Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

Optimizing Household-Scale Fish Farming Wastewater Management As A Form Of Environmental Conservation In Densely Populated Areas

Abizar Alghifari[1], Ira Rahayu Ningsih[2], Widiya Permata Sari[3], Muhammad Fathan Nur Ikhsan[4], Syahrul Ramdhani[5], Anasthasia Rizky Rochiandani[6], Evy Nurmiati[7]
Universitas Islam Negeri Syarif Hidayatullah Jakarta, Jl. Ir. H. Djuanda No. 95 Ciputat, Kota Tangerang Selatan 15412 , Jakarta, Indonesia

Article Info
Keywords:
Home-Scale Fish Farm-ing,
Positive Impact,
Bak-ti Jaya Village,
Water Quality,
Waste Water Management System.

ABSTRACT
One of the strategies to improve the standard of living of the Bakti Jaya people is the innovative home-scale fish farming owned by Mr. Budi. Located in the middle of a populous area, the water management system in aquaculture is an important thing to consider so as not to pollute the environment. Therefore, this research aims to analyze the wastewater management of home-scale fish farming in the context of environmental conserva-tion carried out by Pak Budi's BP Farm, as well as to ex-plore the positive impacts that can be generated from waste management in densely populated areas. This research uses a qualitative descriptive method. The re-sults showed that the wastewater management system applied by BP Farm fish farming can be an alternative that utilizes traditional tools, but the system can be fur-ther maximized by applying the RAS system so that the waste water produced becomes less. In addition, the wastewater produced by BP Farm fish farming has a positive impact, that is, it can be used for liquid fertilizer which contains nutrients that are good for plants.

Corresponding Author:
Abizar Alghifari
Universitas Islam Negeri Syarif Hidayatullah Jakarta, Jl. Ir. H. Djuanda No. 95 Ciputat, Kota Tangerang Se-latan 15412 , Jakarta, Indonesia
abizar.drake@gmail.com

INTRODUCTION

Poverty is one of the social problems faced by various cities, including in the Bakti Jaya Subdistrict. One of the causes of increasing poverty in this area is the COVID-19 pandemic. The pandemic forced many economic sectors to cease operations, leading to the closure of many businesses and the loss of jobs for workers. In South Tangerang Regency, 1.22 million people (12.45% of the working-age population) were affected by COVID-19. This data includes unemployment due to COVID-19 (998.5 thousand people), Non-Labor Force (BAK) due to COVID-19 (360.1 thousand people), residents temporarily not working due to COVID-19 (553.3 thousand people), and residents who experienced reduced working hours due to COVID-19 (1.03 million people). (“Keadaan Ketenagakerjaan Banten Agustus 2021,” 2021)

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

The externalities of the COVID-19 pandemic significantly weakened people's income opportunities. Massive layoffs occurred, affecting 1,943,916 workers from 114,340 companies. This figure is expected to continue to rise if the pandemic persists for a longer period. Additionally, the “stay at home” policy significantly reduced people's incomes due to the severe limitations on economic activity (Yamali & Putri, 2020). Many employees were furloughed, and various companies faced bankruptcy. Of the total companies that implemented layoffs, 77% came from the formal sector, and 23% from the informal sector (Kemnaker, 2020).

The issue of poverty is also exacerbated by low levels of education, which becomes a barrier for individuals to obtain employment. Certain types of jobs, such as waiters, often require at least a high school diploma. According to Sharp and Kuncoro (2006), the low quality of human resources, caused by low education levels, is one of the main causes of poverty. Education is a process of increasing knowledge, skills, and other abilities, and it is a pillar in the economic development of a country.

In the Bakti Jaya Subdistrict, awareness of the importance of education is still relatively low. Many residents do not view education as important, thus not encouraging their children to pursue higher education. This condition is supported by data that the education level in Banten Province is dominated by elementary school graduates. As of February 2024, 35.83% of the working population are elementary school graduates or have lower education. Meanwhile, those with a Diploma I/II/III, Bachelor's, and Postgraduate education only account for 12.99% (“Keadaan Ketenagakerjaan Banten Februari 2024,” 2024).

The economy of Banten Province is largely supported by micro, small, and medium enterprises (MSMEs). In the Bakti Jaya Subdistrict, many MSMEs have developed with support from the Banten Provincial Government. According to the results of the February 2024 National Labor Force Survey (Sakernas), the three main sectors that absorb the most labor are Wholesale and Retail Trade, and Repair and Maintenance of Motor Vehicles and Motorcycles (20.41%), Manufacturing Industry (19.75%), and Agriculture, Forestry, and Fisheries (14.65%) (“Keadaan Ketenagakerjaan Banten Februari 2024,” 2024).

The government plays an important role in alleviating poverty through community empowerment, particularly in the MSME sector. In the Bakti Jaya Subdistrict, the government has provided assistance in the form of mini ponds, fish seeds, fish feed, and machines to 21 residents in the fish farming empowerment program. One figure who has helped the success of this program is Budi Prayitno, a fish farming business owner who started this business before receiving government assistance. With the support of local figures like Budi Prayitno, MSBME fish farming in the Bakti Jaya Subdistrict has successfully developed.

Bakti Jaya Subdistrict is one of six subdistricts in the Setu District. Within Bakti Jaya Subdistrict, there are 10 RW (neighborhood units) and approximately 63 RT (community units). The population of this subdistrict is 19,548 people, and its area is 186.713 hectares (Arwani, n.d.). In Bakti Jaya Subdistrict, the majority of the residents work as private employees, and many seek additional activities outside their jobs to fill their free time. Two of these side activities and potentials in Bakti Jaya Subdistrict are MSMEs and small-scale fish farming. However, this article will focus on fish farming in this subdistrict. Both private employees and

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

retirees are involved in small-scale fish farming due to several reasons, one being that it is easy and can be done on a household scale, requiring little land.

Bakti Jaya Subdistrict is located not too far from the city center, only about 4.6 km away. This supports small-scale fish farming entrepreneurs in accessing shops that provide the tools and materials needed for their fish farming activities. In addition, the government assistance, such as 21 fish ponds distributed to these entrepreneurs, has been a great help in developing this small-scale fish farming business. Besides ponds, fish seed distribution is often carried out by the subdistrict government to support these fish farming businesses.

One of the small-scale fish farmers is Mr. Budi Prayitno, who resides in RT 08/RW 05. He is a retiree who ventured into small-scale fish farming because it is easier and helps fill his free time after retirement. He explained that fish farming has great potential in Bakti Jaya Subdistrict, especially with the government support provided, which should enable these entrepreneurs to grow further. One of the reasons for choosing small-scale fish farming is that it does not require large land areas—just around the house—and is easily controlled at any time. This is why many are interested in small-scale fish farming.

However, fish farming faces challenges, especially in managing the wastewater produced. Improper disposal of wastewater can pollute the surrounding environment. One business that applies good wastewater management is BP Farm, owned by Budi Prayitno. The system used involves periodic water changes between ponds, with the wastewater directed to drains for sedimentation, and then used as fertilizer. The clean water is then discharged into the sewer, reducing pollution (Effendi, 2006).

To address this issue, one fish farming business in Bakti Jaya Subdistrict, BP Farm, has implemented good wastewater management. The system used in the farming involves periodic water exchanges between ponds, where the wastewater is directed to drains for sedimentation, and the sediment is then utilized as fertilizer (Amir et al., 2022). Subsequently, the remaining water from the sediment is disposed of into drainage systems, reducing pollution (Effendi, 2006). Based on this explanation, a good wastewater management system has positive impacts on the environment and can improve community welfare by increasing agricultural productivity. Liquid organic fertilizer from tilapia fish waste affects plant growth because it contains essential nutrients such as nitrogen and phosphorus needed by plants. The use of liquid organic fertilizer from fish waste supports sustainable agriculture by reducing environmental pollution and increasing agricultural yields (Rizki Wira Priyanggi et al., 2019).

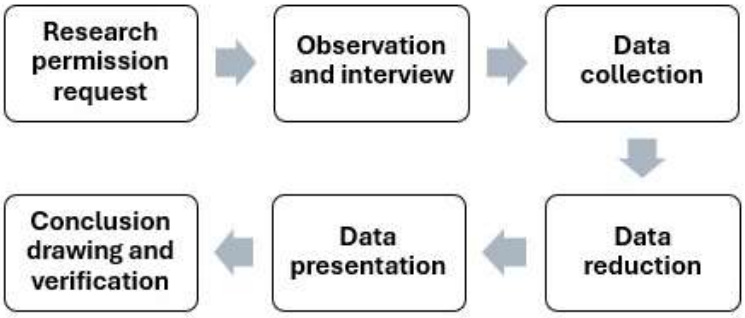
The previous study used is the Techno-Economic Analysis of Environmentally Friendly Liquid Fertilizer Production from Fish Farming Wastewater Based on Community Efforts by Amir et al. in 2022, conducted in Bangkalan Regency. The research concluded that wastewater from fish farming can be converted into liquid fertilizer with positive environmental impacts. This current research aims to analyze the management of household-scale fish farming wastewater for environmental preservation as carried out by BP Farm, as well as to assess the positive impacts of such waste management in densely populated areas.

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

METHODS

In this research, the author employs a descriptive qualitative approach with a case study method. Data collection techniques used in this study include interviews, observation, and documentation. The type of interview conducted is a semi-structured interview, where questions are prepared before the interview session but new questions may emerge spontaneously from the context of the ongoing conversation (Sahir, 2021). The interview respondents are involved in the fish farming process and wastewater management. The observation focuses on observing the fish farming process and its wastewater management.

The data analysis technique used follows the data analysis method by Miles and Huberman, which involves several stages: data reduction, data presentation, and drawing conclusions or verification (Abdussamad, 2021). Here is a further explanation of the data analysis stages:



Flowchart 1: Research Methodology

1. Data Reduction
   Data reduction is carried out by extracting key points after all the necessary data has been collected (Latifah, 2023). The gathered data is then (sorted according to the research focus or problem limitations and simplified, making it easier for the researcher to analyze later (Fauzi et al., 2022). This research focuses on pond and water management, feed management, and wastewater management.
2. Data Presentation
   The data is presented in a narrative form based on the results of interviews, observations, and documentation. This narrative is then linked with relevant theories and supporting research findings.
3. Conclusion Drawing
   After the presented data has answered all the research questions, conclusions are drawn.
4. Verification
   Verification is performed by reviewing interview notes, interview recordings, and documentation from videos and photos.

Data Validity Testing

The validity of the data is tested using four techniques: credibility, transferability, dependability, and confirmability. Below are the explanations:

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

1. Credibility Test tested using technique triangulation and source/data triangulation. Technique triangulation involves interviews, observation, and documentation, while data triangulation is done by interviewing and observing both expert and novice farmers.
2. Transferability Test is tested by providing a descriptive account of the research results supported by relevant theories and research findings.
3. Dependability Test is ensured by attaching interview notes and photos with the respondents.
4. Confirmability Test is carried out by verifying the results and discussion with the raw research data. Additionally, the results and discussion are reviewed by each researcher, ensuring that the data interpretation is more valid.

RESULTS AND DISCUSSION

Fish farming is one of the business prospects in Bakti Jaya Village that not only has the potential for the products produced but also for the development of human resources. Knowing this, the researcher conducted a review and decided to make the fish farming one of the KKN work programs. The review conducted by the researchers ended with our interest in Pak Budi Prayitno's tilapia fish farming business. Pak Budi is a retiree who, in his old age, became interested in learning about household-scale fish farming. Household-scale fish farming is the practice of cultivating fish by utilizing unused land at home, maximizing its use. Fish farming with this technique is suitable for those with limited land, especially in residential areas or densely populated regions (Mokolensang & Manu, 2020).

Image 1. Interview with Pak Budi

Fish farming, which initially stemmed from someone's interest, then turned into a business with promising prospects and value, attracting the enthusiasm of local residents to join as household-scale fish farmers. This, of course, cannot be separated from the unwavering spirit of inspiring and providing positive education about the potential of household-scale fish farming. By utilizing and maximizing unused land at home, the community can turn this household-scale fish farming into a viable business prospect. In the end, Pak Budi successfully

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

formed a team of 7 groups who joined the household-scale tilapia fish farming business. Additionally, Bakti Jaya Village supports the spirit of the farmers by providing some supporting aids such as ponds, fish seeds, and other machinery to motivate the growth of this potential.

In Pak Budi's household-scale fish farming, the type of fish being farmed is tilapia. In terms of advantages, tilapia fish are quite easy to care for and cultivate because they are adaptable, have a relatively fast growth process, have easily available feed, cheap fish seeds, and the resulting water does not smell (Sibagariang et al., 2021). Efforts to maximize farming with good product outcomes must begin with the process of creating and filling water in the pond initially. In Pak Budi's fish farming, for a new pond or a pond that is about to be filled with fish seeds, salt is mixed with the water. The use of salt in the new pond aims to produce an ideal pH level for tilapia fish, which is between 6.5 to 8.5. In addition, previous research conducted by (Eva, 2020) in (Anggraini et al., 2023) showed that the addition of salt in fish farming media proved capable of healing Aeromonas bacterial infections and preventing the spread to other fish. Water with a pH that is too low or too high can cause stress and inhibit the growth of tilapia (Pulungan et al., 2020).

Moreover, if the pond is not made of bricks or a permanent structure, Pak Budi uses rice husks as the pond's base for temporary ponds. The purpose of using husks is to maintain the stability of the water temperature, which is an important component in producing quality farmed fish. The ideal temperature for tilapia farming is between 25-30° Celsius (Bagaskara et al., 2022). If the temperature quality is not well-maintained, tilapia fish will experience stress, the emergence of diseases, or even death. In addition to maintaining water temperature stability, the use of rice husks also aims to prevent the pond, especially those using materials like tarpaulins, from easily tearing. The rice husks are placed underneath the tarp or material that will hold the water. Therefore, to minimize problems with water temperature in the dry season or the tearing of the pond base during maintenance or harvest, rice husks are used as a medium to address these issues.

Image 2. Temporary tilapia pond

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

Another factor of particular concern for Pak Budi is the oxygen flow for each pond. Oxygen is a crucial component for fish farming, as even if the water is very clear but lacks oxygen, the fish in the pond will have a high risk of dying. Oxygen in the pond plays a vital role in the process of food absorption in the fish in the water. If fish lack oxygen, they will have difficulty swimming in balance. In the household-scale fish farming sector, even oxygen distribution plays an important role in optimizing the quality of farmed fish (Scabra et al., 2022). The oxygen management that Pak Budi applies involves using an oxygen supply machine. This machine has a main component that produces oxygen, then through a filtration process, it is stored in pipes before finally being distributed to small hoses for each pond. By utilizing the performance of the main machine that stores oxygen, the machine's workload becomes lighter and consumes less electricity. Additionally, the oxygen produced is of higher quality because it goes through a filtration process first.

Furthermore, to obtain good and safe water quality for fish, another crucial factor is fish feed. In the feeding process, Pak Budi uses the "bibis" technique, which is the process of mixing fish feed with several ingredients, including medicine and vitamins, and then waiting for a while until the vitamins and other ingredients are absorbed by the fish feed (Fadli & Meiyasa, 2023). This "bibis" technique is used to make tilapia fish digest food easily, leaving only a small amount of uneaten food that turns into waste. Overfeeding results in an accumulation of leftover feed, which will cause a decline in pond water quality, indirectly affecting the productivity and growth of the fish in the pond (Pradhana et al., 2021).

Another way to maintain good water quality is by draining the pond. This is what happens in Pak Budi's household-scale tilapia farming, where the pond draining process for small-scale ponds only takes a short time. The pond used in fish farming has a pipe that runs underground to a drain or household sewage system. This pipe is opened for 5 minutes with a small volume, allowing water to flow and carry accumulated waste underground into the drain and household sewage system. Before reaching the sewage system, the accumulated waste settles in the drain, which will be collected and used as plant fertilizer. The water that ends up in the household sewage system is only a small amount, consisting of clean water without any settled waste. Additionally, since the fish being farmed are tilapia and the pond uses tarpaulin, the water in the pond tends not to have a strong odor, so the drained water does not disturb the comfort of nearby residents (Handayani et al., 2021).

Another method that can be applied for draining larger ponds is that Pak Budi schedules pond draining times to manage the large volume of water that will be wasted if all the ponds are drained simultaneously. When a pond becomes very murky, the waste that settles at the bottom is suctioned using a machine. The water and waste that are discharged can be used for watering plants, although the plants must be watered with clean water afterward. The remaining water in the pond is distributed to other, clearer ponds by taking the water from the top layer.

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

Image 3. Water drainage system in the pond

There is great potential in the utilization of fish farming wastewater. Fish farming wastewater contains algae that can be harvested using biodegradable coagulants for further use. Fish farming wastewater is also nutrient-rich and can be reclaimed as fertilizer or used for algae farming (Kurniawan et al., 2021). Wastewater from tilapia fish farming generally contains various components derived from leftover feed, fish metabolism, and other organic matter. The wastewater produced from fish farming has the characteristics of high biological oxygen demand, chemical oxygen demand, protein, nitrogen (N), and phosphorus (P). The nitrogen contained in ammonia helps increase leaf and stem growth, enhances photosynthesis, and promotes higher crop yields. Therefore, ammonia indirectly supports plant productivity when used in moderation (Mery Sukmawati et al., 2024).

The main component found in fish farming wastewater consists of nitrogen compounds (ammonia, nitrite, and nitrate). Ammonia is the primary nitrogen waste produced by aquatic animals (Sri Wahyuningsih et al., 2015). Fish feed is the largest contributor to ammonia in the farming system. The reason is that only 20-30% of the nutrients in the feed become biomass, while the rest is excreted into the environment in the form of ammonia and urea. Ammonia is a compound released from fish gills as waste from protein digestion. If ammonia levels are too high in the water, it can potentially cause fish death. This is because ammonia can interrupt the transfer of oxygen from the gills to the blood and cause long-term or sudden gill damage (KURNIAJI, 2015).

It is crucial to manage water quality as a medium for fish farming to ensure sustainability. The particles dissolved in the water (causing turbidity) must be removed by filtering or settling. One of the technologies being developed to achieve sustainable aquaculture by maintaining the environmental carrying capacity is the Recirculating Aquaculture System (RAS) technology. RAS is a fish farming system using recycled water, first implemented in the 1990s. The quality of a water body is an essential requirement that can affect the survival, development, growth, and production levels of fish (Adinda Kinasih Jacinda et al., 2021). According to (Balasubramanian C P et al., 2020), some important processes in RAS include:

1. Waste removal using sedimentation tanks, granular media filters, screens, porous media filters, hydrocyclones, and foam fractionation,
2. Biofiltration using living microorganisms to remove ammonia,

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

3. Degassing/CO2 stripping to regulate gas pH or alkalinity,
4. Aeration to replenish oxygen in the water through aeration or oxygenation,
   Disinfection to prevent disease by integrating ultraviolet sterilization or ozonizers.

There are three types of integrated RAS technologies that are frequently developed in Indonesia, including modifications by combining plants as filters (aquaponics), modifications to the aeration system using microbubbles, and modifications by integrating immunostimulants, probiotics from bacteria, and biofilters. RAS can be used for almost all fish species, whether freshwater or marine, or other aquatic animals. RAS technology offers many advantages, including more efficient water use, more hygienic conditions because it fully controls the environmental conditions, relatively small space or land requirements, ease of controlling and maintaining water temperature and quality, environmental friendliness, and protection from external water pollution, allowing it to be implemented year-round (Lembang & Kuing, 2022).

In Pak Budi's tilapia farming, the management of water waste is still traditional. However, during the interview, he mentioned his plans to develop the system into an RAS system. Nonetheless, there are challenges ahead related to human resources, such as the need for effective and comprehensive socialization and training for all household-scale fish farmers. In this case, the process of implementing the system is still very long and will require time, effort, and consistency to continue developing a more environmentally friendly water management system.

CONCLUSION

The conclusion of this study highlights the importance of water management systems in tilapia aquaculture in Kelurahan Bakti Jaya. Proper water management has proven to be key to maintaining the quality of the fish produced. One of the techniques used is the addition of coarse salt to stabilize water quality, as well as the use of rice husks to maintain stable water temperature. In addition, the application of oxygen filtration systems through water filtration machines plays an important role in increasing dissolved oxygen content in the ponds, thus supporting optimal fish growth. Effective water management not only enhances the quality of fish production but also minimizes the waste generated. The nutrient-rich wastewater is reused, both for algae cultivation and as organic fertilizer for local agriculture. Thus, the water management system applied in this aquaculture not only maintains fish quality but also provides environmental benefits through more efficient reuse of water resources. This demonstrates that proper water management is a vital component in the sustainability of household-scale tilapia farming. However, the wastewater from fish farming contains harmful compounds for both the fish and the environment. Therefore, this study recommends the use of a Recirculating Aquaculture System (RAS) for managing household-scale aquaculture wastewater to ensure controlled environmental conditions, water quality, and minimal pollution.

REFERENCE

Abdussamad, D. H. (2021). *Metodologi Penelitian Kualitatif.* CV. syakir Media Press.

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

Adam Sofian, S. M. (2024). *Keadaan Ketenagakerjaan Banten Februari 2024.* Banten: Badan Pusat Statistik Provinsi Banten.

Ahmad fauzi, B. N. (2022). *METODOLOGI PENELITIAN.* Banyumas: CV. Pena Persada.

Ainil Zaqiah, M. T. (2023). Pengaruh Pendidikan, Pengangguran dan Jumlah Penduduk Terhadap Tingkat Kemiskinan di Indon. *Jurnal Kajian Ekonomi dan Pembangunan*, 33-43.

Ali Basrah Pulungan, A. M. (2020). Sistem Kendali Kekeruhan Dan pH Air Kolam Budidaya Ikan Nila. *ELKHA : Jurnal Teknik Elektro*, 99-104.

Arwani, Z. (2017). Dakwah ecodevelopment, studi analisis gerakan mensejahterakan hidup anda dan keluarga di koperasi maestro, Kelurahan Bakti Jaya, Kecamatan Setu, Pamulang, Tangerang Selatan. 1-25.

Ela Nur Aini, I. I. (2018). Pengaruh Tingkat Pendidikan Terhadap Tingkat Kesejahteraan Masyarakat di Kelurahan Kesatrian Kota Malang. *Technomedia Journal (TMJ)*, 58-72.

Fadli, F. M. (2023). EFEKTIVITAS PROBIOTIK KOMERSIAL DALAM PAKAN TERHADAP LAJU PERTUMBUHAN DAN TINGKAT KELULUSAN HIDUP IKAN LELE (Clarias garieppinus). *SATI: Sustainable Agricultural Technology Innovation*, 196-206.

Fakhrul Rozi Yamali, R. N. (2020). Dampak Covid-19 Terhadap Ekonomi Indonesia. *Ekonomis: Journal of Economics and Business*, 380-384.

Hafriliza, D. I. (443-448). POLA PERTUMBUHAN IKAN NILA (Oreochromis niloticus)HASIL BUDIDAYA MASYARAKAT DI DESA BANGUN SARI BARU KECAMATAN TANJUNG MORAWA. *Jurnal Jeumpa*, 2020.

Ichsan, S. P. (2021). Sistem Kendali Kualitas Air Kolam Ikan Nila dengan metode Jaringan Syaraf Tiruan berdasarkan PH dan Turbidity berbasis Arduino Uno. *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, 4197-4204.

Khodijah Ishak, S. M. (2017). FAKTOR-FAKTOR YANG MEMPENGARUHI PENGANGGURAN DAN INFLIKASINYATERHADAP INDEK PEMBANGUNAN DI INDONESIA. 22-38.

LATIFAH, D. N. (2023). ANALISIS GAYA BELAJAR SISWA UNTUK PEMBELAJARAN BERDIFERENSIASI DI SEKOLAH DASAR. *Jurnal Inovasi Penelitian Pendidikan dan Pembelajaran*, 68-74.

Manu, J. F. (2021). Budidaya ikan lele (Clarias gariepinus) sistim bioflok skala rumah tangga (Bioflock catfish, Clarias gariepinus, culture system on household scale). *Jurnal Budidaya Perairan*, 79 - 83.

Marzuki, A. R. (2022). Efektivitas Peningkatan Oksigen Terlarut Menggunakan Perangkat Microbubble Terhadap Produktivitas Ikan Nila (Oreochromis niloticus). *Jurnal Perikanan*, 13-21.

Nizar Amir, H. M. (2022). Analisis Tekno-Ekonomi Produksi Pupuk Cair Ramah Lingkungan dari Limbah Air Budidaya Ikan Berbasis Masyarakat. *Journal of Science and Technology*, 222-232.

Panjaitan, R. C. (2023). The Potential Use of Crude Glycerin as an Alternative Feed and Its Effect on the Growth of Mutiara Catfish (Clarias gariepinus). *AGRIKAN - Jurnal Agribisnis Perikanan*, 157-164.

Jurnal Ekonomi
Volume 13, Number 04, 2024, DOI 10.54209/ekonomi.v13i04
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

Prasetio, D. I. (2022). Sistem Klasifikasi Kualitas Air untuk Budidaya Ikan Nila Hitam (Oreochromis Niloticus) menggunakan Metode Support Vector Machine. *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, 5784-5791.

Sahrir, S. H. (2022). *Metodologi Penelitian.* Medan: Penerbit KBM Indonesia.

Susila, N. (2015). Dampak Pencemaran Air Sungai Kahayan pada Usaha Budidaya Ikan Karamba di Kelurahan Pahandut Seberang Kota Palangka Raya. *Jurnal Ilmu Hewani Tropika*, 71-74.