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The EcoMystery Project:

Interactive Escape Rooms for Climate Crisis

Awareness and Civic Engagement in School Education

WP3

ECCC Guidelines for Teachers for implementing

MOD 1 - Activity 2 – Biodiversity Musical Chairs

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The EcoMystery Project: Interactive Escape Rooms for Climate Crisis Awareness and Civic Engagement in School Education

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MOD 1 – Activity 2 - MUSICAL CHAIRS

1. Teacher Support Guide – Forest Ecosystem Roles

Through progressive species elimination, students understand:

- Interdependence within ecosystems
- Trophic relationships and ecological balance
- Cascading effects of biodiversity loss
- Links between biodiversity and climate regulation

2. Trees

Ecological Role

Trees are the structural and climatic foundation of the forest ecosystem. They:

- Absorb CO₂ through photosynthesis (carbon sequestration)
- Release oxygen
- Regulate temperature and humidity
- Provide habitat for animals, fungi, insects
- Stabilize soil with their root systems
- Influence water cycles

Without trees, the forest ecosystem collapses rapidly.

? Teacher Reflection Questions (If trees are eliminated)	
Ecosystem Structure • What happens to animals that live in trees? • Where will birds build nests? • What happens to shade-dependent plants?	• Birds, arboreal mammals, insects decline rapidly. • Increased exposure to predators and weather extremes. • Local extinction of tree-dependent species likely. • Increased sunlight raises ground temperature. • Understory plants adapted to shade may die. • Species composition shifts toward sun-tolerant plants.
Climate & Atmosphere • What happens to carbon dioxide levels? • How would temperature change in this forest? • Would this affect global climate?	• CO₂ absorption decreases dramatically. • Atmospheric CO₂ increases. • Carbon previously stored in trees may be released if trees decay or burn • Local temperature increases (loss of shade and evapotranspiration). • Microclimate becomes hotter and drier
Soil & Water • What happens to soil without roots holding it? • What risks increase (erosion, landslides, floods)?	• Roots no longer stabilize soil. • Increased erosion from rain and wind. • Higher risk of floods and landslides. • Soil fertility decreases over time.

3. Shrubs & Understory Plants

Ecological Role

Shrubs and small plants form the middle and lower vegetation layers. They:

- Provide food (berries, seeds)
- Offer shelter for small animals
- Protect soil from erosion
- Support pollinators
- Maintain biodiversity

They increase structural diversity in the forest.

 Teacher Reflection Questions (If shrubs are eliminated)	
Biodiversity • Which animals lose food sources? • What happens to insects that rely on flowering plants?	• Small mammals, birds, insects lose berries, seeds, nectar. • Herbivore diets become limited. • Pollinators lose floral diversity.
Soil • Does soil become more exposed? • What might heavy rain do to uncovered soil?	• Soil becomes exposed to rain impact. • Increased erosion and nutrient loss.
Forest Regeneration • Do young trees have protection anymore? • Could forest recovery slow down?	• Reduced protection from harsh sunlight and wind. • Higher seedling mortality. • Slower forest regeneration.

4. Pollinators

Ecological Role

Pollinators enable plant reproduction. They:

- Transfer pollen between flowers
- Ensure fruit and seed production
- Maintain plant genetic diversity
- Support food webs

Without pollination, many plants cannot reproduce.

? Teacher Reflection Questions (If pollinators are eliminated)	
Plant Reproduction • Can flowering plants produce seeds? • What happens next season?	• Many plants fail to produce seeds. • Fruit production drops significantly. • Genetic diversity declines. • Fewer new plants grow.
Food Web • What animals lose fruits or seeds? • Could some plant species disappear?	• Food shortages occur. • Herbivores and omnivores decline. • Secondary population effects ripple through food web.
Long-Term Impact • How would the forest look in 10–20 years? • Does biodiversity increase or decrease?	• Loss of plant diversity. • Simplification of ecosystem. • Reduced resilience to environmental stress. • Gradual but profound biodiversity collapse and food web destabilization.

5. Soil Engineers & Decomposers

(Fungi, Earthworms, Bacteria, Microorganisms)

Ecological Role

They recycle nutrients and maintain soil fertility. They:

- Break down dead plants and animals
- Return nutrients to the soil
- Improve soil structure
- Enable plant growth
- Support carbon cycling

They are invisible but essential.

 Teacher Reflection Questions (If soil engineers and decomposers are eliminated)	
Nutrient Cycle • What happens to dead leaves and animals? • Do nutrients return to the soil?	• Leaves and dead organisms accumulate. • Decomposition slows or stops. • Nutrient recycling is interrupted. • Nutrients remain locked in dead material. • Soil becomes nutrient-poor.
Plant Growth • Can trees grow in nutrient-poor soil? • Does forest productivity decline?	• Plant growth declines. • Forests provide fewer ecosystem resources.
Carbon Cycle • Does carbon remain trapped in dead material? • How does this affect atmospheric CO₂?	• Carbon cycling slows. • Some carbon may remain stored longer. • Soil degradation, reduced plant productivity

6. Seed Dispersers

(Squirrels, Deer, Wild Boars, Small Birds)

Ecological Role

Seed dispersers enable forest regeneration. They:

- Transport seeds to new locations
- Increase plant distribution
- Support genetic diversity
- Enable forest recovery after disturbances

? Teacher Reflection Questions (If seed dispersers are eliminated)	
Forest Regeneration • Where do seeds fall without animals? • Do new trees grow far from the parent tree?	• Seeds fall mostly under parent tree. • High competition for light and nutrients. • Increased vulnerability to disease and predators.
Resilience • After fire or drought, can the forest recover? • Does the forest become less diverse?	• Regeneration slows significantly. • Reduced genetic mixing. • Forest recovery after fire/drought becomes weaker. • long-term biodiversity decline.

7. Predators

(Wolves, Foxes, Birds of Prey)

Ecological Role

Predators regulate population balance. They:

- Control herbivore populations
- Prevent overgrazing
- Maintain trophic balance
- Support biodiversity stability

? Teacher Reflection Questions (If predators are eliminated)	
Population Explosion • What happens to herbivore populations? • What happens to vegetation?	• Young trees and shrubs are eaten. • Overpopulation of herbivores damages vegetation. • Forest regeneration slows. • Ecosystem balance shifts.
Cascading Effects • Can removing one predator affect plants? • What is the long-term impact? • Is the ecosystem still balanced?	• Loss of plant diversity • Soil erosion increases • Habitat structure changes • Cascading effects for other biodiversity