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The influence factors on the fish catch at Kaohsiung Port in Taiwan

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Abstract

Located in Southern Taiwan, Kaohsiung is a world-famous city where a port converted from a lagoon was built. It has been famous for both shipping and fisheries since hundreds of years ago. In this research, we combined the fisheries yearbook, the GLOBE data, and some weather data from Central Weather Bureau in order to figure out that the connection between the weather and the fish catch in Kaohsiung. In our project, we researched the culture fisheries, the coastal fisheries, the offshore fisheries, and the far-sea fisheries separately. With the data sources mentioned above, we came to a conclusion that can be seen in the following pages. Although there are plenty of operating variables related to the catch, we will try our best to explore more things unknown.

Introduction & Research question

Fish catching is a work seen all over the world, Taiwan included. Like all the first-level industries, fishing is closely related to the weather. Kaohsiung, which was once the third biggest cargo port on the planet, is also a place where many fishermen catch fish to bring their home the bacon. In the research, we would like to explore what affects the amount of the catch, and how the weather factors, such as the temperature and the rainfall, affect it.

Location

Region: Kaohsiung Port

Location: Southern Taiwan(Kaohsiung City)

Longitude&Latitude: (120°E, 22°N)

Climate: Tropical monsoon climate

GLOBE site: Cianjin 1(Kaohsiung Municipal Cianjin Junior High School)

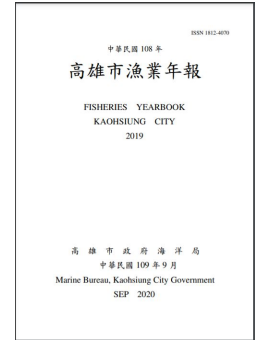


Kaohsiung Port

Data source

1.The amounts of the fish catch at Kaohsiung Port:

The fisheries yearbooks written by Kaohsiung Fisheries Agency(2019)



2.Weather information:

(1)The GLOBE site of Kaohsiung Municipal Cianjin Junior High School

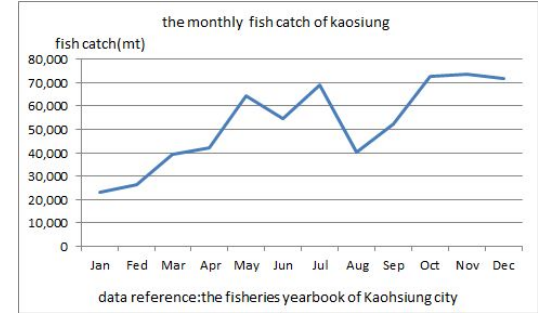
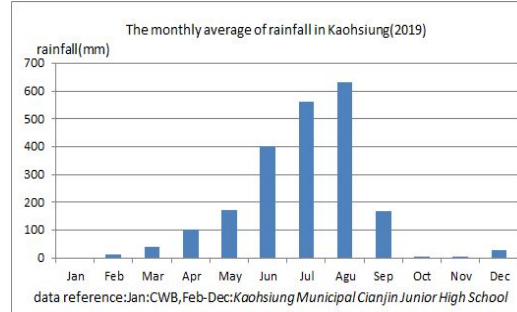
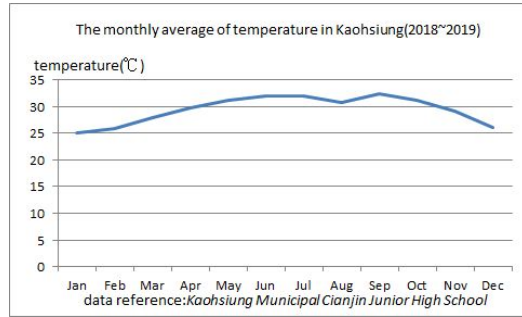
(2)Central Weather Bureau(CWB)

School: Kaohsiung Municipal Cianjin Junior High School
Site: Cianjin 1

The screenshot shows the 'Site Info' tab of the GLOBE website. It displays the following information for 'Cianjin 1':
Site ID: 104218
Name: Cianjin 1
Latitude: 22.630026°
Longitude: 120.291204°
Elevation: 6.8m
Location Source: other
Atmosphere Site: Activated At 2018-01-09 08:43:57.663717, Obstacles: No obstacles



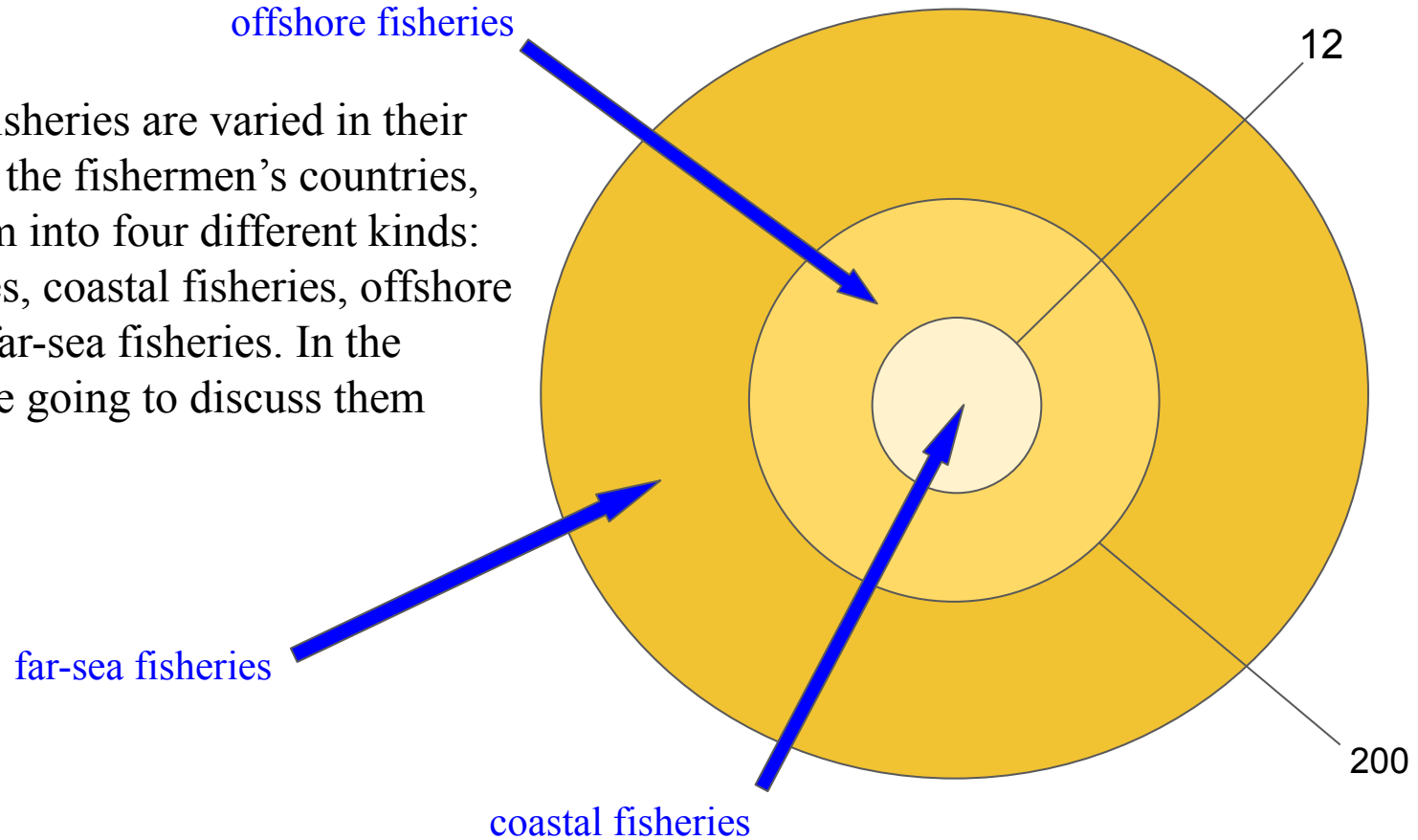
Data analysis



Kaohsiung is on the edge of the tropical monsoon climate zone, which leads to a narrow annual range of temperature and concentrated rainfall in summer, most of which is attributed to the plum rain, afternoon thundershowers and constant typhoons.

From the picture on the right, we can see the monthly average of the fish catch at Kaohsiung Port. The quantity of the fish caught becomes the most in December, and it is almost four times more than that in January.

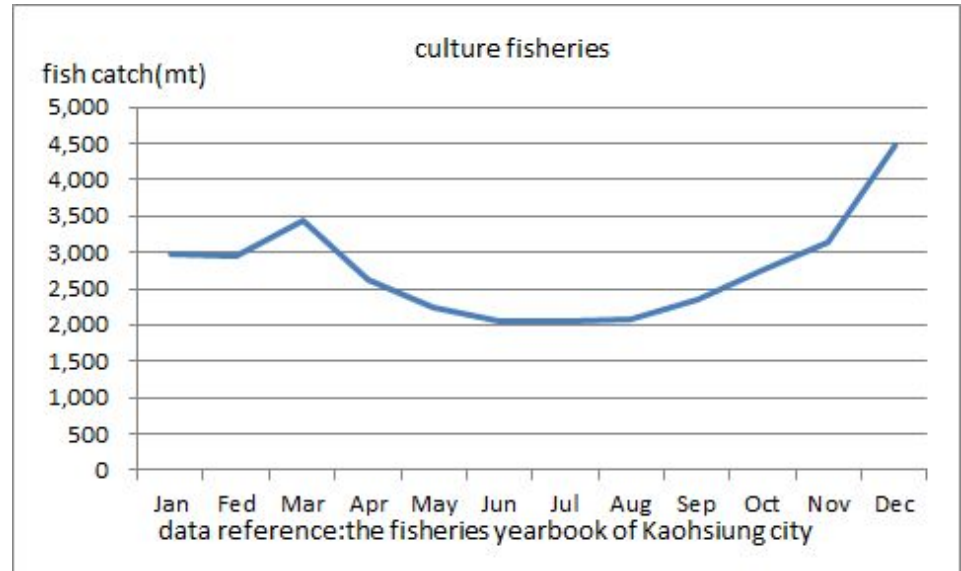
As we know, fisheries are varied in their distances from the fishermen's countries, separating them into four different kinds: culture fisheries, coastal fisheries, offshore fisheries, and far-sea fisheries. In the briefing, we are going to discuss them separately.



unit: nautical kilometer 7

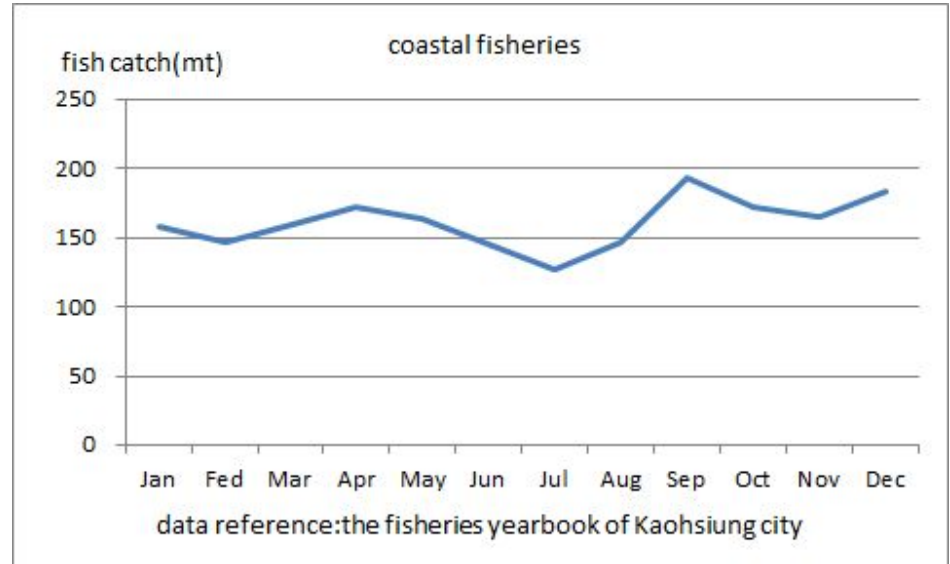
Result: Culture fisheries

By consulting the biologic behaviors of some fish that consist the majority of local culture fisheries, we found that the spawning period of prawns, milkfishes, and weevers is usually between March and September, so there might be less fish caught in summer .



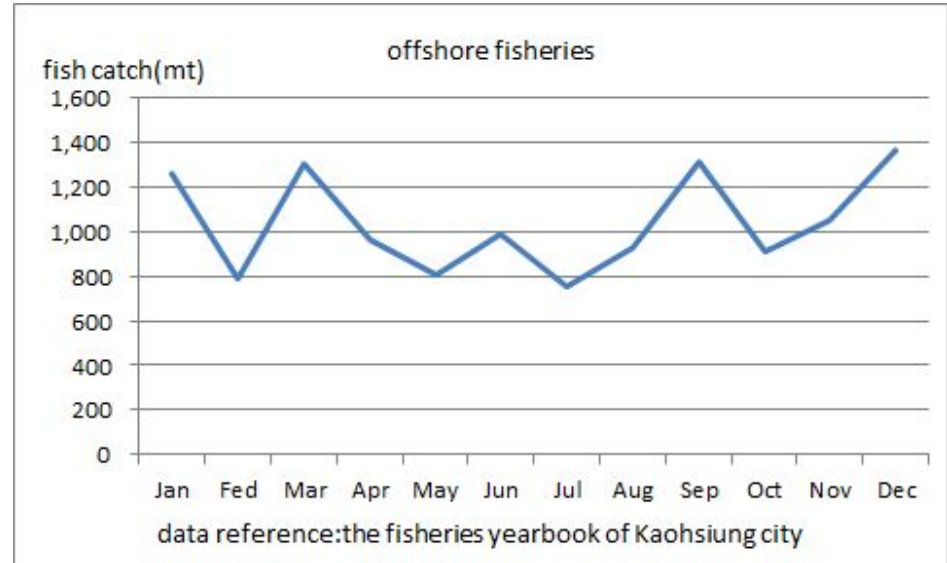
Result: Coastal fisheries

Combining the chart from the fisheries yearbooks with the information we consulted from the Internet, we found that neither cold nor hot is suitable for fish to grow. Especially when the burning hot weather comes, some kinds of fish, such as Black breams hide in shade and baby fish can hardly grow up. Also, the local fishermen usually adopt night fishing because of the hot weather. This is the reason why the catch in summer and winter declined.



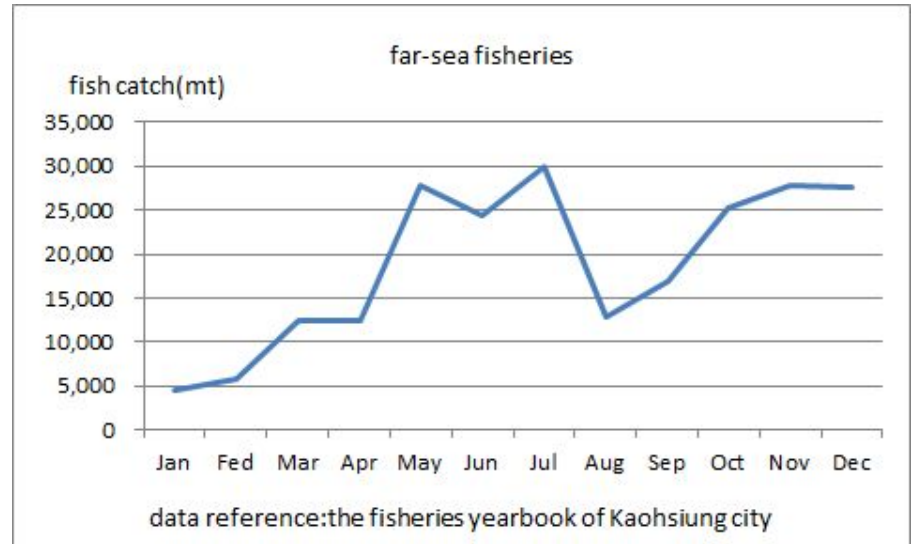
Result: Offshore fisheries

After drawing the schematic diagram according to statistics, we figure out that the catch rose in three periods. Generally, the catches become better in spring, fall and winter. As the result of being located in the tropical sea, there was Kuroshio in flowing past the exclusive economic zone of Taiwan, and the current would enhance the catch in these periods. Apart from it, we thought there might be a crux of other weather reasons, such as the temperature.



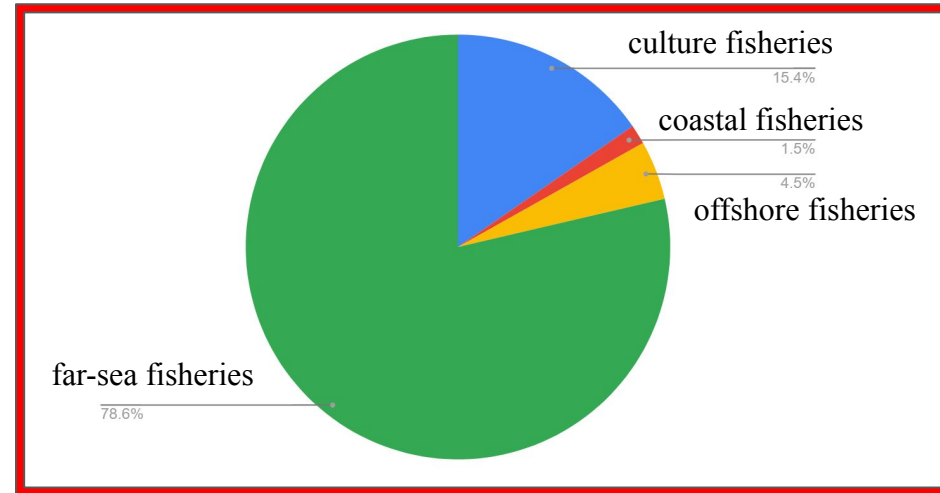
Result: Far-sea fisheries

As you can see, the amounts of fish catch vary greatly with the month, and there are two periods with the most amount of fish catch. However, there is obviously no direct association between the far-sea catch and the weather of Kaohsiung because far-sea fisheries are usually take place in somewhere over 200 nautical miles far from Kaohsiung.



Discussion: The majority of the catch

If you take a look at the quantity of each kind of fisheries, you'll find that the quantity of the far-sea fisheries is much more than the others, accounting for nearly 80% of the overall quantity of the catch. The culture fisheries account for about 15% of the overall quantity of the catch, standing in the second place.



Discussion: The huge amount of rainfall in 2012

According to a statistic from the Central Weather Bureau, Kaohsiung suffered a great amount of rainfall because of the plum rain, especially the one that happened from June 12, which might be one of the reasons why the output value of coastal fisheries in 2012 is the least among these 10 years.

降水量 (mm)	降水時數 (hour)	最大十分鐘降水量 (mm)	最大十分鐘降水量起始時間 (LST)	最大六十分鐘降水量 (mm)	最大六十分鐘降水量起始時間 (LST)
Precp	PrecpHour	PrecpMax10	PrecpMax10Time	PrecpMax60	PrecpMax60Time
152.5	14.7	18.0	2012-06-12 07:40	36.5	2012-06-12 07:01

沿岸漁業 Coastal fisheries						Year
合計 Sub-total		籠具 Fishing Traps		地曳網 Beach seine		
數量 Quantity	價值 Value	數量 Quantity	價值 Value	數量 Quantity	價值 Value	
4,449	446,573	-	-	0	2	2010
1,419	193,022	-	-	-	-	2011
1,160	176,745	-	-	-	-	2012
1,563	198,038	-	-	-	-	2013
1,447	195,612	-	-	-	-	2014

Discussion: The extreme cold wave in Jan. 2016

A strong cold wave hit East Asia in 2016, which led to a freezing cold weather in Kaohsiung. Some kinds of fish like milkfish couldn't withstand such a low temperature, so most of them were frozen to death, making an enormous loss in culture fisheries. According to statistics, the output value of inland culture fisheries dropped about 26%.

temperature				
氣溫 (°C)	最高氣溫 (°C)	最高氣溫時間 (LST)	最低氣溫 (°C)	最低氣溫時間 (LST)
Temperature	T Max	T Max Time	T Min	T Min Time
19.3	27.7	2016-01-06 14:44	7.0	2016-01-25 00:41
19.6	29.2	2016-02-14 12:31	10.1	2016-02-07 06:12

內陸養殖漁業 Inland culture fisheries						Year
合計 Sub-total		鹹水魚塢 Brackish water pond		淡水魚塢 Fresh water pond		
數量 Quantity	價值 Value	數量 Quantity	價值 Value	數量 Quantity	價值 Value	
33,020	4,706,107	19,740	3,604,476	13,268	1,091,673	2015
22,500	3,480,674	11,255	2,073,086	11,233	1,359,350	2016
31,051	3,962,446	16,933	2,253,745	14,118	1,642,956	2017

Conclusion

- 1.The far-sea fisheries account for the majority of the amount of fish caught at Kaohsiung Port, and the second is culture fisheries.The two kinds of fisheries account for 94% of the overall quantity of the catch.
- 2.Except far-sea fisheries, there are usually less fishes caught in summer because of plenty of reasons, such as currents, local fishing customs, and spawning periods.
- 3.If natural disasters happen, the amount of the fish caught will decline, which can made a considerable amount of financial loss to local fishermen.

Reference

1. Fisheries yearbook in Kaohsiung city(2019)

<https://orgws.kcg.gov.tw/001/KcgOrgUploadFiles/336/relfile/69735/139143/02c8a6f1-a0d0-459e-b084-bbafc6fcd3e0.pdf>

2. Central Weather Bureau(CWB) observation data inquire system

<https://e-service.cwb.gov.tw/HistoryDataQuery/>

3. Globe visualize data

<https://vis.globe.gov/GLOBE/>