

## The Impacts of Human Activities and Natural Threats: Spatial Data Function from GIS Perspectives

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### Abstract

Natural threats such as heavy rains and strong winds, as well as the development of rapid development, especially in the Iskandar Johor in Johor waters are found to have affected the income and the number of fishermen in Kampung Melayu and the native village. Unfortunately, the failure to load important spatial data in reports and complaints of fishermen causes fishermen to be unable to understand the problems of the authorities at the local level to give their main attention and immediate action. This causes the frequency of the tendency of the authorities to ignore spatial data in making decisions that are not understood. Recognizing the importance of this spatial data, investigators have succeeded in getting to know the spatial data that are important rather than fishermen through community gatherings, meetings and visits to the site. Spatial data that may be included and highlighted in the report and the document can be documented in documents that can be used as guidelines or references to both fishermen and authorities. This study concludes that spatial data is very helpful in efforts to provide more important information in describing and managing fishermen's problems and contributes to help parties involved in making informed decisions regarding this issue.

**Keywords:** Impact, Human Activities, Natural, Threat, Spatial Data

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### 1. Introduction

In recent years, complaints from fishermen in the southern country of Johor are facing problems with decreasing incomes due to various causes that are often broadcast in communication media. However, it seems as though no one wants to take this issue seriously. Rapid development in southern Johor for the past ten years, especially in the Iskandar Development Area, Nusajaya is one of the main pillars of traditional fishermen in southern Johor who seek income as fishermen in rivers and coastal areas. Development in the Nusajaya Region has caused tens of hectares of mangrove forests to be destroyed and ponded to become sites for buildings and highways involving mangrove areas that are recognized as highly productive with fish, shrimp and shellfish. In addition, development activities also apply in estuaries such as fostering residences, commercial and recreational activities around the mouth of the Malay River into the Danga River which are concentrated in Zon C, Zon B and Zon A rather than the five comprehensive zones of development in South Johor, which now more recognized as the Iskandar Development Area.

### 2. Literature Review

Key Flagship Zone

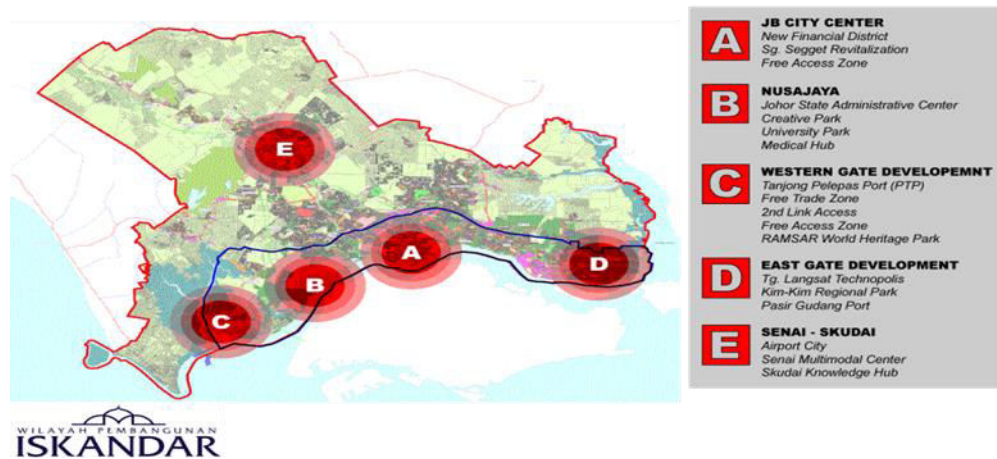


Figure 1: Iskandar Development Includes 5 Main Zones

Complaints by fishermen are the basis for direct or indirect impacts on fishing activities as well as on fishery catchments by fishermen for this rapid development. But complaints and complaints often do not receive the proper attention of the responsible authorities. Therefore, there are parties that are not only affected by their income but also cannot enjoy the results of the rapid development that prevails in their place. However, the fate of the fishermen is taken for granted and the services that are not fair are given once and it shows that it is not worth their contribution to the state. According to a fisherman in Nusajaya, busy fishermen are still in poverty with an average net income of RM30 only every day (The Star Online, 2010).

In the investigation by Rostam Katimah et al. (2011), Orang Asli Seletar's main source of income in the Iskandar region is also trapped if their fishing area in the Johor Strait is directly involved in the Iskandar development project. As a result of human greed in the development of coastal areas, the Orang Asli Seletar has been marginalized and they have risen to oppose if their placement is increasingly disturbed by the visible tails of the Orang Asli Seletar people as if alienated from the impression of development in their area.

The destruction of mangroves for rapid development in the Iskandar region has led to a reduction in fish culture in the mangrove area. In fact, the number of fish species in the river has also declined. The quality of the declining river water is a direct impression of the results of the human activities in the development of the region which in turn contributes to the decline in the activity of river and coastal fisheries. Fishermen's income also decreases if the fishermen's catchment area becomes a port construction area, trade and leisure facilities and recreational facilities development and is limited to any fishing activity in the area.

Pollution caused by human activities and development, oil spills from ships, the seventh season and natural disasters such as floods, tsunamis, etc. have caused the life of coastal fishermen to be increasingly affected. The problem faced by fishermen is worse if they are forced to move to new areas next to each other to continue the activities of fishermen who have become synonymous with their lives. The transition to a new area is not guaranteed to be a better fish catch, but fishermen are forced to deal with the problem of sea water pollution caused by oil and chemical spills.

3. Research Objectives

To ensure the success of this study, the following objectives need to be met:

- 3.1 To identify the fishing areas that are directly involved in the rapid development of South Johor.
- 3.2 To identify the problem (and their reasons) for fishermen in areas affected by the development of South Johor.
- 3.3 To identify spatial and non-spatial data related to the problems (and their causes) of fishermen in areas affected by the development of South Johor.
- 3.4 To document and make available the use of space and non-spatial relevant data to make informed and meaningful decisions.

4. Research Scopes

This study will focus only on:

- i) Fisherman of South Johor coast.
- ii) Data related to problems affecting fisherman activities as a result directly from physical development in Nusajaya.

4.1 Data

Data Types	Source
Primary Data	<ul style="list-style-type: none"> <li>▪ Interviews with fishermen involved.</li> <li>▪ Observations during site visits.</li> </ul>

<b>Secondary Data</b>	Report on fishermen from government agencies: <ul style="list-style-type: none"> <li>▪ Department of Fisheries Malaysia</li> <li>▪ Malaysian Fisheries Development Authority</li> <li>▪ Original People Development Department</li> </ul>
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**Table 2:** Data Types Taken from Various Sources

**4.2 Research Area**

The study area includes the main rivers in the area of Johor Bahru and Gelang Patah, Johor where many fishing activities have been affected. The fishing villages that have been chosen are:

- i) Kg. Sungai Melayu, Gelang Patah
- ii) Kg. Orang Asli Sungai Temon, Johor Bahru
- iii) Kg. Orang Asli Simpang Arang, Gelang Patah.

The selection of this area is mainly because it is close to the 5 main zones of Nusajaya as shown in the following schedule. The selection of this area is mainly due to the close proximity to Nusajaya development and the existence of the productive large river mangrove forests of Pulai area which serve as important fish breeding.

<b>River</b>	<b>Development</b>
<b>Danga River</b> (Zon A: Johor Bahru)	<ul style="list-style-type: none"> <li>▪ Danga Bay development</li> </ul>
<b>Malay River</b> (Zon B: Nusajaya)	<ul style="list-style-type: none"> <li>▪ Johor State New Administrative Centre (JSNAC)</li> <li>▪ Puteri Harbour</li> <li>▪ Legoland Theme Park</li> </ul>
<b>Pulai River</b> (Zon C: Western Gate Development)	<ul style="list-style-type: none"> <li>▪ Port of Tanjung Pelepas (PTP)</li> <li>▪ Genting Janakuasa Tanjung Bin</li> <li>▪ Kilang Kimia di Dinar River</li> </ul>

**Table 3:** Rivers in the Iskandar Development Area (WPI)

**5. Methodology**

**5.1 Data Provisioning and Collections**

In general, the following preliminary studies, data collection, data analysis and documentation have been carried out. The results analysed by data collection have been presented, discussed and documented appropriately. At the end of the research, output is a document for reference to individuals involved in fisheries issues that are affected. Conventional methods have been used to determine the spatial data needed to deal with fisherman problems. Each method has unique strengths and capabilities. Therefore, most methods have been used simultaneously. Interview studies, documents and memoranda, site visits, boat trips, group meetings, formal / informal conversations and phone calls.

**5.2 Interviews**

Interview methods play a major role in identifying the problems and (causes) of fishermen in areas affected by the development of South Johor. Interview methods have also been used to identify spatial and non-spatial data related to the problem (and cause) of fishermen in affected areas. Researchers were able to gather as much primary information as possible from the interview sessions.

**5.3 Document and Memorandum Study**

Some conclusions and findings have been extracted from ongoing and ongoing visits with officials in the Fisheries Department and the Department of Indigenous Development. Observation of fishery activities has been exploited to determine the fishery area for each fisherman from different fishing villages and to explore the problems as well (the source) of the officers responsible for managing the activities and affairs of fishermen for each administrative area. Whether it is spatial or non-spatial about their data, how they use it, how their analysis and decisions are made, policies and collaborations with agencies or other parties that have been involved in the issues facing fishermen are also being considered. Document review is a training to review the relevant documents for more information on each department and agency involved. Information about fishermen's spatial data is not provided. There is only data related to fishermen's extracts from memoranda, reports, research reports, complaints, newspapers and magazines. In particular, management plans and development plans along the coast should provide information relevant to fishermen as planning activities will affect their fishing activities as well as their income.

**5.4 Observation of Tread Review**

One of the methods used is physical examination and attention in the surrounding Pulai River, Danga River and Malay River. Fishermen from each village have recommended and scheduled appropriate periods to make trips into the mangrove forest where

irresponsible people are impatient with development without thinking about the ecosystem. Fishermen have also included investigators into travel in the source area which destroyed the fisheries area. Observation of the site is also a period of physical interaction and a time to appreciate mangrove swamps as fish breeding and fishing grounds. It is a time of knowing and learning about ecosystems in mangroves. Nutrients in mangrove sludge are the most useful for marine life such as fish species, crabs, shrimps and many more for their expenses and food. Access to the source of the problem areas along the Pulai River, the Malay River and the Danga River are located only a few meters from the fishermen fishing area, very close to the placement area for residents who live on the edge of the village. Several issues and (their sources) are considered in this study. During the trip, there was a discussion about the collection in detail and an explanation of their problems and sources. In fact, there are also several other information given by fishermen from different fishing villages.

**6. Research Results**

There are examples of problems and (sources), spatial data identifies each problem and it is important to do whatever is needed on the spatial data:

<b>Problem</b>	<b>Water Pollution</b>
<b>Cause</b>	The residual waste generated from development work and industrial waste from the chemical plant run and built around the river is dumped into the river.
<b>Consequences</b>	The river water becomes cloudy, dirty and contaminated with chemical residues.
<b>Effect</b>	<ul style="list-style-type: none"> <li>▪ Industrial waste and waste generated by development works such as cement, sand, concrete debris, paint and so on have polluted freshwater in mangrove forests that have long been fish-holes.</li> <li>▪ The toxic component of the pollutant is capable of suppressing the ability of marine animals to reproduce and grow, thereby interrupting and destroying marine habitats and wildlife.</li> <li>▪ It also disrupts ecosystems in mangrove forests because nutrients in mangrove forests are depleted and fish do not receive enough nutrients to cause sea life and reproduction in the area and subsequently move to other areas.</li> <li>▪ This is affecting fishermen's source of income due to the significant reduction and decline of their catch.</li> </ul>
<b>Spatial Data Required</b>	<b>Importance of Spatial Data</b>
1) For fish catchment areas, the spatial data involved are: <ul style="list-style-type: none"> <li>i) The location of the ray field.</li> <li>ii) Field (extent) of the ray region.</li> <li>iii) Boundary boundaries.</li> <li>iv) Area of area.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The location of the catchment area should be shown on the map and enclosed in the document (memorandum, complaint, recommendation, etc.) and can be displayed directly on the computer screen for easy decision-makers to reference the actual location rather than just the location called without any emphasis.</li> <li>▪ Location should be stated in the form of the village or tribal/villagers representing each of the diagrams in order for compensation to be paid to the group of fishermen who are eligible to receive it.</li> <li>▪ Location is important in the context of this problem because without accurate and precise location information, this problem cannot be resolved quickly because it is often overlooked.</li> <li>▪ Location can only be determined by specifying the limit of fishery catchment area for each fishery group.</li> <li>▪ The boundaries of the fishery area should be determined and marked by placing the boyer so that the area is not infringed and facilitating the payment of compensation according to their respective limits.</li> <li>▪ The boundary of the diving area determines whether the contamination may involve or enter the fishery catchment area.</li> <li>▪ If pollution is involved in fisheries catchment area, the amount of compensation payable whether the amount is small or large refers to the area (area) involved in the loss and damage to fisheries property and the lack of income of fishermen.</li> <li>▪ If pollution does not enter the fishery area, compensation should not be paid to fishermen.</li> <li>▪ The extent (extent) of the cruise area can be determined by the distance traveled by the fisherman. By knowing the distance, the travel time taken by the fishermen to reach their catchment area can be determined.</li> </ul>
2) For polluted river areas, spatial data involved: <ul style="list-style-type: none"> <li>i) Location of</li> </ul>	<ul style="list-style-type: none"> <li>▪ The actual location of the contamination and the source of the contamination should be shown on the map or on the computer screen accurately whether the contamination occurs at the river mouth,</li> </ul>

<p>contaminated river area.</p> <p>ii) Field (extent) of contaminated river areas.</p> <p>iii) Area (area) of contaminated river area.</p>	<p>riverbank, upstream or downstream.</p> <ul style="list-style-type: none"> <li>▪ The extent of the pollution spread / contamination rate can be identified by using the difference between the area (extent) of the pollutant area prior to the current pollutant area.</li> <li>▪ For example: last year's polluted riverine area was only 5 meters wide, while this year pollution levels have increased by 10 meters. This explains that pollution is increasing in the area. Therefore, immediate action must be taken to prevent the contamination from spreading.</li> <li>▪ Suggestions to resolve this issue:             <ol style="list-style-type: none"> <li>i) Transfer of chemical plants that lead to pollution elsewhere more suitable.</li> <li>ii) Distribute the disposal of chemical waste and development work to a safer and more effective place.</li> <li>iii) Plan development activities in a more orderly manner so as not to pollute the river and not affect the fishermen.</li> <li>iv) The area of pollution caused by this source is important to claim compensation for the effects of the pollution.</li> </ol> </li> </ul>
<p>3) For fishermen's villages affected by pollution, the spatial data involved are:</p> <p>i) The location of the fishing village is affected.</p> <p>ii) Area (area) of fishing village affected.</p> <p>iii) The boundaries of the fishing village area are affected.</p>	<ul style="list-style-type: none"> <li>▪ The location of the fishing village affected by the pollution should be shown on the map or computer screen so that it is easy to see the fishing village involved or not affected by the pollution.</li> <li>▪ Thus, the attributional data can be more accurately appended especially the data of the number of villages involved, the number of fishermen affected, and the number of fishermen affected.</li> <li>▪ The area (area) of the affected villages can indicate the number of people involved. The more villages affected by pollution; the more fishermen are involved. Payment of compensation should also be made based on the size of the village involved with the pollution.</li> <li>▪ The boundaries of the affected fishing village area should be set to prevent the payment of compensation to fishermen from various villages.</li> </ul>
<p>4) For the distance of the source of water pollution from the fishery catchment area, the spatial data involved are:</p> <p>i) Location (location) of the source of pollution and the location of the fishery catchment area.</p> <p>ii) Field (extent) of contamination of contaminated areas.</p> <p>iii) Distance from the source of the pollution to the fishery catchment area.</p> <p>iv) The boundary between the pollutant area and the fishery catchment area.</p>	<ul style="list-style-type: none"> <li>▪ The location of the source of contamination with the location of the fishermen's fishery should be accurately indicated so that the distance between the two locations can be accurately determined.</li> <li>▪ The extent of contamination of contaminated areas has the potential to spread into fishery areas. Thus, the proximity of the source of pollution to the catchment area affects the potential for pollution to spread into the fishery catchment area.</li> <li>▪ Example: the source of pollution is only 5 meters from the fishpond. Pollution has caused the fish hole to collapse, resulting in a sudden decline in fish catch.</li> <li>▪ Thus, this spatial distance data is important for determining the rate of contamination of pollutants whether or not the pollutants enter the catchment area and thus the pollution levels should be compensated for by the fishermen's losses due to deterioration in catch and damage fishing equipment such as nets and nets.</li> <li>▪ The fishery catchment area limit for each village needs to be properly defined and marked so that compensation can be paid to fishermen affected by pollution for each village involved and no compensation dispute between fishermen.</li> </ul>
<p>5) For the distance travelled by the fisherman's village to the old catchment area with the new catchment area, the spatial data involved are:</p> <p>i) Location (location) of old fisherman catchment area and</p>	<ul style="list-style-type: none"> <li>▪ Due to this water pollution, fishermen have to move to new catchment area.</li> <li>▪ The distance travelled by a fisherman fishing is important to know spatially because:             <ol style="list-style-type: none"> <li>i) affects the motorbike engine power needed to fish far.</li> <li>ii) influence the increased use of motorboat oil to reach new catchment areas further. Distance differences from these spatial contexts are important to show an increase in the distance traveled in the past with the present.</li> </ol> </li> <li>▪ For example: fishermen travel from their village within 5 meters while</li> </ul>

<p>location of new fisherman catch area.</p> <p>ii) Limit of fishery catchment area and limit of fishery catchment limit.</p>	<p>the fisherman travels from the village to the new fishing area 15km-30km.</p> <ul style="list-style-type: none"> <li>▪ Increased travel distance affects increased use of motorboat engine power and increased use of motorboat oil.</li> <li>▪ This spatial data is important for deciding whether to compensate fishermen based on the increasing power of the motorboat engine and the motorboat oil they need as well as the decision to increase the subsidy to the fishermen to meet their needs.</li> </ul>
<p><b>Document</b></p>	<ul style="list-style-type: none"> <li>▪ The above spatial data can be included in the document:                     <ol style="list-style-type: none"> <li>i) Complaint.</li> <li>ii) Memorandum.</li> <li>iii) Project proposal paper.</li> <li>iv) Support letter.</li> </ol> </li> </ul>

### 6.1 Analysis

Spatial analysis can be done to solve the problem of fishermen. The analysis depends on the problem situation. Spatial analysis can be done for the estimation of forecasts, and the calculation before the decision to address the problem is made. Spatial analysis can support the spatial data presented for information. So, decision makers can use emerging spatial data as well as spatial analysis to improve decision-making processes to solve fisheries problems. There are a number of potential analyses that can be done such as a buffer between the development of fisheries and fishery areas to identify areas affected by the development, as well as make predictions of the amount of damage and damage to marine fishing equipment for each fisherman.

### 6.2 Documentation

Finally, the output of this study is documentation. The document is in the form of procedures and guidelines that contain all the information in spatial data and attributes with current issues faced by fishermen (as a reference during the decision-making process). There are two types of documentation, namely the first is a referral guide for laypeople that is suitable for use by local authorities, everywhere decision makers from other agencies involved with caught fishermen and groups of fishermen themselves are struggling to get reparation and so on. This document aims to spread and present spatial data that needs to be considered and given attention by those involved in allowing decision makers to reach the best decision to solve the fishermen's problem.

### 7. Conclusion

In summary, the importance of spatial data has also been put forward in this study to help make informed decisions for the parties involved. To collect spatial data is not easy, but spatial data is very important to convey messages about the situation or problems faced by fishermen in this country.

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