Curious Minds/ESERO Framework for Inquiry

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THEME	Dark Skies - Biodiversity	
CURRICULUM	**Strand:**	Living Things, Environmental Awareness and Care.
	Strand Unit:	Plant and animal life, Environmental awareness, Caring for my locality, Caring for the Environment.
	Curriculum Objectives:	Become aware of some of the basic life processes in animals; Observe and explore some ways in which plant and animal behaviour is influenced by, or adapted to, environmental conditions; Identify, discuss and implement simple strategies for improving and caring for the environment; Identify positive aspects of natural and built environments through observation, discussion and recording; Identify and discuss a local, national or global environmental issue.
	Skills Development - Working Scientifically:	Questioning, Observing, Predicting, Analysing, Investigating, Recording and Communicating.

ENGAGE

THE TRIGGER	WONDERING	EXPLORING
• Bats in Flight – Colin Stafford Johnson https://www.youtube.com/watch?v=3BtbS9JC8x8	• What animals are nocturnal – can we make a list? - Mammals - Birds - Invertebrates • What adaptations do these animals have to allow them to travel and hunt at night? (Day and Night in the World – ESERO 30) • How might these animals be affected by artificial lighting – brainstorm ideas?	• Go out at night into your garden or an open space and see what species you see. • Is it bright or dark where you live? • Would you expect to see more or less nocturnal life in a different location? • Leave a light on inside a window and see what insects are attracted to the light. • Can you see insects or bats flying around streetlights? What colour are the lights?

INVESTIGATION 1 – INVESTIGATING NIGHT VISION

STARTER QUESTION	PREDICTING	CONDUCTING THE INVESTIGATION	SHARING: INTERPRETING THE DATA / RESULTS
• How well do we see at night? • What things affect our night vision? • How does your pupil size change with light? • Birr Castle Telescope	• Will you see better at night with or without artificial light? • Will your night vision improve if you stay in a dark place for longer?	A number of short investigations can be done outdoors depending on outdoor lighting conditions. • Walking towards or away from a lighted house. • Torch or no torch. • Closing your eyes to adjust to darkness before walking in the dark. • Using a red filter on a torch.	How do artificial lights impact on our ability to see in the dark? Do they have a positive or negative effect? What about crepuscular or nocturnal animals? Problems caused by excess light. • Migration routes disrupted. • Bats delayed emerging from roosts. • Mating of songbirds. • Invertebrates – feeding, breeding, predation.

Considerations for inclusion

Consider potential area of difficulty for students with Special Educational Needs. See our Inclusive Teaching guidance.

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INVESTIGATION 2 – INVESTIGATING ECHOLOCATION

STARTER QUESTION	PREDICTING	CONDUCTING THE INVESTIGATION	SHARING: INTERPRETING THE DATA / RESULTS
• How do bats navigate in the dark? • How well can bats see? • Bat species.	• Could humans navigate by sound?	• Play bat and moth – how easy is it for the bat to catch the moth. • Sound pairs – find your partner by sound. • Stalking games – can our ears distinguish where sounds are coming from?	• How easy was it for you to navigate by sound? • How are bats adapted for echolocation? • Do bats use sight as well as vision? • What are the effects of different light sources on bat behaviour and survival? • Bat's sight is also important. • Prey draw away.

DESIGN CHALLENGE – IMPROVE THE BIODIVERSITY VALUE OF YOUR SCHOOL / HOME / LOCAL AREA

EXPLORE	PLAN	MAKE	EVALUATE
• Do a biodiversity survey of your chosen area. • What native plant and animal species can we find? • Think of other animal species who might use the area? • How would we find out about nocturnal species?	• What do we need to consider? • Trees and wildflowers for pollinators including moths (nocturnal pollinators) • Lighting – are there security lights at night? • Is the area suitable for bats – tree cover, food.	• Make a biodiversity map highlighting good features. • Highlight problem areas. • Note where improvements could be made. • Make bat boxes if the area is suitable.	• Have we considered all of the issues? • Will our plan help provide food, water, shelter for a range of species? • Will our plan be easy to implement? • Is there anything we can do about excess lighting – reduce no of light left on, change the type of light, tree planting for mitigation.

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TAKE THE NEXT STEP

APPLYING LEARNING	MAKING CONNECTIONS	THOUGHTFUL ACTIONS

- https://www.darksky.org/light-pollution/wildlife/ - 1 minute video USA
- Optimum light levels for bat species – check light using a lux meter
- German Study – Insects not as attracted to LED lights - https://blog.frontiersin.org/2019/05/23/ecology-evolution-streetlights-urban-bats/
- https://www.darksky.org/light-pollution-poses-threat-to-migrating-birds/
- https://www.sciencedaily.com/releases/2010/09/100916121322.htm
- https://cdn.buglife.org.uk/2019/08/A-Review-of-the-Impact-of-Artificial-Light-on-Invertebrates-docx_0.pdf
- https://www.nationalgeographic.com/animals/2019/11/stars-milky-way-navigation-dung-beetles/
- https://www.batconservationireland.org/found-a-grounded-bat including video
- Living the Wildlife – Bats https://www.youtube.com/watch?v=3BtbS9JC8x8
- Make a plan for bat conservation in your school / local area
- Study - Effects of light pollution on mating of songbirds https://www.sciencedaily.com/releases/2010/09/100916121322.htm
- https://www.bbc.com/news/science-environment-26529564#:~:text=Light%20pollution%20could%20affect%20the,avoided%20foraging%20in%20artificial%20light
- If you can hear birds singing at night then there is light pollution

REFLECTION	• Did I meet my learning objectives? • Are the children moving on with their science skills? • Are there cross curriculum opportunities here? • What went well, what would I change? • Did I take into account the individual learning needs of my students with SEN? What differentiation strategies worked well?

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