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Editorial Open Access

Can Bio-Manipulation Be Related to Fisheries and Aquaculture through Environmental Pollution Perspective?

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Editorial

Fish diets as a source of animal protein has been in increasing demand recently. This has triggered high pressures in fisheries and aquaculture activities. Although technological advancement is helpful in increasing overall production, the quality of fish products is becoming the central issue. It has been established that the aquatic resources far from human activities can receive pollutants to considerable amounts by long-range transportation through dry as well as wet depositions. The aquatic resources from remote areas could contain high amount of pollutants such as mercury (Hg) and persistent organic pollutants (POPs) as opposed to the thought that so called 'pristine environments' were safer.

There are different mechanisms that pose risk of high concentrations of Hg and POPs in aquatic resources, particularly fish. Longer the exposure time higher the concentrations, i.e. older fish generally accumulate higher amount of contaminants (bioaccumulation). Similarly, higher the trophic position, higher the concentrations of biomagnifying pollutants such as Hg and POPs, a process called biomagnification. Food chain length further influences the process of biomagnification as biota from longer food chain tends to accumulate more pollutants. In contrast, fast growth rates of organisms dilute the contaminants per unit body mass which is referred as biodilution. Irrespective of the causes of increased contamination of fisheries resources, the ultimate risks are linked to human as well as ecosystem health. The fishery products have been in regulation through different organizations such as WHO by setting the safe levels of contaminants. Besides UN organizations, such safe levels are also established by many nations for safety measures of their respective populations. Therefore, a global concerted effort is necessary to provide safe fishery products to our society through regular monitoring and recommendations.

Although industrial activities are to blame for the increased aquatic pollution leading to reduced quality of fishery products, it has recently been established that agricultural activities (e.g., intensive aquaculture) itself can significantly pose risk to aquatic pollution. It is an indication that unsustainable human activities in large scale poses risk to quality of aquatic food resources. There are many remediation methods to reduce aquatic pollution; however efforts should be focused more on reducing the contaminants entering the aquatic ecosystems for successful management. Bio-manipulation (food web manipulation) is one of such tools used to restore eutrophic condition of lakes since 1970s and is regarded as a successful, easiest and cheapest compared to the chemical and technical methods (e.g., chemical treatment, dredging of the sediments). However, it is also regarded as a controversial application of ecological theory. Nevertheless, it has gained popularity in recent decades. Although bio-manipulation can be done at different levels such as manipulation of nutrients, phytoplankton and zooplankton, fish manipulation seems the easiest process. Bio-manipulation at the fish community brings cascading effects down to the plankton level and brings a lake in clear-water state (from turbid-water state). Studies have shown that bio-manipulation is not only a solution to reduce eutrophication problem, but also to reduce contaminants in the biota such as Hg and POPs. The successful bio-manipulation depends also on the fish management and considerable reduction of external contaminations to the aquatic bodies. It should be taken into consideration that such a remediation is not equally suitable in all parts of the globe as it needs careful prior knowledge of the existing food web for proper intervention. This tool is successful in restoring aquatic bodies in many countries from the temperate regions, however successful use in tropics is still a question as there are no successful experimentations.