

ISSUES AND DECISIONS 4

SHOULD ALIEN SPECIES BE INTRODUCED TO ECOSYSTEMS?

Deliberately or accidentally, many species of plants and animals have been transported all over the world through global trade. Native species exist in an ecosystem in a balanced relationship to one another. When species are taken from their native habitats and transplanted in new ecosystems, these species can seriously disrupt the ecosystems they invade. Transported species are commonly referred to as *alien species*.

Alien species are disruptive because the ecosystems they invade often have no way to control them. In balanced ecosystems, predators and prey act as controls on each other's populations. An ecosystem may have no predator that can control the population of an introduced alien species.

Alien species may also carry alien diseases. Plant and animal species usually develop some resistance to diseases that naturally occur within their habitats. But they usually have no resistance to foreign diseases, and so are easily killed by them. Finally, in the absence of predators, alien species are often able to outcompete native species for resources, such as food or space. Native species may then be pushed out of their habitat, and their populations may decline, sometimes to the point of extinction.

ACCIDENTAL INVASIONS

California is a major provider of fresh produce for much of the United States. If you have ever driven to California from another state, you were probably stopped at the border and asked by an official if you had any fruits or vegetables in your car. The official probably asked you to give up any fresh produce you were carrying to ensure that you were bringing in no Mediterranean fruit flies. These fruit flies, called "Medflies" for short, pose a major threat to California crops.

Medflies, native to tropical Africa, landed in Hawaii in 1910. These insects soon found their way to California's farm fields, where they began to devastate crops. Farmers became

involved in a fierce and continual battle, usually involving the use of pesticides, to eliminate these insects. The Medfly, however, still periodically turns up among the fruits and vegetables growing in California.

Other foreign species have devastated the forests of the United States. Chestnut blight, a disease that has endangered the American chestnut tree, is caused by a fungus that grows beneath the bark of the tree. It was first noted in New York in 1904. The fungus spores probably entered New York harbor under the bark of trees that were imported from Asia. By 1950, 3.5 billion chestnut trees had been afflicted with the blight.

Another way alien species have traveled to foreign lands is on cargo ships used in international trade. When cargo ships leave their home port, they often take on up to 190 million liters of water, which they keep in ballast containers. This ballast helps the ships stay balanced and stable during ocean voyages. When the ships reach their destination, they release water from their ballasts into the foreign harbor. Some of the world's most serious alien-species problems have been caused by "stowaways" in ship ballasts. For example, scientists sampled ballast water from 159 Japanese cargo vessels that had docked in Oregon. They found 370 non-native organisms swarming in the ballast tanks, including fish, plankton, crab and clam larvae, worms, shrimp, snails, and jellyfish. All these alien species were to be flushed out of the ballast tanks and into the waters of Oregon's Coos Bay.

The above examples describe only a few of the accidental arrivals of alien species and some of their effects on native species. These species' introduction resulted in serious disruptions of the local ecosystems invaded. Not all alien species, however, are the result of accidents.

INTRODUCING ALIEN SPECIES TO INCREASE PROFITS

Sometimes alien species are introduced deliberately into an area to benefit an industry



because they have a useful genetic trait. Honeybees are an introduced species, brought to the United States from Europe. The more aggressive and more productive wild African bees were imported into Brazil in 1956. Scientists hoped the honeybees and African bees would interbreed, creating a more productive, yet gentle hybrid. Because African bees come from a harsh, drought-stricken land where resources are few, they have become aggressive to protect food resources. They use an aggressive mobbing strategy to protect the flowers they find. African bees have been known to mob small animals and sting them to death. That is how they became popularly known as “killer bees.”

Since the introduction of African bees, honey production in Brazil has increased six-fold. Some believe this increase is due to the higher productivity of the African bees. However, the hoped-for hybrid of honeybees and African bees—a bee that would be both gentle and productive—has not materialized.

During the experiments, some African bees accidentally escaped. The African bees have outcompeted the honeybees wherever the two species met. The African bees have since expanded their range northward through South America, Central America, and Mexico into Texas and other southwestern states.

In another example of introducing alien species, a court in Brazil recently approved the breeding of Nile crocodiles at a “leather ranch” near the Pantanal River system leading to the Amazon River. The Nile crocodile is highly predatory, responsible for dozens of human deaths in its native Africa each year. The crocs were imported to Brazil so they could be raised to 18 months of age, at which time they would be killed and skinned. Their skins would be exported for the making of leather products. In court, the importers argued that the security around the ranch where the crocs are being bred is equivalent to that of a “nuclear installation.”

Still, ecologists are concerned about the effects on the fragile Amazon ecosystem if this dangerous crocodile manages to escape. The ecological effects of an uncontrolled predator as aggressive as the Nile crocodile would have catastrophic impacts on the Amazon ecosystem, already threatened in many places. So great would be the impact on the countless species of the Amazon, scientists are comparing the prob-

able escape of the Nile croc to “storing plutonium in Grand Central Station.”

The croc’s importers insist that “maximum security is [their] main concern” and that they are “not introducing an exotic species because [the crocodiles] are in captivity.” The importers report that they are trying to establish a leather industry in Brazil and make a living. A crocodile specialist countered with the observation that of all the crocodile farms he has visited, he felt that none was completely secure.

INTRODUCING ALIEN SPECIES FOR RECREATION

Many states in our nation obtain income from the sale of fishing permits and from money spent by fishers in local communities. To promote sport fishing, these states stock their lakes, streams, and rivers with fish species attractive to fishers. Often, however, these species are not native to that state. Their introduction may disrupt aquatic ecosystems and lead to the endangerment or extinction of native fish.

Federal government reports on the effects of stocking game fish indicate that two-thirds of the fish extinctions that have already occurred in the United States were due to the introduction of alien species. Of those 850 native fish species still thought to exist, more than one-third are now considered rare, nearing extinction, or possibly already extinct. Fully half of the fish on the federal endangered species list are being outcompeted by introduced species.

The effects of introduced species are often unforeseen. For instance, Montana introduced an alien freshwater shrimp into the tributaries of Flathead Lake, hoping that the shrimp would fatten up game fish. The shrimp quickly spread into the lake, where they consumed most of the native zooplankton. This left little food for the native kokanee salmon, which feed on zooplankton. The salmon population crashed, followed by the bald eagle population, which depends on salmon as a food source.

BENEFITS OF INTRODUCING ALIEN SPECIES

Fisheries managers in most states defend their fish-stocking practices. They refute the argument of environmentalists that waterways



should contain only native species. They point out that most aquatic ecosystems have already been altered and have adjusted to these alterations. Managers also point out that, because they have to compete with other states to attract sport fishers, they are forced to stock bodies of water with the most sought-after fish. The money that states collect from fishing permits and vacationers is crucial in maintaining fisheries and wildlife programs in most states. Without this money many states would be forced to severely curtail management and protection of state parks, wildlife areas, and waterways.

In addition to recreation, the introduction of foreign species can boost the economy of the

country that imports the organisms. The increased production of the African bees and the skins of the Nile crocodiles can help industries prosper. These introduced species may benefit the economy as long as they can be contained or controlled so that they will not disrupt the ecosystem.

If carefully monitored, an alien species may help return the balance of an ecosystem that was disrupted by some other cause. Predator species may be imported to control a population of pests. Other organisms may be introduced to control certain types of pollution. Whether or not the alien species can be controlled is an important consideration; accidental invaders can harm an ecosystem.

REVIEW

On a separate sheet of paper, answer the following questions.

1. Why do officials in California monitor the transport of fresh produce in the state?
2. How have ship ballasts created some of the world's most serious alien-species problems?
3. How did the introduction of the African bee affect honey production in Brazil? Why are some people concerned about using the African bee for this purpose?
4. Why do fisheries stock game fish in bodies of water where these fish species are not normally found? What effect could these fish have on native fish species?



DECISIONS

On a separate sheet of paper, answer the following questions.

1. If you were a state official involved in the management of state parks, would you approve of stocking waterways with alien fish species? Why or why not?
2. Farmers in the southeast United States imported and planted the kudzu plant to help control soil erosion in the fields. Since then, kudzu growth has been unstoppable and has taken over many agricultural areas. Recently, however, scientists found that kudzu contains a substance that is an effective treatment for people who are alcohol dependent. What do you think should be done about growing kudzu plants in the United States for this purpose?