



Forest Industries
Ireland
ibec

Irish Forests & the Environment



Eligible for CPD

Overview

Target Audience

This course on forestry and the environment is for forestry and environmental undergraduates who wish to gain an understanding of the importance of the Irish forestry and forest products sector.

Course Objectives

The aim of this CPD course on Irish forests and the environment includes that those undertaking this course gain an understanding of the role of Irish forests including its ecological, economic and social importance.



Modules

1

**History & Current State
of Irish Forests**

2

Forests and the Environment

3

**Forest Ecosystem
Structure & Functions**

4

Forest Types and Biomes

5

**Environmental Impacts &
Benefits of Forests in Ireland**

6

**Environmental Challenges
Facing Irish Forests**



MODULE 1

History & Current State of Irish Forests

The module outlines the historical context and current state of Irish the Irish forestry sector.



Module Overview

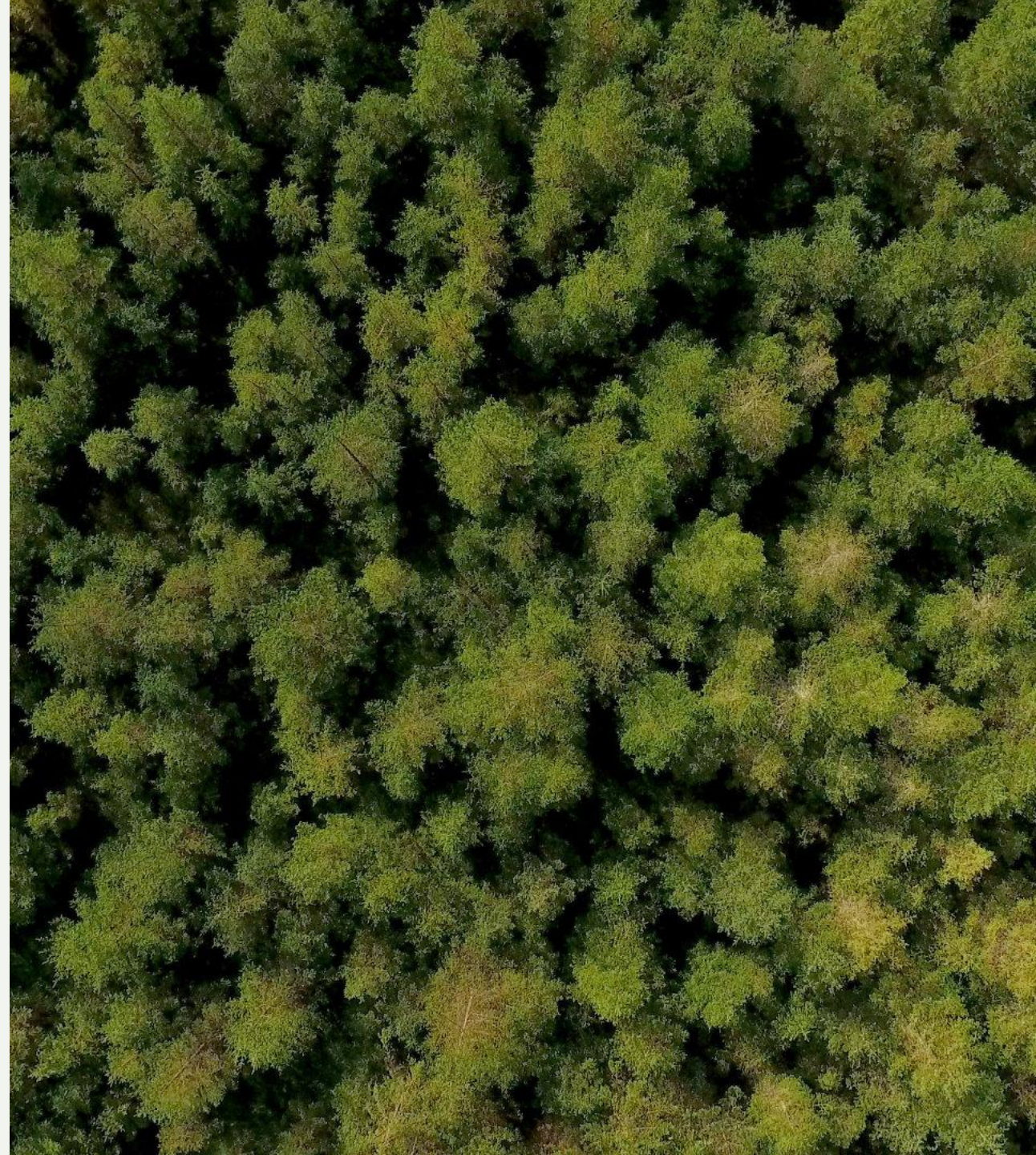
- A brief history of the Irish forestry sector.
- An overview of the Irish forest products sector.
- An introduction to the multiple use of Irish forests.
- What is the development potential of the sector?

Module 1: History



What Are Forests?

- Ireland's National Forest Inventory (NFI) defines forests as:
 - land with a minimum area of **0.1 ha**,
 - trees **5 m or higher**,
 - having a **minimum width of 20 m**,
 - and a tree **canopy cover of 20% or more** within the forest boundary;
 - or trees able to reach these thresholds in situ.



A Brief History of Irish Forests (1904-2024)

- In 1904, **Avondale House**, Rathdrum, Co Wicklow, the former home of Charles Stewart Parnell was opened as a forestry school.
- Up to **1980**, afforestation was primarily undertaken by the **State sector**.
- Coillte was founded in **1989**.
- From **1990-date**, afforestation has been primarily by the **private sector**, mainly by farmers.



Fig. Avondale House, Co Wicklow

A Brief History of Irish Forests (1904-2024)

- In 2024, there were **24,000 private forest owners** in Ireland.
- **11.6% of Ireland is under forest** with Irish forest cover at **809,000 hectares** (ha).
- The average farm forest size is **8 hectares** (ha).
- The Irish government wish to **increase Irish forest cover to 18% by 2050**.



Irish Native Woodlands

- Over a period of centuries, the clearance of woodland for agricultural use and over-exploitation of the forest for timber harvest has reduced Ireland's once extensive native woodlands to the remnants we see today.
- Irish native woodlands are largely located in **Wicklow** and in **Killarney, Co Kerry**.
- These native woodlands are mostly broadleaved with **oak, ash, alder and birch** being the dominant tree species.

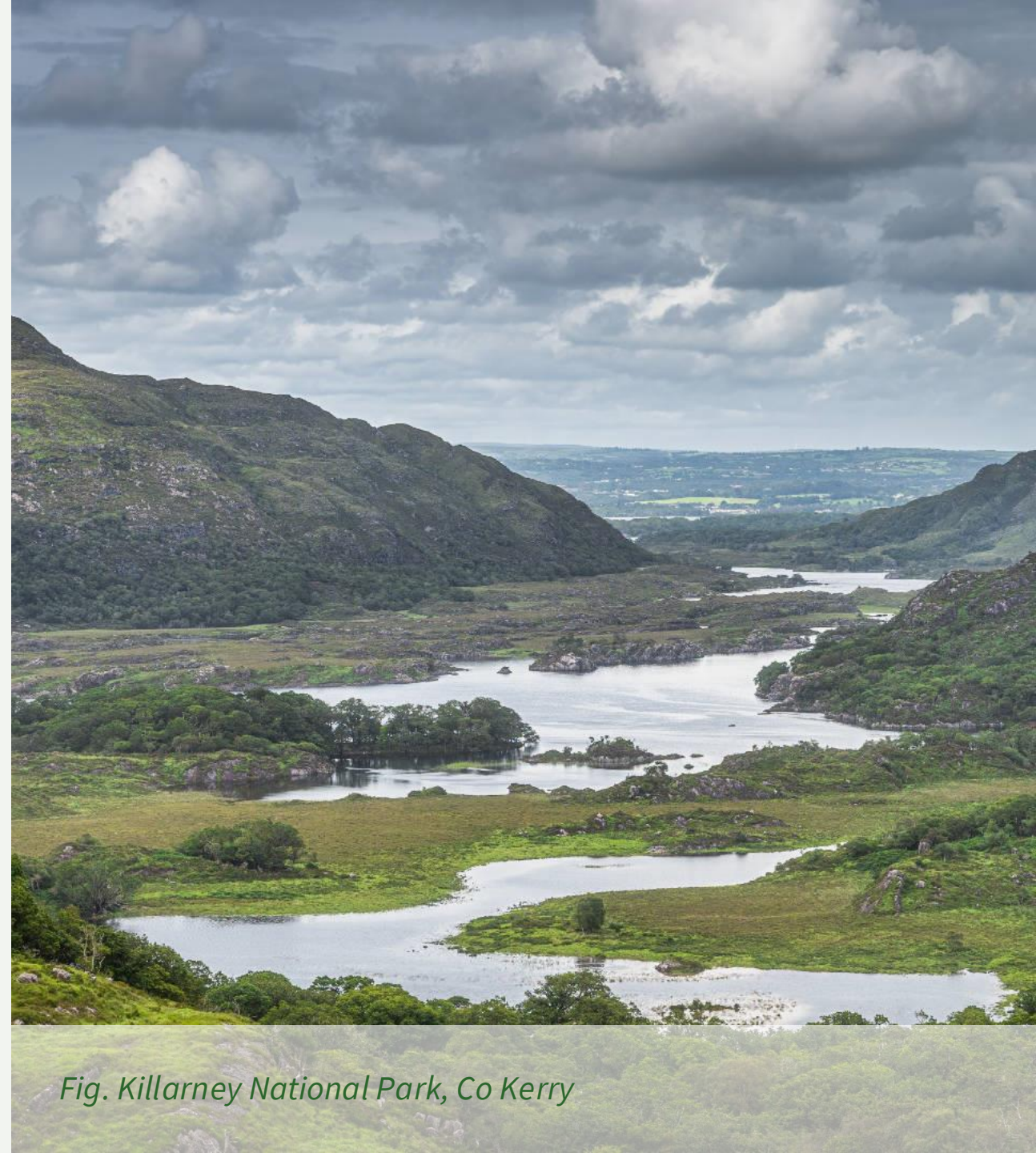
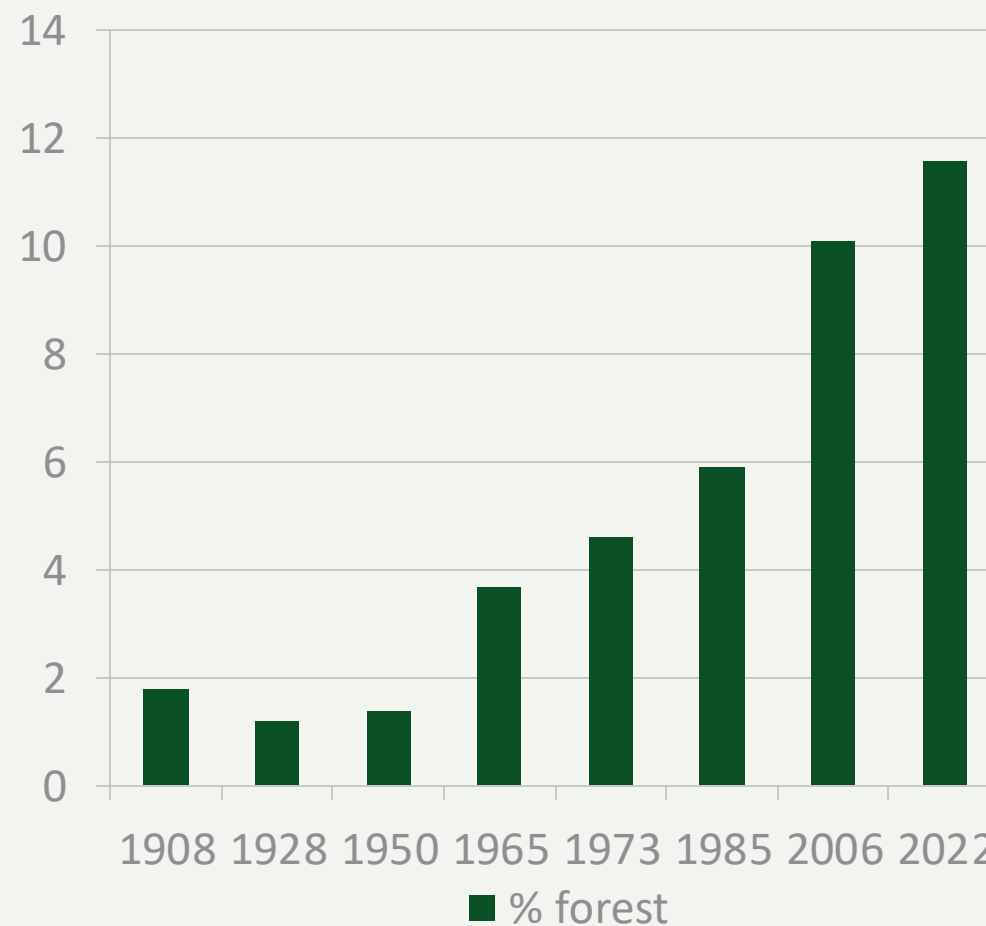


Fig. Killarney National Park, Co Kerry

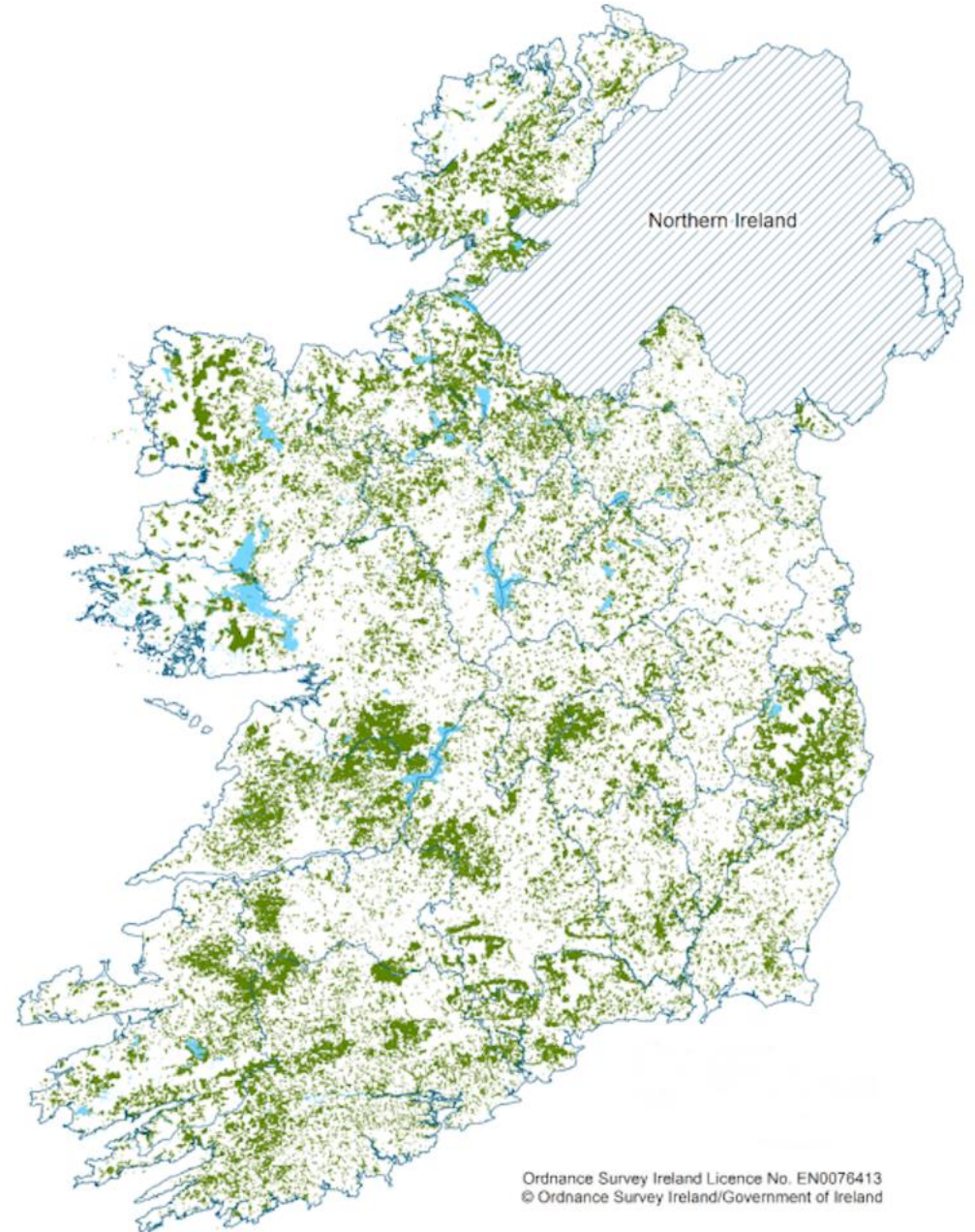
Ireland's Forest Area (1908-2022)

- Ireland's forest cover, at just over **11.6%** of the land area, is **among the lowest in Europe**.
- Over the period 1973-2022, the area of **privately-owned** forests in Ireland has increased from 81,958 hectares (ha) in 1973 to **412,680 ha** in 2022.
- Over the same period, the area of **State-owned** forest area has also significantly increased from 242,056 ha to **396,168 ha**.



Ireland's Forest Cover

- Ireland has **the lowest forest cover** of all European countries (EU27).
- In 2022, Ireland had a **forest cover of 11.6%** compared to an **EU-27 average of 42%.**



Improving Management

- **Sitka spruce** is the predominant species used in Irish forestry.
- It has proven itself as **one of the most productive coniferous species** grown in Ireland.
- As such, it has become the industry's mainstay in terms of **timber processing and end-use markets**.

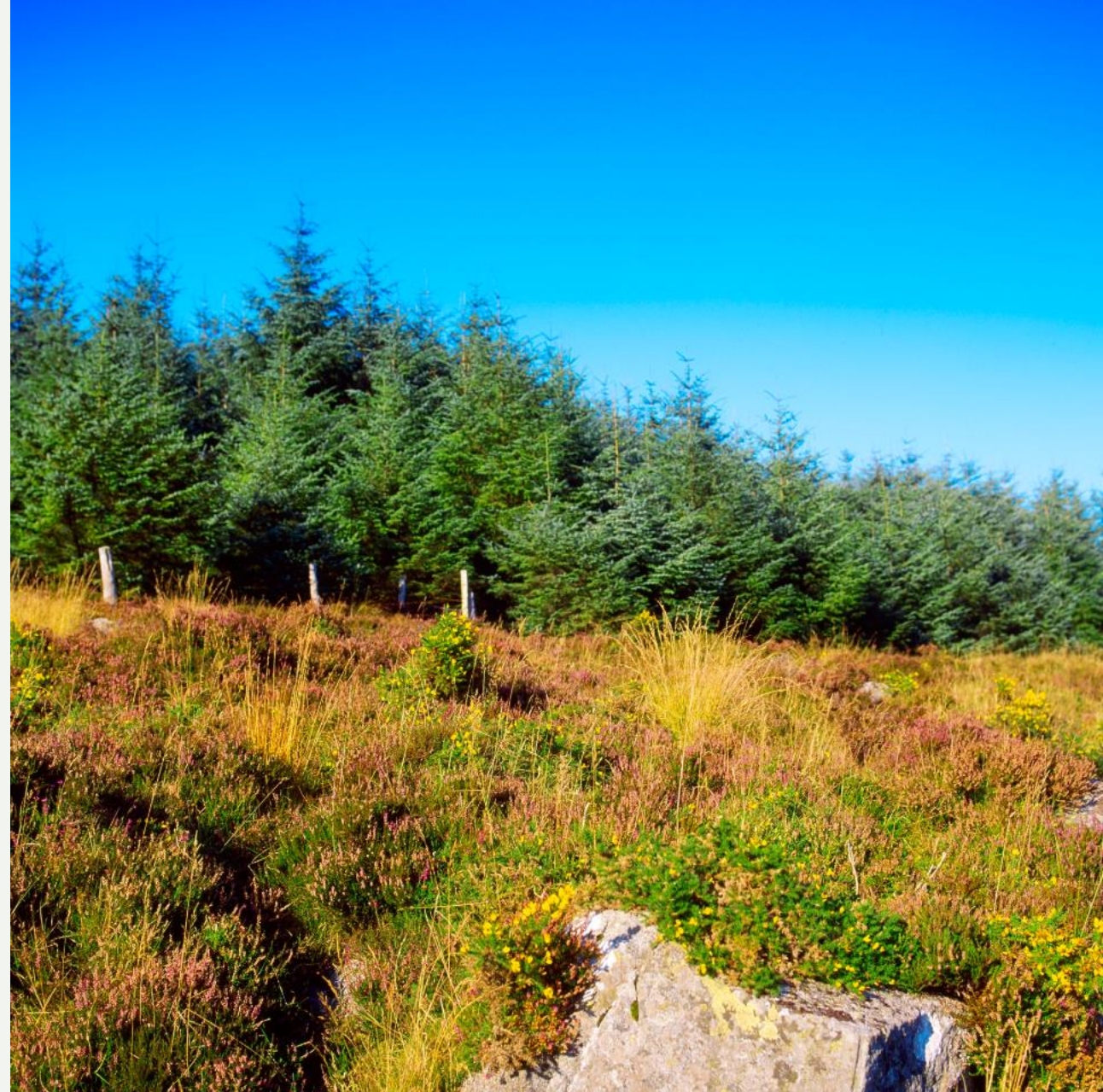


Fig. Sitka spruce, Co Wicklow

Forest Certification

- Coillte's forest estate is dual certified by the **Forestry Stewardship Council (FSC)** and by the **Programme for the Endorsement of Forest Certification (PEFC)**.
- Both FSC and PEFC certifications are **independent** of the forest owner.
- However, only a limited area of Ireland's private forest estate is independently certified.



Coillte

- Coillte is Ireland's **largest commercial forestry company**. Since its establishment in 1989, it has grown its forest and land estate to over **440,000 hectares**.
- It operates three businesses: a core forestry business, Medite Smartply (a wood-based panel manufacturing business), and a land solutions business.
- **Up to 20%** of the Coillte forest estate is **managed for biodiversity**.



Fig. Timber harvesting in a Coillte forest

Coillte, Ireland's state forestry company, manages

440,000
hectares



Or
7%
Ireland's land



Coillte is the nation's largest forester and producer of certified wood, a natural, renewable and sustainable resource.

About Coillte

Coillte employs over 800 staff and over 1,200 contractors across three business divisions: Coillte Forest, Land Solutions and MEDITE SMARTPLY



800+
Staff



1,200
Contractors

Coillte is part of a wider forestry sector

Ireland's forestry sector manages c.11% of Ireland's land, supports 9,000 jobs and contributes €2.3bn to the Irish economy annually.



Forest sector
contributes to
economy annually

€2.3bn

Coillte is the largest provider of outdoor recreation in Ireland

260 Recreational
Forests

12 Forest Parks
3,000km of way
marked trails



Coillte Forest manages the forest cycle, from collecting seed to planting trees, tending forests and sustainably harvesting trees, to replanting and starting the cycle once more



Coillte Forests are certified by both the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC)

Forests
managed
sustainably



Managing Biodiversity

Over 90,000 hectares of the Coillte estate (c. 20%) is managed primarily for biodiversity.



20%

Land managed primarily
for biodiversity

Multiple Benefits of Forestry

Multiple Benefits of Forestry

Coillte is focused on balancing and delivering the multiple benefits of **forestry** for **climate, nature** and **people**.



Land Solutions

Responsible for asset development and enabling sustainable solutions for activities in areas such as renewable energy, housing, infrastructure development, tourism and education.

Over 30% of all installed wind farms in Ireland are developed on land supplied by Coillte



300km
Bike Trails

Coillte has developed 6 world class mountain bike centres in Sligo, Galway, Laois/Offaly, Dublin, Wicklow and Limerick

Coillte Nature



The not-for-profit branch of Coillte dedicated to the restoration, regeneration and rehabilitation of nature across Ireland.

Panel Board Manufacturing

MEDITE SMARTPLY is Coillte's market leading panel board business manufacturing innovative and sustainable products with uses from furniture to construction.



MEDITE SMARTPLY
Sustainable products

Private Forest Estate

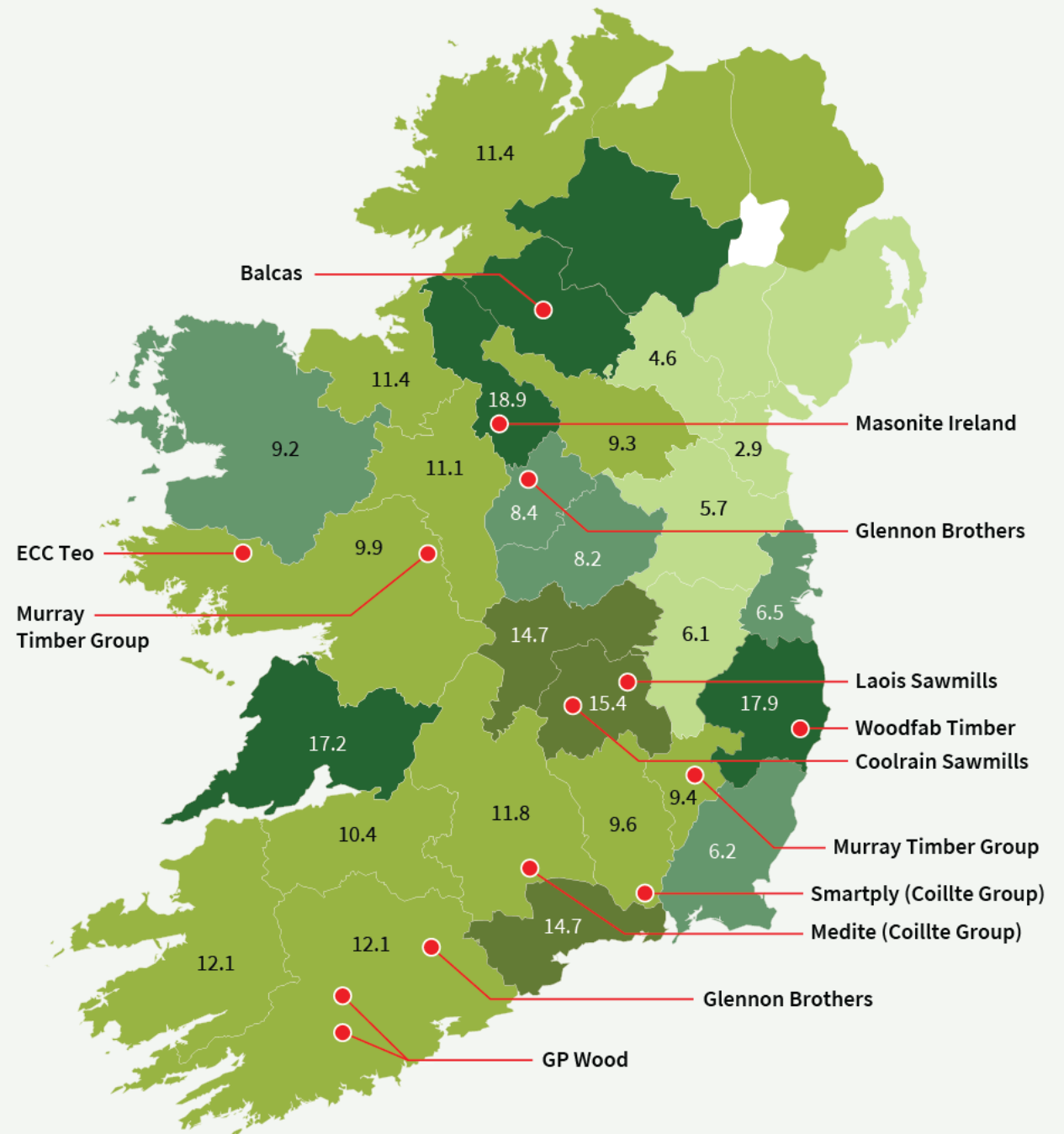
- Since 1990, afforestation in Ireland has been **dominated by the private sector**, notably by **farmers**.
- Virtually all of the forecast increase in roundwood harvest to 2030 will come from the private forest sector.
- **Teagasc** and the **IFA** provide forestry advice and support for the farm forestry sector, as do a range of forest management companies.



Fig. Glencree Valley, Co Wicklow

Irish Timber Processors

- In 2023, **4.25 million cubic metres of roundwood** was harvested from Irish forests (CSO).
- The majority of the sawlog which is harvested in Ireland is **processed into sawn timber by eight sawmills**.
- Pulpwood and sawmill residues are used to produce wood based panels (WBP).



Irish Sawmills

- Irish sawmills are **sustainable, modern and efficient**, producing sawn timber for construction, fencing and packaging markets.
- **Sawn softwood** is the primary product produced by Irish sawmills.
- More than **60%** of this output is **exported to the UK**.



Fig. Sawn softwood used in construction

Wood-based Panel Producers

- Three manufacturers of **wood-based panels (WBP)** operate in Ireland.
- These produce door skins, medium density fibreboard (MDF) and oriented strand board (OSB). This is **largely for export**.
- **Pulpwood and sawmill residues** are the primary raw materials which are used to produce WBP.
- The key export markets are the **UK** and the **Benelux countries**.



Fig. Smartply export

Key Market: The UK

- **The UK is the key market** for Irish forest product exports.
- In 2023 **99% of the sawn timber** exported from the Republic of Ireland, and **65% of the wood-based panels** which was exported from the Republic of Ireland were sold in the UK.



Fig. Harvesting roundwood

Multiple Use of Forests

- **Forests have multiple uses** including timber production, wood biomass energy, employment, recreation and the mitigation of climate change.
- Forests have never been more important. They help **tackle climate change**, supply **sustainable wood products** to help build our homes, provide **valuable habitats for wildlife**, and offer places for people to visit and enjoy that **add to our health and wellbeing**.



Economic Output

- Irish forests provide **9,000 jobs**, largely in rural Ireland.
- In 2018, it is estimated that this generated an income of **€2.3 billion**.



Fig. Forest manager

Wood-biomass Energy

- In 2018, **40% of the wood fibre used in Ireland** was for the production of wood-biomass energy.
- **1.6 M cubic metres** (m³) of wood fibre was used to produce **11,460 terajoules** (TJ) of wood-biomass energy.
- This generated greenhouse gas (GHG) savings of **0.88 M tonnes of carbon dioxide** (CO₂).



Fig. Biomass power plant

Why Use Forest Products?

- The reasons for using forest products include:
 - ✓ They act as a **carbon sink**, thus reducing greenhouse gas (GHG) emissions
 - ✓ Unlike other building material which are in common use, forest products are **renewable, re-usable and recyclable**
 - ✓ Moreover, wood is **strong, flexible and lightweight** to use

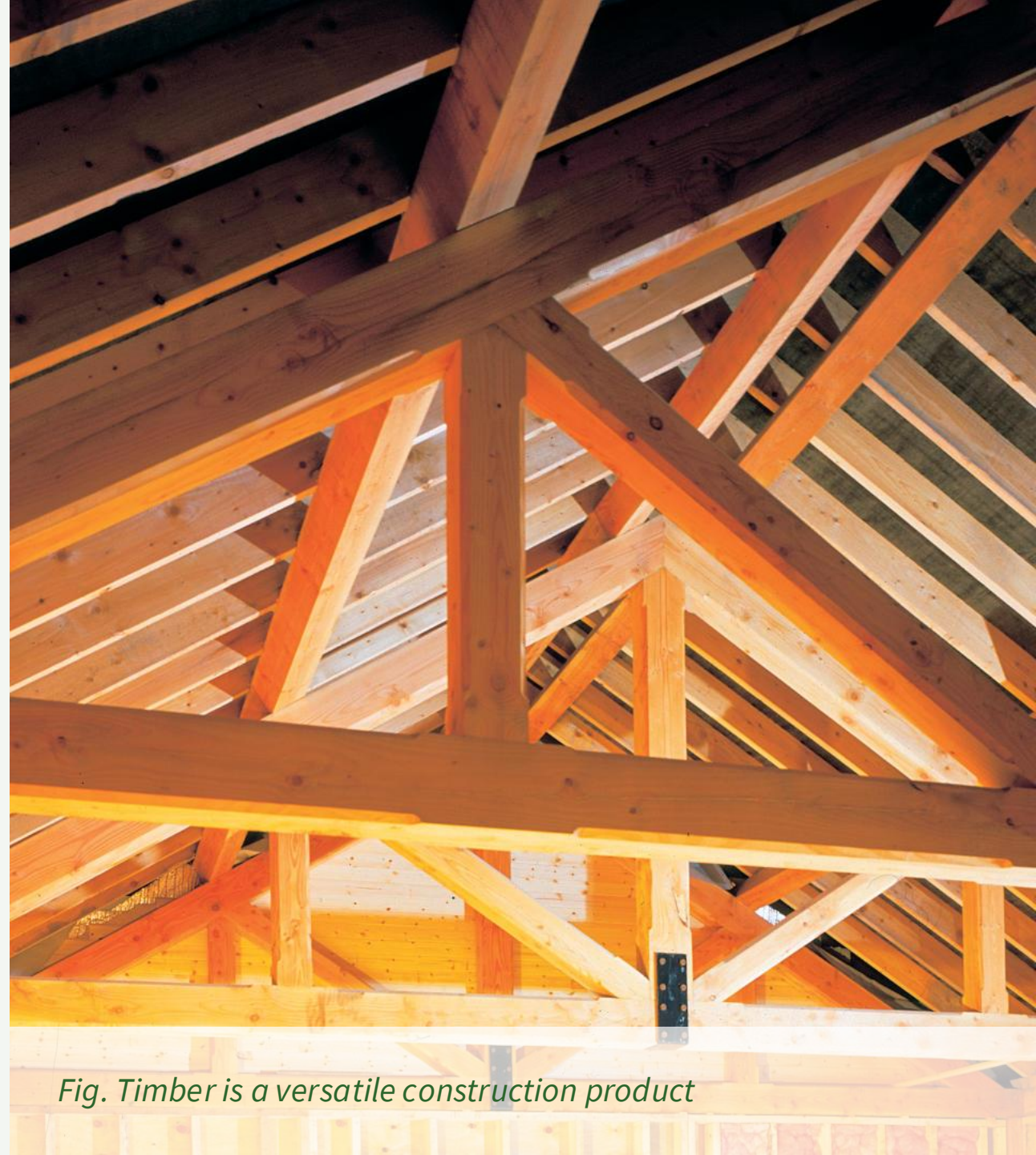


Fig. Timber is a versatile construction product

Who Regulates Forest Policy?

- The **Forest Service, Department of Agriculture, Food and the Marine (DAFM)** is responsible for implementing national forest policy in Ireland.
- **Sustainable forest management (SFM)** is heavily featured in all aspects of this current strategy.



Fig. A roundwood harvest in an Irish Sitka spruce forest

Afforestation Assessment

- In assessing an application for afforestation, DAFM considers its **potential impacts** across a range of issues and sensitivities.
- These include the impacts on water courses and on **sensitive habitats and ecosystems**.
- It then applies the necessary procedures regarding the appropriate assessment and which **environmental impact assessment (EIA)** is required.

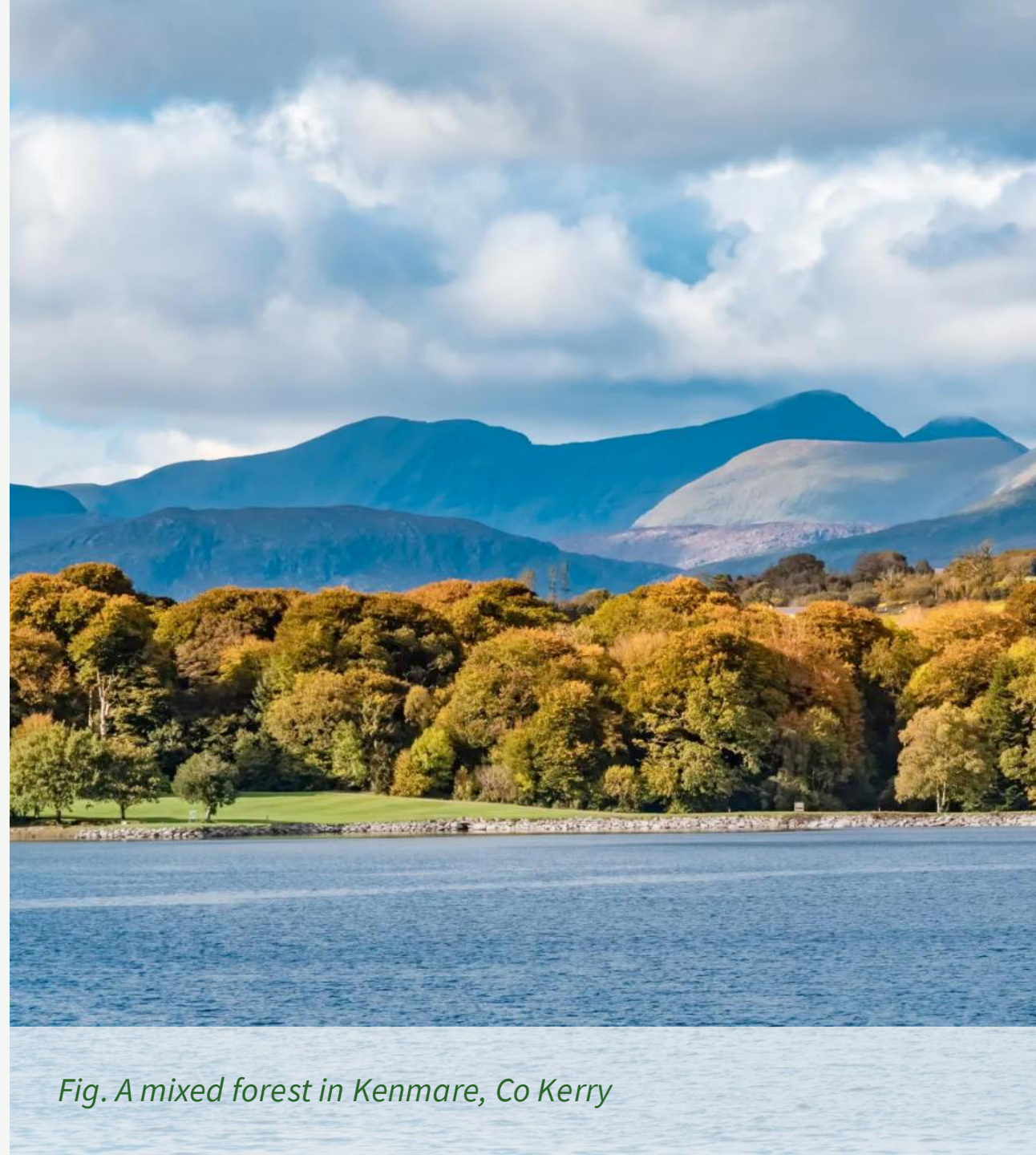


Fig. A mixed forest in Kenmare, Co Kerry

Forest Ecology

- In Ireland, sensitive habitats are subject to **strong regulation**.
- Conservation areas include:
 - ✓ Special Areas of Conservation (SAC)
 - ✓ Special Protection Areas (SPA)
 - ✓ Natural Heritage Areas (NHA)
 - ✓ Proposed Natural Heritage Areas (pNHAs)



Fig. The hen harrier

EU Forestry Policy

- The new EU forest strategy for 2030 is one of the flagship initiatives of the European Green Deal and builds on the **EU biodiversity strategy for 2030**.
- The strategy will contribute to achieving the EU's biodiversity objectives as well as **greenhouse gas (GHG) emission reduction** target of at least **55% by 2030** and **climate neutrality by 2050**.



Fig. Timber harvest

What is the EUDR?

- EUDR stands for the **European Union Deforestation Regulation**. This is a legislative framework adopted by the European Union (EU).
- It aims to **prevent deforestation and forest degradation** which is associated with the production and trade of certain commodities.
- The regulation seeks to ensure that **products** sold in the EU market **do not contribute to deforestation** worldwide.

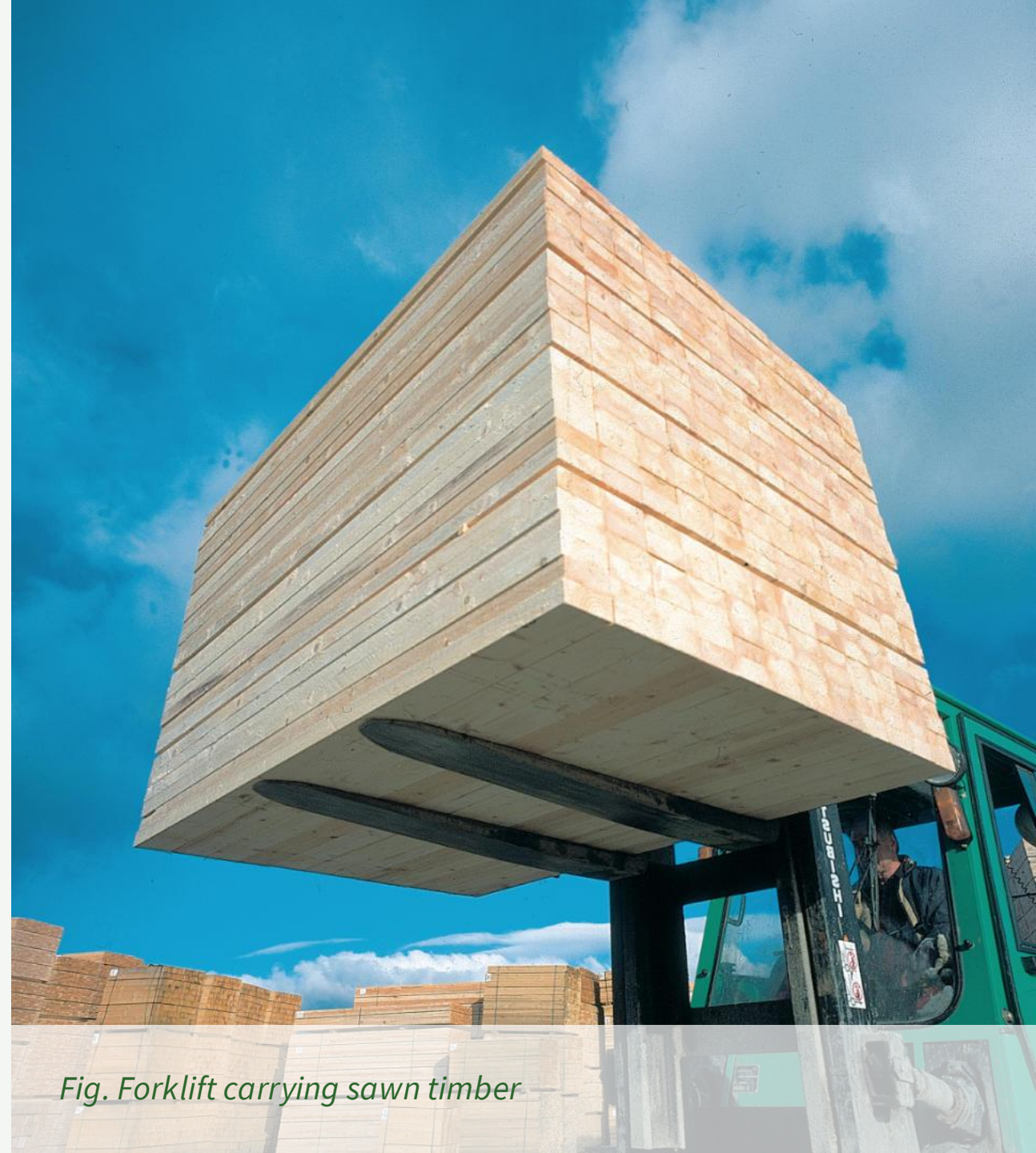


Fig. Forklift carrying sawn timber

Knowledge Check

What % of Ireland is under forest?

- 20%
- 5%
- 11.6%
- 18%

Who regulates Irish forest policy?

- Coillte
- Department of Agriculture, Food and the Marine (DAFM)
- Department of the Environment
- The Environmental Protection Agency (EPA)

Knowledge Check

What % of Ireland is under forest?

- 20%
- 5%
- 11.6%
- 18%

Who regulates Irish forest policy?

- Coillte
- Department of Agriculture, Food and the Marine (DAFM)
- Department of the Environment
- The Environmental Protection Agency (EPA)

The background of the slide is a photograph of a forest. Sunlight filters through the trees, creating a warm, golden glow. The trees are tall and slender, with some showing green leaves and others bare. The ground is covered in fallen leaves and low-lying vegetation. A white rectangular box is positioned on the left side of the slide, containing the text. In the upper right corner of this white box, there is a decorative pattern of light gray dots arranged in a grid-like fashion.

MODULE 2

Forests and the Environment

An overview of the environmental threats to forests and the environmental benefits of forests.

Forest Ecosystem Services

- Forest ecosystem services refer to the various **benefits that forests provide** to humans and the environment.
- These services can be broadly categorised into four categories: **provisioning, regulating, cultural, and supporting services.**



Fig. Raheenleagh Wind Farm, Co Wicklow

Benefits of Forests

- The benefits of forests include **economic**, **environmental** and **social** benefits.
- Economic benefits include: timber, food, fuel and bio-products.
- Ecological functions include: carbon storage, nutrient cycling, water and air purification and the maintenance of wildlife habitats.
- Forests offer a myriad of social and cultural benefits including: recreation and leisure, education and research, aesthetic value and mental health benefits.



Fig. Timber build under construction

Threats to Forests

- Despite their importance, forests face numerous threats, including **deforestation**, **illegal logging**, **climate change**, and **land conversion** for agriculture and urban development.
- **Protecting and sustainably managing forests** is essential for maintaining their ecological and social functions.



Fig. A forest fire

Environmental Benefits

- Forests have many environmental benefits. They play a crucial role in maintaining a **healthy environment** and in **supporting biodiversity**.
- These benefits include:
 - ✓ Carbon sequestration
 - ✓ Maintenance of biodiversity
 - ✓ Improving air quality
 - ✓ Soil protection

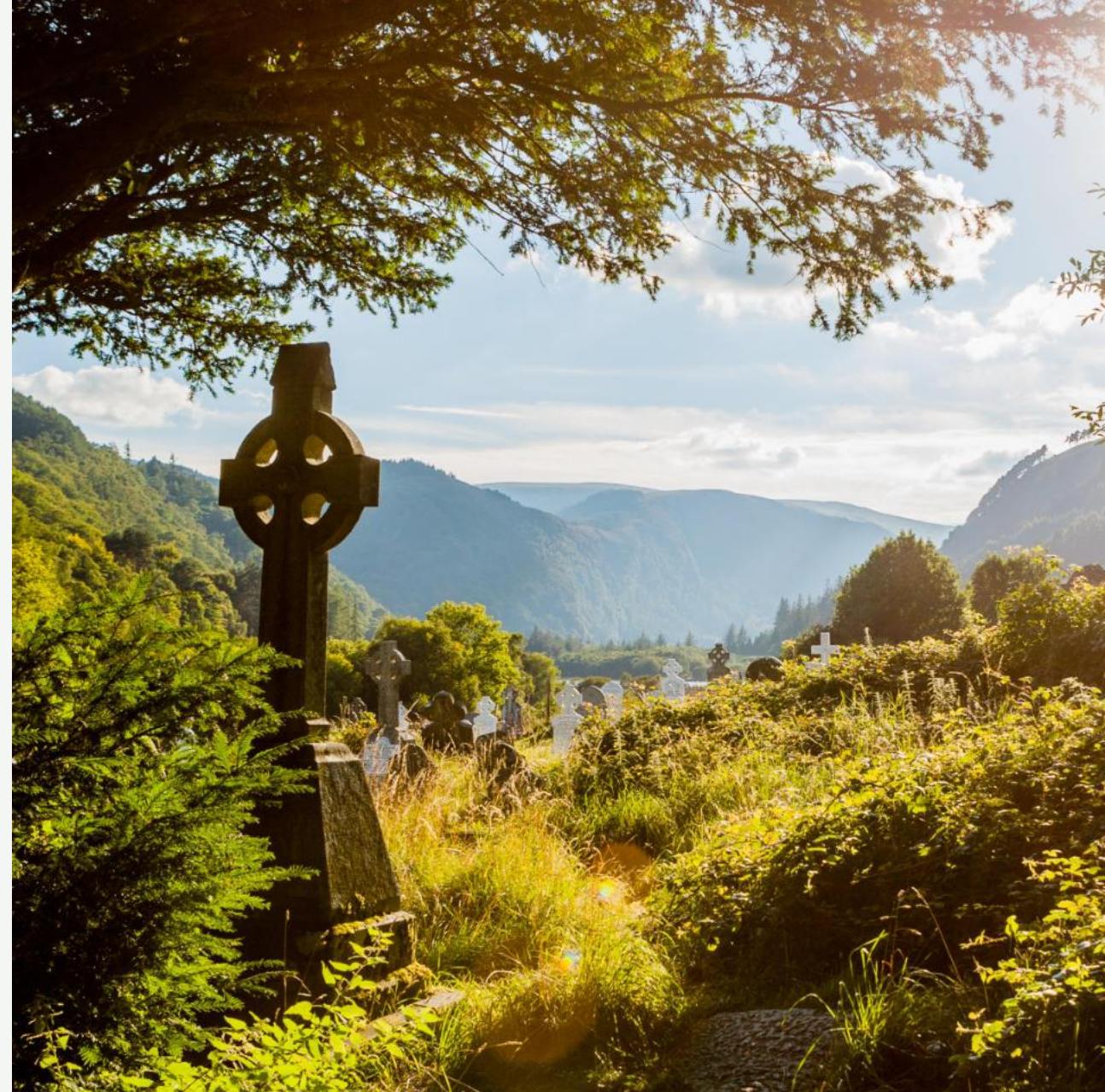


Fig. Irish forests can have a cultural importance

Carbon Cycle

- A COFORD statement on forests and climate change outlines the role that forests in Ireland, and across the globe, play in the carbon cycle.
- As regards the mitigation of climate change, the main role forests play is through the **uptake of carbon dioxide (CO₂)** by photosynthesis and **storage of carbon** in biomass and soils.

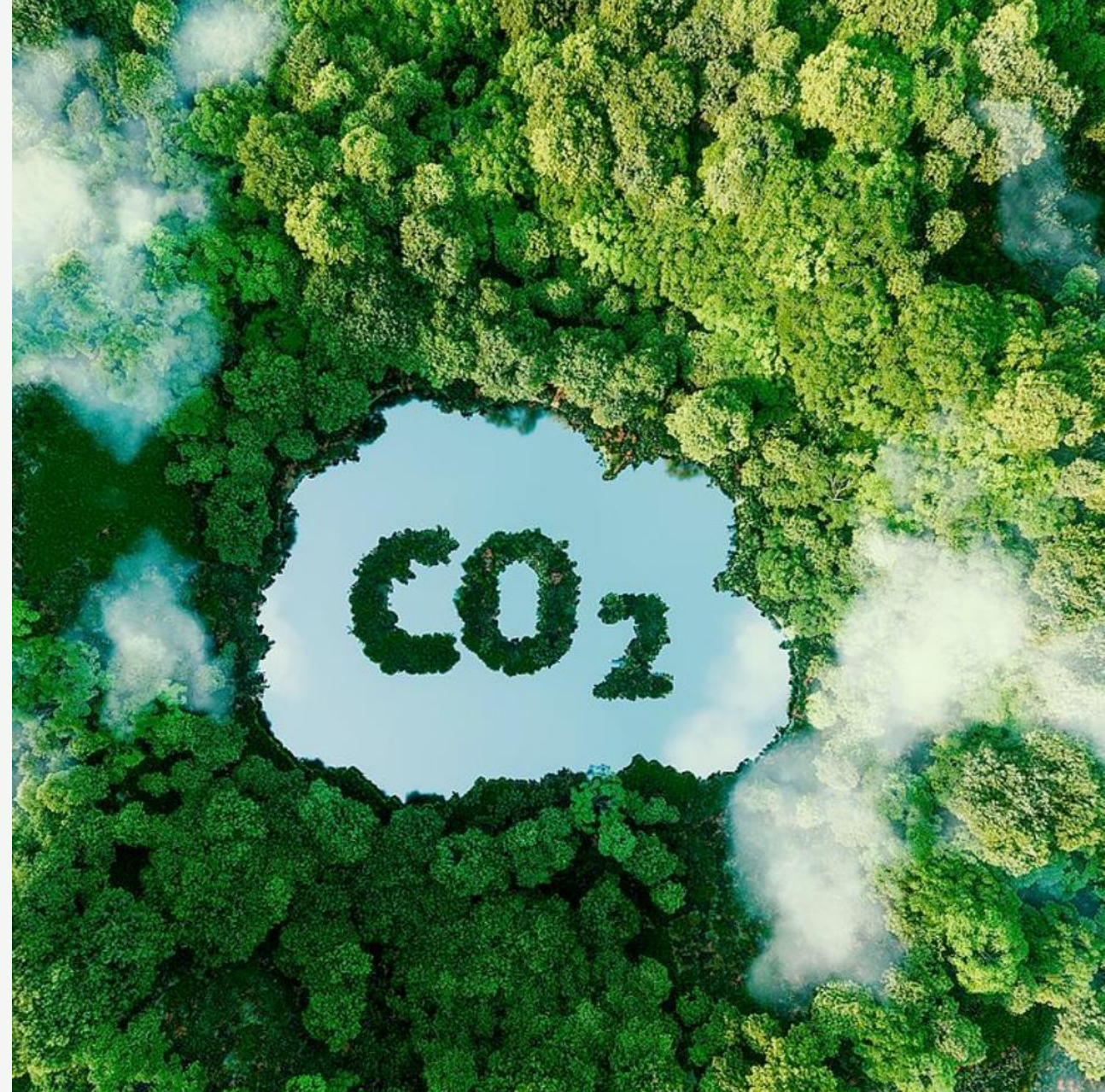
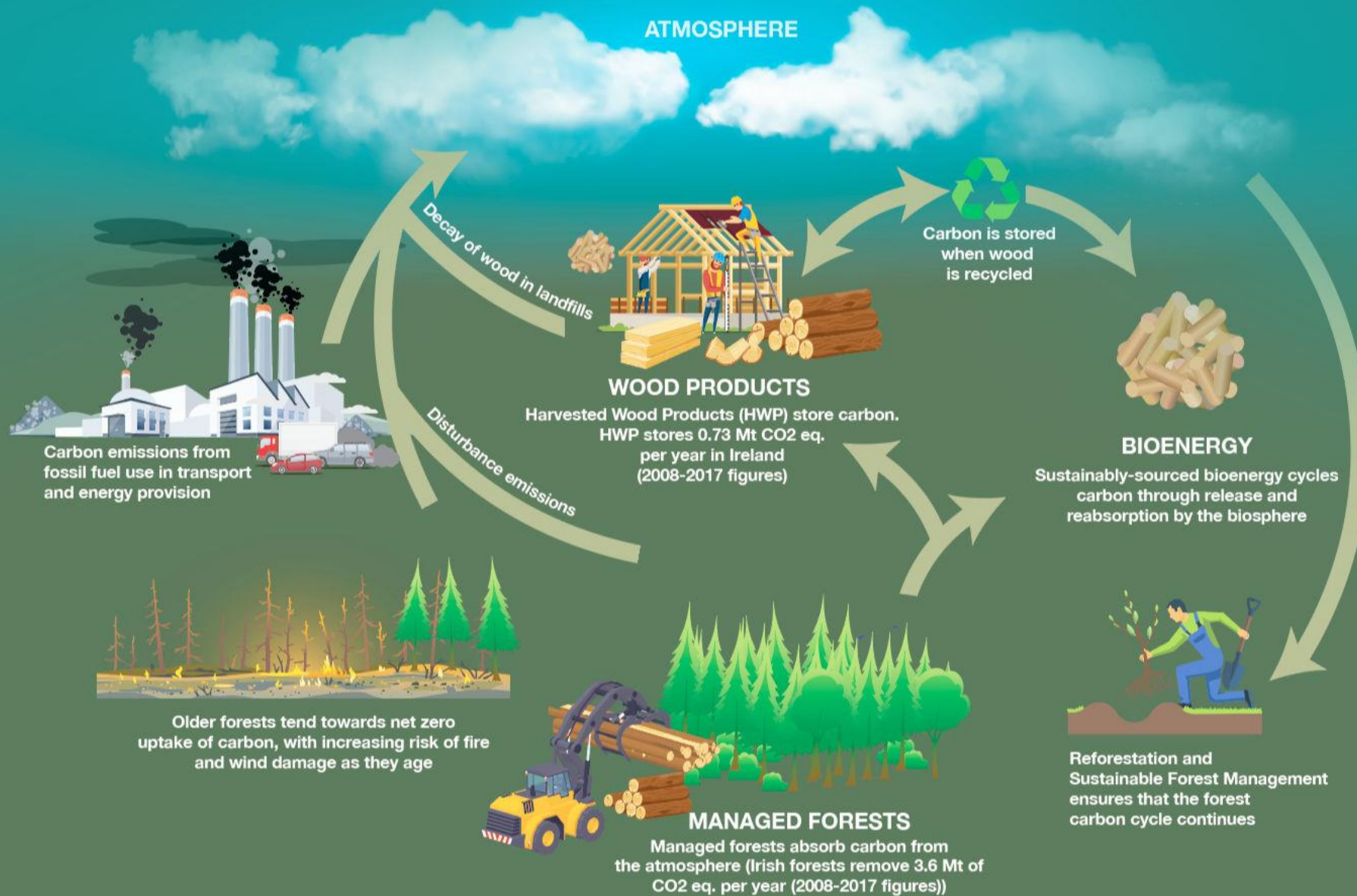


Fig. Irish forests absorb carbon dioxide



Irish Forests and Carbon

- Ireland's forests play a significant role in **climate change mitigation** by removing greenhouse gases (GHG) from the atmosphere.
- The national forest estate is an important and expanding **sink for carbon**, estimated at over **323 million tonnes**.

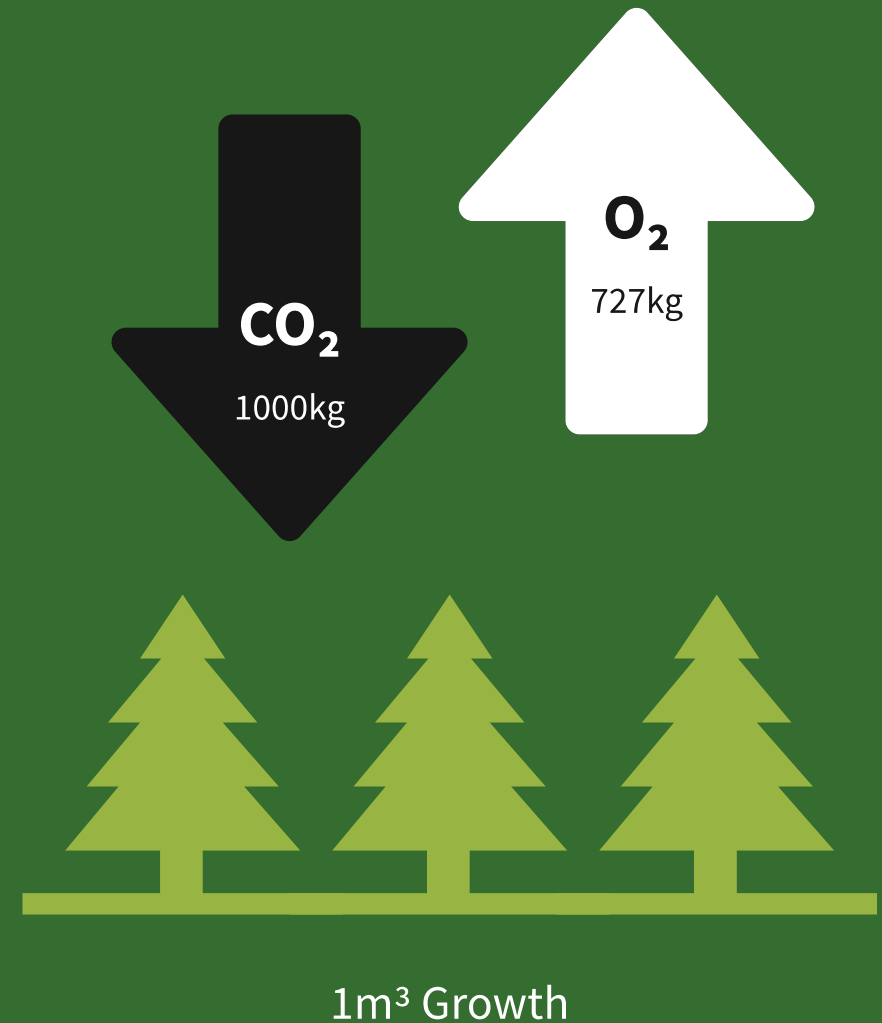


Fig. Forests are the lungs of our planet

Forests and Air Quality

- **Forests play a crucial role** in maintaining and improving air quality.
- Challenges including: **deforestation, climate change, and pollution** threaten these critical benefits provided by forests.



Fig. Forests are essential for preserving air quality

Soil and Water

- **Ireland comparing favourably** with European counterparts for **water quality**.
- **34% of water** bodies not meeting environmental objectives under WFD.
- **Forestry** has been identified as one of the top five pressures on water bodies.

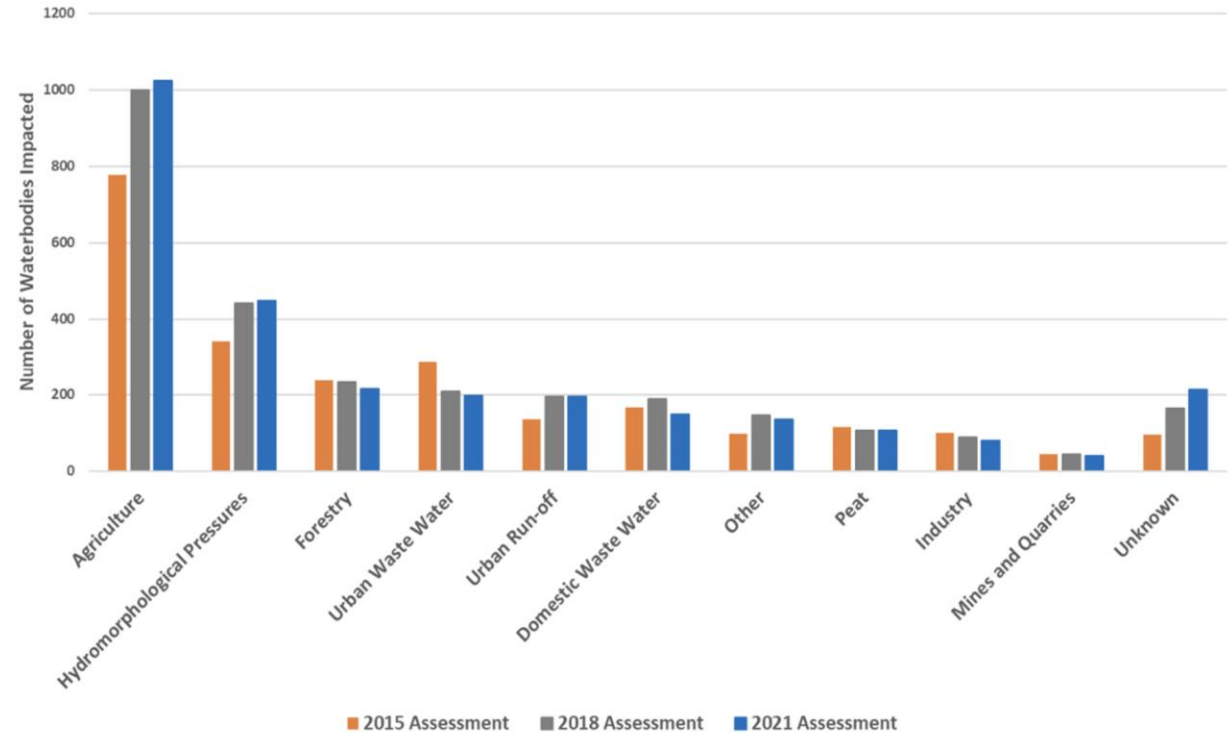


Fig. Change in number of waterbodies impacted. Source: EPA

Water Regulations

- Irish forests play a crucial role in maintaining water quality and quantity by acting **as natural filters, reducing runoff, and regulating water flow**.
- However, **forestry practices can also impact water resources**, potentially causing acidification, siltation and eutrophication.
- The relationship between forests and water in Ireland is complex, with **both positive and negative impacts**. These depend on how the forest is managed.

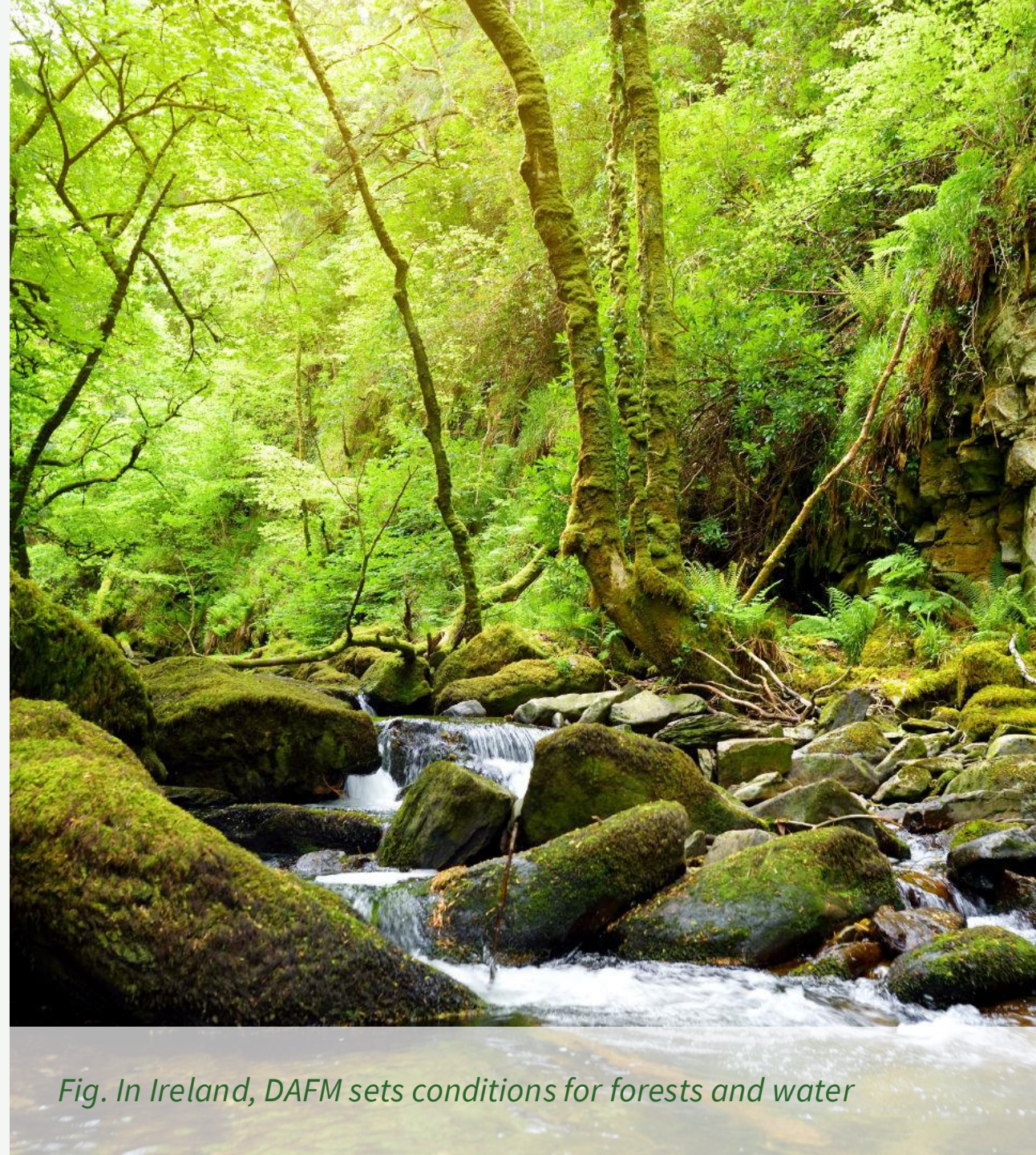


Fig. In Ireland, DAFM sets conditions for forests and water

Forest Recreation

- In 2023, it is estimated that there were **29 million visits** to Irish forests.
- This activity has been valued at **€97 M**, which in turn generates **€268 M in economic activities** in rural communities.
- Studies have shown that walking in forests helps **improve our overall wellbeing**.



Fig. Ballyhoura mountain bike trails, Co Limerick

‘Beyond the Trees’ Avondale

- Beyond the Trees, Avondale, Rathdrum, Co Wicklow provides a unique opportunity to **experience Irish forests** from the vantage of a **tree top walk**.
- The viewing tower was built using **glued laminated timber** (glulam). These were manufactured from **sustainably managed** Douglas fir and larch logs which were **sourced from Irish forests**.



Fig. The viewing tower at Avondale, Co Wicklow

Health and Wellbeing

- Forests provide rich sensory experiences that **enhance well-being** by stimulating our senses in a balanced way, promoting comfort and reducing stress.
- By fostering a connection to nature, **forests improve mood and cognitive functioning**, while incorporating natural elements like wood into our indoor environments can help replicate these benefits and enhance our overall quality of life.



Fig. Children learning about our forests

Knowledge Check

What amount of carbon (Mt) is estimated to be stored in Irish forests?

- 100 Mt
- 150 Mt
- 400 Mt
- 323 Mt

How many million people are estimated to visit Irish forests per annum?

- 10
- 15
- 29
- 45

Knowledge Check

What amount of carbon (Mt) is estimated to be stored in Irish forests?

- 100 Mt
- 150 Mt
- 400 Mt
- 323 Mt

How many million people are estimated to visit Irish forests per annum?

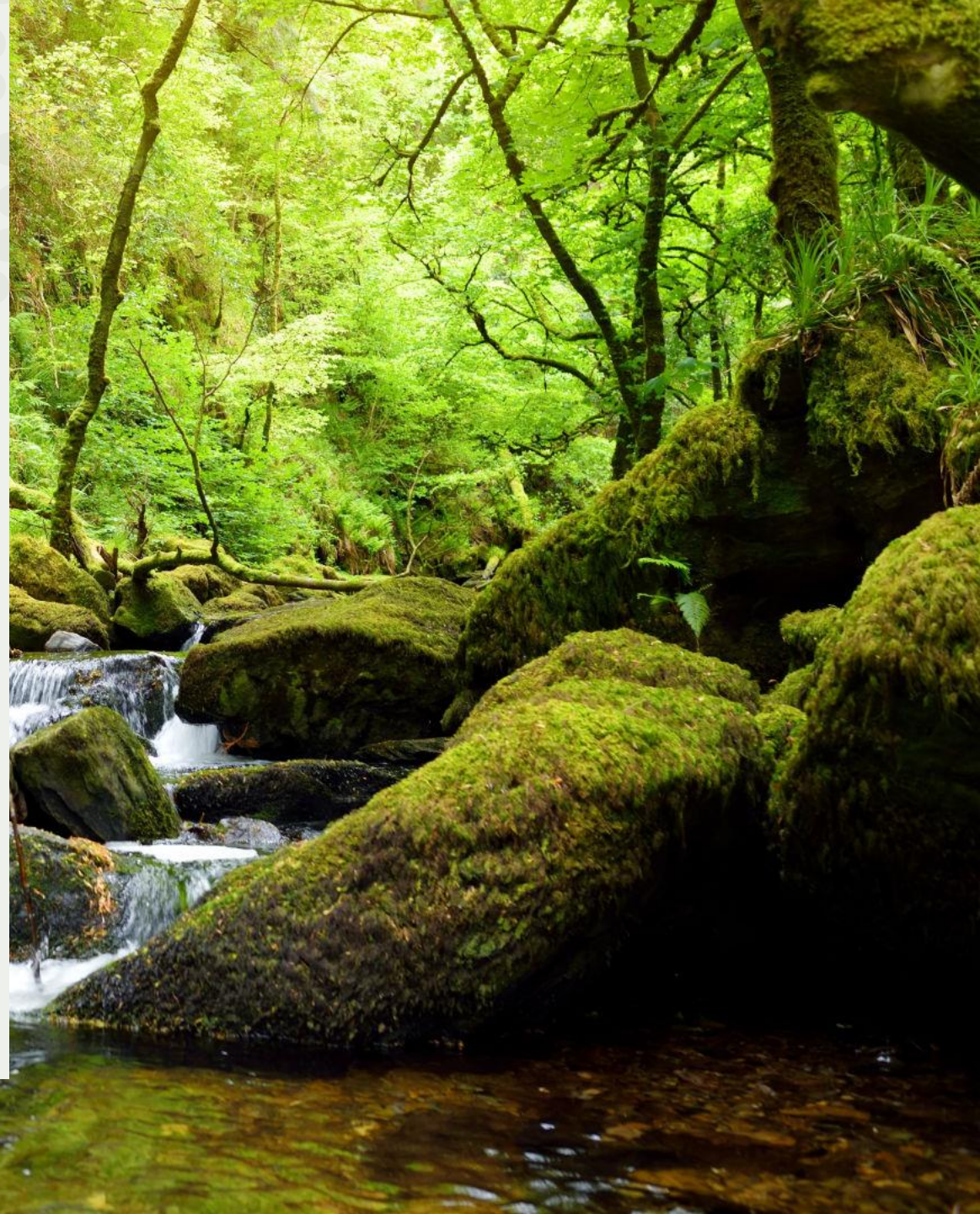
- 10
- 15
- 29
- 45



MODULE 3

Forest Ecosystem Structure & Functions

This module provides an overview of the environmental benefits of forests.



Forest Ecosystem Structure

- A forest ecosystem comprises the following layers:
 - ✓ **Tree canopy**
 - ✓ **Understory**
 - ✓ **Shrub layer**
 - ✓ **Forest floor**



Fig. Hollywood, Co Wicklow

Tree Canopy

- A tree canopy is the **upper layer** or habitat zone, formed by mature tree crowns, that includes the branches, leaves, and reproductive structures.
- It provides **shade, shelter and food** for a wide variety of plants and animals.

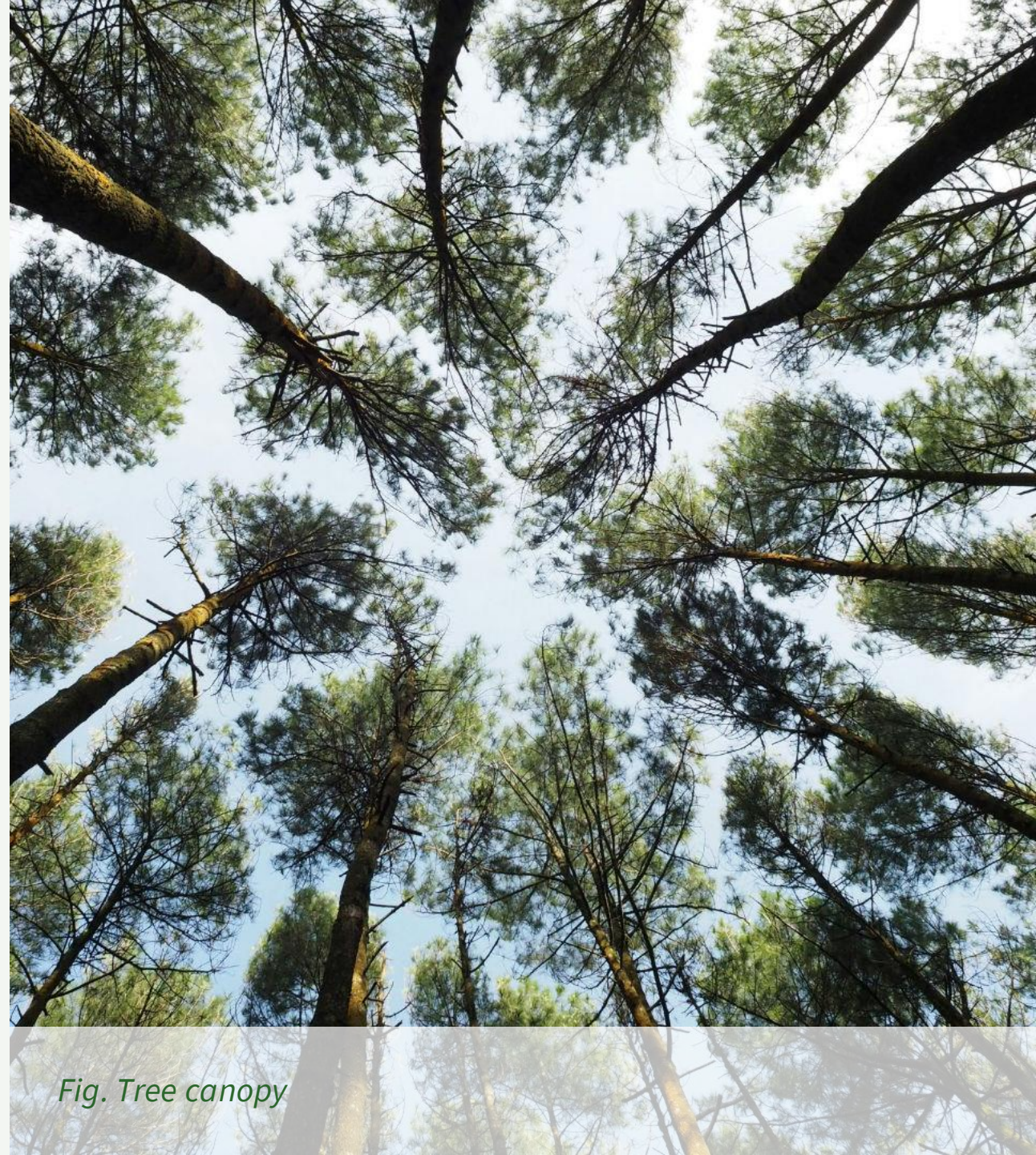


Fig. Tree canopy

Understory

- An understory refers to the **layer of vegetation that grows beneath the canopy** of a forest or woodland.
- It is a **vital and dynamic layer** within a forest ecosystem. It's not just a collection of plants; it's a complex community that plays a critical role in the health, biodiversity, and functioning of the entire forest.

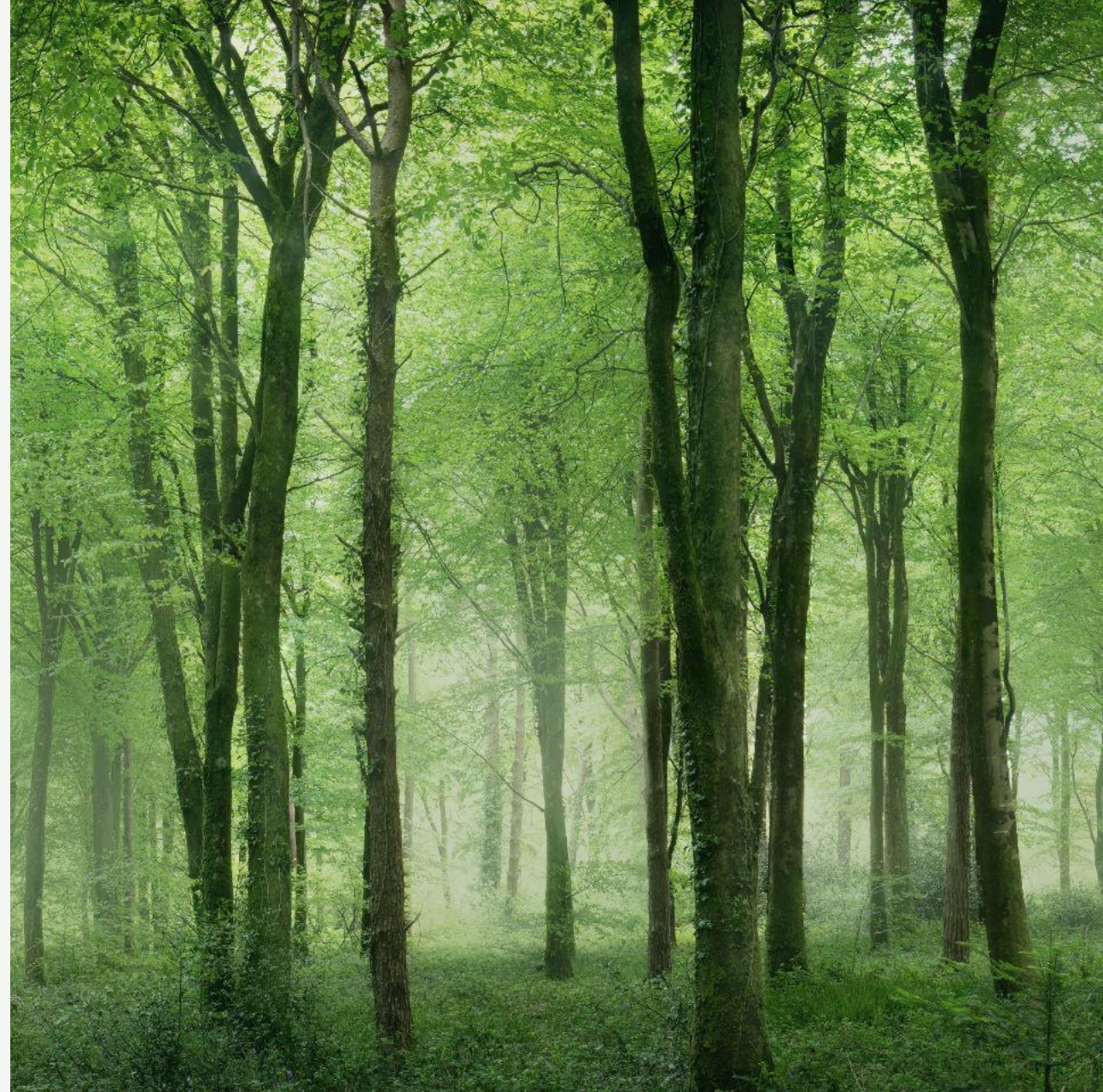


Fig. A mixed forest understory

Shrub Layer

- The shrub layer describes a specific stratum or vertical layer within a forest or woodland ecosystem.
- It refers to the **combination of trees and shrubs that occupy the intermediate height range**, typically above the herbaceous layer (grasses, wildflowers) and below the canopy layer (the uppermost layer of mature tree crowns).

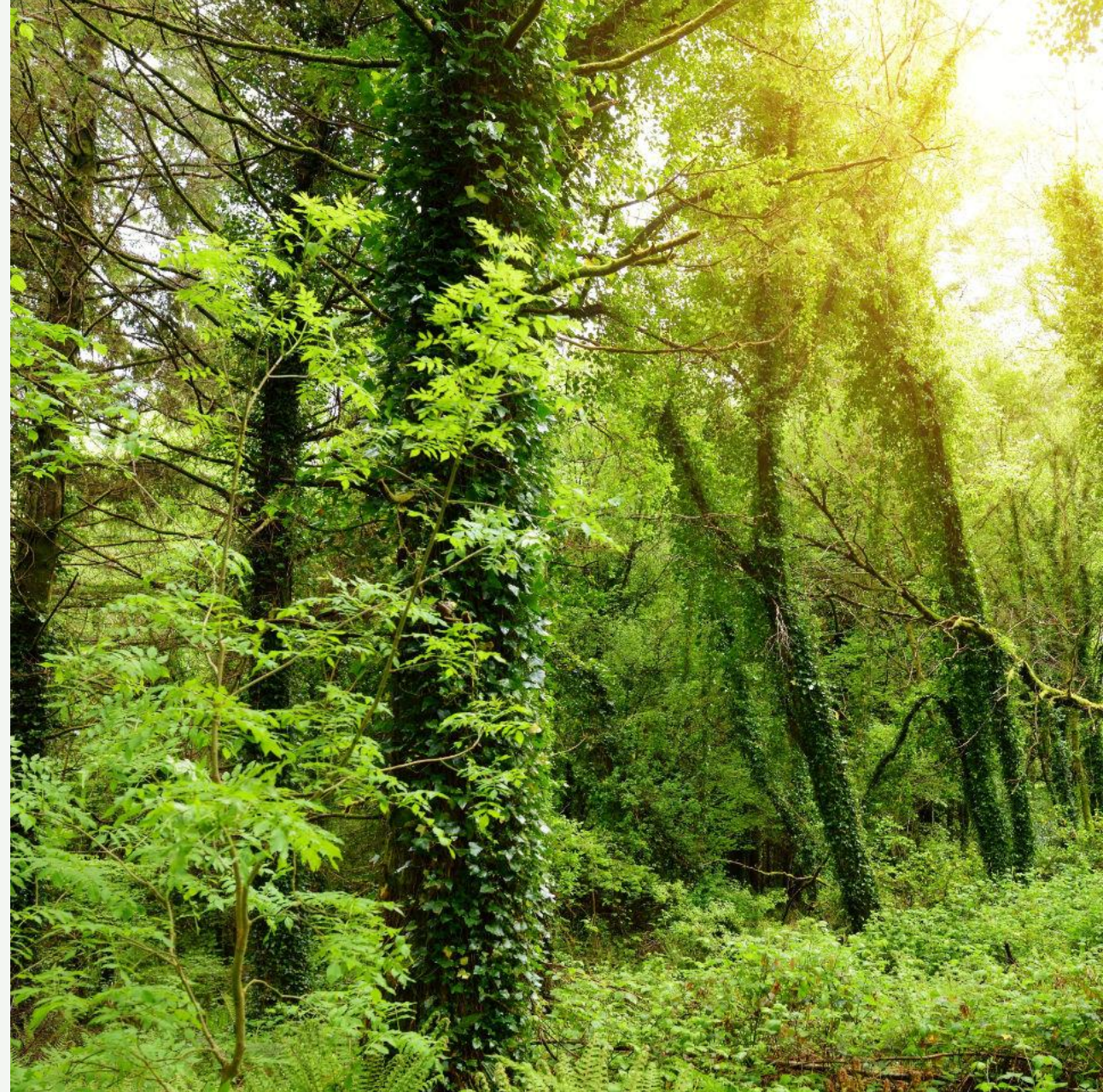


Fig. Forest in Killarney, Co Kerry

Forest Floor

- The forest floor is the **lowest layer** of a forest ecosystem, sitting directly on top of the mineral soil.
- It's a dynamic and complex environment, often described as the **'recycling centre'** of the forest.



Fig. Forest floor

Forest Ecosystem Processes

- A forest ecosystem process refers to the various **natural activities and interactions** that occur within a forest environment, contributing to its structure, function, and health.
- These processes involve the **flow of energy**, the **cycling of nutrients**, and the **relationships between living organisms** and their physical surroundings.

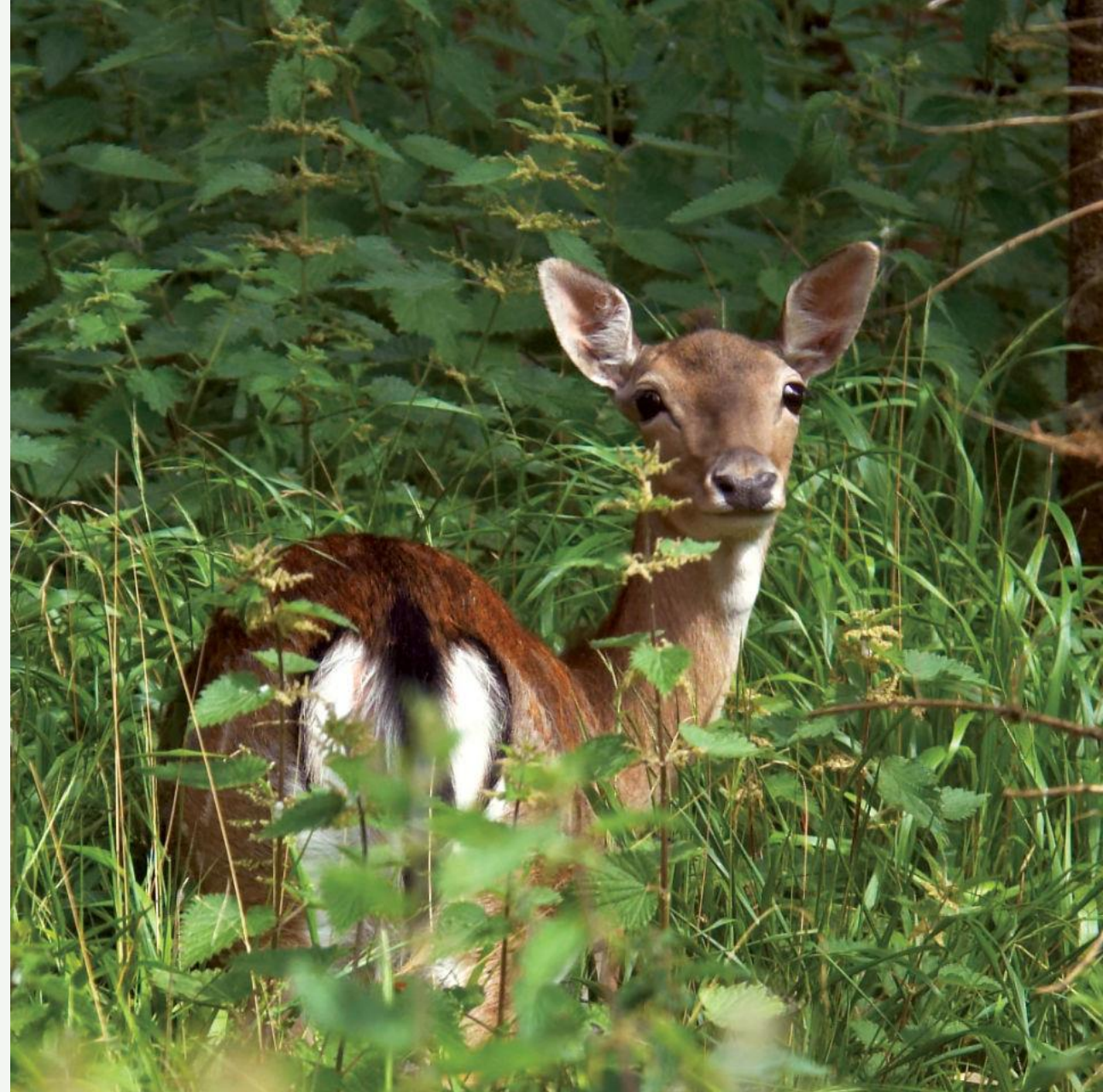


Fig. Fallow deer doe in an Irish forest

Forest Ecosystem Processes

■ Forest ecosystem processes include:

- ✓ **Photosynthesis**
- ✓ **Decomposition**
- ✓ **Nutrient cycling**
- ✓ **Water cycle**

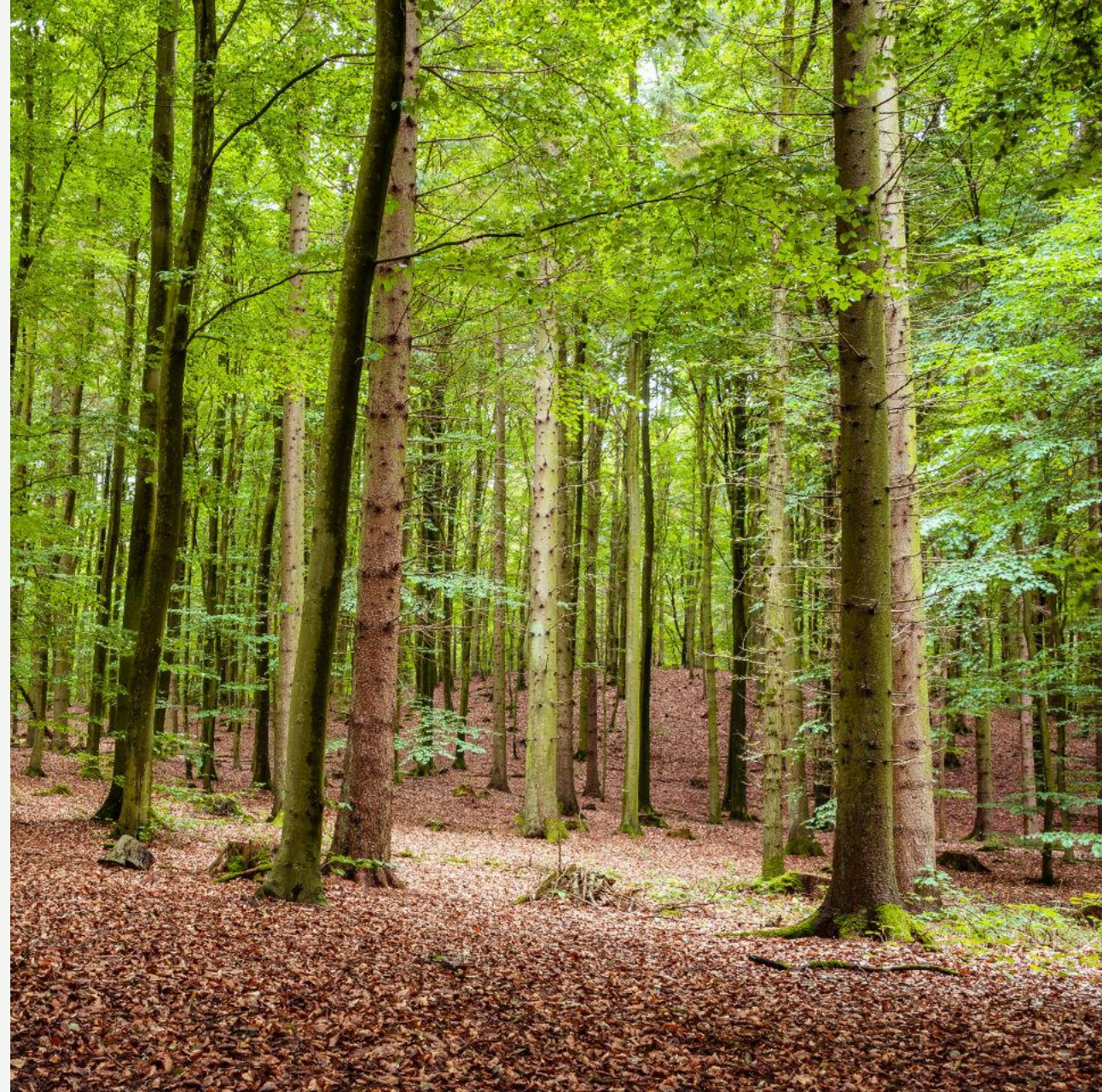
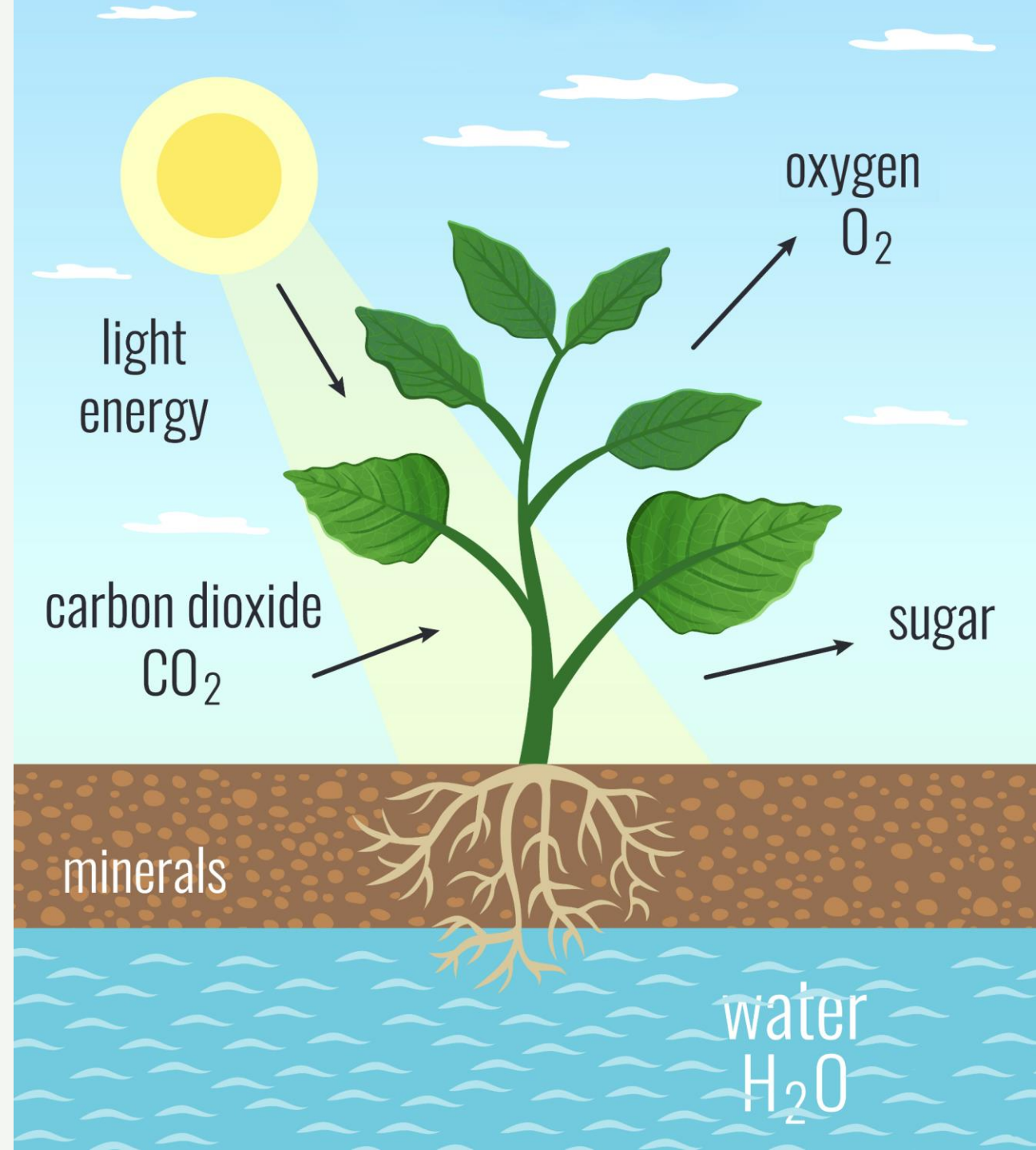


Fig. Beech forest

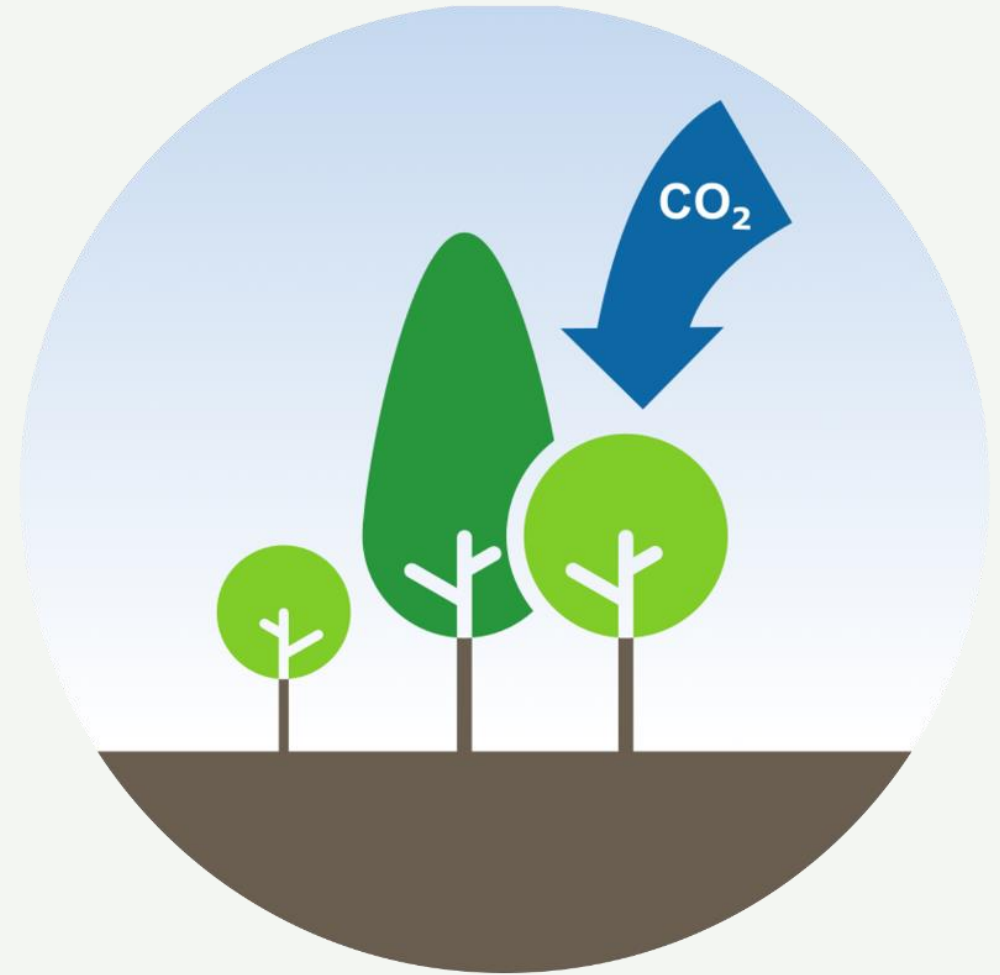
What is Photosynthesis?

- Photosynthesis is the biological process by which green plants, algae, and some bacteria **convert light energy, usually from the sun, into chemical energy** stored in the form of glucose (a sugar).
- This process is **fundamental to life on earth**, as it provides the primary energy source for nearly all ecosystems and produces oxygen as a byproduct.



Benefits of Photosynthesis

- The key advantages of photosynthesis include:
 - ✓ production of **oxygen** (O_2)
 - ✓ production of food in the form of **glucose** ($C_6H_{12}O_6$)
 - ✓ energy storage and the (CO_2) **removal of carbon dioxide**



Forest Decomposition

- Decomposition in forests is the natural process by which **dead organic matter**, such as fallen leaves, branches, and dead animals, is **broken down into simpler substances**. This process is crucial for maintaining the health and productivity of forest ecosystems.
- It is a fundamental ecological process in forests that **recycles nutrients, builds healthy soil, and sustains the entire ecosystem**. It's a continuous and complex interaction between dead organic matter and a diverse community of decomposer organisms.



Fig. Mushrooms growing on a forest floor

Nutrient Cycling

- In forest ecosystems, nutrient cycling is the process where vital elements **like carbon, oxygen, nitrogen, and phosphorus** move through the environment, both living and non-living components, to be regenerated for organisms to thrive.



Fig. Forests in the Glendalough Valley, Co Wicklow

Water Cycle

- Forests play a crucial role in the water cycle, influencing **local and regional water availability** and quality.
- Trees actively participate in the hydrologic cycle through **transpiration**, where they absorb water from the soil and release it into the atmosphere, contributing to humidity and potentially increasing rainfall levels.



Fig. Killarney National Park, Co Kerry

Knowledge Check

What is produced as a by-product of photosynthesis?

- Fructose and oxygen
- Glucose and oxygen
- Glucose and hydrogen
- Fructose and hydrogen

What is the lowest layer in a forest structure?

- Forest floor
- Canopy
- Understory
- Shrub layer

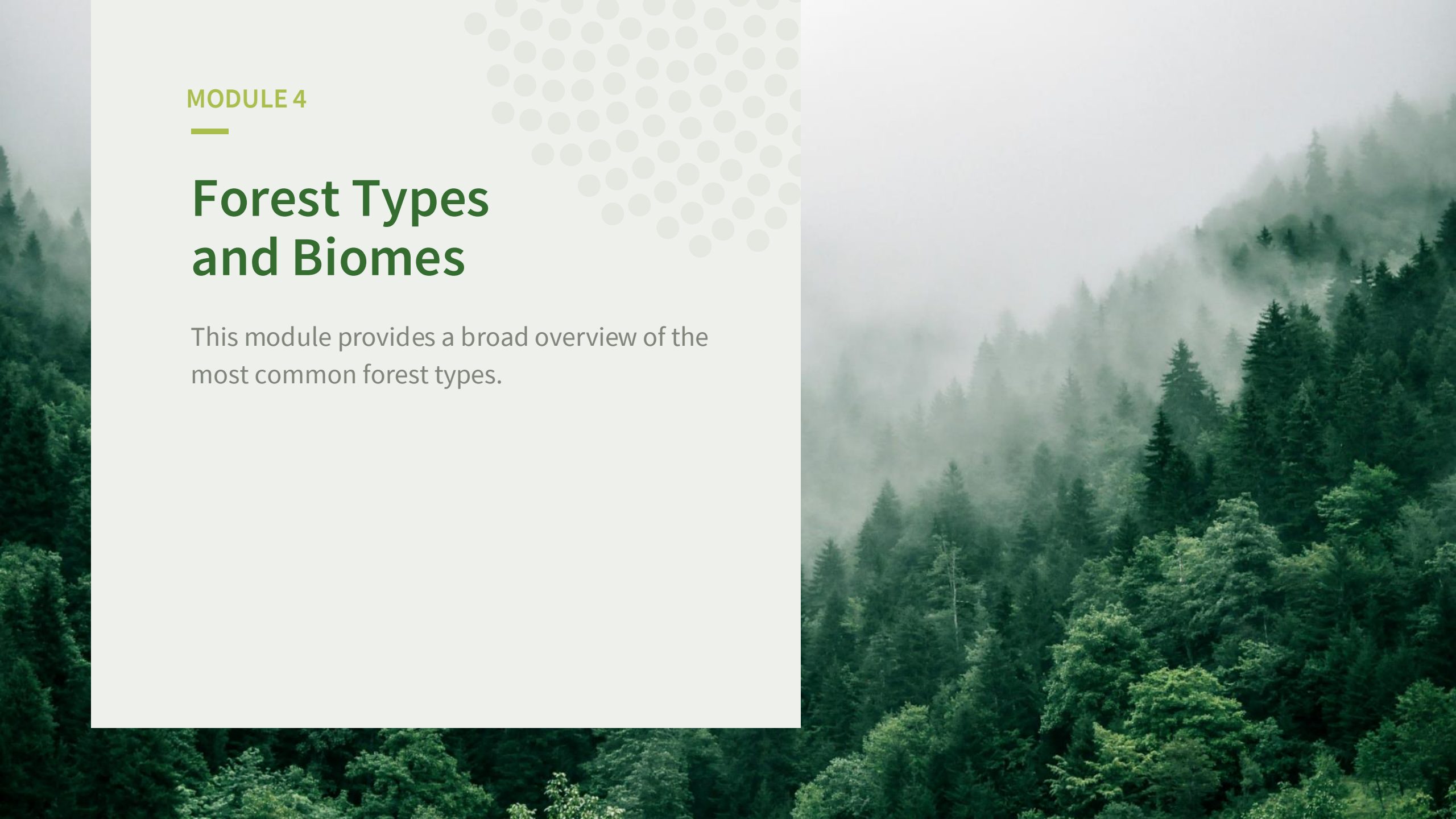
Knowledge Check

What is produced as a by-product of photosynthesis?

- Fructose and oxygen
- Glucose and oxygen
- Glucose and hydrogen
- Fructose and hydrogen

What is the lowest layer in a forest structure?

- Forest floor
- Canopy
- Understory
- Shrub layer

The background of the slide is a photograph of a dense forest. In the foreground, there are lush green deciduous trees. In the background, there are misty, hazy evergreen forests on hillsides. A white rectangular box is positioned on the left side of the slide, containing the module title and description. The top right corner of the white box features a decorative pattern of light green circles.

MODULE 4

Forest Types and Biomes

This module provides a broad overview of the most common forest types.

What Forest Types Exist?

- There are several main types of forests, classified based by **climate**, their **dominant vegetation** and by their **geographic location**.
- The primary forest types by vegetation type and location are discussed overleaf.



Fig. Taiga forest, Yukon, Canada

Forests by Vegetation Type

- The primary forest types by vegetation type and location are discussed overleaf. These include:
 - ✓ **Tropical rainforest**
 - ✓ **Temperate rainforest**
 - ✓ **Temperate forest**
 - ✓ **Boreal forest (Taiga)**

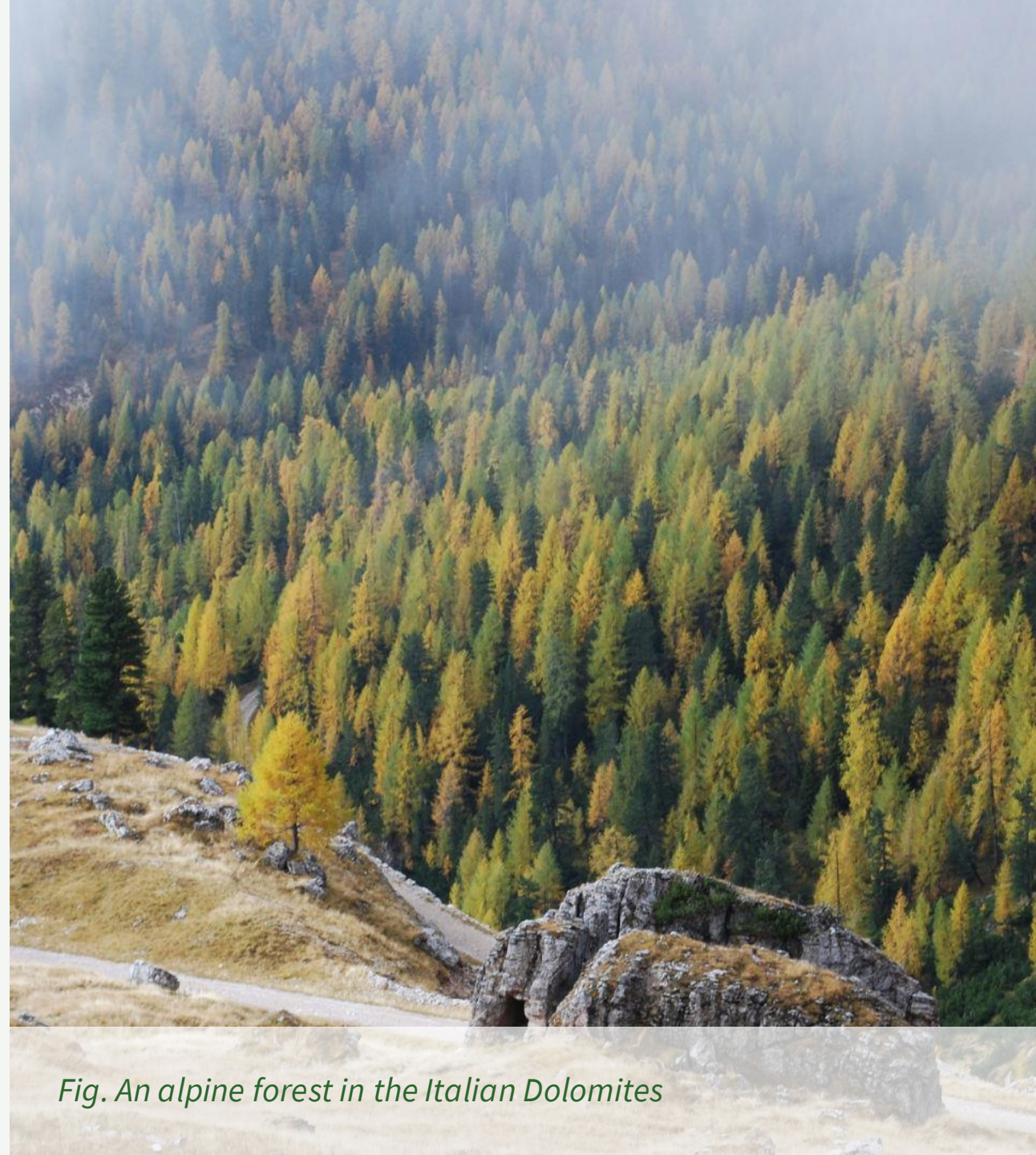


Fig. An alpine forest in the Italian Dolomites

Tropical Rainforest

- A tropical forest is a **dense, lush forest** that occurs near the **equator**. The forests are bounded by the Tropic of Cancer and by the Tropic of Capricorn
- Rainforests are **highly vulnerable to climate change**, which can lead to a range of negative impacts, including canopy dieback, changes in forest structure, and altered evapotranspiration patterns. These **changes can affect biodiversity, ecosystem health, and even global climate stability.**



Fig. Rainforests are dense, warm and wet

Temperate Forest

- Temperate forests are characterised by **moderate climate** conditions.
- These have **distinct seasonal changes** including warm summers and cold winters. These forests typically receive **a moderate amount of rainfall** throughout the year. This supports a diverse range of plant and animal life.
- Temperate forests are commonly found in eastern North America, Europe, parts of Asia, and New Zealand.

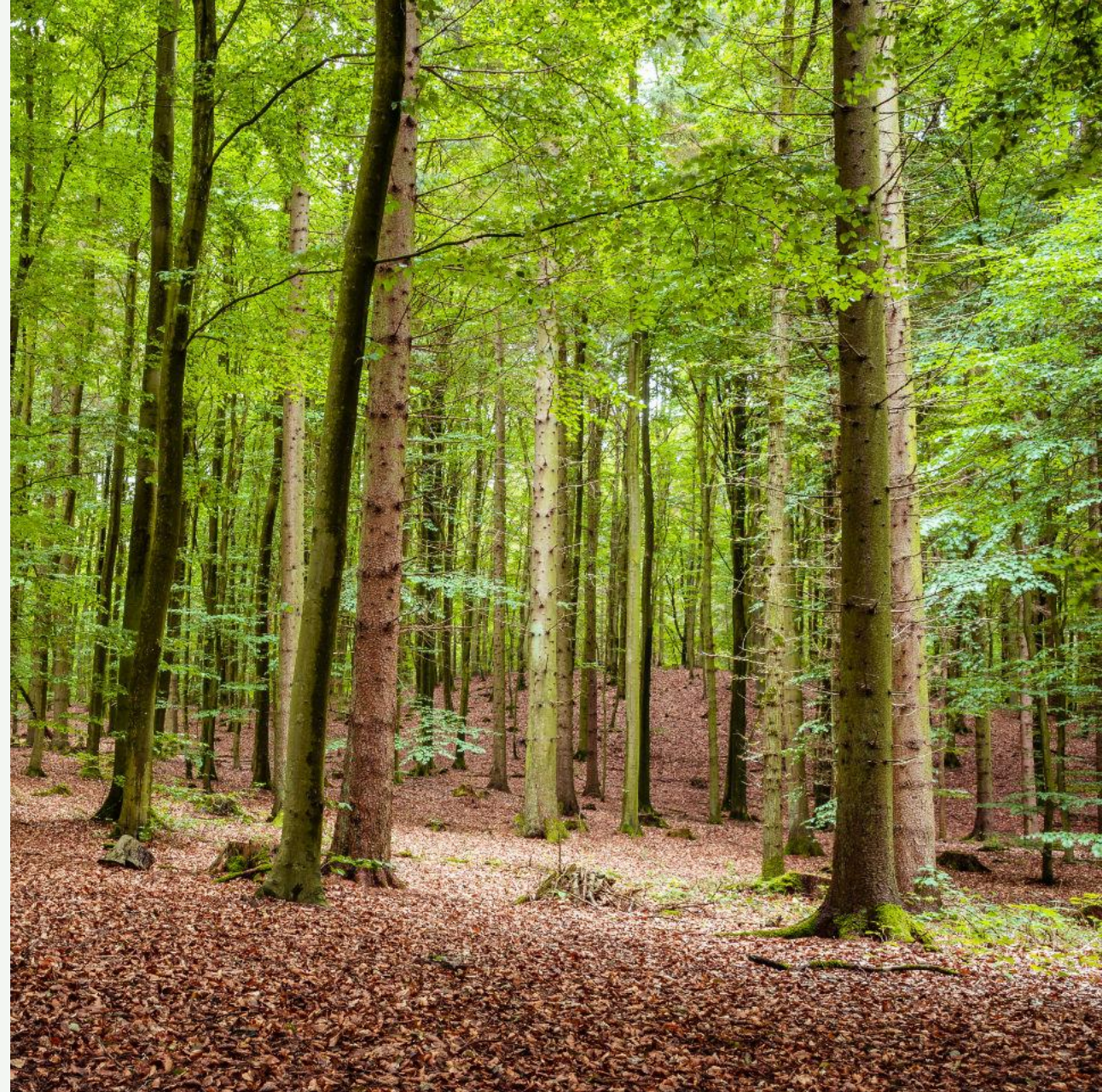


Fig. Temperate forest, Germany

Temperate Rainforest

- Temperate rainforests are rich in vegetation. They are characterised by **high levels of precipitation** and by **mild temperatures**.
- They typically occur in **coastal regions** where moist air from the ocean is forced to rise over mountains, resulting in **frequent rainfall**.
- These forests are known for their tall, dense trees, rich biodiversity, and lush understory vegetation.

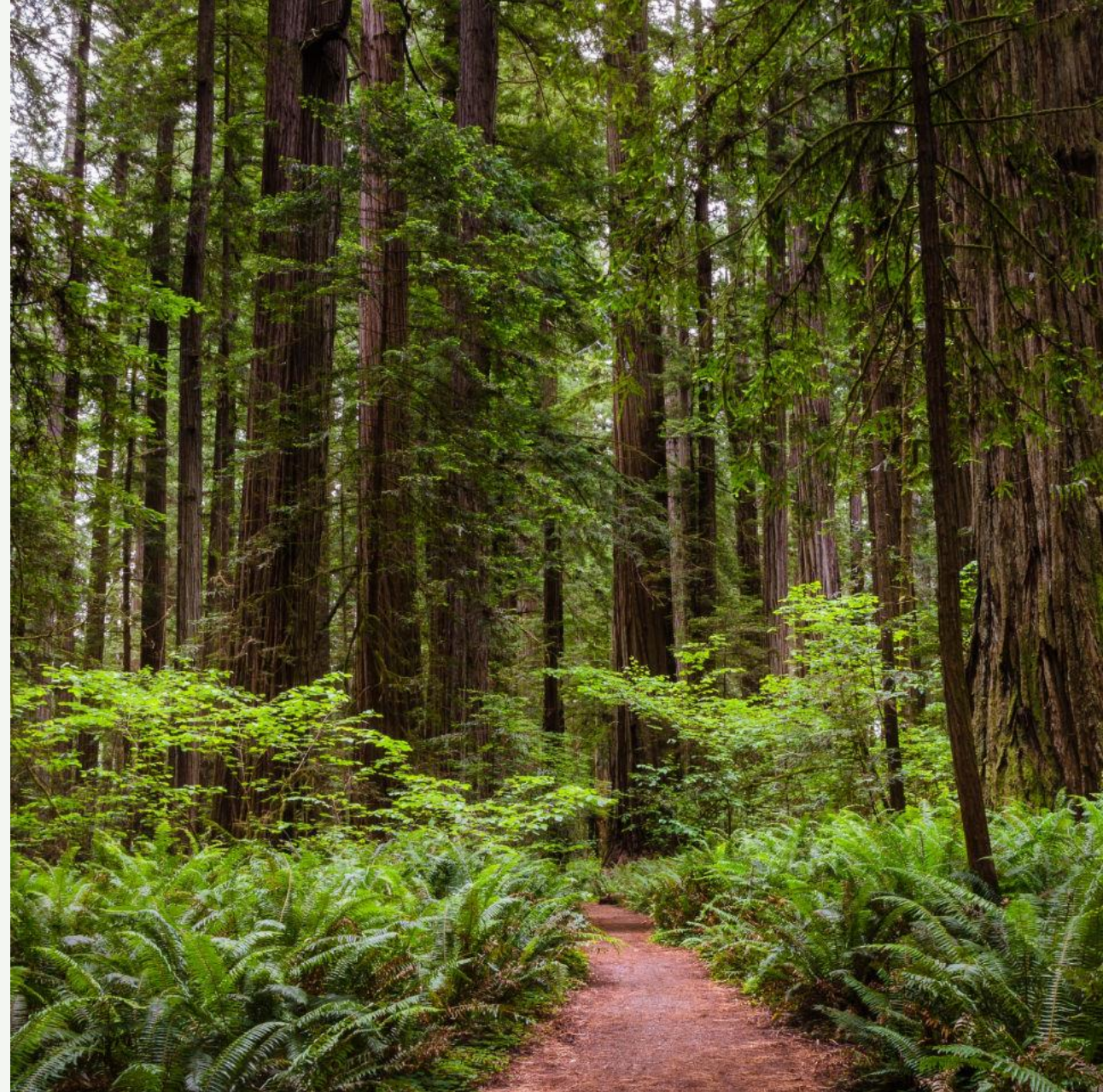


Fig. Coastal redwood forest, USA

Boreal forest (Taiga)

- A boreal forest, also known as taiga, is a **coniferous** forest that stretches across the **northern regions of North America, Europe, and Asia**.
- Such forests are characterised by **cold temperatures, long winters** and by short, mild summers.



Fig. Boreal forest, Norway

Forest Types Based On Use

- Such forests include:
 - ✓ **Old growth forests**
 - ✓ **Productive forests**
 - ✓ **Protective forests**
 - ✓ **Conservation forests**



Fig. Young teak plantation

Plantation Forests

- Plantation forests are **large-scale, managed forests**.
- These are established by the planting of **specific tree species**.
- This is **often for commercial purposes** including producing wood fibre to produce sawn timber, paper, wood-based panels (WBP) and/or other forest products.



Fig. Pine plantation

Old Growth Forests

- Old growth forests are **mature, undisturbed forests** that have developed over long periods of time without significant disturbance from human activity or natural events.
- Their key features include:
 - ✓ Trees are at least **250 years old**
 - ✓ The presence of a **multi-level canopy**
 - ✓ **Standing dead trees and fallen logs** play an important role in the forest ecosystem



Fig. Old-growth redwood forest, California, USA

Secondary Forests

- A secondary forest is a forest that has **regrown after a major disturbance** such as:
 - Logging
 - Agriculture
 - Fire
 - Clear-cutting

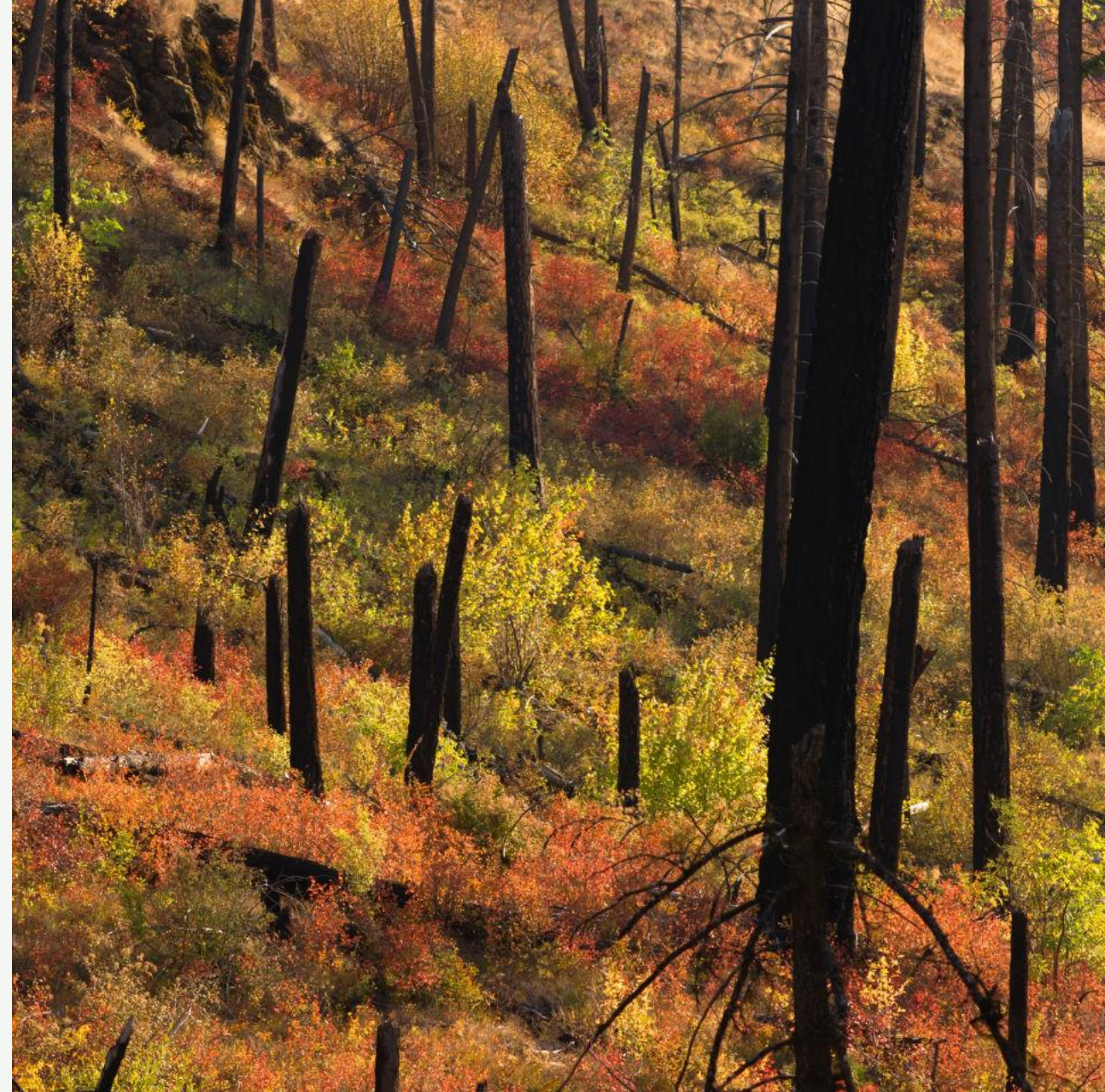


Fig. Regeneration after a forest fire

Productive Forests

- A productive forest is **managed to produce goods and services**, primarily timber and wood products, on a sustainable basis.
- It is essentially **a working forest**, in contrast to forests which are primarily designated for conservation, recreation, or wilderness.



Fig. Harvesting timber from a spruce forest, Ireland

Protection Forests

- These are primarily managed for their **ecological services** and protective functions, rather than timber production.
- In these forests, forest management focuses on maintaining forest health and structure to fulfil their **protective roles**.
- Timber harvesting is often restricted or prohibited.



Fig. An Alpine forest helps to reduce the threat of avalanches

Conservation Forests

- These forests are primarily managed for the **conservation of biodiversity**, genetic resources, and for the provision of a wide range of **ecosystem services** (i.e. non timber).



Fig. Yosemite National Park, USA

Knowledge Check

What is the alternative name for boreal forests?

- Temperate forests
- Taiga
- Rainforests
- Protection forests

What is the minimum age for old growth forests in years?

- 100
- 150
- 250
- 350

Knowledge Check

What is the alternative name for boreal forests?

- Temperate forests
- Taiga
- Rainforests
- Protection forests

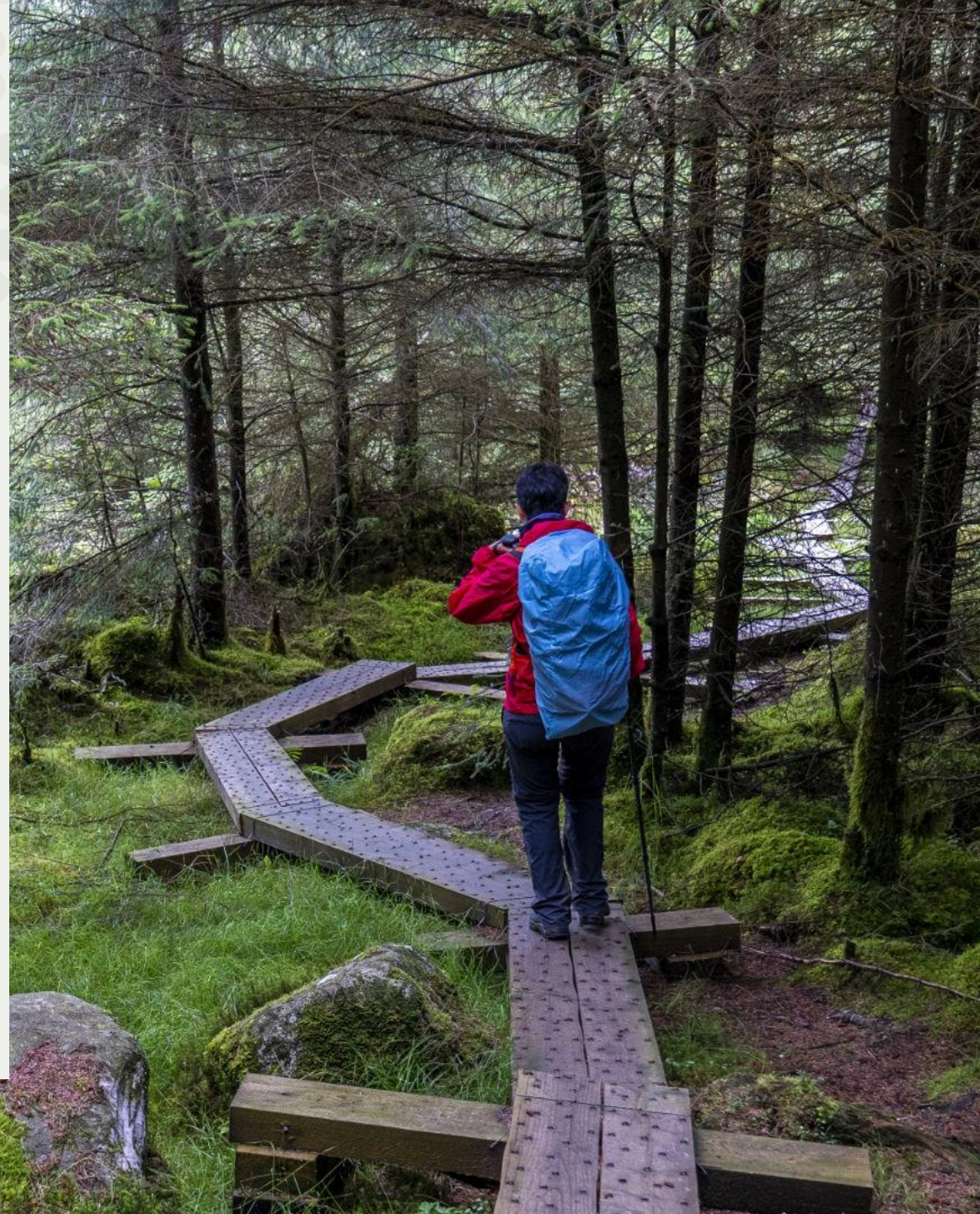
What is the minimum age for old growth forests in years?

- 100
- 150
- 250
- 350

MODULE 5

Environmental Impacts & Benefits of Forests in Ireland

An overview of the environmental threats to forests and the environmental benefits of forests in Ireland.



Benefits of Forests

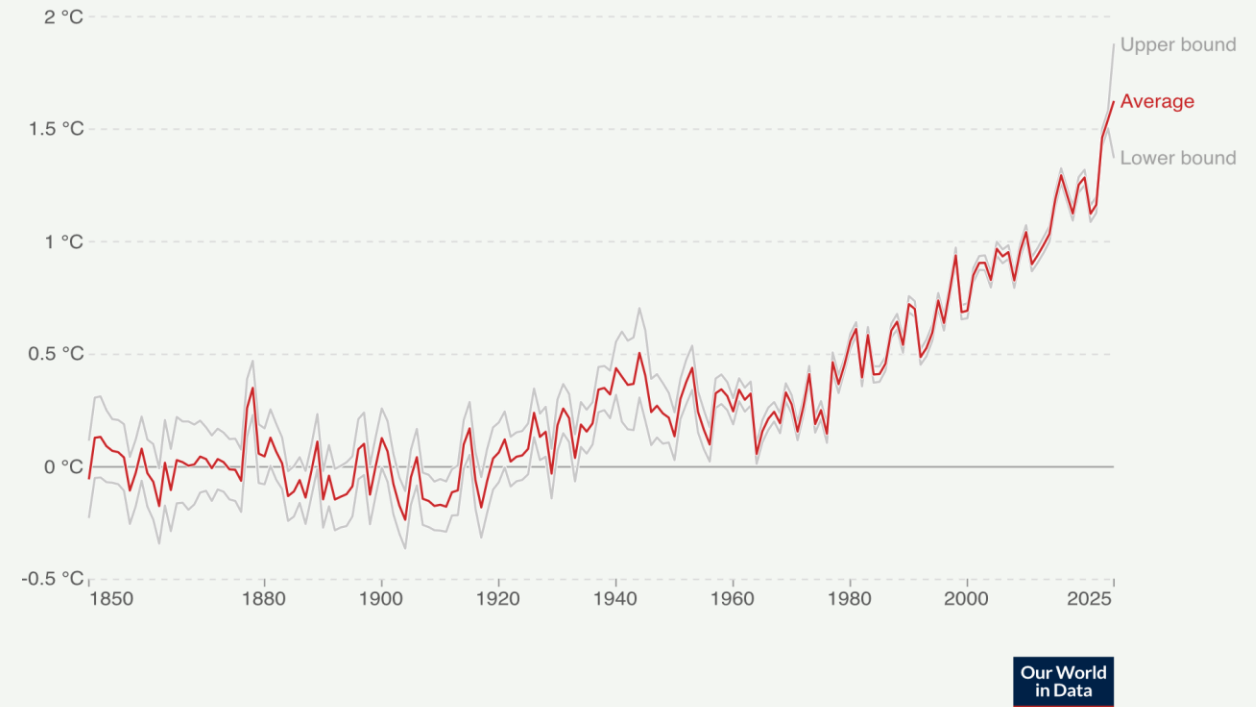
- The benefits of forests include economic, environmental and social benefits.
- **Economic benefits** include: timber, food, fuel and bio-products.
- **Ecological functions** include: carbon storage, nutrient cycling, water and air purification and the maintenance of wildlife habitats.
- Forests offer a myriad of **social and cultural benefits** including: recreation and leisure; education and research; aesthetic value and mental health benefits.



Fig. Building a timber frame house in Ireland

Climate Crisis

- Global average temperatures have **increased by more than 1°C** since pre-industrial times
- Temperature is a fundamental measurement for describing the climate and the temperature in particular places can have **wide-ranging effects** on human life and ecosystems.



Irish Forests & Climate Change

- Forests play an **important role in mitigating climate change** by sequestering and storing atmospheric carbon dioxide (CO₂).
- In 2022, the total **carbon store** in Irish forests was estimated to be **312 million tonnes** between trees, leaf litter and soils.



Fig. Hollywood, Co Wicklow

Mitigation of Climate Change

- Forests mitigate climate change by **absorbing carbon dioxide** from the atmosphere during photosynthesis, thus reducing greenhouse gas concentrations and stabilising the global climate
- It is estimated that Sitka spruce plantations **absorb 6.8 t/CO₂-eq/ha/yr**



Fig. Sitka spruce forest in Ireland

Forest Biodiversity

- Forest biodiversity refers to **all life forms** found within forests and the **ecological roles** they perform.
- This encompasses **not just trees**, but the multitude of plants, animals and micro-organisms that inhabit forest areas and their associated genetic diversity.

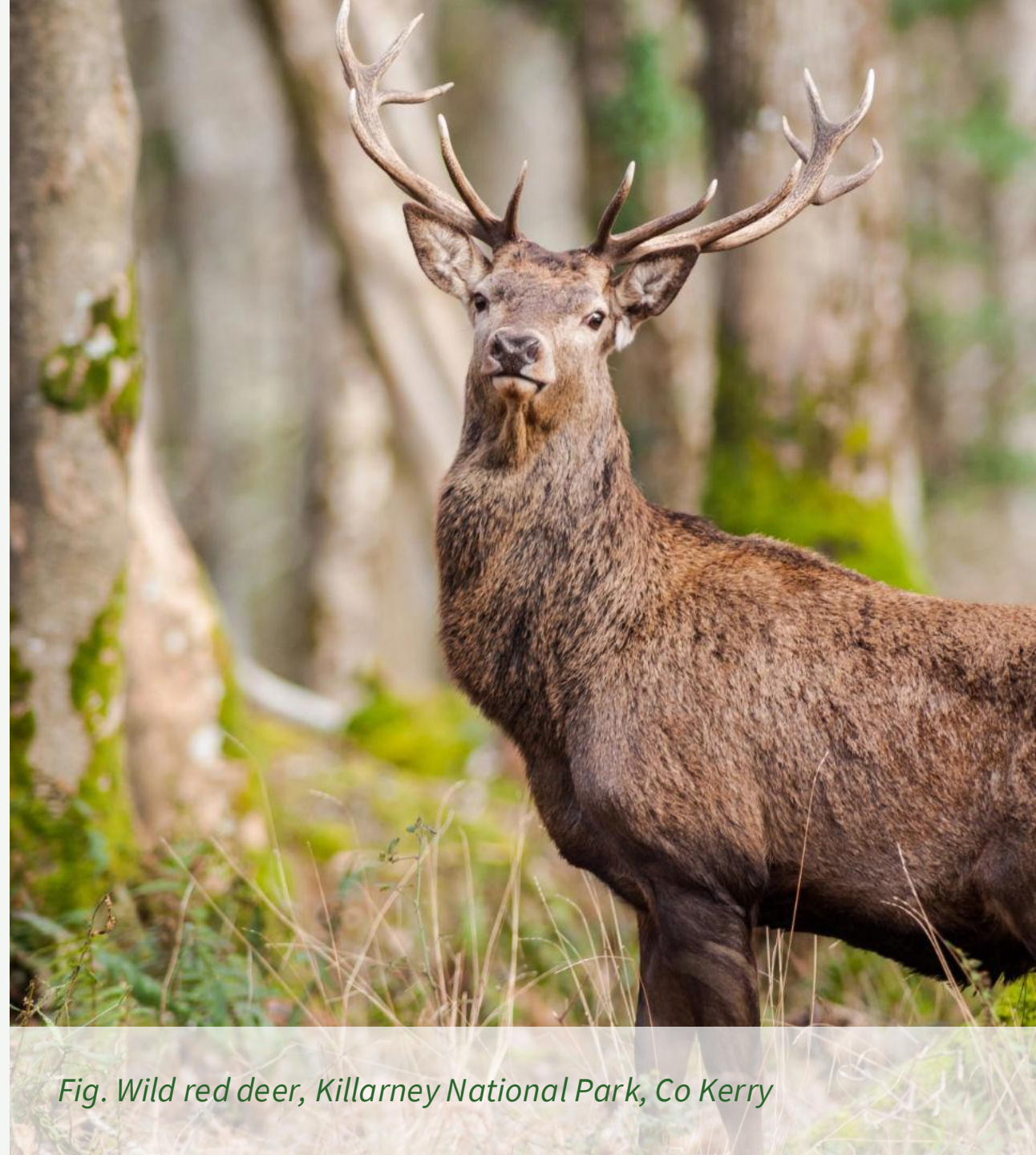


Fig. Wild red deer, Killarney National Park, Co Kerry

Biodiversity and Culture

- Biodiversity in forests also contributes to **cultural and spiritual values**.
- Many indigenous and local communities **rely on forests** for livelihood, food, medicine, and cultural practices, fostering a deep connection with nature.



Fig. A brown bear in a forest in Finland

Forest Mammals

- Ireland's broadleaved and coniferous forests provide **habitats for a range of mammal species**, from large and medium sized herbivores.
- These include red, fallow and sika deer, to smaller mammals such as pine martens, red and grey squirrels, bank voles, wood mice and shrews.
- In addition, hares and rabbits are frequently found at the edges of such habitats (COFORD).



Fig. European red squirrel

Forest Birds

- The types of forest birds found in a particular area depend on the type of forest, the climate, and the availability of food and nesting sites.



Forest Insects

- Irish forests are home to a variety of insect species.
- These include beetles, butterflies, moths, flies, bees and ants.
- Insects play a **crucial role in forest ecosystems**.
- This includes pollination, aiding in decomposing, and serving as a food source.



Fig. A forest beetle

Forests and Native Species

- Forests are **crucial for conserving native species** due to their role as habitats, corridors, and genetic reservoirs.
- By **protecting and restoring forests**, especially native woodlands, we can support biodiversity, mitigate climate change and **ensure the long-term resilience of ecosystems**.



Fig. A native oak in Killarney National Park, Co Kerry

Carbon Sequestration

- Carbon sequestration refers to the process of **capturing and storing atmospheric carbon dioxide (CO₂)** to mitigate climate change.
- Forests play a critical role in this process as they act as **natural carbon sinks**, absorbing CO₂ during photosynthesis and storing it in biomass and soils.



Fig. Forests sequester carbon dioxide (CO₂)

Forests and the Water Cycle

- Forests are **integral to maintaining and improving water quality**, providing ecological functions that benefit both natural ecosystems and human communities.
- Protecting these vital habitats is essential for securing **clean water resources** for future generations.

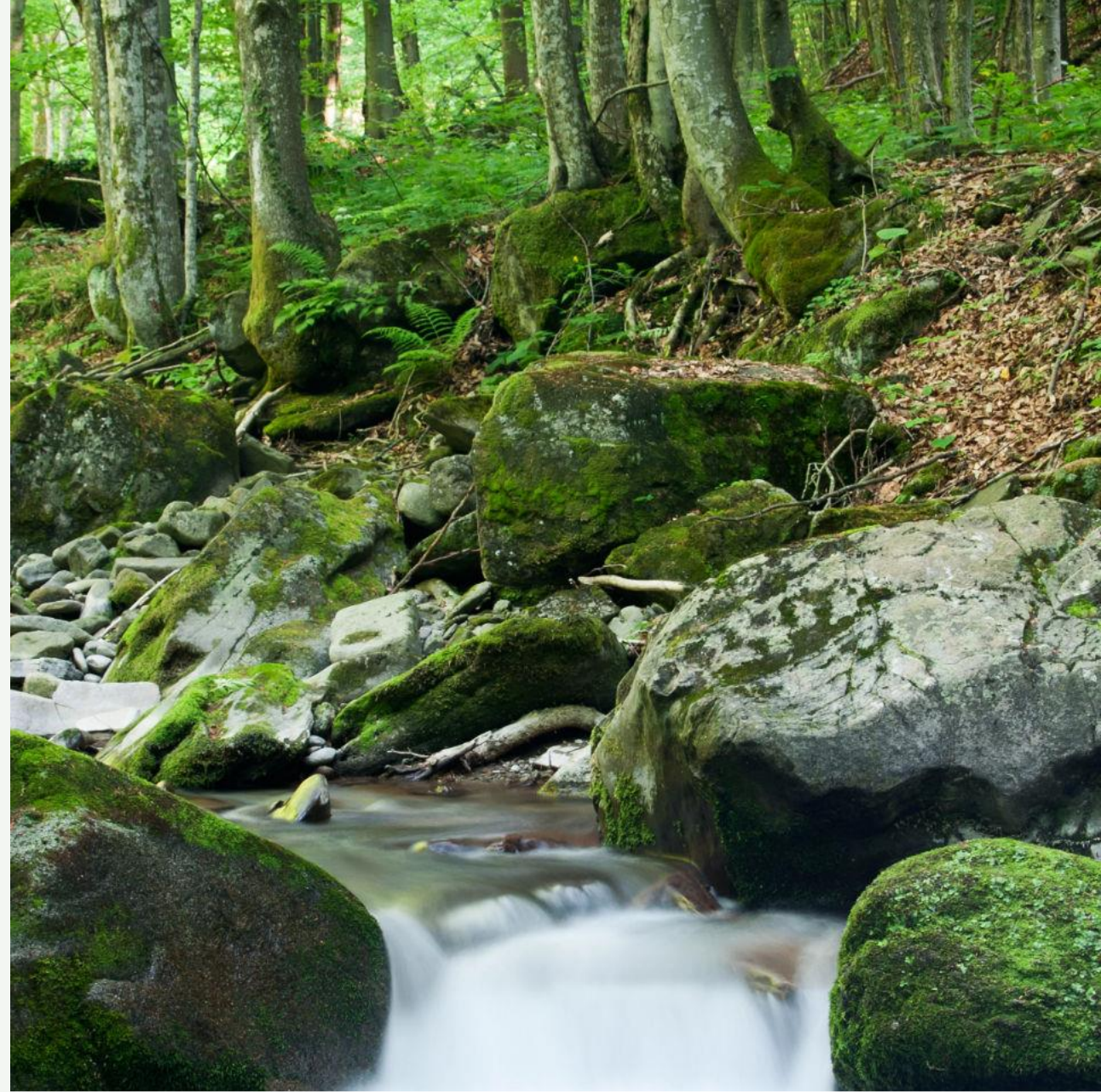


Fig. Stream in the Sheeffry Hills, Co Mayo

Forests and Water Quality

- Forests play a crucial role in maintaining good water quality by acting as **natural filters and regulators**. They help reduce sediment and nutrient runoff, prevent erosion, and regulate water flow, all of which are important for maintaining healthy aquatic ecosystems.
- However, forestry activities can also negatively impact water quality if they are not managed sustainably.



Fig. Clare Glens, Co Tipperary

Forests and Soil Health

- Forests play **a crucial role in maintaining healthy soils**. They protect soil from erosion, enhance water infiltration, and improve soil fertility through nutrient cycling and organic matter accumulation.
- In turn, healthy soil supports the growth and survival of trees, making the relationship between forests and soil a vital and **interconnected ecosystem function**.

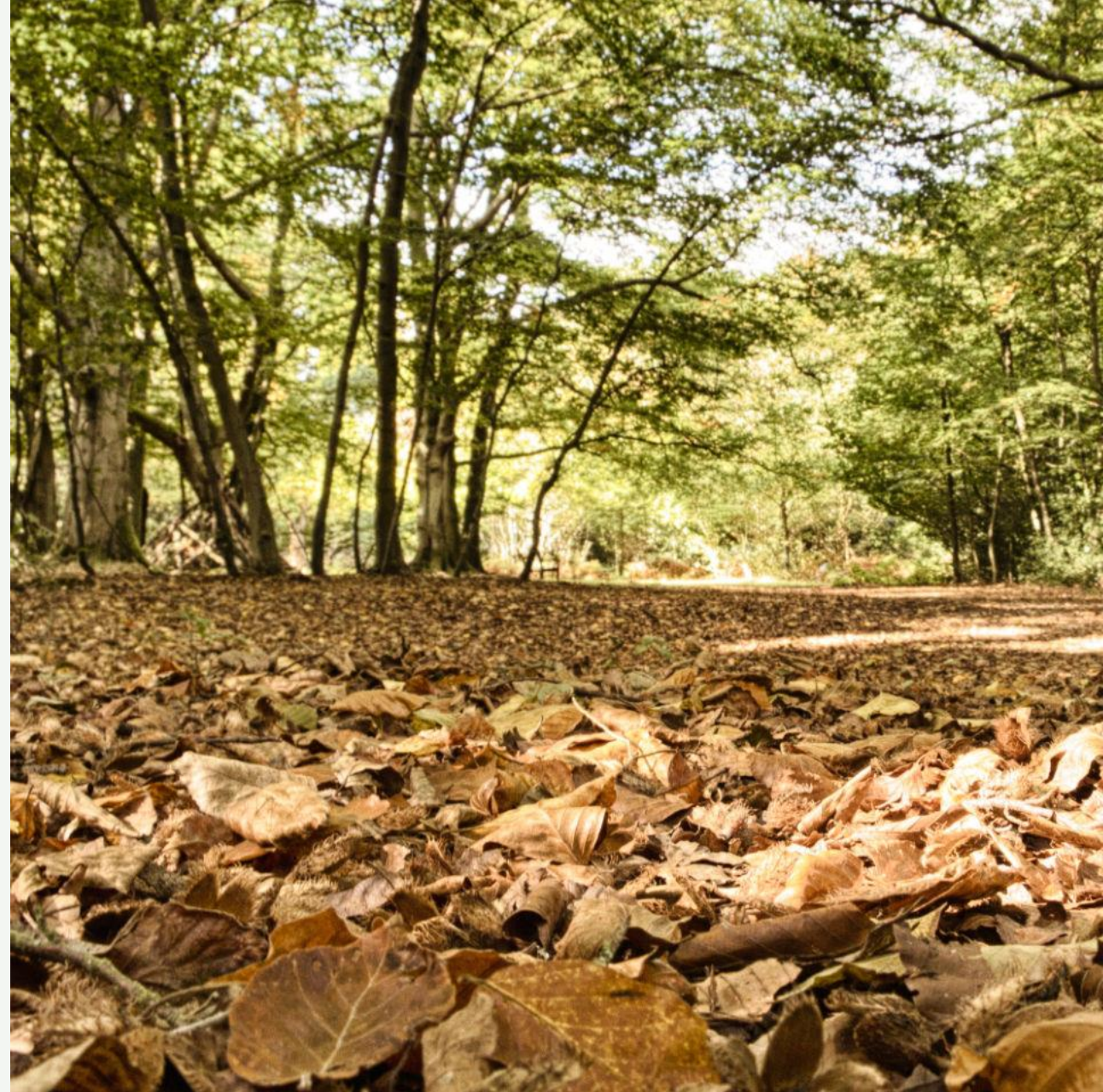


Fig. Leaf litter on a forest floor

Forests and Air Quality

- Forests play a crucial role in **maintaining and improving air quality**.
- This includes: absorption; providing oxygen (O₂); carbon sequestration and temperature regulation .



Forests and Wellbeing

- **Forests have a profound and multifaceted impact on human well-being**, influencing our physical, mental, and social health in numerous ways.
- The connection between forests and well-being is a growing area of research and is increasingly recognized for its importance in urban planning, healthcare, and environmental policy.



Fig. A walking trail in an Irish forest

Knowledge Check

What do forests sequester during photosynthesis?

- Oxygen (O₂)
- Carbon dioxide (CO₂)
- Hydrogen (H)
- Potassium (K)

How many tonnes of carbon dioxide (CO₂) are estimated to be absorbed by a hectare of Sitka spruce per annum?

- 5.0
- 7.5
- 6.8
- 10.0

Knowledge Check

What do forests sequester during photosynthesis?

- Oxygen (O₂)
- Carbon dioxide (CO₂)
- Hydrogen (H)
- Potassium (K)

How many tonnes of carbon dioxide (CO₂) are estimated to be absorbed by a hectare of Sitka spruce per annum?

- 5.0
- 7.5
- 6.8
- 10.0

An aerial photograph of a dense forest, likely a coniferous woodland, with a white rectangular overlay on the left side containing text. The forest is lush green, and a small stream or path is visible winding through the trees. The text overlay is positioned on the left side of the image, with a decorative pattern of light green circles in the background.

MODULE 6

Environmental Challenges Facing Irish Forests

An overview of the environmental challenges which face Irish forests.

Irish Forest Policy (2023-2027)

- Irish forest policy aims to **expand the national forest estate while addressing climate change, biodiversity, and water quality.**
- In order to provide for a sustained wood harvest and to provide for climate change mitigation and other public goods, the Irish government aim is to **increase forest cover to 18% by 2050.**



Fig. The output of the Irish forest sector will double by 2035

Ireland's National Forest Strategy

FOREST FOR CLIMATE	FORESTS FOR WOOD	FORESTS FOR PEOPLE	FORESTS FOR NATURE	FORESTS FOR ECONOMY
				

Forest Goals

1. Forest Expansion 2. Carbon sequestration and storage 3. Measuring embodied carbon 4. Product carbon substitution	1. Supply and expansion at scale 2. Timber and wood product promotion 3. Product and market development 4. Quality assurance and forest certification	1. Promote recreation 2. Access to forests 3. Building confidence and trust 4. Learning and awareness	1. Native forest expansion 2. Protecting and restoring natural heritage and ecosystem services 3. Forest biodiversity 4. Ancient and long-established woodlands 5. Invasive species	1. Value 2. Transition to low carbon economy 3. Supporting a thriving rural economy 4. Supporting the bioeconomy
---	---	---	---	--

Outlook to 2050

- A recent report '*Forests and Wood Products, and their Importance in Climate Change Mitigation*' was undertaken by COFORD/DAFM.
- The report notes that **afforestation and forest management practices are crucial for mitigating climate change** in Ireland to 2050



Minimise Deforestation

- To minimise forest degradation and deforestation, a **multifaceted approach** is needed.
- This includes strengthening **forest governance**, promoting **sustainable practices**, and **addressing the root causes** of deforestation.



Fig. A deforested rainforest in Brazil

Forest Fires

- In 2023, it is estimated that **100 ha of state forest** was damaged by fire
- The Department of Agriculture, Food and Marine (DAFM) is responsible for managing forest protection in Ireland.
- The general public, forest owners and other land owners are also involved.



Continuous Cover Forestry

- The management of Irish forests is evolving and improving to meet new conditions. This includes the use of continuous cover forestry (CCF).
- CCF is an approach to forest management where the forest canopy is retained and **individual or small groups of trees are removed** at certain times to **allow light to reach the forest floor** and new seedlings to grow.
- The adoption of CCF schemes are **grant aided** by the Department of Agriculture (DAFM).



Fig. A CCF managed forest in Ashford, Co Wicklow

Forestry & Products to 2035

- **Ireland's forest bio-economy is thriving** and the sector has the ambition and drive to grow further in the decades ahead
- It is estimated that the supply of **roundwood from Irish forests will double by 2035**.
- The gross output of the Irish forestry and forest products sector is set to double by 2035 against a backdrop of increasing carbon constraint. This creates a tremendous opportunity for the Irish forestry and forest products sector.



Fig. Timber storage in an Irish sawmill

Timber Output to 2035

- Estimates indicate that the annual potential roundwood supply from Irish forests will increase from 4.7 million m³ in 2021 to **7.1 million m³ by 2035**.
- By 2035, the output of the Irish forestry and timber sector is forecast to double from €2.3 billion (2018) to **€4.6 billion**.



Fig. A roundwood harvest in Ireland

Conserving Forest Biodiversity

- Conserving forest biodiversity in Ireland involves various strategies. These include:
 - ✓ **Protecting existing forests**
 - ✓ **Restoring degraded habitats**
 - ✓ **Promoting native tree planting**



Fig. The barn owl is commonly found in Irish forests

Certification & Private Forests

- Forecasts indicate that **private timber will exceed Coillte supply.**
- Timber processors will likely be getting increased supplies from private owners.
- However, with uncertified **intake capped at 30%** - uncertified private owners may find it **difficult to sell** their roundwood.

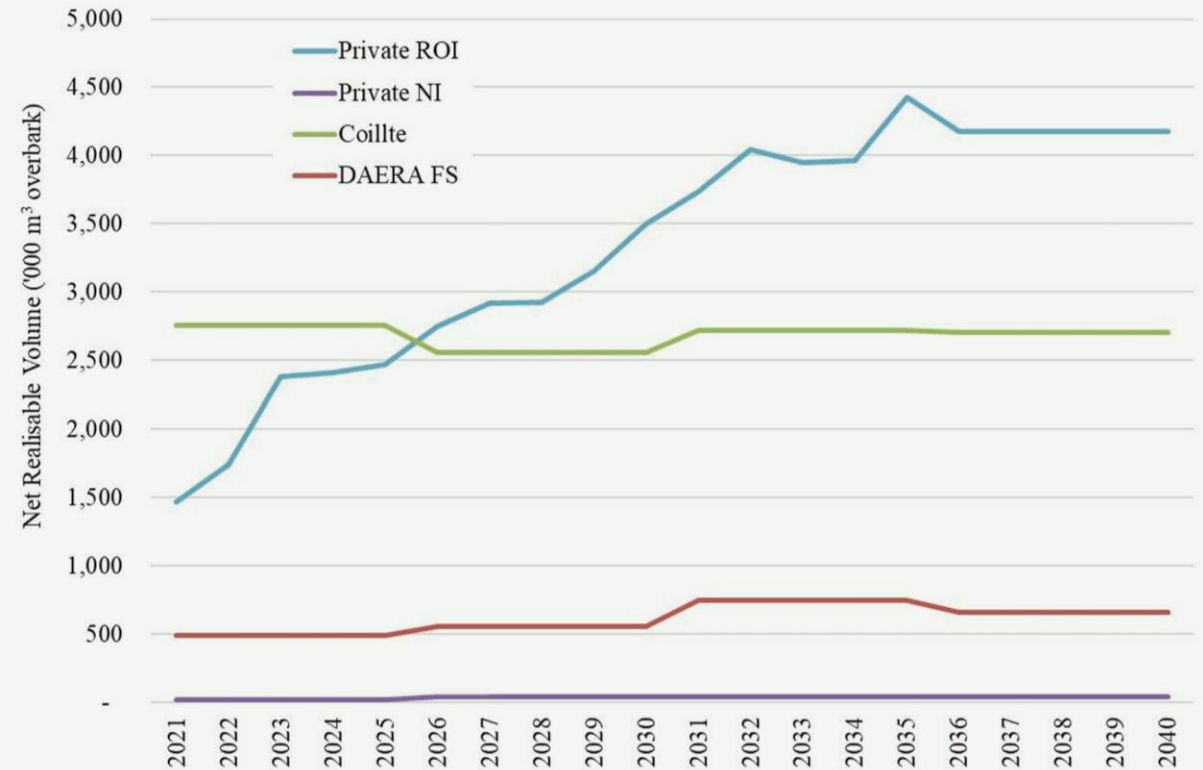


Fig. Forecast of net realisable volume by ownership category

Certification Group Schemes

- **Group forest certification schemes** – might be the **solution** for privately owned forests.
- **Cost** of certification is a major concern.
- **Grouping forest owners** mean the **cost can be spread** and offers scalability.



Fig. Group schemes may solve the problem of certification costs

Plant and Forest Health

- One of the key objectives of the Forestry Inspectorate of DAFM is to implement the forestry aspects of the **EU Plant Health Regulation** 2016/2031.
- This includes **monitoring and control programmes** for harmful forestry pests and diseases.



Fig. A mixed forest in the Wicklow Mountains National Park

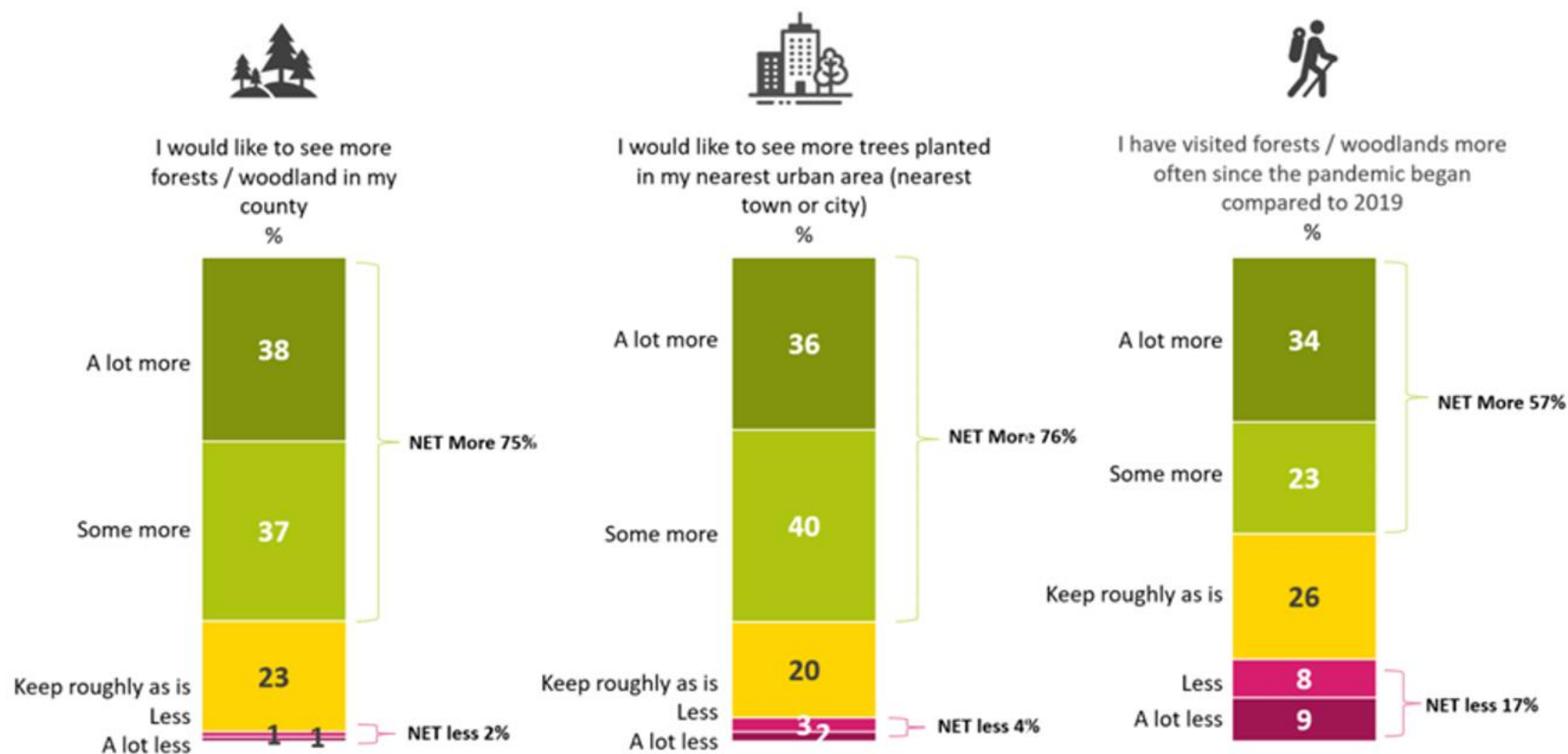
Public Perception of Forests

- In 2021, a **market research survey** was undertaken for the Department of Agriculture, Food and Marine while developing a new Forest Strategy.
- This field survey was undertaken by behaviour & attitudes of the general public to better understand **attitudes towards forestry**, and exploring wider perspectives of forestry and trees in Ireland.

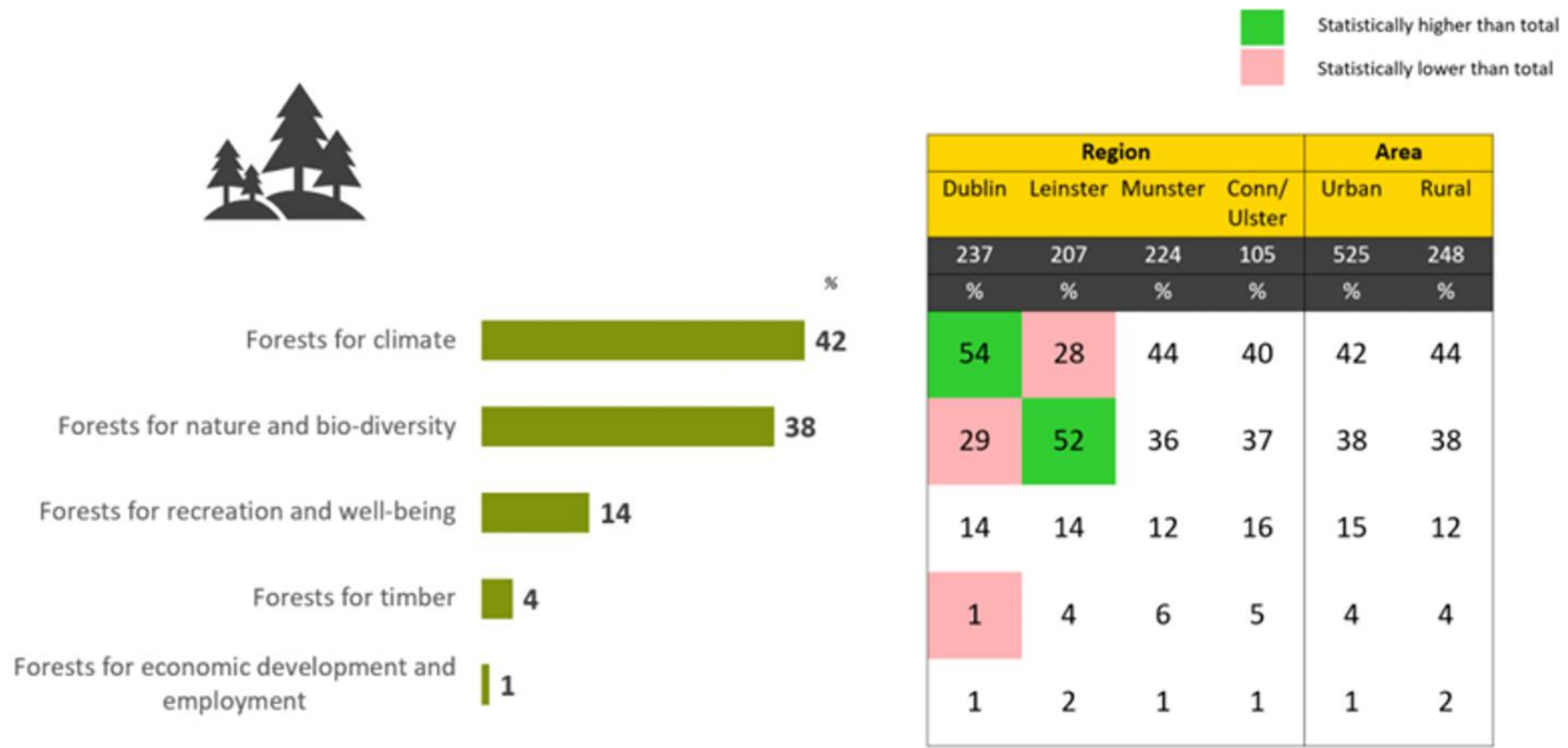


Fig. Wicklow Mountains National Park

Attitudes Towards Forests/Woodlands



Most Important Reasons For New Forests



Perception of Forest Products

- A recent report by the **Timber in Construction Steering Group** found that:

“Increasing the use of timber in construction is driven by several key factors, primarily in response to the climate crisis and the need to decarbonise our built environment.”



Opportunities in Sustainability

- Suppliers who are able to differentiate themselves in terms of sustainable supply, quality and consistency of products will have access to **additional markets** and margins.
- **Wood is a renewable resource**, unlike fossil fuels or mined materials.



Fig. Timber frame houses are climate friendly

A Growing, Positive Outlook

- By 2035, the output of the Irish forestry and timber sector is forecast to double from €2.3 billion (2018) to **€4.6 billion**.
- Employment in the sector is set to increase to **18,000 jobs**.
- Virtually all of the forecast increase in roundwood harvest to 2035 will come from the private forest sector.

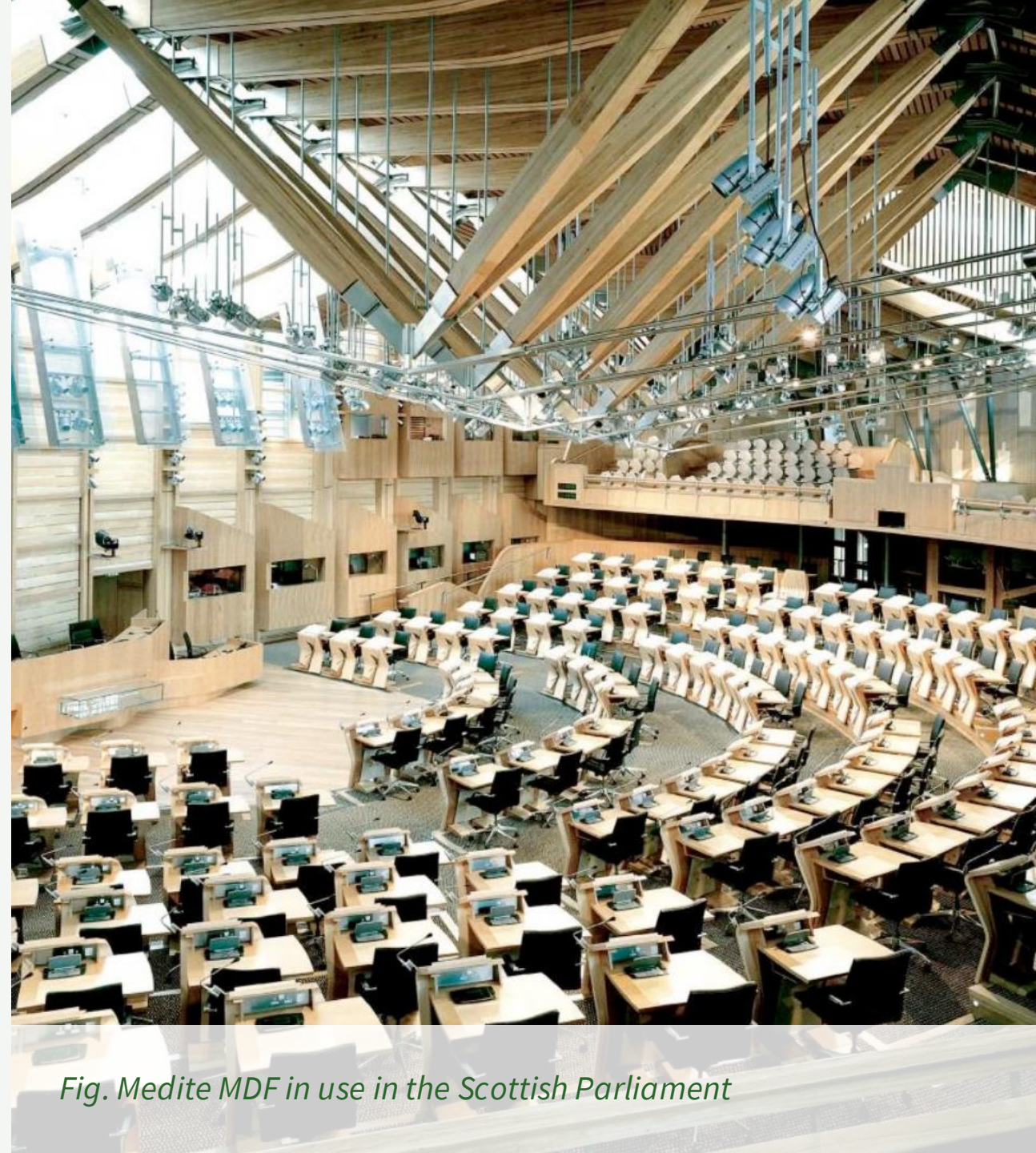


Fig. Medite MDF in use in the Scottish Parliament

Forest Innovation

- **Treemetrics** is an Irish forest technology company.
- Its laser scanning software is used for the **capture of forest inventory** and roundwood harvesting data
- This data is used to **maximise the value of the roundwood harvest** by producing the timber assortments which are most profitable.



Forest Products Innovation

- Innovative timber products include:
 - ✓ **Engineered wood products (EWP)**
 - ✓ **Recyclable packaging**
 - ✓ **Bio-refined products**
- The EWP in common use include:
 - ✓ **Cross-laminated timber (CLT)**
 - ✓ **Timber I-beams**
 - ✓ **Glued laminated timber (glulam)**



Fig. Glulam beams

Innovative use of EWPs

- Engineered wood products (EWP) are **man-made wood materials** created by binding or fixing together wood strands, fibres, or veneers, often with the use of adhesives and heat.
- These products are designed to provide better performance, stability, and durability compared to traditional solid wood.

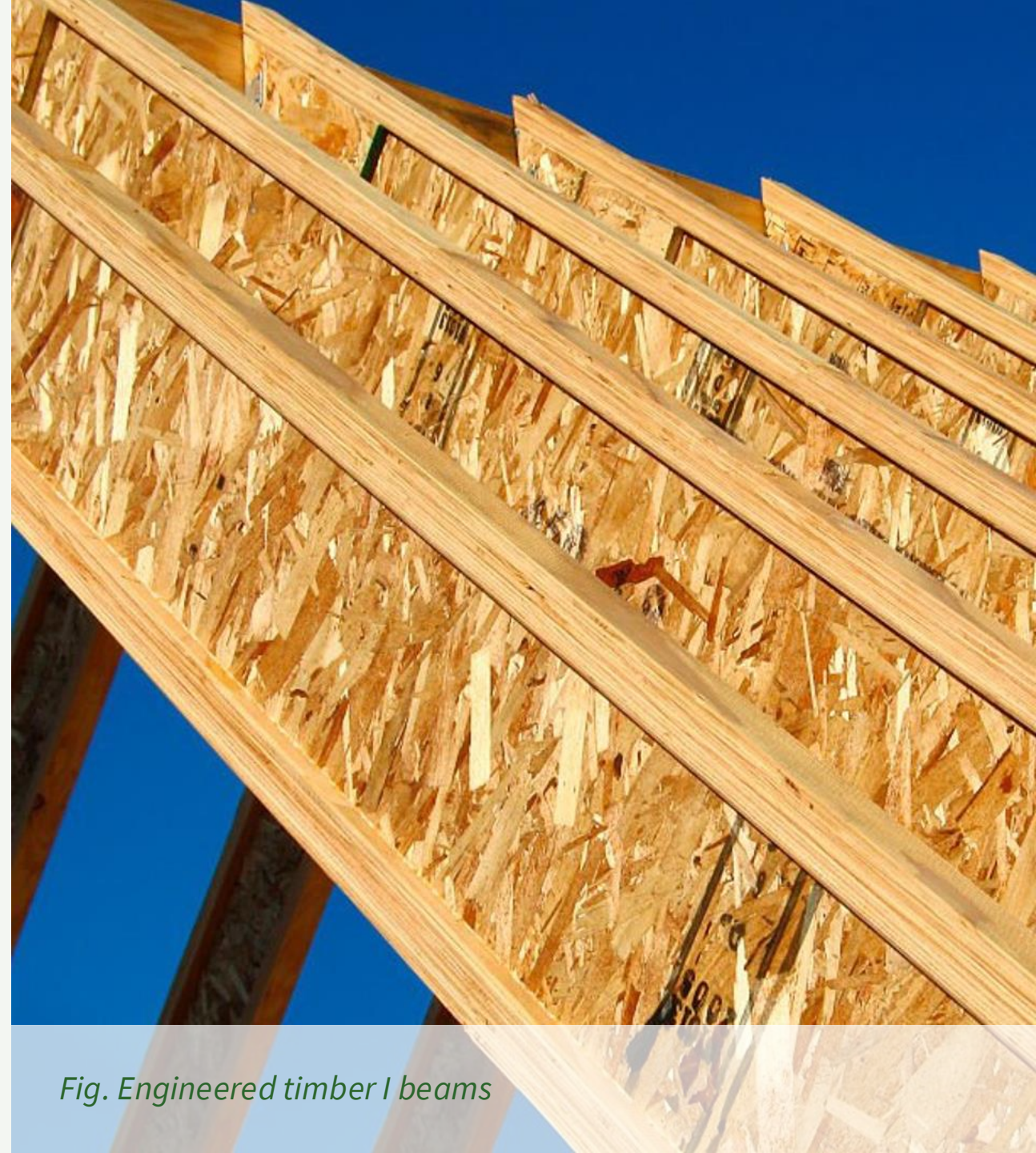


Fig. Engineered timber I beams

Knowledge Check

What is Ireland's target forest cover in 2050?

- 20%
- 18%
- 25%
- 30%

By 2035, what is the forecast roundwood harvest in Ireland in million cubic metres (m₃)?

- 5.0
- 10.0
- 15.0
- 7.2

Knowledge Check

What is Ireland's target forest cover in 2050?

- 20%
- 18%
- 25%
- 30%

By 2035, what is the forecast roundwood harvest in Ireland in million cubic metres (m₃)?

- 5.0
- 10.0
- 15.0
- 7.2

Common Terminology

- **Carbon dioxide (CO₂)** - colourless gas produced by burning fossil fuels and through respiration and the most prevalent greenhouse gas (GHG) in the atmosphere which absorbs heat causing a warming of the planet.
- **Carbon footprint** - total amount of GHG, particularly CO₂ emitted as the result of a specific activity.
- **Whole life carbon** – is cradle-to-grave carbon emissions and refers to total operational and embodied carbon emissions of a building asset.
- **Sequestration** – refers to the process of capturing and storing atmospheric carbon dioxide to reduce its concentration in the atmosphere and mitigate climate change.
- **Substitution** – involves replacing one material with another—particularly replacing carbon-intensive materials with more sustainable options, like using wood instead of steel or concrete, to lower overall carbon emissions.

Common Terminology

- **FSC Forestry Stewardship Council** – an independent forestry certification organisation
- **PEFC Programme for the Endorsement of Forest Certification** – an independent forestry certification organisation

Further Reading

- **Forests and Wood Products, and Their Importance in Climate Change Mitigation**
COFORD working group report, 2022
- **Environmental Requirements for Afforestation**
DAFM, 2024
- **Regulation, Forest Health and Resources**
DAFM, 2024
- **Forest Health**
DAFM, 2025
- **LULUCF Regulation**
DAFM, 2021
- **Global Policies Influencing the Greater Adoption of Timber in Construction**
Timber in Construction Steering Group, 2025
- **Forest Stewardship Council**
- **Programme for the Endorsement of Forest Certification**



Forest Industries
Ireland

ibec