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## Livelihood Strategies after the 2004 Indian Ocean Tsunami in Banda Aceh, Indonesia

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### Abstract

The 2004 Indian Ocean Tsunami disaster which affected Indonesia, particularly the Aceh Province, left devastating impacts to the people and their livelihoods. The tsunami waves wiped out 800 kilometres of coastline and 3,000 hectares of land, killing many and caused permanent land losses including aquaculture ponds. This resulted in disruption of the households' livelihood that relies on aquaculture activities as well as on the natural resources such as the mangroves found in the aquaculture farms along the coastal areas. This study aims to understand the impacts of the 2004 Indian Ocean Tsunami disaster on the households' livelihood, and the interventions from the government and non-government organisations (NGOs) to help rebuild household's livelihood. The study also identifies the livelihood strategies households had taken to adapt to their current livelihood. Information from 77 households was collected for analysis. Quantitative and qualitative data were collected between September 2015 to March 2017 through questionnaire surveys, semi-structured interviews, observations, and group discussion to understand the livelihood recovery experience of disaster-affected households. Household who previously were involved in aquaculture farming, traditional cigarette making and fishing had taken up livelihood strategies such as agricultural intensification and livelihood diversification to attain income security and better well-being of education opportunities for their children and better housing condition to live and conduct their home-based businesses.

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## 1. Introduction

The 2004 Indian Ocean Tsunami disaster affected many countries among which the highest devastation was found in Aceh Province in Indonesia; killing 167,052 people, affecting another 590,684 individuals with estimated total damage of USD 4.5 billion [1]. The significant destruction totalled up to about 97% of the Province's GDP [2]. Records from [3] and [4] showed 669 government buildings, 517 health facilities, 3,000 kilometres of roads, 14 seaports, 11 airports and 120 bridges and other facilities such as education and telecommunication were badly affected. 78% of the private sector also suffered severely from the disaster. About 139,200 homes were totally destroyed or severely damaged, and 104,500 SMEs were wiped out by the tsunami. Farmers and fishers were unable to work as 73,869 hectares (ha) of agricultural land were destroyed, 13,828 of fishing boats were lost, 27,593 ha of aquaculture ponds disappeared, 16,775 ha of coastal forest and mangroves, and 29,175 ha of reefs were lost [5]. Among those affected sectors, agricultural, particularly fisheries experienced the worst effects [6]. About half of the total fishermen population were killed; 55,000 fishermen and aquaculture workers, and 14,000 more were reported missing [7]. This has severely affected and paralysed the livelihood activities of those living along the coastal area who were relying on the natural resources from the sea and mangroves. The immense destruction had decreased the ability of households to continue with their previous livelihood causing them to diversify and change their livelihood strategies through their own efforts, or the livelihood assistance received [8] [9].

In Aceh, the livelihood restoration was given secondary consideration as attention and funding were given more towards housing reconstruction [10]. A survey conducted to livelihood beneficiaries found that livelihood restoration programs implemented by the government and the NGOs were rated poorly [11]. Most of the aid agencies' funds were provided mainly for housing reconstruction and did not have enough for livelihood intervention programs [12]. In the aftermath of a disaster, aid response is necessary to assist the affected people in securing their livelihood [9]. Although there are plenty of studies on livelihood, little research has been made on livelihood changes in tsunami-stricken areas. Tsunami and earthquake disaster has the characteristics of unexpectedness and massive devastation, which was different from many other types of natural disasters. Hence, it is necessary to continually increase exploration to improve the knowledge of livelihood changes tsunami-stricken areas of Indonesia. This study aims to understand the impacts of the 2004 Indian Ocean Tsunami disaster on the household's livelihood, and the interventions from the government and non-government organisations (NGOs) to help rebuild household's livelihood. The study also identifies the livelihood strategies households had taken to achieve their current livelihood. The paper is structured as follows. In Section 2, the study site situation of before and immediately after the disaster event is introduced, and basic information on the methodology of the study is provided. In Section 3, disaster impacts on the household's livelihood are explored, followed by the livelihood interventions from the government and the NGOs in Section 4. Adaptive strategies taken by households are Section 5. Discussion in Section 6. Finally, Section 7 is concluded with the summary of the paper with some remarks.

## 2. Study Area and Methods

Survey was conducted in a village called Pande (Fig. 1) in Banda Aceh, Indonesia, which was heavily devastated by the 2004 Indian Ocean Tsunami disaster leaving only 30% of the total population. The location of the village is close to the tsunami prone zone where Indo-Australian and Euroasia plates collide with each other. The disaster had altered the land features which drastically changed the aquaculture pond land size (Fig. 2) affecting the households' livelihood. Pande has clay soil with flat topography, is 257 ha in size; 57 ha for settlements, facilities and infrastructures, and 200 ha is wetlands comprising of aquaculture pond and mangroves. There are 4 hamlets with 251 households making Pande's population density at 85 persons per km<sup>2</sup>. There are 101 poor households, of which 29 are extremely poor households (*fakir*) earning IDR (Indonesia Rupiah) 450,000 (USD (US Dollar) 33) monthly, and 73 are poor households (*miskin*) earning between IDR 450,000 to IDR 900,000 (USD 67) monthly [13].

The research is a cross-sectional study relying on quantitative and qualitative data through questionnaire surveys, semi-structured interviews, observations, and group discussion were conducted to understand the livelihood recovery experience of disaster-affected households. From the 100 household's heads selected using convenience sampling, 77 valid responses were obtained. In order to collect more information on their livelihoods and better understand the respondents' various actions, a total of 15 respondents were interviewed through semi-structured interviews, and 1 informal group discussion of 5 women were conducted. The interviewees were asked questions covering (1) personal and household information, (2) household livelihood changes and (3) strategies taken to the tsunami disaster. The

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