Coral reefs are vulnerable ecosystems where a great number of fish species live. Some fish are beautiful, and some are not. This study compared the human perception of fish beauty with the ecological roles and characteristics of these fishes. It appears that ugly fish have a wider variety of roles in the coral reef ecosystem than beautiful fish do. This means that the ugly fish seem to be more important for ecosystems. The results of this study warn us about the need to preserve not just cute fishes, but the entire ecosystem, which means protecting the ugly fish as well as the beautiful ones.

Biodiversity and Coral Reefs

In the scientific study of animals, we often talk about biodiversity. But what does that mean? Biodiversity refers to the diversity, or different kinds of living beings, in a certain habitat or ecosystem. You can get a glimpse of biodiversity when you walk around, by observing the...
Coral reefs are important ecosystems where up to 8,000 species of fish live. These reefs provide many services to humans. For instance, they protect shores against large waves and provide fish for humans to eat. The reefs are also simply beautiful, and that is why many divers admire them.

UGLY FISH vs. BEAUTIFUL FISH

You probably know Nemo, the orange and white clownfish (*Amphiprion percula*) hero of the movie “Finding Nemo” and his friend Dory, a blue and yellow surgeonfish (*Paracanthurus hepatus*). These fish species do actually live in coral reefs and are sought after for their beauty. It is this beauty that ecology researchers have been interested in. These researchers wondered whether the fish that humans appreciate the most and find the most beautiful were as useful to the coral reef ecosystem, as the ugly fishes that humans less appreciate. How did these researchers first determine which fish people found beautiful? They conducted an online survey with photos of tropical fish. Each page had two photos and the survey participant had to click on the most beautiful fish (Figure 1). Eight thousand people did the online test, with 20 different comparisons each. A total of 116 fish species were ranked from the ugliest to the most beautiful, according to the number of votes received from the survey.
How does the beauty of fish relate to their roles in the ecosystem? The group of fish with fewer votes, or the “ugly” fish, have a greater diversity of ecological characteristics. On the other hand, the “beautiful” fish that received more votes have fewer ecological characteristics. This means that the “uglier” fish are actually more useful for the functioning of coral reefs (pictures from left to right: tubelip wrasse (*Labrichthys unilineatus*), bluefin trevally (*Caranx melampygus*), moon wrasse (*Thalassoma lunare*), sea goldie (*Pseudanthias squamipinnis*), raccoon butterflyfish (*Chateodon lunula*), and semicircle angelfish (*Pomacanthus semicirculatus*) (source: Randall, J. E. from FishBase.org).

The results of the survey showed that Nemo and Dory are in the group of the prettiest fish, but not at the top. The most attractive fish, according to the survey, is the semicircle angelfish (*Pomacanthus semicirculatus*), a black and white fish, and the least attractive is the tubelip wrasse (*Labrichthys unilineatus*), a brown fish (see Figure 2). It appears that people prefer round fish that have patterns on the body like stripes, or fish with lots of different colors. In short, people prefer fish that are easy to notice!

### THE ROLES OF FISH IN CORAL REEFS

Researchers then turned their attention to the roles of fish in the coral reef ecosystem. Fish have different physical and ecological characteristics. Ecological characteristics of a species are the characteristics that define the life of a species in its environment: its diet, its reproduction, its swimming speed, its habitat preferences, etc.

Characteristics that define the life of a species in its environment: its diet, its reproduction, its swimming speed, its habitat preferences, etc.
Researchers were interested in the ecological characteristics of each fish to determine their roles in the ecosystem. The researchers then looked at the number of different ecological characteristics between ugly fish and beautiful fish. By comparing the ecological characteristics of these fish, they realized that beautiful fish share many ecological characteristics, and therefore have very similar roles in the ecosystem. This is not the case for ugly fish, which have many different ecological characteristics, some of which are shared by beautiful fish (Figure 2). The researchers found that ugly fish have many different ecological roles, so they are probably more useful for the functioning of coral reefs!

**A PROBLEM FOR THE PROTECTION OF SPECIES**

Coral reefs are useful to humans, but they are also very fragile ecosystems. Coral reefs are currently disappearing from the oceans due to climate change, pollution, and intensive fishing. To reduce these threats to coral reefs, we need to be better educated about the
diversity of roles different fish play and how these roles are important for healthy coral reef ecosystems.

But there is a problem. Humans like to protect what we find beautiful. Like the giant panda, for example, which is such an endearing species that it attracts a lot of money for research and its protection. This species is called **flagship species**, which means well-known endangered species that people want to save and often donate money for, like the giant panda. The protection of some flagship species can sometimes help with the protection of other species. For example, if money is used to restore the environments in which flagship species live, other species living in the same environment will also benefit. These flagship species act as an “umbrella”: they protect other species that are less well-known but are also endangered. But sometimes, flagship species attract too much of our attention and make us forget about other important species that share the same environment but might need their own protection from threats (Figure 3).

Our appreciation for animals that are beautiful, cute, and endearing can therefore have a bad side, by keeping us from learning about other species that we may think are ugly and strange, but that are essential to the survival of other living beings on Earth, including us! In the case of coral reefs, it is clear that the fish we find the most beautiful are not necessarily the most useful for the functioning of the reef. Beautiful fish are necessary of course, but if we only kept the pretty fish, we would have a beautiful ecosystem that would not be ecologically functional. In this study, researchers helped to show us the extraordinary diversity of tropical ocean fishes, and they reminded us to appreciate fish species we might not always find pretty. This research is important because it shows us that it is only by getting to know our fishes and our planet better that we will really be able to love the earth enough to preserve it in its entirety, both pretty species and ugly species, too.

### ORIGINAL SOURCE ARTICLE

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YOUNG REVIEWERS

Gustavo, Age: 14
Hi, I am Gustavo, from Portugal. I love to swim, surf, play basketball, and read manga books. My mom is a marine biologist and I want to become a marine biologist myself!

Habiba, Age: 12
Hi, my name is Habiba and I am 12 years old. My favorite sport is basketball and I also like badminton. I like hanging out with my friends, reading, watching movies, and visiting my home country. My favorite foods are pizza, biryani, samosa, chips, and a bunch of other foods.

Selena, Age: 12
Hi, my name is Selena. I am 12 years old and my favorite sports are soccer, basketball, and volleyball. I like to do many things like reading, studying, hanging out with my friends and family, and traveling. My favorite foods are mostly from my home country. I really love participating in as many extracurricular activities as possible.

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Quentin Carabeux is a scuba diver in tropical areas. He is using all the knowledge he is got on coral ecosystems, due to his master’s degree, to teach divers the importance of this ecosystem. He is combining tourism and science to provide a double service to the customers. His wish is to reach the maximum of people in order to change their behaviors by helping them understand the knowledge of the scientists.

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