

In partnership with Garfield Weston Foundation

EXPLORE: URBAN NATURE

Habitat Loss and Fragmentation

THE
URBAN
NATURE
PROJECT

N NATURAL
HISTORY
MUSEUM

HABITAT LOSS AND FRAGMENTATION

OBJECTIVE

Students experience and explore the effects of habitat loss and fragmentation on different species in an urban environment. They discover the drivers and causes of habitat loss and fragmentation, as well as practical actions that can protect urban nature.

OVERVIEW

A habitat is the home of a species. It contains the things that species needs to stay alive. Every plant, animal and fungi has different needs and there are many different types of habitat.

An urban space can contain many different habitats and be home to a great variety of plants and animals. Unfortunately, habitats in urban areas are often some of the most vulnerable to habitat loss, habitat degradation and fragmentation. The overall amount of habitat is important, but so too is habitat 'health', and how well connected different habitats are.

Habitat loss happens when land use changes, for example when a grassland is ploughed to grow crops. Habitat degradation is when the 'health' of a habitat declines. This is caused by issues like pollution and invasive species, and by not managing or protecting habitats.

Habitat fragmentation is the breaking up of a habitat into smaller areas. These smaller areas might not contain all the resources that a species needs. Populations may also become isolated and fragmented habitats make it harder for animals to move through an area to access the resources they need, or in response to changes or threats. This makes populations vulnerable.

We can stop habitat loss, degradation and fragmentation in urban areas by protecting existing high-quality habitats, managing and improving degraded habitats and improving the ease with which species can move through urban areas to suitable habitats, using green corridors and stepping stones creating new greenspaces.

TIME NEEDED

30 minutes

PARTICIPANTS

Around 20.

RESOURCES NEEDED

- tarpaulin / sheets / towels / mats
- skipping ropes / rope
- hula hoops
- printed scenario suggestions
- a large space

SETTING

Works best outdoors, but could be played in a large indoor space

LEARNING OUTCOMES

- understand that habitat loss and fragmentation cause biodiversity loss
- appreciate that species rely on habitat connectivity
- understand that habitats can be managed to improve biodiversity

INSTRUCTIONS

The aim of the game is for species to survive. It isn't necessary to outline this from the start. Hopefully, the class will work towards this themselves.

1. Lay out your sheets, tarpaulins, mats and towels in different parts of the space. These represent different types of habitat in your urban environment. They can be different sizes, with some overlapping or connected, and others existing as separate islands. For the most basic version of the game, these spaces can just be referred to as generic 'habitats'. If you wish, you can give an identity to some of the larger ones (for example, park, school, allotments, nature reserve, football pitch). You'll want at least four distinct habitats.
2. Add corridors and stepping stones of habitat between some of the larger areas. These can be narrower bits of material, like skipping ropes. All other spaces represent built up parts of the urban area with little suitable habitat for animals.
3. Ask each student to pick a British animal species that might be found in an urban environment. Encourage them to consider a variety of animal types – mammals, invertebrates, birds, amphibians and reptiles. Each student will represent the species, or more specifically, a population of the species, they choose.
4. Ask the students to think about how their animal might move around and between habitats. Can they cross large gaps between habitats, will they have to stick to corridors, or hop short distances between stepping stones? That is how they will now also have to move around the space. Ask for a few volunteers to share with the class the species they have chosen and how they might move, to make sure everyone is on the right track.
5. Shout 'Disperse!'. The students should now roam around the room between the habitats, pretending to find food, shelter, etc in the manner of their chosen species. As they roam, explain that each patch on the floor is a habitat and that each habitat can only hold five people (increase or reduce this number if there are significantly more or less than 20 players). Remember, if a student's chosen species can't cover large gaps between habitats then they must stick to the stepping stones, habitats and corridors as they move around.
6. After a while shout 'Habitat!'. Students then have a split-second to find a habitat to reside in. If they don't make it to a habitat in time they perish. Remember, only five people can exist in each habitat at any time. If there are more than five, the last person to make it to the habitat perishes. If students move in a way contrary to the limitations of their chosen species they perish.
7. Find out which species have perished and why. Did they move too far from a habitat, was there not space for them in a certain habitat, were they not able to move fast enough?
8. The game can now be adapted, and the space manipulated to explore issues of habitat loss, degradation and fragmentation. This could be done between rounds or during play, as species are roaming. To reduce habitat space, fold tarpaulins and mats in half and narrow or remove stepping stones and corridors. You could also add your own specific changes and conditions (suggestions below) and involve 'perished' species, to re-engage them in the activity and help the rules of the game.
9. Discuss the impacts that these changes have on the survival of species and why. Are certain species more vulnerable than others? Why?

CLASS DISCUSSIONS

- What do species need from a habitat to survive?
- What are possible barriers to species moving between habitats in an urban area?
- What do humans need in the place they live (transport, employment, shops, houses)?
- What are the impacts of each of the negative scenarios on urban nature? Think about how this might affect the rest of the food web.
- Which species are most vulnerable to habitat loss, fragmentation and degradation and why?
- What can happen to a population of a species that becomes isolated?
- Which species are less vulnerable to habitat loss and fragmentation?
- What are the benefits to humans of greenspaces and urban habitats?

Habitat loss and fragmentation

Scenario example	Impact on the habitats
A new supermarket is built.	Habitat loss. Reduce the area of one habitat. It now accommodates one less species.
The number of allotments available in the area is halved to make space for a new carpark.	Habitat loss. Reduce the area of one habitat. It now accommodates one less species.
An enormous new housing development is built.	Habitat loss. Remove an entire habitat.
A paving company is offering a special deal to pave over entire garden lawns.	Habitat loss. Reduce the area of two habitats. They now both accommodate one less species.
A new main road is built on the outside of town.	Habitat fragmentation. Place a barrier through or split a habitat or several habitats. Only strong flying animals can cross the road.
A long avenue of trees is removed from one of the main roads of the town.	Habitat loss or fragmentation. Remove or narrow a corridor.
A brownfield site full of wildflowers is dug up to lay the foundations of a new hotel.	Habitat loss or fragmentation. A connection between habitats has been lost. Remove a stepping stone.
'Overgrown' rail embankments are being 'tidied up' by mowing the long grass and cutting down mature trees.	Habitat loss or fragmentation. Remove or narrow a corridor.
The council have used herbicides and pesticides heavily in a park.	Habitat degradation. The toxic chemicals diminish resources and may harm some species. One habitat now accommodates one less species. (This could only affect insects.)
Regular heavy traffic through the town means there is a lot of air pollution in a habitat.	Habitat degradation. The air pollution negatively effects some species. One habitat now accommodates one less species.
A music festival in a park has created a huge amount of litter that no one has cleared up.	Habitat degradation. The rubbish is a hazard to larger animals. One habitat now accommodates one less species. (Rubbish can also end up in rivers and waterways. You may want to also reduce the number of species in another habitat 'downriver' to show how these impacts and habitats are interconnected.)
A non-native species has been accidentally introduced in a nature reserve. It is invasive, outcompeting native species with no natural enemy.	Habitat degradation. One habitat now accommodates one less species. (This could only affect one type of animal, for example insects or birds.)
Extras	
The climatic conditions in a habitat have changed (for example, there is more rain, or it is warmer). This habitat is no longer suitable for certain species.	Climate change range shifts. Certain species must move to the northern most habitat. Those that aren't able to move north perish.
Climate change has changed the timings of some' life events, like caterpillars hatching, disrupting food availability for other species.	Phenology. Certain species perish due to lack of food. A good example is insect feeding birds that suffer food shortage when the earlier emergence of caterpillars and other insect grubs is out of sync with the hatching and feeding of their hungry chicks.

OPTIONAL EXTENSION

Restoring, protecting, creating and connecting habitats

Once the game has been played to the point where many species have perished, you may want to explore steps that could be taken to restore the remaining populations and maybe reintroduce some species.

Following each suggestion, discuss the impact that the positive measure might have and then manipulate the habitat to reflect the change (for example, returning corridors, increasing the size of habitats). Below are a number of suggestions in case the class aren't forthcoming. They can be roughly thought of as actions that do one or more of the following:

- create new habitat
- connect habitats (corridors and stepping stones)
- restore current habitats (improve ecosystem health)
- protect existing and future habitats

There is no need to play these changes out as rounds of the game, unless this is desired by the students.

Ideally, students will come up with their own ideas and discuss the impacts they could have on habitats.

Habitat loss and fragmentation

Scenario example	Impact on the habitats
Wildflower meadows are planted in all urban parks.	More habitat created for insects and all animals further up the food chain. Enlarge habitats. They can now support more species.
A law is passed requiring that all new developments create more habitat for nature than was there before (green roofs, parks, allotments, trees).	More habitat created. Enlarge habitats. They can now support more species.
All schools to have wild zones.	More habitat created, including important stepping stones. Enlarge habitats and add stepping stones.
The council have agreed to double the number of allotments available to residents.	More habitat created. Enlarge habitats. They can now support more species.
Wildflower seeds are provided for all households.	More habitat created, including important stepping stones. Enlarge habitats and add stepping stones.
Planning permission is now required to pave over more than 10% of a garden.	Protects against habitat degradation. Just as important as creating new habitat.
Tree orders placed on mature and valuable trees throughout the area.	Protects against habitat degradation. Just as important as creating new habitat.
The local council has decided to keep parks, rail and roadside verges uncut until later in summer.	More corridors created. Enlarge corridors or add new ones.
The council have decided to plant rows of native trees along streets throughout the area..	More corridors created. Enlarge corridors or add new ones.
The local authority is banning the use of herbicides and pesticides in gardens and urban areas.	Restores habitats and protects against habitat degradation. Return species to habitats (especially insects and animals that feed on them).
Brownfield sites turned into pop up nature reserves.	Creates and connects habitats. Add stepping stones between larger habitats.
More pedestrian only zones are introduced.	Restores habitats by reducing air pollution. Return species to habitats.
The local council create several new jobs designed to manage current habitat.	Restores habitats and protects against habitat degradation. Return species to habitats.
New tree-lined cycle paths, away from traffic, are installed.	More corridors created. Enlarge corridors or add new ones.
The council introduce yearly BioBlitzes in communities, working with and supporting local recording schemes	Improves our understanding and appreciation of urban nature. This helps us restore, protect, create and connect habitat. Take a moment to celebrate urban species with a cheer, high fives or round of applause.
Any other ideas...	

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