European Commission

Science for Environment Policy

Conserving the critically endangered European eel

A number of policies have been developed to protect the critically endangered European eel (*Anguilla anguilla*). Italian researchers have developed a model of the long-term population trends of the eel to assess the effectiveness of these measures and prevent further decline of this ecologically and economically important species.

According to the Food and Agriculture Organization of the United Nations, over 70% of fish populations are fully used, overused or depleted[1]. The European eel in particular is one of the most severely affected species. Over recent years, a large section of the eel's habitat has been degraded and lost due to land reclamation, the construction of dams and reductions in water quality. In combination with overfishing, this has led to a drastic decline in the number of eels in European waters. The European eel is in such serious decline that the IUCN has declared it critically endangered.

This is a big problem for Europe, as the eel has socio-economic importance and has historically sustained many small-scale fisheries. In order to prevent further decline, the European Commission introduced national eel management plans, which aim to limit fishing and restock inland waters with young eel[2].

Measuring the effectiveness of such initiatives is difficult, however, due to the complexity of the eel's life cycle. This species develops at sea before migrating to inland waters where it matures. Over the course of a lifetime, European eels travel thousands of miles over many geographical locations and a wide range of habitat types. The migratory nature of the eel's life cycle means they are exposed to natural and human pressures, acting both at the local and global scales. Interplay between the two makes it hard to predict the success of conservation policies in the long term.

To overcome these issues, the researchers developed a comprehensive model of the eel life cycle, considering the two major phases of its life (continental and oceanic). The model describes the population dynamics of the eel stock and was used to investigate how population size might vary under possible future conditions.

The researchers predicted the fate of global European eel stock from 2010–2100 under nine different management options, a combination of restocking strategies for immature (glass) eels and exploitation rates for adult eels. They also analysed population variation in the past, from 1975-2010.

The results indicated that habitat loss or degradation, as well as the decrease of reproductive success, played a major role in the decline of the species in the second half of the 20th century. Predictions for the future showed that the viability of European eel is at risk if protection measures are not implemented.

The authors give the stark warning that, without effective conservation measures, it will be impossible to halt the continuous decline of the eel population. According to model projections, habitat loss and overfishing may push the European eel toward the brink of extinction by the end of the century. To prevent this, they recommend management policies that increase the number of eels allowed to escape to the sea to spawn. They say that the complete closure of adult eel fisheries could restore the numbers of the eels migrating to spawn to the levels of the 1970s, while a 50% reduction in fishing mortality could restore it to the levels of the early 1990s. The recovery of glass eel recruitment (the number of immature eels surviving to join the adult population) to its historical abundance would require additional measures aimed at re-establishing past levels of reproductive success.

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1.http://www.fao.org/newsroom/common/ecg/1000505/en/stocks.pdf

2. The EC's national eel management plans: http://ec.europa.eu/fisheries/marine_species/wild_species/eel/management_plans/index_en.htm