The present status of fixed lift net fishing in Banten Bay Indonesia

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Abstract. Banten Bay is the main fishing ground for small scale fishing activity in Banten Province. The fishers use several fishing gears, such as gillnet, trap, hook and line, danish seine, and lift net. However, a lift net fishery has a significant contribution to fish production in Archipelagic Fishing Port of Karangantu, Serang City. The purpose of this study is to analyze the status of fixed lift net fishing in Banten Bay. The research was conducted on Mei to July 2019 through survey and field observation. There are more than 150 units of fixed lift net operated in Banten Bay, that have landing place in Karangantu and Panjang Island. The rectangle lift nets (10Wx10L m²) are fixed at six to ten-meter depth. The fishers used four to six pressure kerosene lamps as a light source before 2010. However, since 2010 the fishers changed the lamp to the electrical light source due to high price, and limited availability of kerosene. In peak season, the lift nets have high productivity (500-1000 kg/trip). The productivity was decreased in the low season (< 100 kg/trip). The main target species in fixed lift net fishing are anchovies and squids with a potential margin more than IDR 60 million per year.

1. Introduction
The fisherman used various fishing gears to utilize the fish resources in Banten Bay. Fishing units in this area dominated by small scale fisheries using < 30 GT fishing vessel. Lift net fisheries have a main contribution to the fish production in the fishing port of Karangantu, as primary landing place in Banten Bay. However, a fixed lift net is the prevailing fishing gears with the main target are anchovy, squid, scad, and mackerel. The fixed lift net (bagan tancap) is the stationary lift net that using an artificial light source to attract and concentrate fish in the catchable area. The fixed lift net fishing in Banten Bay is still developed due to the low investment cost and high productivity.

The fishermen in Banten Bay used pressurized kerosene lanterns as a light source until a mid-year of 2011. The development of the electric light was caused by the transformation of light source application in lift net, from kerosene to the electric lamp, especially a fluorescent lamp [1-2]. The fishers prefer the fluorescent lamp because it is easy to obtain, low cost [1-2] and considered bright enough to attract schooling fish [3]. However, the application of this lamp with various number and wattages for a light source influence the increase of the operational cost. The purpose of this research is to analyze the current status of fixed lift net fishing including a number of gears, and fishing productivity related to the substitution of a light source in Banten Bay.
2. Methods
This research used a mixed-method, i.e. study literature and field survey. The study literature was conducted through review the result of earlier research related to the fixed lift net fisheries in Banten Bay. The survey and field observation was accompanied on Mei to July 2019 in Banten Bay and Archipelagic Fishing Port of Karangantu. The descriptive analysis used to define the present status of a fixed lift net. Moreover, a cost-benefit analysis used to evaluate the economic prospect of the lift net fisheries in Banten Bay.

3. Results and Discussions
The fixed lift net in Banten Bay was made from bamboo in rectangle construction (10Lx10W m²) as presented in figure 1. The fishers selected a fishing ground based on experience knowledge especially a pattern of sea current, wave or wind energy, and productivity at the earlier fishing season. Usually, the lift net is located at water depth less than 10 m and around a small island in Banten Bay. The lift nets are operated by one fisherman at a dark moon period. There are approximately 20 days of fishing trip every month.

![Figure 1. The fixed lift net in Banten Bay](image)

All fishers of fixed lift net in Banten By used the kerosene lamp until at the end of 2011. In each lift net, they usually used four to six kerosene lamps to attract the fish as showed in figure 2 [5]. The high cost of kerosene and limited spare part caused these lamp to become expensive. However, they changed the lamp into the fluorescent lamp as a light source in various number and power. They applied generator as an electric source with four to nine lamps with wattages approximately 45-90 W as presented in figure 3.
Figure 2. Fixed lift net fishing used the kerosene lamp in 2009

Figure 3. Fixed lift net fishing used the fluorescent lamp in 2014

Figure 4 showed the location of the fixed lift net in a different year. There were 101 units in 2011 with a dominant fishing location around the small island and coastal area. However, the number of lift net was increased by approximately 50 per cent in 2018. The fishers move their lift net into deeper location due to of fishing season and monsoon exchange. Generally, the number of fixed lift net in Banten Bay has fluctuation, related to the fishing productivity and profit in recent year. The fisher will be built a new lift net if there is high productivity during operation. The application of fluorescent lamp generates a high proportion of anchovy as the main target catch in lift net. It was related to the light spectrum of a fluorescent lamp which has suitable enough for an adaptation stage of anchovy [6]. As a result, the high productivity of anchovy increases the economic income, thus induce the increase of fixed lift net in Banten Bay.
Fixed lift net fishing in Banten Bay generates high economic income for fishermen. It caused the number of the unit to always fluctuation every year. However, there were increased in the investment and total cost of lift net fishing between 2009 to 2018. It was related to the price of bamboo, fuel cost, and purchase a generator as an energy source for a fishing lamp. Table 1 presented the cost-benefit analysis of fixed lift net fishing in 2009-2018.

| Item                     | Value (USD) 2009 | Value (USD) 2014 | Value (USD) 2018 |
|--------------------------|-----------------|-----------------|-----------------|
| Year                     | 2009            | 2014            | 2018            |
| Light source             | Kerosene lamp   | Fluorescent lamp| Fluorescent lamp|
| Fishing units investment | 321.43          | 642.86          | 958.57          |
| Total cost               | 2,140.86        | 3,178.57        | 4,707.21        |
| Revenue                  | 3,523.57        | 5,614.29        | 9,192.86        |
| Benefit                  | 1,382.71        | 2,435.71        | 4,485.64        |
| R/C                      | 1.65            | 1.77            | 1.95            |

The benefit from lift net fishing significantly is influenced by fishing season. There is three seasons in Banten Bay, i.e peak season, middle season and low season. The fishing productivity in peak season reaches 500-1,000 kg per trip. Meanwhile, in the low season, its productivity dropped only 20-50 kg per trip. In conclusion, fixed lift net fishing in Banten Bay is important enough to develop to become profitable small scale fisheries activity. Introduction of energy-efficient fishing light, i.e light-emitting diode (LED) in fixed lift net is a sufficient way to increase efficiency and effectiveness of the fishing operation.

Figure 4. Fishing ground location of fixed lift nets in the different year a) 2011; b) 2018
4. References
[1] Hua L T, Xing J 2013 Research on LED fishing light *Res J Appl Sci, Eng and Technol*. 5 (16) 4138-4141
[2] Susanto A, Irnawati R, Mustahal, Syabana M A 2017 Fishing efficiency of LED lamps for fixed lift net fisheries in Banten Bay Indonesia *Turkish Journal of Fisheries and Aquatic Sciences*. 17 283-291
[3] Khairul W, Mawardi, Riyanto M 2017 Use of blue lights emitting diode (LED) lamp to the catch of floating lift net in Aceh Jaya Regency *Albacore*. 1 (2) 235-243
[4] Hamidi, Baskoro M S, Riyanto M 2017 The use of underwater Light Emitting Diode (LED) with different color: its effect to the catch of boat lift net *Albacore*. 1 (3) 285-296
[5] Lee J W 2010 The influence of moon period to catch composition and fishermen income of fixed lift net in Serang Regency [Thesis]. Bogor Graduate School of Bogor Agricultural University. Bogor [ID] 117 pp
[6] Kondrashev S L, Gnyubkina V P, Zueva L V 2012 Structure and spectral sensitivity of photoreceptors of two anchovy species: *Engraulis japonicus* and *Engraulis encrasicolus* *Vision Research*. 68 19-27