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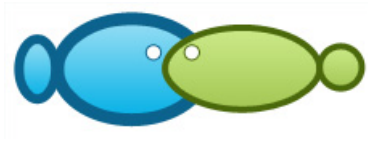
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Indonesia's affirmation as an archipelagic country with enormous marine resources must consider the role and function of regional parameters from a local economic development perspective. Maintaining marine sovereignty is not exclusive to weapons at sea because the community, especially fishers, must be involved in optimizing the advantage and management of marine resources through the optimization of fishers as professionals. By employing secondary data of regional development parameters, such as gross regional ...

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You are here › [Home](#)

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[Model of paper](#)

[Reviewer information pack](#)

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[Coverage / databases](#)

[Volume 16\(6\)/2023 \(December, 30\)](#)

[Volume 16\(5\)/2023 \(October, 30\)](#)

[Volume 16\(4\)/2023 \(August, 30\)](#)

[Volume 16\(3\)/2023 \(June, 30\)](#)

[Volume 16\(2\)/2023 \(April, 30\)](#)

[Volume 16\(1\)/2023 \(February, 28\)](#)

[Volume 15\(6\)/2022 \(December, 30\)](#)

[Volume 15\(5\)/2022 \(October, 30\)](#)

[Volume 15\(4\)/2022 \(August, 30\)](#)

[Volume 15\(3\)/2022 \(June, 30\)](#)

[Volume 15\(2\)/2022 \(April, 30\)](#)

[Volume 15\(1\)/2022 \(February, 28\)](#)

[Volume 14\(6\)/2021 \(December, 30\)](#)

[Volume 14\(5\)/2021 \(October, 30\)](#)

[Volume 14\(4\)/2021 \(August, 30\)](#)

[Volume 14\(3\)/2021 \(June, 30\)](#)

[Volume 14\(2\)/2021 \(April, 30\)](#)

[Volume 14\(1\)/2021 \(February, 28\)](#)

[Volume 13\(6\)/2020 \(December, 30\)](#)

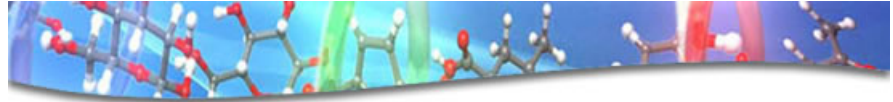
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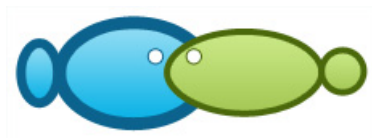


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[Volume 16\(6\)/2023 \(December, 30\)](#)

[Volume 16\(5\)/2023 \(October, 30\)](#)

[Volume 16\(4\)/2023 \(August, 30\)](#)

[Volume 16\(3\)/2023 \(June, 30\)](#)

[Volume 16\(2\)/2023 \(April, 30\)](#)

[Volume 16\(1\)/2023 \(February, 28\)](#)

[Volume 15\(6\)/2022 \(December, 30\)](#)

[Volume 15\(5\)/2022 \(October, 30\)](#)

[Volume 15\(4\)/2022 \(August, 30\)](#)

[Volume 15\(3\)/2022 \(June, 30\)](#)

[Volume 15\(2\)/2022 \(April, 30\)](#)

[Volume 15\(1\)/2022 \(February, 28\)](#)

[Volume 14\(6\)/2021 \(December, 30\)](#)

[Volume 14\(5\)/2021 \(October, 30\)](#)

[Volume 14\(4\)/2021 \(August, 30\)](#)

[Volume 14\(3\)/2021 \(June, 30\)](#)

[Volume 14\(2\)/2021 \(April, 30\)](#)

[Volume 14\(1\)/2021 \(February, 28\)](#)

[Volume 13\(6\)/2020 \(December, 30\)](#)

[Volume 13\(5\)/2020 \(October, 30\)](#)

[Volume 13\(4\)/2020 \(August, 30\)](#)

[Volume 13\(3\)/2020 \(June, 30\)](#)

[Volume 13\(2\)/2020 \(April, 30\)](#)

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Volume 3(2)/2010 (July, 30)

Volume 3(1)/2010 (February, 28)

Volume 2(4)/2009 (October, 30)

Volume 2(3)/2009 (July, 30)

Volume 2(2)/2009 (April, 30)

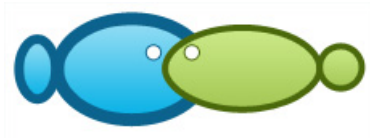
Volume 2(1)/2009 (January, 30)

Volume 1(2)/2008 (December, 30)

Volume 1(1)/2008 (September, 30)

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You are here › [Home](#) › [Volume 15\(4\)/2022](#)

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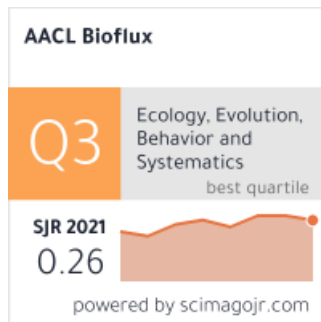
- [Instructions to authors](#)
- [Submission letter](#)
- [Model of paper](#)
- [Reviewer information pack](#)
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- [Coverage / databases](#)
- [Volume 16\(6\)/2023 \(December, 30\)](#)
- [Volume 16\(5\)/2023 \(October, 30\)](#)
- [Volume 16\(4\)/2023 \(August, 30\)](#)
- [Volume 16\(3\)/2023 \(June, 30\)](#)
- [Volume 16\(2\)/2023 \(April, 30\)](#)
- [Volume 16\(1\)/2023 \(February, 28\)](#)
- [Volume 15\(6\)/2022 \(December, 30\)](#)
- [Volume 15\(5\)/2022 \(October, 30\)](#)
- [Volume 15\(4\)/2022 \(August, 30\)](#)
- [Volume 15\(3\)/2022 \(June, 30\)](#)
- [Volume 15\(2\)/2022 \(April, 30\)](#)
- [Volume 15\(1\)/2022 \(February, 28\)](#)
- [Volume 14\(6\)/2021 \(December, 30\)](#)
- [Volume 14\(5\)/2021 \(October, 30\)](#)
- [Volume 14\(4\)/2021 \(August, 30\)](#)
- [Volume 14\(3\)/2021 \(June, 30\)](#)
- [Volume 14\(2\)/2021 \(April, 30\)](#)
- [Volume 14\(1\)/2021 \(February, 28\)](#)
- [Volume 13\(6\)/2020 \(December, 30\)](#)
- [Volume 13\(5\)/2020 \(October, 30\)](#)
- [Volume 13\(4\)/2020 \(August, 30\)](#)
- [Volume 13\(3\)/2020 \(June, 30\)](#)
- [Volume 13\(2\)/2020 \(April, 30\)](#)

Volume 15(4)/2022

- Pandara D. P., Masengi K. W. A., Tamuntuan, G. H., Angmalisang P. A., Wuntu A. D., Ferdy F., Bobanto M. D., Sompotan A. F., 2022 The potential of fish scale application as photothermal raw material in seawater desalination. *AACL Bioflux* 15(4):1617-1629.**
- Mulis, Habibie S. A., 2022 Analysis of water quality and plankton community of *Litopenaeus vannamei* ponds in the coast of Tomini Bay, Mootilango Village, Gorontalo, Indonesia. *AACL Bioflux* 15(4):1630-1638.**
- Fadhilah N., Rahayu R. P., Arwati H., Lastuti N. D. R., Fuana Y., Budhy T. I., 2022 Preparation model and standardization of potentially anti-cancer hydroxyapatite nanoparticles from *Tegillarca granosa* shells. *AACL Bioflux* 15(4):1639-1647.**
- Efriyeldi E., Effendi I., 2022 Aspects of reproduction biology of blood cockle (*Anadara granosa*) in Pasir Limau Kapas waters. *AACL Bioflux* 15(4):1648-1655.**
- Isfaeni H., Corebima A. D., Suwono H., Rohman F., 2022 Signature of mitochondrial DNA on the painted spiny lobster (*Panulirus versicolor*) population in Indonesia. *AACL Bioflux* 15(4):1656-1662.**
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- Ghafari M. I. A, Litaay M., Agus R., 2022 Variation on the morphological features of coral *Echinopora lamellosa* population suggests corals survivorship mechanisms in Alas Strait, Indonesia. *AACL Bioflux* 15(4):1680-1691.**
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- Hendrik, Hendri R., Syahrul, Yulinda E., 2022 Profit levels and aquaculture ownership structure before and during the covid-19 pandemic in Maninjau Lake, West Sumatra Province, Indonesia. *AACL Bioflux* 15(4):1703-1711.**
- Monika F., Baiquni M., Hadi M. P., 2022 Foreign vessels' mobility crossing the Archipelagic Sea Lanes in the Karimata Strait. *AACL Bioflux* 15(4):1712-1730.**

- Volume 13(1)/2020 (February, 28) **Asiah N., Yustiati A., Darfia N. E., 2022 The potential reproduction of Kelabau (*Osteochilus melanopleurus*) in Kampar and Siak Rivers, Riau Province, Indonesia. AACL Bioflux 15(4):1731-1736.**
- Volume 12(6)/2019 (December, 30)
- Volume 12(5)/2019 (October, 30)
- Volume 12(4)/2019 (August, 30) **Pratiwi D. Y., Nurhayati A., Putra P. K. D. N. Y., 2022 The community perception of Batu Karas mangrove forest preservation in Pangandaran Regency, West Java, Indonesia. AACL Bioflux 15(4):1737-1747.**
- Volume 12(3)/2019 (June, 30)
- Volume 12(2)/2019 (April, 30) **Tuiyo R., Pasingi N., 2022 Performances of reproductive phases and carrageenan concentration of *Kappaphycus cottonii* (Weber Bosse) Doty in a non-cultivated environment (study case area: Likupang Minahasa coastal area). AACL Bioflux 15(4):1748-1757.**
- Volume 12(1)/2019 (February, 28)
- Volume 11(6)/2018 (December, 30)
- Volume 11(5)/2018 (October, 30) **Ouaach A., Ennayer I., Akharbach H., Chebbaki K., Idhalla M., Chadli H., Nhhala H., Chairi H., 2022 Valorization of Northern shrimp shells meal of *Pandalus borealis* (Krøyer, 1838) as partial substitution for fish meal in diet for European seabass *Dicentrarchus labrax*: effects on growth and feed efficiency. AACL Bioflux 15(4):1758-1768.**
- Volume 11(4)/2018 (August, 30)
- Volume 11(3)/2018 (June, 30)
- Volume 11(2)/2018 (April, 30)
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- Volume 10(5)/2017 (October, 30)
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- Volume 10(3)/2017 (June, 30)
- Volume 10(2)/2017 (April, 30)
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- Volume 9(6)/2016 (December, 30)
- Volume 9(5)/2016 (October, 30)
- Volume 9(4)/2016 (August, 30) **Wardhani L. T. A. L., Herawati R., Pinilih S. A. G., Ristyawati A., 2022 Global Fishing Watch System as a solution in the control of the fishing industry in Indonesia. AACL Bioflux 15(4):1807-1816.**
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- Volume 9(2)/2016 (April, 30)
- Volume 9(1)/2016 (February, 28) **Pratama I. S., Siahaan E. A., Anggorowati D. A., Putra Y., Sujangka A., Pengestuti R., 2022 Seaweed phytochemicals utilization in marine aquaculture. AACL Bioflux 15(4):1817-1836.**
- Volume 8(6)/2015 (December, 30)
- Volume 8(5)/2015 (October, 30) **Tamrin T., Aris M., 2022 Virulence of *Vibrio* sp. on whiteleg shrimp (*Litopenaeus vannamei*) in different salinity ranges. AACL Bioflux 15(4):1837-1842.**
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- Volume 8(3)/2015 (June, 30) **Ririmasse P. M., Retraubun A. S. W., Hiariy J., Lopulalan Y., 2022 Social capital relationship model and the empowerment of fishery institutional identity: a study of purse seine group of Hitu village, Ambon. AACL Bioflux 15(4):1843-1849.**
- Volume 8(2)/2015 (April, 30)
- Volume 8(1)/2015 (February, 28)
- Volume 7(6)/2014 (December, 30) **Ho Q. P., Thi M. T. L., Huynh L. H., Tran M. P., Thi B. T. N., Takagi Y., 2022 Preparation of collagen nanofibril-scaffold from the skin of catfish (*Pangasianodon hypophthalmus*) farmed in the Mekong Delta. AACL Bioflux 15(4):1850-1860.**
- Volume 7(5)/2014 (October, 30)
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- Volume 6(6)/2013 (November, 15)
- Volume 6(5)/2013 (September, 15) Wijayanto D., Nugroho R. A., Kurohman F., Nursanto D. B., 2022 The effect of garlic (*Allium sativum*) supplementation in feed on growth, survival and profits of Asian seabass (*Lates calcarifer*) cultivation reared in freshwater media. *AACL Bioflux* 15(4):1882-1890.
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- Volume 6(3)/2013 (May, 15)
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- Volume 5(5)/2012 (December, 30)
- Volume 5(4)/2012 (September, 30) Rosyadi, Dahril T., Mulyadi A., Siregar S. H., Windarti, 2022 Growth of *Chlorella* sp. reared in a leachate enriched media. *AACL Bioflux* 15(4):1899-1907.
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- Volume 4(3)/2011 (July, 30)
- Volume 4(2)/2011 (April, 30) Olli A. H., Pasingi N., 2022 Diel catch of marine life stage of "nike" in Gorontalo waters: daily growth and morphometric body ratios. *AACL Bioflux* 15(4):1938-1947.
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- Volume 3(1)/2010 (February, 28)
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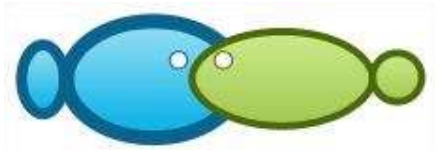
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Empowering Natuna's local fishermen by optimizing regional development parameters

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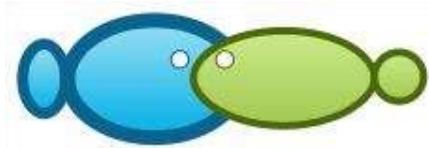
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Abstract. Indonesia's affirmation as an archipelagic country with enormous marine resources must consider the role and function of regional parameters from a local economic development perspective. Maintaining marine sovereignty is not exclusive to weapons at sea because the community, especially fishers, must be involved in optimizing the advantage and management of marine resources through the optimization of fishers as professionals. By employing secondary data of regional development parameters, such as gross regional domestic product (GRDP), poverty rate, expected length of schooling (education), and human development index (HDI) from 2006 to 2019 obtained from the Indonesian Central Statistics Agency 2021, this study aims to determine the relationship between regional development parameters that can strengthen fisheries' potential, development, and growth in Natuna Regency. Furthermore, the discussion further elaborates on the possibility of economic integration to achieve sustainable utilization of Natuna's fishery resources. Data processing using the vector error correction model on Eviews v.10 proves that education as the dependent variable has a long-run causality with the GRDP and the HDI. Increasing the GRDP and HDI by 1% can increase the expected length of schooling (education) by 0.012% and 2.66%, respectively. Considering that the overall education is under the scheme of the general HDI, improving education represented by school expectations is proven to be faster when the HDI is set as the priority. Therefore, the government is expected to prioritize education as an investment in local economic development by strengthening the GRDP and the HDI. Regional economic development with the blue economy orientation must integrate facilities and infrastructure, be built on principles that favor the community, uphold accessibility for all groups, and involve community elements in natural resource optimization policies.

Key Words: blue economy, education, human development index, marine resources, vector error correction model.

Introduction. Based on the 2022 Land Registration Certificate, more than 99% of the Natuna area consists of the sea. In addition, 127 over 154 islands in the Natuna Regency are uninhabited. The Minister of Maritime Affairs and Fisheries of Indonesia (KKP Indonesia), Sakti Wahyu Trenggono, stated that the Natuna Islands have the potential to become a Special Economic Zone (KKP 2021). As an area with great potential in the capture fishery and aquaculture sectors, Natuna waters have high economic value, especially if various fishery activities are integrated, such as production, processing, and logistics.

Although the KKP Indonesia stated that the economic growth of the fisheries sector in Natuna waters is exceptionally high, the goal of optimizing the fishery resources productivity must be oriented towards the economic development of the outer islands that adhere to the blue economy principle where the sustainability of marine ecosystems gets deserving attention as well. The economic development of the outer islands, including the Natuna waters, is influenced by the physical aspects of the area itself. Unfortunately, the government does not prioritize many small outermost islands with distance as an excuse. Physical aspects such as islands and natural resources in these areas are needed for national development. Therefore, Natuna Regency needs special



Ovarian lavage methods of fish propagation: a mini review on sperm artificial insemination and/or hormone delivery into the ovary

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Abstract. Recently, the demand for fish source protein has been in increasing manner. The natural water fish seed sourcing is time overwhelming, inadequate, erratic, and an uneconomic way for the fish production system. Instead, *in vitro* (artificial) fertilization methods were used since long time ago. However, these methods have weaknesses including complications to the forecast of ovulation time, which affects on egg quality or cause stress on fish. Several fish do not lend themselves to hormonal injection due to their armored skin, small size, or inability to handle the stress involved. To overcome those problems new ovarian lavage sperm injection method has been tried. Similarly, this method is used for hormone delivery to induce ovulation, or delivery of sperm-hormone mix to induce ovulation, and at the same time to make fertilization happen in live-bearing fish species or after water activation in external fertilization fish species. A small-sized catheter tube coupled with a syringe is used to inject sperm and/or hormone into the ovary. Hence, this mini review aimed to address ovarian lavage sperm and/or hormones injection methods, application, importance, and impact on some reproductive traits on different fish species. Ovarian lavage hormonal induction is important to small fish species and removes the use of needles which produces injuries. Similarly, this application is important for artificial insemination to produce viable offspring either in the internal or external fertilization of fish species. Moreover, it is used to create hybrid fish that the two parental species do not ordinarily mate under natural conditions.

Key Words: artificial insemination, external fertilization, hormone, live-bearing, ovarian lavage, propagation, sperm.

Introduction. Population growth and searching for a healthy diet have increased the demand for fish meat (Hoga et al 2018). To attain the rising demand, the creation of sustainable aquaculture industries is one of the prerequisites. But the natural water fish seeds source is most erratic, inadequate, time overwhelming, and uneconomical; and creates the main limitation to the progress of intensive fish farming (Satia 1990; Fagbenro et al 1993; Adebayo & Fagbenro 2004). Controlling the reproductive processes of fish in captivity and collecting extraordinary top seeds for the grow-out of the marketable product is a solution (Ittész et al 2020). Hence, technologies like artificial insemination and the use of hormones have significant importance. In an ovoviparous fish (fertilization occurs externally), the use of very simple artificial insemination techniques results in original gamete physiological maturity after being diluted in the external medium (Bellard 1988).

Furthermore, the involvement of exogenous hormones can alter environmental factors and manage the reproduction time to outfit the production cycles (Woynarovich & Horvath 1980). Induction of ovulation of ready-to-spawned fish is properly set through the application of exogenous hormones (Lam 1982). The application of different hormones has been tried in different studies, for instance, ovaprim, ovopel (a mixture of dopamine receptor antagonist and mammalian GnRH analogue), and the two kinds of