Engineering a World without Light Pollution

Now that students have learned about artificial light at night, have them use their science, design and engineering skills to engineer a world without light pollution!

Please complete this activity after finishing the National Parks and Light Pollution activity.

Grades

- 5

Time

- 30-60 minutes

Next Generation Science Standard

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Materials

◊ Flashlight or a lamp. If possible, remove the cover over the bulb on the flashlight or lamp. If you can not remove the cover, you can still do the activity.

◊ Grab a variety of materials– recycled works great, to have on hand for your design. You will want to have tape as well. Good materials are paperboard (cereal box), plastic (recycled containers), aluminum foil, etc.

◊ A dark room. Having a dark room will help you see how your model worked.

Directions

- Students will become an engineer and design their own light shield that will help dark sky preservation.
- First, have students choose a dark location to do this activity. Start by testing the flashlight or lamp with the light shield removed. How much light does it give off? Where does the light go? Have students take a "before" picture of their lamp/flashlight.
- Now think about where you want the light to go. Students will be designing a light shield that should provide light for pedestrians while preserving dark skies for animals, celestial viewing, and human health. After all, we need some light at night, but we do not want wasted light. How can students make the light only directed where it needs to go?
- If students would like to, start by sketching a design then try making the design sketched.

Directions Continued

- Test the design in the dark with your light on. Did it work the way you wanted? Can you improve your design?
- If so try again.
- Which design worked best? Why? Which design used the least amount of resources? Can you think of constraints engineers would have in the real world with their designs?
- Have students take an “after” picture of their final design. Have students write a short paragraph about the engineering process, what materials they used, and why they believe this design works well.
- Turn in the before and after pictures with the paragraph.

Through the videos, activity, and the website exploration you will have learned the main problems with light pollution (wasted energy, losing the ability to view the Cosmos, animal’s needs for darkness, and human health concerns). But communities can combat light pollution quite easily. Communities can decide to only light areas that need light at night for safety reasons. In areas where communities choose to create light at night, they can do this in smarter and more efficient ways.

- Go Further: Check out your neighborhood at night. Drive around with your family looking for examples of good and bad lighting. How would you retrofit the bad lighting if you could? Can you change any lighting at your own house to be dark sky friendly? Take pictures of good and bad lighting in your neighborhood and share with the class.
- To conclude this activity, show students this video about the citizen science project Globe at Night

  https://www.youtube.com/watch?v=_kJLfOwzV-4&feature=emb_logo
- Invite students to track and record light pollution where they live!