

# Dredging Impact towards Marine Ecosystem and Fisheries Activity at Penang Coastal Area

Fauziah Ab Rahman, Nor Amira Hassan, Azman Ismail, Bakhtiar Ariff Baharudin

**Abstract:** *The increase of land reclamation project in Penang due to interest for advancement and frameworks of housing, businesses, and commercials. However, from the dredging activities and reclaimed land will affect the angler's livelihood in term of their economy, activities, environment, and health. Therefore, this research was conducted to analyse fisher's perspective about dredging problems. Besides, the researcher wants to identify from anglers perception on how far the dredging activities will affect the ecosystem at surrounding area. Data were taken by using questionnaire instrument that was distributed to five areas in Penang. The questionnaire was classified into various factors including the factor of development, economy, living organism and plant, production, authority, air, and water pollution. Data has been analysed by using IBM SPSS to know the strength relation under each part of the questionnaire in both variables. The result shows that there are no significant differences between factor development, living organism and plant, and production in overall perception level among fishers about dredging problem. Air pollution is the primary factor in angler's perception about the effects from land reclamation and dredging activities toward ecosystem disturbance. It is because most of the anglers give negative feedback about the loss of wetlands as air filtration give adverse impact on health and increase potential spreading of disease. Hazard in the coastal area caused by environmental change and human actions. As conclusion majority of the respondent, vigorously protest against land reclamation and dredging activities within Penang coastal area that adversely influenced the environment and fishing activities.*

**Index Terms:** *Keywords: Land Reclamation; Dredge; Coastal Development.*

## I. INTRODUCTION

Land reclamation developments show a vital role in the area of urban development involving coastal areas or coastal wetlands for agricultural purposes, industrial use or port developments. Most of the population can create living nearby the coastal area as compared to others. It is one of the ideas of getting new land and usually done in coastal areas. Penang is a state in which the number of population expanded persistently, and interest for improvement and frameworks of housing, business, and commercials. However, due to a geographic factor in the area make the land is limited for that

purpose.

A dredge machine working is required in the water or floating on water. So when it is operated, the physical removal of materials including plants, sand, debris, rocks, bottom sediments, and refuse from the bed of a water body to excavate, cleaning, deepening, widening, or lengthening the water body. Marine dredging activities can be for the most part described as one or the other colossal scale development dredging for the formation of new ventures or developing waterways or periodic maintenance dredging that helps to keep up current facilities and support existing hydrologic features.

An increase of development projects involving the work of land reclamation and dredging the seabed in some waters, creating concern to the country especially among fishers. The reclaimed land will also reduce coastal fishing grounds, mainly for local fishers. Although fishes of many species thrive in rivers and bays with undoubtedly high concentrations of suspended sediments, the size of sediment and the duration of exposure can be substantial factors in measuring risks posed to fish populations.

## A. Problem Statement

The issue of enormous land reclamation is of a broad public interest because it changes the landscape of Penang Island with pressing environmental, economic and social consequences endlessly. These activities give lousy impact to fisher's livelihood and impact the severe pollution in the sea area up to make fishers and fish cage operators face massive losses. Many fish died because seawater to become dirty and toxic when mixed with mud that had not been cleaned. The seabed dredging and land reclamation seemed free to do without any monitoring by the authorities and widening in some locations such as around Tanjung Bungah; Queensbay; Gulf Tempoyak; and Teluk Kumbar [1]. The status of the land reclamation project is still being questioned to either endorsed or grew unlawfully. Subsequently, the public has each privilege to comprehend what is occurring as well as to take part expressively in such choices that influence their lives, and the State has each commitment to give precise and full information and to make the procedure as straightforward as possible.

## B. Research Objective

This research aims to analyze perception from fishers about dredging problem and to identify the effect of land reclamation and dredging activities toward ecosystem disturbance from fisher's perspective. The reclamation

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project and dredging activities around coastal areas contribute many factors to many parties. One project may affect other parts of the coastal area and their function like port and hotels nearby. Their business will be interrupted effect from the activities. If more projects are conducted around that area, it is not impossible that one day their business suffered significant losses and had to be closed. The tourism industry will be affected by tourist area if the problems cannot be solved.

The same thing will affect the fishers around. They could not continue their work as fishing because seawater to become dirty and toxic when mixed with mud that had not been cleaned. When the rules are not followed, rivers and water become polluted, fish died, and fishing becomes less profitable.

### C. Limitation of Research

The scope of the project only concentrates on Penang water area. Penang is known one of the ongoing places of the reclamation project because of the demand for development and infrastructure. Therefore, the impact of the community and changes to them can be expected. However, some other factors may be produced while research is conducting. Some parties will most likely be unable to give their full collaboration amid the research done in which they do not provide enough information. Not all fishers aware of the real problems they will encounter instead they only go to work and returned when they finished their work. If there have no fish in their fishing spot, they will move to another area. Apart from that, a few areas might be limited to look into because of it particularly the State need to protect their interests from the community. Thus, the critical and adequate data cannot be gathered totally, and it will constrain the exploration.

## II. LITERATURE REVIEW

Land reclamation is one of the principal areas of enthusiasm for the dredging business. It contains dredging a lot of ocean sand transported over significant separations to make another land for industrial or framework purposes. Dredging and reclamation are regularly some portions of port development ventures. Nevertheless, likewise, shoreline nourishment for coastal protection, a coastal extension for public or modern industrial improvement or development of artificial islands require significant dredging volumes and large fill operations.

### A. Dredging Activities

Dredging is a removal movement as a rule completed underwater, in shallow oceans or freshwater zones with the reason for getting together base silt and discarding them in an alternate area. This procedure is regularly used to keep waterways navigable. It is additionally utilized as an approach to recharge sand on some open shorelines, where sand has been lost because of seaside disintegration. Fishing dredges are utilized as a system for getting certain types of palatable shellfishes and crabs.

Excavation, transport, and disposal of sediments are most essential structures of dredging activities. The processes are successively repeated until a target quantity of sediments was

dredged with each stage requiring different technologies. As the dredging industry has established, technologies have upgraded, and today various types of dredgers are available to be exploited for different applications [2].

Dredging begins with the removal of silt at a site of hydraulic as well as mechanical cutter [3]. Distinctive sorts of dredgers are required for different sediment and depth, yet comparable extraction techniques might be necessary for both capital and maintenance dredging, whether through suction or grab. Trailer dredger is utilized at sea; extend by dragging their cutter along the seabed, extracting free dregs until the container is full and prepared for disposal. Anchor dredgers are for the most part bound to a small area, for example, takes and port basin, and move by grapple and additionally hydraulic spud: some portion of dredger that infiltrated into the ocean or riverbeds to hold stability while digging [4]. Pit excavators and bar skimmers, then again, are regularly used to concentrate silt from waterway beds. Backhoe dredgers, trailing suction hopper dredgers and cutter suction are among other sorts of dredgers every now and again used to date.

Dredging silt is then moved into hopper barges or pipelines using suction funnels, conveyor belt, bucket or grab. The pipelines then transport the dredging dregs to the planned transfer site. Dredging regularly still happens amid transport when the act of excess digging is connected, which includes the continuation of dredging after the container is full, with the surplus volume released over the container weirs. Finally, the dredging sediment is arranged at a chosen site. A few strategies are accessible for this, including unsettling dumping, side throwing, dumping in the re-handling basin, sump re-handling of operations, or direct pumping aground. Vast water transfer is the most conservative and utilized strategy, with hopper barges as the regular method for transport. While open transfer, the dug sediment are burst to the assigned dumping site and arranged through its bottom gate. Another strategy is the utilization of pipelines to pump the dug sediment onto land. This procedure incorporates loading sediments into the hopper, transporting them through pipelines, and afterward pumping them aground.

During the open transfer, silt curtains or brooms might be utilized to contain sediment keeping preventing diffusion and helping sedimentation. A boom is an overwhelming structure involving a plastic cover, connectors and ballast weight, which is a snare air [5]. A submerged or floating silt curtain comprises of a balance weight, anchor, and curtain. The open transfer is not allowed when handling of very contaminated sediments. Contaminated dug sediment regularly require remediation, for instance through mechanical mixing and air circulation [6]. Other remediation procedures incorporate sequential extraction procedures, pre-treatment, physical separation process, containment, washing, thermal extraction, bioremediation, electron energy, stabilization, and chemical oxidation. Most of these methods are regularly expensive; however, exact dredging can bring down the dredging cost by the assurance of digging depth based on the contamination level earlier dredging. This technique can likewise give an ideal

environment to the benthos [7].

## B. Dredge Impact

Effects of dredging are very subject to the levels of contamination at dredging sites and technology utilized. Moreover, the expansion in chemical parameters that happens amid dredging transfer demonstrates that the aggravation of dregs opens the environment to contaminants. Increments in the levels of natural and inorganic mixes elevate the danger of contaminant presentation that can adversely influence widely varied vegetation. The change in physical parameter additionally fortifies this point. While it has been noticed that some good changes can happen during the different phases of digging, this audit regards those more as recounted and proposes that the effects are mainly inconvenient to nature.

Current administrative activities are intending to protect nature from dredging negative impacts and their related issues. Another vital issue identifying with dredging is its high cost. The cost fluctuates as indicated by the innovation and equipment utilized, evaluated volume, kind of dredged material, separate from exhuming to transfer site, time and separation of assembly and retirement, and disposal strategy. The high cost has dependably been the principal issue for port administrators, who are in charge of dredging and keeping up deep channels, additionally need to spend assets to extend or build new terminals with a specific end goal to cater for developing exchange activities [8,9]. Although various dredging partners see operational expenses as the most significant issue, few papers have talked about or analyzed the cost of digging. For instance, Lewis and Lee [10] endeavored to make a system for digging cost, investigating the development operation prepared, kind of stream segment, and the blend of equipment utilized for river digging.

This investigation depended on verifiable information of river dredging projects directed in South Korea [11]. Regardless of the way that creating nations were evaluated to wind up distinctly the biggest digging markets around the world throughout the following couple of years, stiff rivalry from foreign digging contractual worker uplifts the need to cut contractual cost workers [12]. Together with inadequate facilities, constrained digging, and environmental expertise expands the danger of environmental carelessness in creating nations. To the issues confronted in created nations, digging administrators in creating nations, for instance, Malaysia, confront a much more challenge test of limited assets. Despite the fact that the maritime business in Malaysia has been dealt with as a need by its administration this country is confronting a challenge in successfully observing the effects of digging. The sensitivity of its surroundings, which is decaying, makes it more critical to examine the consequences of digging at a national level [2].

The requirement for a coordinated way to deal with digging environmental management that consolidates natural ramifications and the aggravation of biological system harmony, which has exhibited fluctuate as per silt properties and the technology utilized, to the economy, which commands the procedure, to be particularly produced for digging at creating nations. The other worries of authoritative

difficulties, bad public perception should likewise be considered, therefore making the requirement for a more coordinated way to deal with digging management [2].

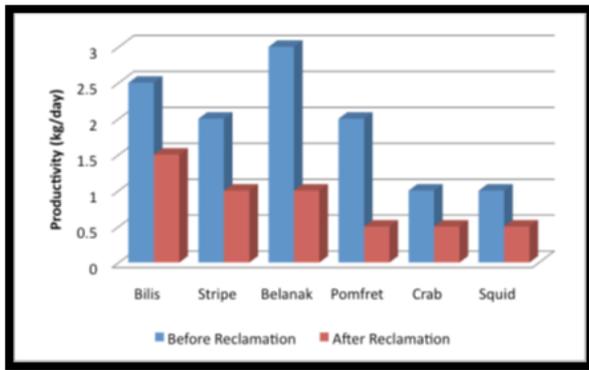
## C. Fisheries Activities

In the coastal areas, the fishers are the most critical industry. Reclamation will unavoidably significance affect the fishery, so representative species of fish is chosen to measure the effect on species, which is likewise an essential character of the production work. From the research from Priyandes and Majid [13], physically, the loss of mangrove backwoods give a hard strike to the close-by society. The expansion of the overwhelmed zone is one of the impacts of the mangrove deterioration. At the point when high up tide and solid wave, fisher's homes along shoreline be overflowed because of the increment of the water level. The decay of the mangrove biological systems additionally put a downside to the close-by human societies, since it was reliable sources for the adjacent social societies. The greater part of them utilizes mangrove part as firewood, charcoal, medication and building material.

Dredging and reclamation operations usually lead to the decrease of biological diversity, the decline of natural wetlands, and destroyed of habitats for animals and plants. The living environment of marine plants and animals has been hugely affected. Ecological and economic impacts of dredging resulting from the borrow areas used for the taking out of sand substances and number of key habitats and species are affected in the surrounding area of these projects [14]. Sediment dumping may be more harmful to benthic communities than any other component of the aquatic ecosystem because of the relative rigidity of the benthic organisms as agreed by [15].

Studied by Erfteimeijer, Riegl, Hoeksema, & Todd, [16] mentioned dredging operations have contributed to the loss of coral reef habitats, directly due to the removal or burial of reefs, or indirectly. As a result, stress to corals caused by raised turbidity and sedimentation. It influenced the efficiency of fish within Bengkong coastal territory because almost half have dropped substantially in profitability. The most decrease fish is Belanak, which achieved 70%. Likewise, the disintegration of coral reefs and water quality brought on the eradication a few types of fish, for example, Snapper, Shrimp, and Grouper that have high value in the market.

Crumbling of the corals because of dredging activities activated real diminishing to the financial circumstance of the fisher's lives. Before reclamation, the greater part of the fishers could get roughly 15 kg for every day, after dredging, the majority of them were just ready to get around 5 kg for each day. It demonstrated that the natural decline of the catch surpasses to around 10 kg for every day. Before reclamation, fishers can get RM.667 to RM.833 [Rp.2, 000,000 to Rp2, 500,000) monthly. After reclamation, they may get RM.333 to RM.500 (Rp.1, 000,000 to Rp.1, 500,000 monthly [13]. Fewer in the production drove fishers to shift and diversify their job with a specific end goal to close the gap of income prior and then after reclamation.



**Fig. 1.** Productivity output before and after reclamation

Wasserman, Barrocas, & Almeida [17] highlighted ecosystems and their biological communities are threatened, particularly in where dredged sediments area are contaminated because they can affect the juvenile survival rates of various fish species. From Yu and Zhang [18] perspective, the dredging itself destroys marshlands and biodiversity damage of marine; some species are chosen to reflect the effect of habitat function. It will directly give impact on fishery resources. At the coastal areas, the fishery is the most essential to the contribution to the industry. Reclamation will undoubtedly have a major impact on the fishery, so representative species of fish is selected to measure the impact on species, which is also a vital character of the production function.

Large-scale reclamation projects cause the changes of topography and water in Gulf, which can affect the fisheries resources directly. The rapid growth of the industry, marine, the aquaculture industry and the rapid development of urban population, continue to produce a vast number of pollutants discharged into the sea, and then seriously affect the reinforcement volume of fishery resources and marine aquaculture industry.

### D. Penang Coastal Area

Mohd Nadzir, Ibrahim, & Mansor [19] highlighted that Tanjung Tokong is the largest land reclamation and commercial purpose with three islands given to the private developer. Severe siltation in Gurney Drive after phase 1 of land reclamation of 240 acres. When it took place, no monitoring that creates adverse impact. Approval is given for further two islands reclamation of 740 acres despite adverse impacts of phase 1 as shown in Fig. 2.



**Fig. 2.** Impacts of phase 1, phase 2, phase 3 and phase 4

The growth of Seri Tanjung Pinang had caused an environmental problem and affected the quality of life to the community. Coastal reclamation in Penang as a strategy to raise the amount of land especially on the island and this will carry on in the future. According to recent research conducted by Leong Yueh Kwong [20] point out that several reclamations of land occurred in the Straits of Penang involving:

1. Proposed island in the middle of a cliff in the Structure Plan but this is an outstanding nursery and feeding grounds for commercial fish species
2. Bayan Baru, Queensbay and Batu Maung land reclamation for industrial development
3. Proposed land reclamation in Perai

The issue in Penang forum by Leong Yueh Kwong [20] points out several future developments in Tanjung Tokong. It includes in future development plan (2005-2020) involving proposed Tanjung Seri Pinang reclamation area for establishment marina, promenade, pier, outlets, restaurants, residential suites, yachting & sea sports activities and others. Some of another further project such as Penang port proposed land reclamation of 400 hectares for the new mini Free industrial zone and halal logistic hub in Butterworth, Port deepening (RM350 million), North of Penang bridge 61.5 hectares and South of Penang bridge 14 ha +25 hectares of Bayan Mutiara. Proposed International Tuna Port, Batu Maung also included in this plan.

## III. METHODOLOGY

### A. Population and Sample

The population is defined as all elements including individuals, objects, and events that meet the criteria for inclusion in the sample survey. The study population shall consist of the fishers close to human activities that are polluting the environment in the coastal areas of Penang, and they might be selected to participate in this study. Researcher got a total population of fishers in Penang is 2578 people [21].

Based on Krejcie & Morgan [22] stated that the sample is representative selected to study the characteristics of a larger group from which they have been chosen. It is the item selected at random from the population and is used to test hypotheses about the population. A sample is also defined as groups of subjects were selected from the population. The study was conducted based on the purposive sampling techniques that allow more detailed information about a particular subject can be obtained. To maintain the quality and effectiveness of this review, this process will involve the participation of the respondents only.

The sample to be focusing village or fishers, which is located in Tanjung Bungah, Tanjung Tokong, Queensbay, Teluk Tempoyak, and Teluk Kumbar. Researcher uses stratified sampling method in this research. Stratified random sampling is used when a researcher wants to highlight a particular subgroup of the population. This technique is useful in the study because it ensures the presence of a small



group in the sample. With stratified sampling, researchers can sample representatively even a subset of the smallest and most inaccessible in the population. That allows researchers to try extreme rarity given population. With this technique, the researcher has a higher statistical accuracy compared with simple random sampling. That is because of the diversity in small groups is lower than the variation when dealing with the whole population.

Because these techniques have a high statistical accuracy, it also means that it requires a smaller sample size, which consumes a lot of time, money and effort of the researcher. Stratified sampling method in the target area is shown in Table I.

**Table I:** Distribution of Respondent

Population Target	Sampling Area (Groups (Strata))	Respondent (Simple Random Sample)
Penang Coastal Area	Tanjung Bungah	67
	Tanjung Tokong	67
	Queensbay	67
	Teluk Tempoyak	67
	Teluk Kumbar	67
<b>TOTAL</b>		<b>335</b>

### B. Questionnaire

The questions were isolated into three sections, to be specific general data, structured closed-ended questions. The overview was regulated straightforwardly to the respondents. This overview encourages analysts to get all the essential data as composed in the questionnaire. A number of the questionnaire is an equivalent number of surveys have been gotten as feedback.

Specialists have gotten positive input from the five sample area since they have confronted a few issues identified with their daily lives is considered to exercises that add to the disturbance of biological communities and fisheries exercises. In this way, they are searching forward for research to help distinguish and address the issues caused by human movement that is drawing nearer to their living area.

From the questionnaire construction, the listed perceptions about dredging problem are as follows:

1. *Development*
2. *Economy*
3. *Living Organism and Plant*
4. *Production/Activity*
5. *Authority*

Meanwhile, the main effects of dredging activities toward ecosystem disturbance are as follows:

1. *Living Organism and Plant*
2. *Water Pollution*
3. *Air Pollution*

In the questionnaire, respondents ought to assess their reactions in based on the Likert Scale. Likert scale is a scale psychometric describing the approval questions; standard scale comprises of five differing extending from "Strongly Agree," "Disagree," "Neutral," "Agree" and "Strongly Agree." In any case, researcher utilizes scale comprises of seven various running from "Entirely Disagree," "Mostly Disagree," "Somewhat Disagree," "Neither Agree nor Disagree," "Somewhat Agree," "Mostly Agree" and "Entirely

Agree". Psychometric demonstrates that scale is better than other scales. Have seven focuses tend to be a decent harmony between having enough point separation without having toward keeping up excessively numerous options. This survey fills in as a benchmarking procedure that will enable them to comprehend and recognize activities that contribute to the disturbance of biological systems and fisheries exercises. Moreover, the respondents can likewise locate the best improvement ways intend to help the environment for the mostly coastal area in Penang.

## IV. RESULTS AND FINDINGS

### A. The Perceptions from Fishers about Dredging Problems

**Table II:** Respondents feedback by perception factors

Factors	Scale	Frequency	Perc ent	Rank Average	Chi-square	df	P-value
Development	Medium	329	98.2	161.5	311.430	1	.000
	High	6	1.8	-161.5			
Economy	Low	19	5.7	-148.5	263.310	1	.000
	Medium	316	94.3	148.5			
Living Organism	Medium	318	94.9	150.5	270.451	1	.000
	High	17	5.1	-150.5			
Production	Medium	46	13.7	-121.5	176.266	1	0.00
	High	289	86.3	121.5			
Authority	Medium	334	99.7	166.5	331.012	1	0.00
	High	1	.3	-166.5			

The findings in Table II shows that the result of respondent's feedback based on the factors. The fishers in Penang roughly agreed that the business activities of fishers affected caused by land reclamation and dredging projects with only 46 fishers respond medium for this factor. Meanwhile, the economy perception level among fishers about dredging problem is the lowest rank with no one give a high scale for this factor. Nineteen respondents respond low scale while 316 respondents elect medium scale.

**Table III:** Kruskal Wallis test for fisher's perception about dredging activities in Penang

Perception Dredging Problem	Mean Rank	Chi-square	df	p-value
Development	230.83	4.684	2	.096
Living Organism and Plant	205.12			
Production	165.28			

An examination of the findings in Table III shows that the result of Kruskal Wallis test applied to determine



whether there is a significant statistical difference between two or more independent variables on an ordinal dependent variable. It showed that no statistical difference which is (Chi-square = 4.684, df = 2, p = .096 > 0.05). By the results obtained, the p-value is more than 0.05, so the researcher failed to reject the null hypothesis. Therefore, there are no significant differences in development, living organisms and plant, and production perception level among fishers about dredging problem in Penang coastal area. The rank average of the development group of fishers was 230.83, while fishers in the living organisms and plant group were 205.12, and fishers in the production group were 165.28.

**B. The Effects of Land Reclamation and Dredging Activities toward Ecosystem Disturbance from Fishers Perspective**

**Table IV:** Respondents feedback by effects from dredging

Factors	Scale	Freq uency	Perc ent	Rank Avera ge	Chi-squ are	df	P-val ue
<b>Living Organi sms and Plant</b>	Medi um	57	17.0	-110.5	145.794	1	.000
	High	278	83.0	-110.5			
<b>Water Pollutio n</b>	Medi um	34	10.1	-133.5	212.803	1	.000
	High	301	89.9	133.5			
<b>Air Pollutio n</b>	Medi um	23	6.9	-144.5	249.316	1	.000
	High	312	93.1	144.5			

The findings in Table IV shows that the result of respondent’s feedback based on the effects. The fishers in Penang roughly agreed, “Loss of wetlands as air filtration give negative impact on health and increase potential spreading of disease” with only 6.9% fishers respond the average score for this factor. Meanwhile, around 93.1% respondents agreed that the air pollution would be the leading dredging and land reclamation effect.

**Table V:** Kruskal Wallis test for fisher’s perception about dredging activities effect toward ecosystem disturbance

Perception Ecosystem	Mean Rank	Chi-square	df	p-value
<b>Living Organism and Plant</b>	140.58	33.449	2	.000
<b>Water Pollution</b>	140.08			
<b>Air Pollution</b>	201.71			

The findings in Table V shows that the result of Kruskal Wallis test indicated that it is statistically different among the effects which are (Chi-square = 33.449, df = 2, p = .000 < 0.05). By the results obtained, the P-value is less than 0.05, so null hypothesis was failed to reject. Thus, there are significantly different in living organisms and plant, water

and air pollution perception level among fishers in ecosystem disturbance at Penang coastal area. The rank average of the living organisms and plant group of fishers was 140.58, while the fishers in the water pollution group were 140.08, and the fishers in the air pollution group were 201.71.

Post hoc test was conducted by using Mann-Whitney U test for all pairs; Living Organism and Plant versus Water Pollution, Living Organism and Plant versus Air Pollution, and Water Pollution versus Air Pollution. From all tests, Air pollution effect is considered as the main factor from fisher’s perception of the effects from land reclamation and dredging activities toward ecosystem disturbance. That is because most of the fishers give negative feedback about the ‘loss of wetlands as air filtration give negative impact on health and increase potential spreading of disease’ as well as ‘Hazard in the coastal area caused by environmental change and human actions’.

**V. CONCLUSION**

Land reclamation and dredging activities give severely impact to fisher’s livelihood. From that activity, it will directly destroy living organism and plants at surrounding area. Land reclamation projects play a significant role in the area of urban development for agricultural, industrial and port development purposes. Chairperson of Fisheries Development Authority of Malaysia (LKIM), Dec 2015 said that the proposed reclamation area covers an area of 809.73 hectares for the development of three artificial islands believed to affect environment and fishers from Teluk Kumbar and the other area. The rationale for the reclamation project, as it seems, is more of corporatization and commercialization, while the welfare of the lower classes is negligible. LKIM has built a fishery market in the Teluk Kumbar area, Teluk Tempoyak so that fishers can sell their catch directly to customers and earn up to RM4 million annually, and if the project is approved, it will affect the sales income of fishers [1].

Dredging changes the natural flow of water bodies. Although this is sometimes a special purpose for dredging operations, disrupting the flow of natural water may have undesirable and unknown effects. Changing the flow of water often destroys the habitat. It can make wetlands dry soils, thereby eliminating floodplains. In the ocean, dredging can change the natural wave pattern. Because of dredging is proposed as a way to solve the problem, it is essential to consider the impact of no dredging instead of the impact of dredging. Any dredging efforts, though intended to improve the area, are potentially harmful.

Dredging causes harm to wildlife in various ways. First, mechanical drilling action destroys the habitat and can kill fish and other animal life. The machine used for degradation of the animal. In addition, excavation disturbs the sediment, causing it to float through the water in a way that is not normal. Furthermore, dredging puts additional food, such as dead fish into the water. That attracts predatory fish that consume native species and can affect natural populations. Life forms like corals are often destroyed by digging and take



longer to replenish than some other forms of life. Dredging can allow invasive species to land while native species is struggling to recover.

Dredging can destroy and kill marine flora, smooth powder form until plant life has a much harder time to get a footing and reduce biodegradability. Sediment dredging also reduces the amount of light that penetrates into the body of the water, thereby reducing the number of plants that can grow.

Although dredging is sometimes performed to eliminate pollutants that have been settled in the soil for many years, it only triggers polluted sediments causing pollutants to spread. From cleaning the water body, dredging can transfer pollutants to a broader area. Moreover, digestible pollutants need to be disposed of in other locations; thereby increasing the likelihood of contaminants will deviate to areas previously free of contaminants. It also affects the severe pollution such as water and air pollution. Give negative impact on the environment, health and increase potential spreading of disease.

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