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Transmission, biomagnification and impacts of plastic on the eco-chain

Summary

Plastic and synthetic materials are the most common types of marine debris and cause the most problems for marine animals and birds. At least 267 different species are known to have suffered from entanglement or ingestion of marine debris including seabirds, turtles, seals, sea lions, whales and fish [1].

Plastic pollution would transmit along the eco-chain, species will suffer from different impacts, which will inevitably influence marine ecosystem, and ultimately jeopardize human beings. Researchers point out that biomagnifications occurs along eco-chain (Cecilia Eriksson, Harry Burton 1993).

This article mainly draws together to address the circulation of plastic pollution in the eco-chain and its impacts on the local eco-system, some important steps we take can be included as follows:

- After deeply analyzing internal relations between different species, we establish a differential model to simulate the circulation of plastic pollution between different kinds of species in local eco-chain system.
- We take the real environment into consideration, that is, Pacific Ocean is an open system, huge volumes of plastic are poured into the ocean, besides, the photodegradation and self-purification are also taken into consideration, then, we get a revised model to address the problem.
- After above these analyses, we apply it to the "population-developing" model with the pollution impacts on the growth of species. In different conditions of plastic-pollution levels, we find that there is a threshold of pollution level theoretically; species could develop slowly when pollution level is lower than this value, on the contrary, they would face the danger of extinction.
- In order to ameliorate its negative effects, we simulate a "cleaning-up" plan to predict the effects on eco-chain; likewise, we acquire a threshold on "cleaning-up proportion" of plastic which determines the deterioration of situation.
- Then, we have a comprehensive analysis and evaluation about our models and propose the direction of further research in order to help researchers.

In the end, we summarize our findings and give an advisable report on the government's potential to act on the problem to improve this situation before it worsens.