



# INTERNATIONAL SEMINAR ON FISH AND FISHERIES SCIENCES (ISFFS) 2021

## Preface

The International Seminar on Fish and Fisheries Sciences (ISFFS) with the theme “Science and innovative technologies for ensuring the long-term sustainability of fisheries towards Society 5.0” was conducted virtually on July 13-14, 2021 due to the ongoing COVID-19 pandemic. The seminar was organized by the Indonesian Ichthyological Society (Masyarakat Iktiologi Indonesia), in collaboration with the Faculty of Marine Science and Fisheries, Udayana University, Research Center for Fisheries, Ministry of Marine Affairs and Fisheries, Research Center for Biology, Indonesian Institute of Science, BIONESIA (Biodiversitas Indonesia), Faculty of Fisheries and Marine Sciences, IPB University and The Jakarta Technical University of Fisheries.

The opening keynote was given by the Minister of Marine Affairs and Fisheries, Republic of Indonesia, then continued by welcoming remarks from the Governor of Bali Province, Rector of the Udayana University, and Chairman of the Indonesian Ichthyological Society. Our four plenary speakers were sure to inspire participants with their broad experiences in their particular field. Prof. Dr. Nicolas Hubert (IRD, France) talked on DNA barcoding and biogeography of Sundaland freshwater fishes, Prof. Dr. Dr. habil. Sven M. Bergmann (Institute of Infectiology, Friedrich-Loeffler-Institut (FLI), Germany) delivered speak about Global warming and viral diseases – Tilapia Lake Virus (TiLV) on tilapia, common carp, crucian carp, and rainbow trout. Dr. Allen (Smithsonian Institution, USA) presented an excellent topic Towards a comprehensive barcode database for fishes of the US EEZ, and Prof. Dr. Teguh Peristiwady (Research Centre for Oceanography, Indonesia) shared the recent biodiversity of marine fishes from Indonesia.

A total of 148 manuscripts was presented in a two-day event, both in oral and poster presentations. More than 400 participants, including researchers, academicians, government and non-government officials, and graduate and undergraduate students from 9 countries, were involved in fruitful discussion and knowledge sharing. The submitted manuscripts have been through conscientious review and process to meet the qualifications of the international publication standard.

The proceedings are a compilation of the accepted articles based on their originality and significance to the aim of ISFFS 2021. All the accepted papers are grouped into five topic areas: Biodiversity, Fisheries Biology and Conservation, Aquaculture, Fish Capture and Fishing Gear, Post-harvest and Fish Processing Technology, and Fisheries Social, Economics, and Extension.

As chairman of the ISFFS 2021, I would like to express my sincere gratitude to plenary speakers, authors, reviewers, scientific editors, and all technical committee members who made the International Seminar on Fish and Fisheries Sciences was running well. Then the conference proceedings are ready to be published with E3S Web of Conferences. Last but not least, I also want to thank the Indonesian Ichthyological

Society, Faculty of Marine Science and Fisheries, Udayana University, Research Center for Fisheries, Ministry of Marine Affairs and Fisheries, Research Center for Biology, Indonesian Institute of Science (LIPI), BIONESIA- Biodiversitas Indonesia, Faculty of Fisheries and Marine Sciences, IPB University and the Jakarta Technical University of Fisheries for a good collaboration. Special thanks go to USAID through PEER Program BIONESIA and JAPFA, for their contribution to funding this seminar.

Chairman of ISFFS 2021,

Dr. Charles P. H. Simanjuntak



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# The edu-tourism fisheries as an alternative to the development of tourism in Gunung Salak village Selemadeg Timur District Tabanan Regency, Bali Province

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**Abstract.** Gunung Salak Village is a tourist village located in Tabanan Regency, Bali Province, with fishery potential. Edu-tourism Fisheries is a fishery facility that provides added value for fish farming education and tourism. The initiation of Edu-tourism Fisheries is carried out through the empowerment of fishery groups, namely fisheries extension. The purpose was to see changes in the level of knowledge, attitudes, and skills of the target towards the concept of culinary tourism, hygiene and sanitation, and innovation of traditional processed fish products. The study was conducted from September 2020 to March 2021. The respondents were 10-12 farmers and five elementary school children. The research method uses lectures, discussions, demonstrations, and observations. Fisheries education socialization obtained cognitive changes of 27% and affective of 10%. Culinary tourism socialization obtained cognitive changes of 25.8% and affective of 8.3%. Hygiene sanitation and innovation of traditional processed fish products obtained 32.5% cognitive, 10% effective, and 36.7% psychomotor. Outdoor study of elementary school students obtained 33% cognitive and affective changes 16%. The initiation of Edu-tourism Fisheries impacts changing the knowledge, attitudes, and skills of the target so that the concept of Edu-tourism Fisheries can be realized.

## 1 Introduction

Selemadeg Timur District is one of the sub-districts in Tabanan Regency, Bali Province, which has fairly high utilization of fishery potential with freshwater aquaculture production reaching 154.36 tons in mid-2020 [1]. This is supported by natural resources, namely springs, which make this sub-district suitable for aquaculture development. Selemadeg Timur District consists of ten villages with a total area of 54.78 km<sup>2</sup> [2]. Gunung Salak village has a pond area of 330.6 acres and a rice-fish farming (*mina-padi*) of 30 acres, with the highest potential for tilapia and catfish commodities compared to other villages. In addition, Gunung Salak Village also has a variety of natural, social, and cultural resource potentials that can be developed as a tourism destination, as evidenced by the stipulation of Gunung Salak Village as a tourist village in March 2017 through the Tabanan Regent's Decree Number: 180/225/03/HK&HAM/2017 [3]. The existing fishery potential is an opportunity and an alternative for the development of tourist villages. The development of the tourist village will certainly have an impact on improving the community's economy. Activities that can be carried out to encourage the development of tourist villages are through community service [4].

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Edu-tourism fisheries describe the fishery potential that supports the area as a place for education and tourism. Mina edu-tourism is a tourist attraction that provides tourist attractions and educational facilities by utilizing integrated fishing activity facilities [5]. Edu-tourism fisheries are fishery activities that provide added value as a vehicle for education and tourism by involving the role and participation of local communities. Edu-tourism fisheries are an alternative to existing tourism and fisheries activities such as marine tourism and fisheries tourism. Indonesia already has many marine tourism sectors supported by the abundance of rich marine resources diversity [6]. Fisheries tourism acts as a liaison between the main actors/fishery business actors and the community engaged in tourism. Then a synergy arises that can affect the social welfare of the community [7].

The concept of Edu-tourism fisheries is under the umbrella of Gunung Salak Village tourism. Edu-tourism fisheries are an alternative to developing a tourism village in Gunung Salak Village based on local wisdom. Local wisdom is divided into intangible and tangible [8]. Intangible local wisdom such as local language, community habits, choosing a good day to sow fish seeds, and balancing human life with nature through traditional ceremonies. Tangible local wisdom such as *subak*, traditional food, and *saung/minapadi* camp.

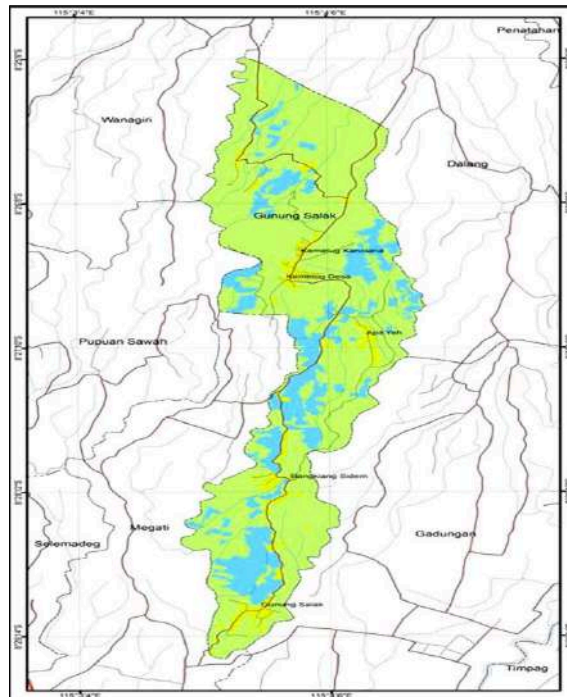
The initial stage of forming The Edu-tourism Fisheries group was carried out through the initiation stage. The initiation of Edu-tourism fisheries is carried out through the empowerment of fisheries groups, namely fisheries extension. Fisheries community empowerment plays a role in managing marine and fishery resources, especially by utilizing the value of local wisdom [9].

To support this, fisheries extension is needed to improve the knowledge of the attitudes and skills of the main actors in fisheries, both in technical, economic, and social aspects. The purpose of this study is to improve aspects of knowledge, attitudes, and target skills regarding the concept of Edu-tourism fisheries, fish-based food tourism, application of hygiene sanitation in fishery product processing, and innovation of regional traditional fish processing, the introduction of freshwater aquaculture to elementary school students.

## 2 Material and method

This research has been carried out from September 2020 to March 2021, located in Banjar Apit Yeh, Gunung Salak Village, Selemadeg Timur District, Tabanan Regency, Bali Province. The research target is the Mina Tirta Pertiwi Fish, an aquaculture group. Determination of the target sample by purposive sampling based on predetermined criteria. Respondents consist of 10-12 people who carry out aquaculture activities, with age in the medium to an old category ( $\geq 34$  years old), education in the medium category, and length of business experience in the medium category. Respondents also involved five elementary school children who live around the research location. The materials used are questionnaires and fisheries extension media (leaflets and real media). The extension method used is lecture, discussion, demonstration, and observation. Data were collected through observation, interviews, and questionnaires. Respondents in each activity were evaluated using pre-test and post-test questionnaires to determine behavioral changes.





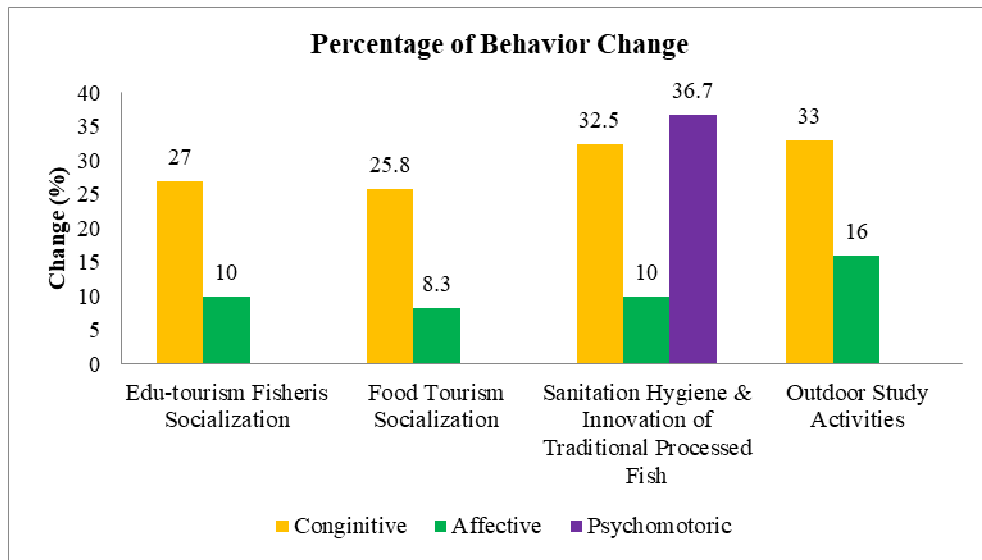
**Fig. 1.** Research Site Map.

## 3 Result and Discussion

### 3.1 Changes in Respondent Behavior

Fisheries extension is carried out using group and individual approaches. Both methods are more effective than the mass approach method. A significant relationship was seen in the target's attitude with the fisheries extension method individually and in groups, compared to the mass fisheries extension method because the mass method was not effective and efficient [10]. The stages of fisheries extension activities include identifying potential fishery areas, planning (time and location, materials, methods, media, targets), and implementing fisheries extension, which is preceded by a pre-test evaluation and ends with a post-test evaluation. The evaluation of the extension was carried out to determine the effectiveness of the fisheries extension on the respondents. The effectiveness of fisheries extension is carried out to determine the level of change in the target's knowledge, attitudes, and skills towards the material presented by the extension worker[11].

The Edu-tourism Fisheries obtained a cognitive change analysis of 27% and 10% effective., the food tourism socialization activities obtained a cognitive change analysis of 25,8% and 8,3% effective, for the activities of implementing sanitation and innovation of traditionally processed fish, an analysis of cognitive change was obtained 32,5%, effective 10%, and 36,7% psychomotoric, in the outdoor study activities of elementary school students, the analysis of cognitive changes was 33% and effective 16%.



**Fig. 2.** Percentage of Behavior Change.

The characteristics of the respondents influence changes in the behavior of respondents. Characteristics of the target are seen in terms of age, education level, and work experience. The target age is in the age range from 34 - 60 years, which is 50% in the medium category (33-51 years) and 50% in the old category (>51 years).

**Table 1.** Respondent age

Respondent Age		
Category	Standard (years)	People
Young	$x \leq (33)$	0
Medium	$(33) < x \leq (51)$	5
Old	$x > (51)$	5
Total Respondent		10

The target age is in the productive category that supports group work productivity. Increased work productivity is related to the productive age of the workforce (15-60 years) [12], where at that age, the workforce has high creativity for work because it is supported by better knowledge and insight and has a high responsibility for the tasks given. The education level of the dominant target is in the medium category as much as 90% (elementary school to senior high school), and only 10% has a higher education (Diploma 3). Labor education influences labor productivity [13]. The target age, which is in the productive category, and education in the medium category, supports the target's level of knowledge, insight, and skills to affect the level of work productivity.

The old experience of the dominant target business is in the medium category as much as 90% and as much as 10% in the new category. The target business experience has been in line with the group's development of production activities since 2017. The skills of workers can be seen from the length of experience a person has in doing their work, where high skills will positively impact their performance, such as the time required to complete the work faster and the quality of the results. His work will also get better [14].

### **3.2 Edu-tourism Fisheries socialization**

The first step in empowering The Edu-tourism Fisheries community is through the socialization of The Edu-tourism Fisheries concept. The socialization of Edu-tourism fisheries aims to introduce the concept of Edu-tourism fisheries to the target so that the target's interest and desire grow in developing existing fishery facilities as a vehicle for education and tourism. The contribution of community empowerment in the development of tourist villages can be seen from two aspects, namely social and educational aspects. The social aspect, one of which is to optimize the potential possessed by the village, then from the educational aspect, namely by increasing the ability of citizens to develop this potential [15]. The provision of material also accompanied the socialization of Edu-tourism fisheries on group performance. Improving group performance is an effort to strengthen the spirit and social relations between group members. Strong social relationships are built on good cooperation. Performance describes the achievement of work carried out by the group, namely the success or failure of the organizational goals that have been set. These goals are achieved through a proper planning and implementation process. So that effort is needed to improve the group's ability to manage, plan and carry out group activities. Target knowledge, attitudes, and skills affect the implementation of group activities [16].

Group performance can be judged from how the group's dynamics and functions work. The elements of group dynamics are group goals, group structure, task functions, developing and fostering groups, group cohesiveness, group atmosphere, group pressure, and group effectiveness. Group performance is also assessed from group functions, where there are eight group functions according to the Regulation of the Minister of Maritime Affairs and Fisheries Number 14 of 2011 [17]. One of them is the function as a production unit, where group interaction, self-efficacy, and mentoring of extension workers affect group success [18].

To improve group performance, Mina Tirta Pertiwi group members have shown their commitment and consistency to empower themselves, marked by group members' presence and activity during fisheries extension. The high and low performance of the group depends on each member of the group. Group performance can increase if group members have the commitment and consistency to empower themselves [19]. The low performance of fishery groups is due to financial problems and a lack of human resources in terms of work ethic, creativity, innovation, and utilization of their resources [20]. The high and low performance of the group can be seen from the classification of adopters. The adopter category of fisheries extension activities can be divided into five categories: innovator, early adopter, early majority, late majority, and laggard [21]. The adopter category of Mina Tirta Pertiwi Group is an early majority, the group of people who have an average education level and accept innovation as long as the innovation can provide benefits.

### **3.3 Fish-based food tourism socialization**

The socialization of fish-based food tourism aims to prepare The Edu-tourism Fisheries group in developing fish culinary processed menus as a tourist destination. Besides being processed into grilled fish or fried fish, there are now various modern food preparations with economic value, such as crackers, nuggets, and sausages. The various processed fish can be souvenirs for visiting tourists.



**Fig. 3.** Edu-tourism Fisheries Socialization.

An alternative to developing types of tourism other than natural and marine cultural tourism is culinary tourism. Culinary tourism is one of the tourism products that is a tourist attraction. Tourism products are an integrated array of activities, consisting of tourist attractions and attractions, transportation, and accommodation, where each element is prepared by the product provider and offered separately to tourists [22]. Fish is no longer a new thing in culinary tourism. Fish is healthy food for consumption. Fisheries have a major role in meeting food needs, especially animal protein [23].

### **3.4 Sanitation hygiene and innovation of traditionally processed fish**

Culinary preparations that the previous group has developed include grilled fish. Fish that is processed into grilled fish is tilapia. However, in processing, the application of sanitation and hygiene is still lacking. The weakness of the attractiveness of grilled fish as a tourism destination is the minimal management of food hygiene [24], [25]. Fisheries extension on the application of sanitation and hygiene in the fish processing process is important to the target to maintain the quality of processed products. Personal hygiene is important to be applied in the grilled fish processing process to improve product quality, quantity, and safety [26]. Things that need to be considered are the importance of maintaining good health, getting used to living clean, applying personal hygiene procedures such as good hand washing, and standard equipment such as masks, gloves, and aprons.

The application of sanitation and hygiene is also applied to the material for processing innovations in traditional fish processing, namely *timbangan*. So far, *timbangan* are made from chicken or pork. To attract tourists, *timbangan* is processed with different ingredients, namely fish. Making *timbangan* is fairly simple, starting from preparing Balinese spices, tilapia fillet, then spices and tilapia are mixed and put into bamboo. The bamboo is then covered with banana leaves and burned for  $\pm$  30 minutes until cooked and ready to be served. One alternative for tourism development is culinary tourism by utilizing the potential of traditional food or utilizing local wisdom. As it is known that culinary cannot be separated from tourist destinations, culinary based on local wisdom can be a tourist attraction that tourists demand [27]. The name *timbangan* follows the terms in the area. *timbangan* is local wisdom that is still maintained today. *timbangan* is unique in the way it is processed. Of course, this traditional food will be able to attract tourists.



**Fig. 4.** The Process of Making Timbungan.

### **3.5 Outdoor study activities of elementary school students**

Before the fisheries extension activities for children were carried out, some children did not dare to approach the fish pond. Children are also not too familiar with the types of freshwater fish. Some even say they don't like eating fish. This shows that the child is not familiar with fish or processed fish products. The lack of students' knowledge of fisheries is caused by the absence of an early approach and introduction to fisheries by parents, teachers and the absence of additional courses on fisheries from the school. An introduction to the world of fisheries for children is needed from an early age because of their lack of interest and knowledge about fisheries [28]. In addition to introducing the aquaculture environment, children can also be introduced and invited to process fish into products that children like, such as meatballs and nuggets. At a higher level, namely in adolescents, empowerment through education and training will increase their knowledge and interest in fisheries [29].

After the fisheries extension activities for children were carried out, the children were more familiar with the aquaculture environment. Teachers who accompany student activities appreciate this activity as a positive activity and provide a new atmosphere for students amid online learning conditions that are still ongoing due to the Covid-19 pandemic. The children also enjoyed meeting and learning while playing about the aquaculture environment with their friends.





**Fig. 5.** Outdoor Study Activities of Elementary School Students.

## 4 Conclusion

The concept of Edu-tourism Fisheries should also be applied to other fisheries groups to develop tourism villages in Gunung Salak Village. The challenge in the future is to maintain the sustainability of aquaculture activities in Gunung Salak Village. Based on the activities carried out, the initiation of Edu-tourism Fisheries impacts changes in target knowledge, attitudes, and skills to realize the concept of tourism. The Edu-tourism Fisheries socialization obtained a cognitive change analysis of 27% and 10% effective. The food tourism socialization activities obtained a cognitive change analysis of 25,8% and 8,3% effective. The activities of implementing sanitation and innovation of traditionally processed fish, an analysis of cognitive change was obtained 32,5%, effective 10 %, and 36,7% psychomotor. In the outdoor study activities of elementary school students, the analysis of cognitive changes was analyzed 33% and effective 16%. Further, in the future, this research can be recommended for other locations that have the potential for edu-tourism fisheries with some various activities in the village.

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