

# Climate-ready forestry at Queen Elizabeth Forest Park

Queen Elizabeth Forest Park (QEFP) is in Forestry and Land Scotland's central region. It covers an area of approximately 67 000 ha, of which about 54% is forested. The forest has been established as a 'climate-ready' demonstration forest supported by ClimateXChange (www.climatexchange.org.uk), where district staff, researchers and policy leads are working together to understand the potential impacts of climate change and to identify and address barriers to adaptation.

## Management objectives

QEFP is managed for a wide range of objectives, including timber production, recreation, tourism and conservation, as well as protective services such as enhancing slope stability. Increasing the species and structural diversity of the forest has been an important adaptation management objective and the area of even-age Sitka spruce has been reduced from 65 to 50% of the forest area.

# Risks and opportunities

#### Main climate change risks

Temperatures in the growing season are projected to increase, which may result in more rapid growth through to the 2060s. This presents an opportunity for a rise in timber productivity, where other factors are not limiting. The frequency of storm events is projected to increase under future climate scenarios, which may lead to

Increasing the species and structural diversity of the forest, and sensitively managing riparian areas are important adaptation management objectives at QEFP.









Find detailed information in UKFS Practice Guide Adapting forest and woodland management to the changing climate.

Information on the UK Forestry Standard and supporting guidance is available at www. forestresearch.gov.uk/ukfs more windthrow. Increased winter rainfall is likely to further increase damage from storms, flooding and landslides. Warmer conditions may lead to a rise in the incidence of pests and/or disease outbreaks.

#### **Vulnerabilities**

The forest has a medium to high level of wind risk and contains areas of steep slopes that are vulnerable to landslides, and towns in the catchment area are vulnerable to flooding. The forest has experienced damage and loss from wind, most notably during a storm in 2012. The damage was assessed across the entire district using a helicopter survey, and with airborne light detection and ranging (LiDAR) technology. More than 1% of approximately 12000 sub-compartments present in the District were damaged to some extent, with most damage located within QEFP.

Landslides and debris flows are not uncommon in the catchment areas, although the risk of damage to people and property is typically low to moderate. Risk assessments recommend monitoring those sites subject to landslides and following best practice for forest operations. The increased risk of run-off following harvesting is acknowledged, and replanting is undertaken as soon as harvesting operations have been completed.

# Identifying and selecting measures

Projected climate change and available adaptation management options are carefully considered by forest planners in land management and regional strategic plans. Current and future species suitability was assessed using ESC, the **Ecological Site Classification decision-support system** and wind risk was calculated using the decision-support tool **ForestGALES**. Through the climateready demonstration forest partnership, Forest Research and Forestry and Land Scotland hosted workshops to explore climate change adaptation with public and private sector managers, researchers and policy leads.

## Implementing adaptation measures

Species diversity is being increased by strategic planning, diversifying the range of novel conifer species planted, restoring ancient woodlands, increasing the area of native woodland and increasing the area of productive broadleaf woodland. The target is to increase the productive broadleaf area to 40%.

Following the discovery of larch stands infected with *Phytopthora ramorum* in surrounding forest areas, the species is no longer planted in the region. Existing larch stands are currently targeted for felling as per guidance contained within the Forestry and Land Scotland Larch strategy.

Suitable areas have been identified for long-term retention and for conversion to continuous cover forestry to increase structural diversity. Riparian habitats are being sensitively managed and restored for conservation, water quality and flood-risk management. The forest is being managed for high wind risk and for slope stability in vulnerable areas to reduce the incidence and impacts of landslides. To mitigate against regular flooding in Aberfoyle and Callander, work is ongoing to implement natural flood management techniques. These include installing timber bunds, large woody debris dams, ponds to provide storage of excess water and planting native tree species in riparian areas to increase resistance to flow. Natural flood management has also improved the habitat available for wildlife.

# Monitoring and assessment

Forest Research has installed an automatic weather station within the Duchray catchment area to monitor trends in environmental and climatic variables as part of the climate-ready forest partnership, and to contribute to the assessment of the suitability of natural flood management practices for the **Strathard Project**, a collaborative project with a number of Scottish organisations. Forest Research has carried out research to model the projected impacts of climate change and alternative 'adaptive' management options on the range of benefits that forests provide at QEFP.

Ongoing work to understand the impact of the adaptation measures being implemented will be used to inform future activity within QEFP and to share the insights generated.

### Lessons learnt

Through the partnership working approach we have identified and addressed barriers to adaptation at both an operational level and at the forest-planning stage. These barriers include the need for accurate and accessible climate impact projections, suitable climate tools and support in understanding climate-related risk and uncertainty.

# Intended future outcomes

To create a resilient, diverse and productive forest that continues to meet a wide range of forest management objectives.

This case study is one of a number supporting the UKFS Practice Guide on Adapting forest and woodland management to the changing climate