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The meeting point between fisheries science and traditional ecological knowledge in fisheries

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Abstract

Traditional Ecological Knowledge (TEK) is the sum of data and ideas acquired by a human group on its environment. Over the years, there has been a growing lack of confidence in centralized scientific fisheries management. Traditional ecological knowledge is recognized as a valuable tool for understanding trends of marine resources, ecosystem management and conservation. Some researchers and policy-makers have called for TEK to play an increased role in fisheries management decisions. TEK helps to develop sound management practices which allow economic development without the over-exploitation of natural resources. However, the acceptance of TEK in fisheries management has been partly hindered by difficulties in translating local ecological knowledge into a form that can be applied directly to conventional top – down approach of western fisheries management. For full integration of TEK and scientific knowledge in fisheries management, there must be constant communication, continuous education, mutual trust collaborative validation of knowledge and respect for a working relationship to be sustained.

Keywords: Fisheries management, TEK, scientific knowledge, overexploitation.

Introduction

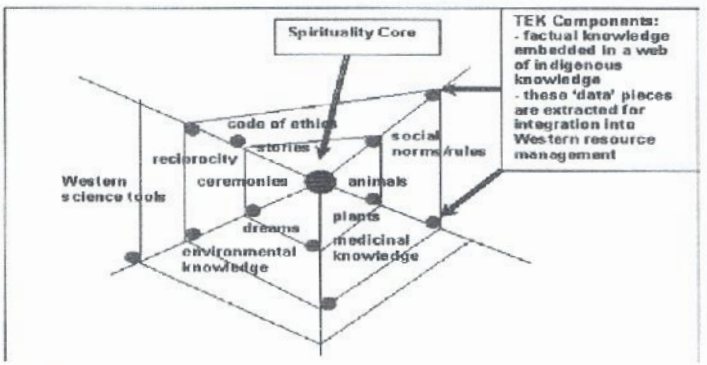
The world as a globe is surrounded by natural resources and guided by various traditions, principles, religions and ethnicity which inevitably provide the relevant necessities for human existence. The state of global fisheries production is precarious. Most of the world's fisheries are experiencing stagnation. They have already reached or exceeded the levels at which fish stocks can regenerate (FAO, 2005). More than 80 percent of the world's fish stocks assessed have been fished to their biological limits or beyond. Almost 30 percent are overexploited; about 57 percent are fully exploited and only about 13 percent are not fully exploited (FAO, 2012). The plan to restore overexploited stock to their full and sustainable productivity by 2015 appears unattainable except in the United States of America, New Zealand and Australia where some progress has been achieved in reducing exploitation rates; restoring overexploited fish stocks and marine ecosystems through effective management actions (FAO, 2012). In response to the shortfalls which have resulted primarily from the centralized or top-down approach conceived after conventional western fisheries management, attempts have been made globally to involve fishermen and fishing communities in fisheries management processes whereby decisions are taken and implemented at the lowest practical level thus bringing about co-management. The principles of Agenda 21 of the Biological Convention reveal that sustainable development requires a conceptual differentiation that is able to meaningfully articulate scientific and indigenous forms of knowledge. Ethno-ecological knowledge surveys may be a useful management approach, by bringing the methodological and conceptual tools to 'translate' fishermen's knowledge which may bring to light useful and often new information to serve both as guidelines for related disciplines of fish biology and fisheries and as a quick, inexpensive method to assessing biological data (Silvano and Begossi, 2002; Drew, 2005). Today, there are many synonyms connoting TEK. However, the mostly widely used synonyms of TEK in the field of fisheries include indigenous knowledge (Gasalla, 2002), local ecological knowledge (Neis and Felt, 2003), fishers ecological knowledge and 'ethno ichthyology' (Johannes et al., 2000).

The main objective of this paper is to review the concept of TEK and provide critical analysis of its usefulness to advance biological knowledge which is important for understanding the management of fishery resources.

Definition and Components of TEK

Though there are many definitions for traditional ecological knowledge (TEK) (Johnson, 1992) there is however a consensus among scientists about the fact that such knowledge is linked to a specific place, culture or society. TEK is the sum of data and ideas acquired by a human group on its environment (Mailhot, 1993). According to Berkes et al. (2000) TEK is interpreted as a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission about the relationship of living beings (including humans) with one another and with their environment. Fishers Ecological Knowledge (FEK), a synonym to TEK is defined as local knowledge concerning inter annual, seasonal, lunar, diet and food-related variations in the behavior and movements of marine fishes and mammals. Such knowledge is passed from generation to generation of fishers and influences the nature, timing, and location of their fishing (Johannes et al., 2000).

TEK brings about the methodology to understand organization of the local people and how it could be involved in environmental management. The components of TEK and the relationship or connectivity are illustrated in the model below.



Source: Casimirri, 2003

Fig. 1: A model showing principles of TEK integrated into western resource management

Principles for inducting TEK

Some basic principles that would greatly enable the inclusion of TEK and knowledge-holders in natural resource management include:

a. Explicitly acknowledge the value of TEK to resource management (Huntington, 2000)
b. Understand the value of TEK to the knowledge-holders (Houde, 2007)
c. Not to use TEK in isolation from the knowledge-holders (Drew, 2005)
d. Investigate when TEK disagrees with scientific information (Johannes et al., 2000).

Evolution and case studies of TEK in fisheries and marine sciences

Ever since Morril (1967) coined ethno ichthyology as a scientific discipline, several studies have addressed local ecological knowledge that fishers hold on fish. Virtually all aspects of fisheries have been investigated using TEK as survey tools. Some examples are:

a. Marine population trends (Gasalla, 2002).
b. Reproduction (Johannes et al., 2000).
c. Taxonomy (Berkes et al., 1999; Bwala et al., 2010).
d. Exploitation status of the Gulf Grouper (*Mycteroperca jordani)* (Sáenz-Arroyo et al., 2005).
e. Establishment of protected areas in Gladden Spit in Belize (Drew, 2005).
f. Community- based management of Kanji Lake (Ovie et al., 2003).

Major challenges of TEK

a. The major challenges affecting the acceptance of TEK into scientific management are:
a. TEK 'Data' is understood as disappearing and invalid when compared against Western
b. Knowledge (Johannes et al., 2000).
c. Problems with attempts to integrate or interpret TEK (Huntington, 2000; Casimirri, 2003).
d. Holders of TEK are sometimes reluctant to share information (Huntington, 2000).
e. TEK is threatened by the influence of urbanization and market economy on resource use
f. Strategies (Silvano and Begossi, 2002).

Traditional ecological knowledge (TEK), scientific ecological knowledge (SEK), integration and sustainable development

Traditional knowledge and scientific knowledge are both valid systems of knowledge that should be integrated and harmonized within the context of cooperative research. Comparisons between traditional ecological knowledge (TEK) and scientific ecological knowledge (SEK) show that:

a. TEK is usually in accord with SEK (Silvano and Begossi, 2002).

b. TEK and SEK are made up of logical systems of organized knowledge based on empirical data (Berkes, 1999).

c. Both use methods of observation, comparison, and classification and see nature as a system of relationship between organisms and their environment (Drew, 2005).

Conclusions

The meeting point between fisheries science and TEK has contributed a lot to development, management and sustainability of fisheries resources. Besides fishing communities, small-scale fishermen also show detailed folk knowledge. Environmental degradation, demographic shift in population due to urbanization and market pressures are threatening the existence of fishing communities especially in the tropics. Therefore, preservation of TEK of fishers and fishing communities becomes crucial for the purpose of conserving sustainable fish stocks and the fish habitat.

Recommendations

a. Train researchers on TEK.

b. Pursue ecological research based on TEK.

c. Knowledge on TEK should be gotten fully from elders.

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