Innovative Systems Design and Engineering
ISSN 2222-1727 (Paper) ISSN 2222-2871 (Online)
Vol.5, No.5, 2014
www.iiste.org

Indigenous Knowledge System of Fishers on Siganids in Lagonoy Gulf, Philippines for Fisheries Management

Leonila B. Barbacena[1], Ninfa R. Pelea[2], Maria Luisa U. Tango[3], Glenda A. Abejuela[4] and Raffy B. Bilangel[5]

Bicol University Tabaco Campus, Tabaco City, Albay, Philippines

[1]lbbarbacena@gmail.com, [2]anaisrp06@gmail.com, [3]tangomlu@gmail.com, [4]glenphysics71@yahoo.com, [5]rhafbilangel@gmail.com

Abstract

Anchored on the social learning theory, this study aims to infuse indigenous knowledge system in the management of fishery resources that are peculiar to a fishing ground. The study determined the indigenous knowledge of the fishers for the purpose of valuing, preserving and infusing them in managing fishery resources that are peculiar to a locality, which in this phase of the research is focused on siganids (Siganidae) in Lagonoy Gulf, Bicol Region, Philippines where a fishery management initiative exists. Formal knowledge on the species was consolidated and catalogued to serve as references in explicating the indigenous knowledge. The study adopted the qualitative method of research, and made use of key informant interview, focus group discussion and documentary analysis to gather and analyze data. Fishers were the key informants and formed part of focus group discussions. The researchers who have studied siganids in the area and whose findings formed the basis of resource management strategies in the Lagonoy Gulf were interviewed to explicate the IKs to formal knowledge. The electronic and print media, books, information and communication materials, laws and ordinances were the sources of documents that were analyzed. Indigenous knowledge of fishers on siganids covers diversity, biology and events that indicate the species' abundance during its spawning season. Literature on siganids that were reviewed cover the areas of morphology, distribution and stock assessment, habitat, feeding fecundity and maturation, spawning behavior and season, fisheries and socio-economic aspects. Notable were the locally-generated knowledge from studies that were conducted by a local academic institution, Bicol University Tabaco Campus, which formed the bases of local-government resource management initiatives. The scientific bases of majority of the indigenous knowledge on siganids were found in the results of studies on siganids in the locality and elsewhere. However, some astronomical and natural events which fishers use to predict production like the date of new moon and production are either spuriously correlated, or limited to certain levels of exploitation. The results of studies on siganid by the Bicol University Tabaco Campus were published in technical journals but dissemination of the results through printed materials was not sustained. Although siganids are important to fisheries in villages in Lagonoy Gulf, topics on the fish are not included in the text books and are not among the collection of information, communication and educational (IEC) materials of local government units and educational institutions. Siganids in the gulf continue to be overfished, despite several initiatives to manage the resource, which point to the need for effective knowledge management for siganids resource management.

Keywords: Indigenous knowledge system, siganids, Lagonoy Gulf, fisheries management

1. Introduction

Indigenous (Knowledge (IK) is broadly defined as the knowledge that an indigenous or local community accumulates over generations of living in a particular environment (http://www.ikap-mmsea.org/topic.htm). Other terms are used interchangeably to refer to this concept such traditional knowledge, indigenous technical knowledge, local knowledge and indigenous knowledge system (IKS). Indigenous knowledge is the knowledge that people in a given community have developed over time, and continue to develop. It is based on experience, often tested over centuries of use, adapted to local culture and environment, dynamic and changing (IIRR, 1996). The study adopted the operational definition of IK as knowledge produced and long practiced or used by the local community.

For the past years and decades, the survival of fishers relied on their indigenous practices. Indigenous knowledge or traditional ecological knowledge is of significance from a conservation perspective and an attribute of societies with continuity in resource practices (Lasserne and Ruddlie, 1983). Many of these indigenous knowledge systems are at risk of becoming extinct due to the rapid changes of natural environment brought

about by fast changing political, economic, cultural changes on a global scale. Indigenous knowledge is part of the lives of the rural poor; their livelihood depends almost entirely on specific skills and knowledge essential for their survival. It serves as the basis for local-level decision making in agriculture, health care, food preparation, education, natural resources management, and a host of other activities in rural communities (Warren, 1991). The basic component of any country's knowledge system is its indigenous knowledge system. People's knowledge and perception of the environment, and their relationship with it are often important elements of cultural identity (UNESO). In another instance, it has been pointed out that indigenous technologies, practices and knowledge system had been studied extensively by sectors specialist, and even more so by social anthropologists. The information revealed, though limited speaks about this systematic transfer of local knowledge across communities and culture which does recognize that there is considerable impressionistic evidence of indigenous knowledge transfer from traditional societies to industrial countries (Knowledge and Learning Center, 1998).

In this context, it has a value and relevance in itself. The Global Knowledge Conference in Toronto (1997) emphasized the urgent need to learn, preserve and exchange indigenous knowledge and call for a new inclusive approach to development and the World Bank has agreed to lead an indigenous knowledge initiative to help stimulate recognition, utilization and exchange of indigenous knowledge in the development process. Sabola et al (2007) pointed out that inhabitants had developed and maintained some local ecological knowledge and practices that can have significant implications in scientific studies and on the management of lake resources. That same study also contended that to achieve sustainable designs and implementation of natural resource management projects, there is a need to integrate relevant existing indigenous knowledge systems that promote conservation of natural resources. Mukwada (2000) as cited by Tanyanyiwa and Chikwanha (2011) underscored the importance of indigenous knowledge systems in the conservation of natural resources and argued that indigenous knowledge systems created a mutual co-existence and balance between man and his local environment. Tanyanyiwa and Chikwanha (2011) posited that there is generally lack of knowledge on how indigenous knowledge caused mismanagement of resources. Several conservation rules (Ruddle, 1994, as cited by Sabola et al.,2007) were traditionally employed by communities in Asia-Pacific regions. Some practices included live storage or freeing surplus fish during the spawning migrations, setting up of closed seasons during spawning; placing taboos on fishing areas, reservation of particular areas for fishing during bad weather, size restrictions and in recent times gear restrictions. These practices were based on ecological rationale that follows local knowledge about spawning periods of fish species and prohibit their capture during such periods. In Chembre (Mwale and Malekano, 2000), there were restrictions on who could fish from their area. In fact, there were chiefs that would inspect the fishing gears used and they were strict on the fish stocks caught to avoid degradation and conserve fish for future generations. These restrictions indeed helped a lot in controlling the fishing technologies in their area.

According to Pomeroy and Carlos (1997), the Philippines has a long history of indigenous fisheries and resource management systems where the barangay (village) had jurisdiction over natural resource use and access. Indigenous resource management systems have in fact been documented by various researches (Fernandez, 1999). Management schemes are usually complimented by the richness and relevance of indigenous knowledge that help promote sustainable development and ecological consciousness (Magos, 1994). Thus the study finds its rightful direction to be undertaken particularly in the Lagonoy Gulf. The Gulf has been the subject of major research undertaking. Of particular interest are the Fishery Sector Program (FSP) in the mid-1990, the Community-Based Coastal Resource Management (CB-CRM) in early 2000 and recently the Fisheries Resource Management Project (FRMP) (Nieves et. al, 2010).

The objectives of this study were to document the indigenous knowledge of the fisher on siganids in Lagonoy Gulf and to provide the corresponding scientific explanation to these IKS and to recommend strategies in utilizing explicated IKS in the management of the resource.

2. Study Area, Materials and Methods

Lagonoy Gulf is a rich fishing ground located on the east coast of the Bicol Region. It is bordered by 15 towns in the three provinces of Albay, Catanduanes and Camarines Sur. Lagonoy Gulf (123º31'37"E, 13º44'30"N) is a large gulf in the southeastern part of Luzon island, Philippines. It is separated from the Philippine Sea by the Caramoan Peninsula in the north; it is separated from Albay Gulf in the south by a chain of islands including Batan Island and Rapu-rapu Island. It is about 3,070 square kilometers (1,190 sq mi) in area, with 80% of its area between 800 meters (2,600 ft) and 1,200 meters (3,900 ft) deep. The gulf is home to 480 fish species, and annual fishery production in 2004 amounted to some 20,000 MT, making Lagonoy Gulf a major fishing ground in the Philippines. Coral reefs, seaweed/seagrass beds, and mangroves form the critical habitats for gulf's ecology (Soliman et al, 2008).

The study employs qualitative methods; survey of key informants, focus group discussion and expert consultation-round table discussion and review of related literature. The study was carried out along three coastal fishing communities where there are more catch of juvenile siganids namely in Sagurong, San Miguel Island in Tabaco City and Gaba, Rapu-rapu both are in the province of Albay and in Cagraray, Bato province of Catanduanes. According to the study of Soliman et al (2009) the study sites mentioned were considered to be the fishing ground for siganids. Survey instrument were first validated in a coastal community before subjecting it to the Key Informants (KI). Snowball sampling was used to determine the KI who corroborated and validated the results.

3. 1. Demographical Profile

The ages of fishers range from 25 to 85 years old with an average age of 51 and an average household size of 5. This means that the fishers are matured and experienced in fishing. While majority are fishers, results also show that another significant source of income is farming. It implies that income from fishing is not sufficient to provide the needs of the family and it supports the findings of Pelea (1994) that the average income from fishing is comparatively low compared to non-fishing income, making fishers worse off than their farming counterparts or other occupational group. A large majority of the respondents are elementary graduates (Table 1). This suggests that the formal education acquired by fishers provided them with limited skills to be able to engage in other sources of livelihood.

Table 1. Educational attainment of fishers

Educational Attainment	Sagurong		Gaba		Cagraray		Total	%
	No.	%	No.	%	No.	%		
College graduate			1	4.0			1	1.3
High school graduate	5	20.0	3	12.0	1	4.0	9	12.0
Elementary graduate	18	72.0	18	72.0	19	76.0	55	73.3
Elementary undergraduate	2	8.0	3	12	5	20	10	13.3
Total	25	100	25	100	25	100	75	100.0

3.2. Indigenous Knowledge of Fishers

Fishers' knowledge on the origin of siganids locally named "coyog" is imbibed in them from childhood as reflected by the 46.7% of the respondents from the three sites (Sagurong, Gaba and Cagraray). The same percentage of the respondents stated that "coyog" are spawned by adult siganids while 6.67% claimed that "coyog" is a school of fish (Figure 1). The term "coyog" as used in the Bicol dialect generally refers to siganid juveniles, however, the term also connotes to group together. These findings revealed that fishers are familiar with the species that are found in their environment.

Siganid juveniles are fished using bagnet and seine net. Sources of knowledge on the techniques of fishing "coyog" came predominantly from old people. This is followed by the information provided by the parents and the co-fishers (Figure 2). The data showed that practices acquired by the young fishers are the result of the learned practices from the old folks. This idea suggests that long-honored practice of fishing continue to perpetuate as this is carried on from the old to the young members of the community.

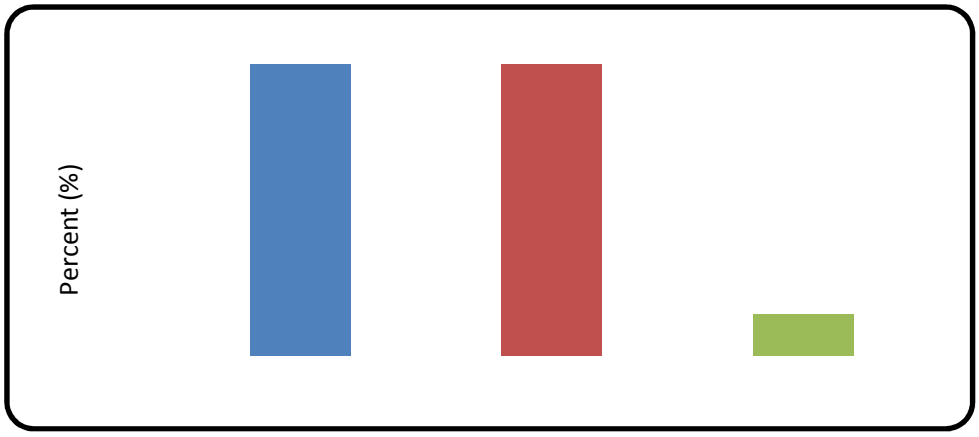

Figure 1. Origin of coyog

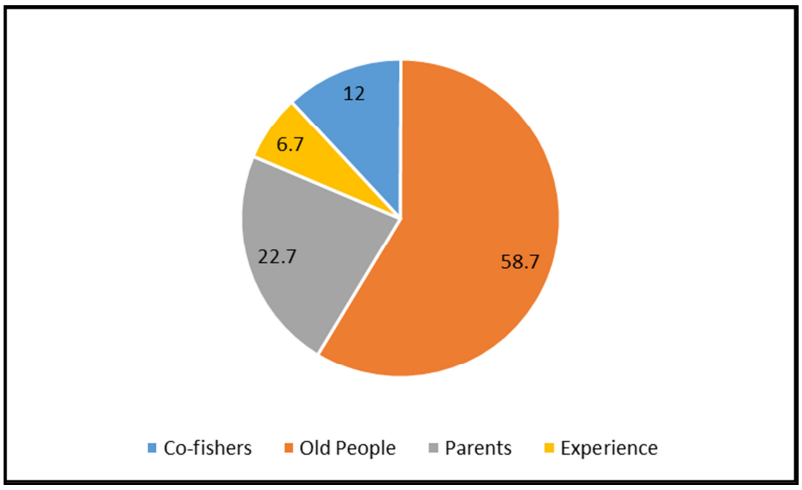

Figure 2. Source of knowledge on techniques of fishing coyog

Fishers caught from a minimum of one to a maximum of six species of siganids. The species caught were locally named as "bataway", "balawis", "taragbago", "mublad", "burikat/ketong" and "sandig" (Figure 3). Fifteen siganid species have been reported to occur in Philippine waters and 26 species have been identified in the Indo-Pacific region (Woodland, 1990). There are at least 14 siganid species (Figure 4) found in Lagonoy Gulf (Soliman, 2008). When the fishers are shown of the siganid species that are established in the waters of Lagonoy, they said that they actually have seen and caught all those species. It is evident that fishers are not species-specific when they attribute a name to their catch but would rather use a general local term. Hence a single local name for siganids account for several species. It is understandable why fishers could not distinguish well the species of siganids considering that they have limited formal schooling.

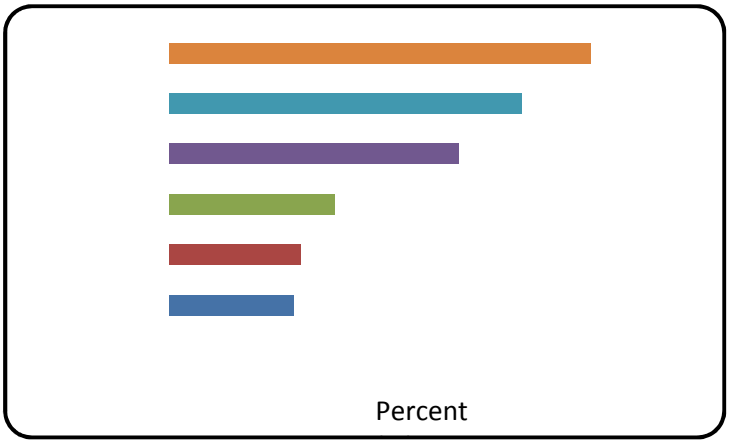

Figure 3. Species caught by fishers

Figure 4. Species of siganids caught in Lagonoy Gulf (Soliman et al 2008)

A large majority of fishers (76.3%) catch siganid species due to its seasonality and distribution, a lesser percentage (16%) for food consumption, while others as source of livelihood (Figure 5). The data pointed out that there is an abundance of siganid species on an specific season. While the fishers claimed to have caught siganid juveniles on its peak season, studies had shown that the annual siganid juevenile catches have been in continuous steep decline from 2001 through 2004 as a result of overfishing by bagnet (Soliman, 2010). The same study pointed out that the fishery has been overfishing a highly diverse resource by capitalizing on indigenous knowledge of its almost predictable settlement in space and time. This suggests that catching of siganids on its peak season might result to the depletion of this unique marine resource that are found in the specific locality if not managed properly.

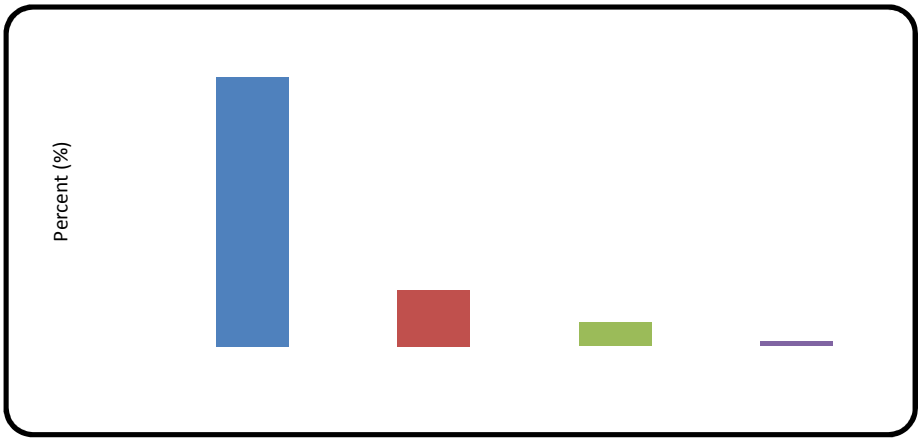

Figure 5. Reasons for catching species of siganids

Fishers rely on local beliefs in catching siganids as indicated by environmental events or natural phenomena. According to them, "kung gimata" or when its new moon there is an abundance of siganid juveniles. The peak of abundance of the catch happens in the months of February to July. Other natural signs observed by the fishers are the appearance of "ruron" or anchovies-like fish and "mamansi" or small sardines referred to as "manginot" which means appears ahead; these species were said to come first before the advent of siganid juveniles. As recounted by the fishers, " pag may basol ang talisay" the presence of hairy caterpillar on tropical almond (Terminaliacatappa) is also an indicator of the abundance of the siganids. Fishers also noted than "kung magatol ang tubig" or when the seawater becomes itchy, it signals for the richness of siganids in area. The respondents insisted too that "pag ibaba ang bilang kan petsa kang gimata, diit ang kuyog", when the new moon appears during the first few days of the month, the catch of siganid fry is low. It is noticeable that fishers are guided by a number of natural and environmental occurrences in the determination of the abundance of siganid juveniles. It can be deduced that the fishers are keen observant and well aware of the things that are happening in their environment.

3.3 Explication of Indigenous Knowledge

Fishers show evidence of indigenous knowledge pertaining to the resource present in their environment relating to diversity, biology. spawning season and abundance. Through the scientific forum conducted attended by experts in the field of fisheries and biology, the scientific explication was offered to the indigenous knowledge held by the local folks. These experts' knowledge provides the scientific rationale that merged with the indigenous knowledge of fishers (Table 2).

Knowledge generated by research institutions on siganids have not become part of IKS of fishers and other stakeholders that are the basis of decisions that affect the management of the resource. Information and educational campaign, programs or projects on the locally generated knowledge are lacking. . The integration of IK into formal knowledge will offer the benefit of sustaining it. The view of human as part of the natural world is of value for evolving sustainable relation with the natural-resource base (Oldfield, M.L. and Alcorn, J.B.). Thus the need to infuse in the basic education and socio-cultural events the explicated IKS for effective resource management

Table 2. Indigenous Knowledge and its Scientific Explanation

Indigenous Knowledge	**Scientific Explanation**
Fishers identified 6 species of siganids	Fourteen species in Lagonoy Gulf were identified by (Soliman 2009). Several species are given by fishers the same local name, thus the discrepancy.
Siganid fry appearance is associated with the new moon in February to July, preceded by the appearance of "ruron", anchovies-like fish and “manamsi”, small sardines called by locals as “manginot”, which in English means "appears ahead".	Spawning of anchovy is triggered by the warming up of surface waters and coincides with the maximum rate of temperature rising and the onset of stratification (Motos et.al 1996). Jane (1985) observed two peak seasons for anchovies, March to April and August to September in the fishing grounds of Lagonoy Gulf and Tabaco Bay, Bicol, Philippines.
Fishers have observed that emergence of insects, spawning of aquatic animals, coincide with the spawning season of siganids during the warm months of February to July.	From the study of Soliman et. al (2009) during summer period the juvenile siganids appears and larger gravid siganids were observed.
Abundance of siganids is associated with the appearance of hairy caterpillar in “talisay” or tropical almond (Terminaliacatappa) and by skin irritants in the seawater. Calls from local bird, “bahaw” (myna, crows, blabber), signal the appearance of siganids.	Temperature has long been recognized as an important environmental factor in both terrestrial and aquatic ecosystems in regard to its pivotal role over biological activity development, growth and reproduction (Begon et al. 1990). Local birds attracted by attractive flowers of talisay feed on insect larvae.
Fishers attest that when new moon appears during the first ten days of the month, the catch of siganid fry is low.	Soliman et al. (2009) observed the highest volume of juvenile siganids catch are obtained consistently in April and May new moons, but production in the gulf have continuously declined in from 2001 to 2004, including years when the new moon fall during the latter days of the spawning months. Fishing pressure on siganid fry and gravid adult is the over riding factor to declining catch.

4. Conclusion

Indigenous knowledge system of local folks is very rich. Majority are validated by scientific knowledge from the research conducted by Bicol University, and by other institutions, but have not been popularized for inclusion in the IKS of fishers, and the general public. IKS on the abundance of siganids are linked to meteorological and astronomical events which affect or trigger events interpreted to be “signs” of abundant catch by fishers. Climate change effects such as ocean warming, and other human activities like overfishing, deforestation maybe “coincidental” effects. Utilization of socio-cultural events for the locals will take on a protective role over these resources.

5. Acknowledgement.

This research project is funded by Bicol University Tabaco Campus (BUTC) and Bicol University-Research and Development Center (BU-RDC). The authors wishes to acknowledge the support and assistance of BUTC, BU-

RDC, Dr. Victor S. Soliman, Dr. Wilfredo L. Campos, LGU officials and fishers from Barangay, Sagurong, San Miguel Island, Tabaco City; Cagraray, Bato, Catanduanes and Gaba, Batan Island, Rapu-rapu, Albay.

References:

Begon , M. , J.L. Harper, and C.R. Townsend. (1990) Ecology: Individuals, Populations and Communities , 2nd Ed, Blackwell Scientific Publications , Boston , pp. 945.

Fernandez, Pepito Jr. 1999. Coastal zone management approaches and outcomes in the Philippines: Conceptual and institutional retooling for the 21st century. Fisheries Today in the Philippines. p. 49.

IIRR. 1996. Recording and using indigenous knowledge: A manual. International Institute of Rural Reconstruction, Silang, Cavite, Philippines.

Jane, M. R. 1985. Seasonal abundance and biology of anchovies at Lagonoy gulf and Tabaco Bay (Philippines). BU R & D Journal Vol. II.

Lasserne, P. and Ruddlie, K., 1983. Traditional Knowledge and Management of Marine Coastal System. Report of the ad hoc Steering Committee, UNESO, Paris.

MacSween, R.M. and H.C. Williams, 1996. Seabather's eruption-a case of Caribbean itch. Department of Epidemiology and Public Health, Queen's University of Belfast. 312, 957-958.

Motos L., A. Uriarte, and V. Valencia. 1996. The spawning environment of the Bay of Biscay anchovy (Engraulisencrasicolus L.). SCIENTIA MARINA. 2, 117-140.

Mukwada, G. 2000. Natural resources conservation and management, Zimbabwe Open University, Harare.

Nieves, P.M., S. C. de Jesus, M.B. Macale, and JM. D. Pelea. 2010. An Assessment of Macro-Invertebrate Gleaning in Fisheries on the Albay Side of Lagonoy Gulf. Kuroshio Science 4-1, 27-35, 2010.

Oldfield, M.L. and Alcorn, J.B. (eds.) 1991. Biodiversity: Culture, Conservation and

Ecodevelopment. Westview Press, Boulder.

Pelea, et al., 2004. An Assessment of Macro-Invertebrate Gleaning in Fisheries on the Albay Side of Lagonoy Gulf, FRMP Report.

Sabola- Kalanda et al. 2007. Use of Indigenous Knowledge and Traditional Practces in Fisheries Management: A Case of Chisi Island, Lake Chilwa, Zomba.

Soliman, V.S., A.B. Jr., Mendoza, and K. Yamaoka. 2008. Seawed-associated fishes of Lagonoy Gulf in Bicol the Philippines - with emphasis on siganids (Teleoptei : Siganidae). Kuroshio Science 2-1: 67-72.

Soliman, V.S., and K. Yamaoka. 2010. Assessment of the fishery of siganid juveniles caught by bagnet in Lagonoy Gulf, Southeastern Luzon, Philippines. Journal of Applied Ichthyology (Impact Factor: 0.9). 07/2010; 26(4):561 - 567.

Soliman, V.S., R.U. Bobiles, and K. Yamaoka, 2009. Overfishing of three siganid species (Family : Siganidae) in Lagonoy, Philippines. Kuroshio Science. 2: 1 45-150.

Warren, D. M. 1990. "Indigenous Knowledge Systems and Development." Background paper for Seminar Series on Sociology and Natural Resource Management. The World Bank, Washington, D.C.December 3, 1990.

Warren, D. M. 1990a. "Indigenous Knowledge Systems for Sustainable Agriculture in Africa." Keynote Address, International Conference on Sustainable Agriculture in Africa. Columbus, Ohio: The Ohio State University, Center for African Studies.

Websites:

http://www.ikap-mmsea.org/topic.htm

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Recent conferences: http://www.iiste.org/conference/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar