fuel in the first 7-10 meters was burned, creating a blackened strip that would act as a barrier in case of sudden change in wind direction. Gradually, they descended the slope, burning the remaining fuels in strips until one-third of the area was blackened. Finally, they burned the remaining area from the base of the slope and concluded the operation with extensive mop-up activities. The flames swept through the land, effectively eradicating the invasive shrub. Buoyed by their success, the team moved on to the second phase on 24 April 2024. This time, they targeted two areas: 0.30 acres in the morning and 1.09 acres in the evening, aiming to eliminate 70% of the shrub cover.

Their efforts paid off; the growth of Rhododendron lepidotum was effectively controlled with little to no signs of regeneration in the well-burnt areas.

After the burn, Pteridium revolutum, an unpalatable fern commonly known as hairy bracken, began to dominate the burnt sites, covering 75% of the area. However, it appears that the fern does not inhibit the growth of grass species. Fodder and grass species began to flourish under the fern's cover, something that was not observed under the dense growth of Rhododendron lepidotum. The intervention has successfully promoted the growth of grass and fodder species, indicating its effectiveness in restoring pasturelands. The team has established permanent scientific plots to monitor and study the effectiveness of various control methods over the longer term.

WHAT NEXT?

Building on the valuable lessons learned from their recent burning exercises, the Department of Forests and Park Services, in collaboration with ICIMOD, Nepal, is drafting comprehensive guidelines titled "Prescribed Burning for Rangeland Management". This holistic document aims to guide future interventions using a standardized approach, reducing risks and ensuring consistency and efficacy in burning operations. Currently, habitat management efforts are focused on the alpine areas within the country's protected areas. This upcoming guideline will serve as a crucial resource for field implementers, providing detailed instructions on how to conduct burning operations effectively. With the new guidelines in place, and with the positive results from the trials, the hope is that we will see the revival and judicious use of a traditional management practice that could enhance the management of rangelands, balancing ecological health and sustainable land use for years to come.

Grass regrowth in one of the trial sites after prescribed burning

AUTHOR AFFILIATIONS

Karma Chorten Dendup *is a Forestry Officer with the Forest Resources Planning and Management Division (FRPMD), Department of Forest and Park Services (DoFPS), Ministry of Energy and Natural Resources; kcdendup@moenr.gov.bt*

Sonam Tobgay *is a Chief Forestry Officer, Forest Resources Planning and Management Division (FRPMD), Department of Forest and Park Services (DoFPS), Ministry of Energy and Natural Resources; sonamtobgay1@moenr.gov.bt*

Pema Wangda *is a Chief Forestry Officer, Divisional Forest Office, Thimphu, Department of Forest and Park Services (DoFPS), Ministry of Energy and Natural Resources; pwangda@moenr.gov.bt*

Sonam Lhaki Dema *is an In-charge, Forest Management Unit, Bjemina, DFO, Thimphu; sonamlhakidema505@gmail.com*