COASTAL USE CHANGE ANALYSIS, STUDY CASE: JAKARTA RECLAMATION PROJECT

ILHAM ARMI, WIWIN WINDUPRANATA, AGUNG BUDI HARTO
Faculty of Earth Sciences and Technology Institut Teknologi Bandung
ilhamarmi@gmail.com, w.windupranata@gmail.com, abh.geodesi@gmail.com

Abstrak: Teluk Jakarta merupakan kawasan yang sangat strategis namun dengan berbagai permasalahan. Proyek reklamasi diharapkan dapat mengatasi berbagai permasalahan di kawasan tersebut. Sehingga perlu dikaji apakah proyek reklamasi tersebut berdampak pada teluk Jakarta. Salah satu yang dapat diteliti adalah perubahan penggunaan lahan, dalam hal ini pemanfaatan pesisir, untuk mengetahui apakah terdapat perubahan fungsi lahan di teluk Jakarta. Dapat juga dilihat apakah proyek reklamasi yang telah berjalan selama ini akan berdampak pada beberapa aspek kawasan, baik dengan keadaan saat ini maupun di masa yang akan datang. Untuk mengetahui perubahan fungsi lahan pantai, salah satu cara yang mungkin dilakukan adalah citra satelit. Citra satelit landsat dapat digunakan sebagai data untuk melihat dan membandingkan ada tidaknya perubahan fungsi lahan pantai di kawasan teluk Jakarta. Dari hasil penelitian diketahui terdapat beberapa perubahan fungsi lahan meskipun masih sebatas pulau reklamasi. Kemudian dengan menganalisa beberapa aspek, diketahui bahwa proyek reklamasi akan memberikan pengaruh yang positif terhadap kondisi Teluk Jakarta.
Kata Kunci: Pemanfaatan Pesisir, Reklamasi, Perubahan, Penginderaan Jauh

Abstract: Jakarta Bay is a very strategic area but with various problems. The reclamation project is expected to address various problems in the area. So, it is necessary to study whether the reclamation project is affecting the bay of Jakarta. One that can be researched is land-use change, in this case coastal use, to know whether there is any change in the land function in Jakarta bay. It can also be examined whether a reclamation project that has been going on so far will have an effect on some aspects of the area, either with its current state or in the future. To know the change of coastal land function, one of possible method is satellite image. Landsat satellite images can be used as data to see and compare whether there are changes in the function of coastal land in the bay area of Jakarta. From the results, it is known there are some changes in the function of land, although still limited to the islands of reclamation. Then by analyzing a number of aspects, it is known that the reclamation project will give some positive influence on the condition of the Jakarta Bay
Keywords: Coastal Use, Reclamation, Change, Remote Sensing

A. Introduction

Jakarta bay is a coastal area located in the north of Jakarta. It is a place where the Seribu islands located and many rivers flow into this bay. Sadly, the ocean part of the Jakarta bay itself is polluted because of the industrial waste and the habit to dump the garbage randomly. In short, Jakarta bay is in miserable state.

With the growing population in Jakarta, the bay itself also got the impact. More Industrial location, more poor community, and of course more risk to get flooded because the land will sink every year. Talking about poverty Jakarta have a high number of underprivileged. BPS as of 2016 illustrated that there were 384,300 low-

income communities in Jakarta. Meanwhile, North Jakarta is home to the city's largest population of poor community, standing at 54,000.

Jakarta reclamation project is a hottest topic in Indonesia, Jakarta to be precise, in these recent years. Since the president decree in 1995 that started it all, reclamation project became problematic issue. From environmental activist to political scheme, from civilians to clerics, reclamation project is controversial topic. This issue became more debatable when Jakarta's governor election in early 2017. Until now, reclamation project still addressed as controversial topic.

Whether it's good or bad the reclamation project will affect the condition of land use in Jakarta bay. In this case it is called coastal use. Coastal use, like land use is the total of arrangements, activities, and inputs that people undertake in a certain land cover type (FAO, 1997a; FAO/UNEP, 1999). But there are several differences between land use and coastal use. Coastal use not only about land but also the coastal, the sea part of the area. That is including the surface and the sea floor part of the sea, which means the change of coastal use will not only affect the surface that easier to see, but also the sea floor that sometimes hard to determined.

To see the change of coastal use is quite a feat because it need to be observe in continuous way. One method that can make it easier is remote sensing method. Remote sensing is the science of obtaining information about object or areas from distance, typically from aircraft or satellites. The term "remote sensing" itself was first used by the US military in the 1950s by Ms. Evelyn Pruitt of the U.S. Office of Naval Research. Remote sensing now commonly used to describe the science and art of identifying, observing, and measuring an object without coming into direct contact with it. This process that uses in remote sensing involves the detection and measurement of radiation of different wavelengths reflected or emitted from distant objects or materials. The wavelength will be identified and categorized by class/type, substance, and spatial distribution.

Remote sensing can also provide consistent historical series data (Xiao et al., 2005). The importance of remote sensing was emphasized as a "unique view" of the spatial and temporal dynamics of the processes in urban growth and land use change (Herold et al., 2003 in Xiao et al., 2005).

One of remote sensing satellite is Landsat. Landsat program was the longest satellite program for image acquisition. The idea of this program came from William Pecora, Director of the U.S. Geological Survey (USGS), who put forth the idea of a satellite based remote sensing program to gather information about the earth's natural resources. Since 1972, Landsat has collected million images of earth. Its function mainly to gather the images of earth natural resources. Today, Landsat 8 is the latest satellite of Landsat program. The purposes of this research are to analyze the change of coastal use of reclamation area in Jakarta bay using remote sensing methods. Also, this research will analyze the effect of he reclamation project in some aspects.

B. Research Methodology

The data in this research is remote sensing image data of Jakarta bay area. The image data is obtained from Landsat satellite. Selection of Landsat as the source of image due to 2 factors. First Landsat imagery can be downloaded for free to facilitate the acquisition of data, and Landsat image data are considered sufficient to observe changes in coastal use to be analyzed. In this research, the data that acquired is data from 2012 to 2016, one data each year. To acquire a good result, the image should have minimum amount of cloud, especially on the northern area of Jakarta. Hence, the

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dry season between April to September is the best time to get the image. The goal of image processing is to comparing two images of different time and see the change between them. Figure 1 shows us the process of the method.

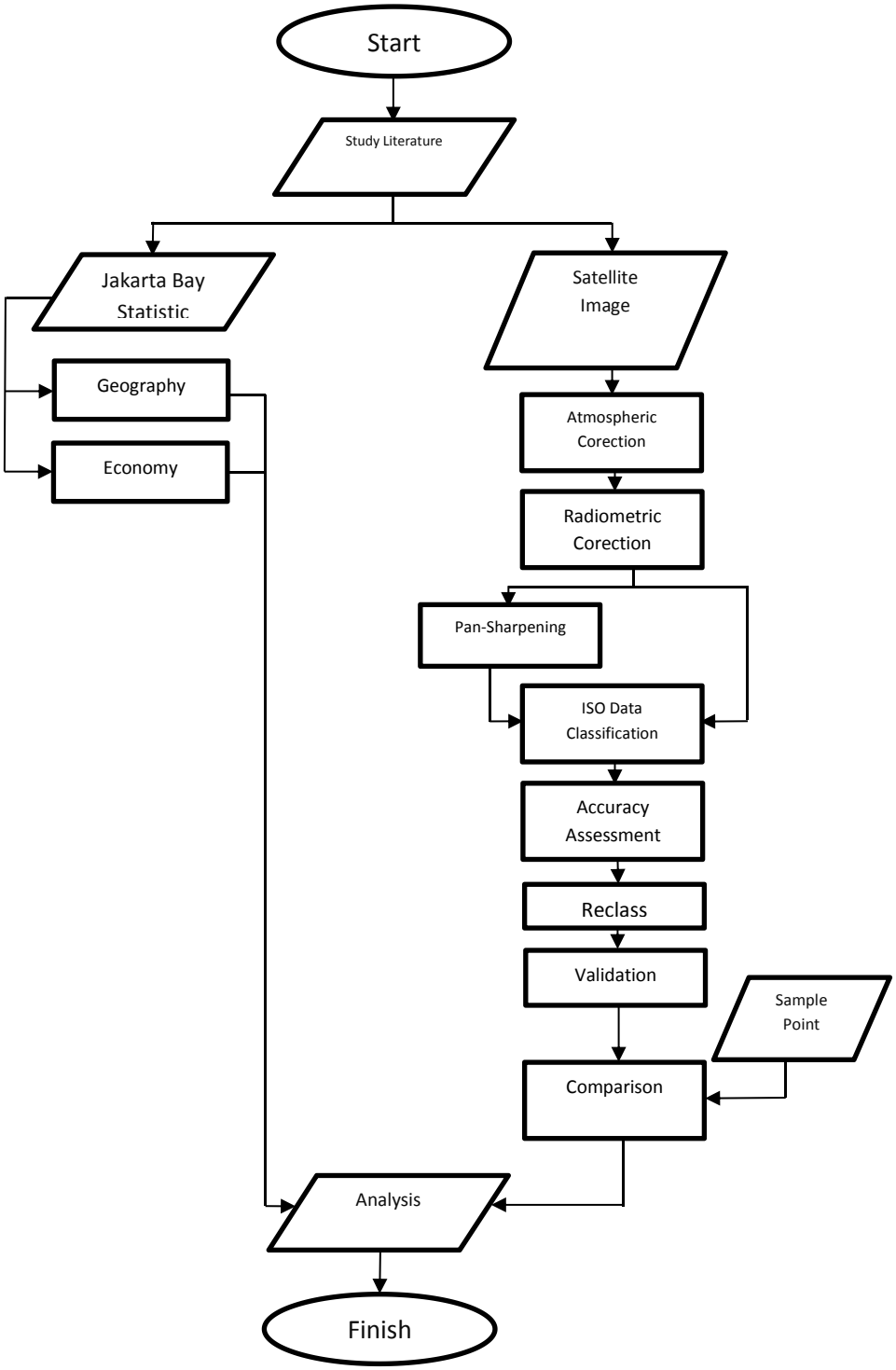

Figure 1. Flowchart

C. Results and Research

The results of satellite Landsat processing indicate a change in coastal use in the bay area of Jakarta as seen in figure 1 and 2. The most striking changes of course exist in the reclamation area, due to the creation of the island. Figures 2 and 3 shows the classification results in the north Jakarta area from 2012, before the reclaimed island was made, until 2016 when several islands were formed. The classification map is divided into 3 categories. Blue for water, green for vegetation, and red for human constructions and vacant lots. Then there is the class 0, it is colored black which means no data, because the area outside the north Jakarta area or the area covered by cloud.

Visually, the most significant change is of course on the island of reclamation. Areas originally in water are replaced with vegetation and soil.

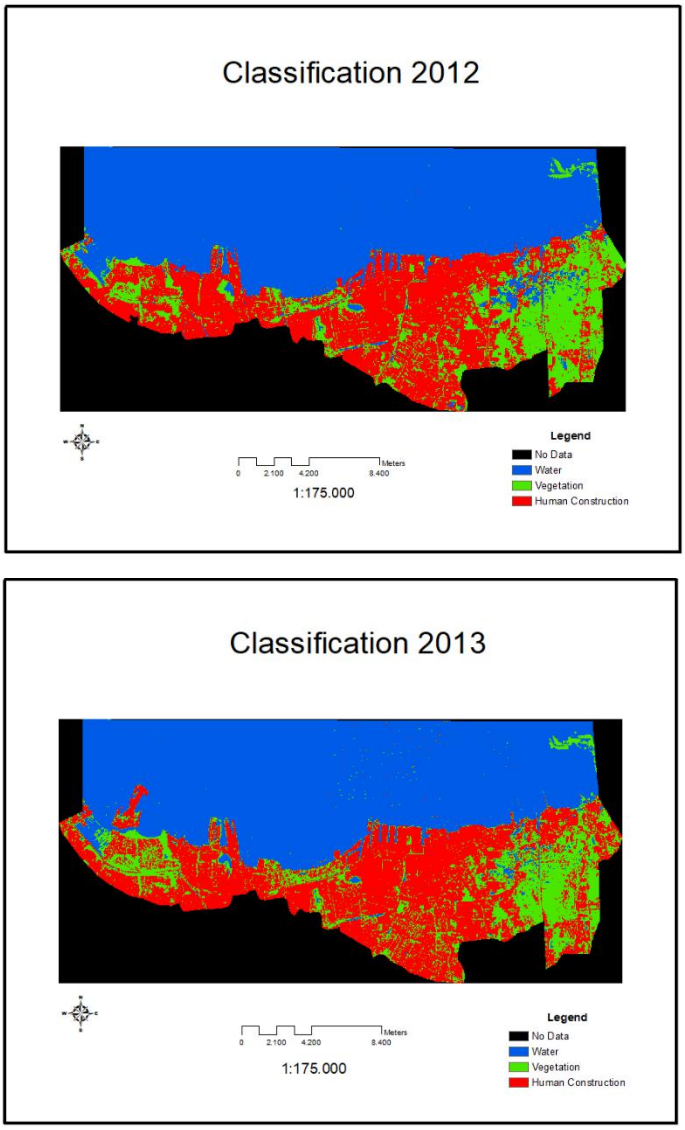

Figure 2 The classification result from 2012 and 2013

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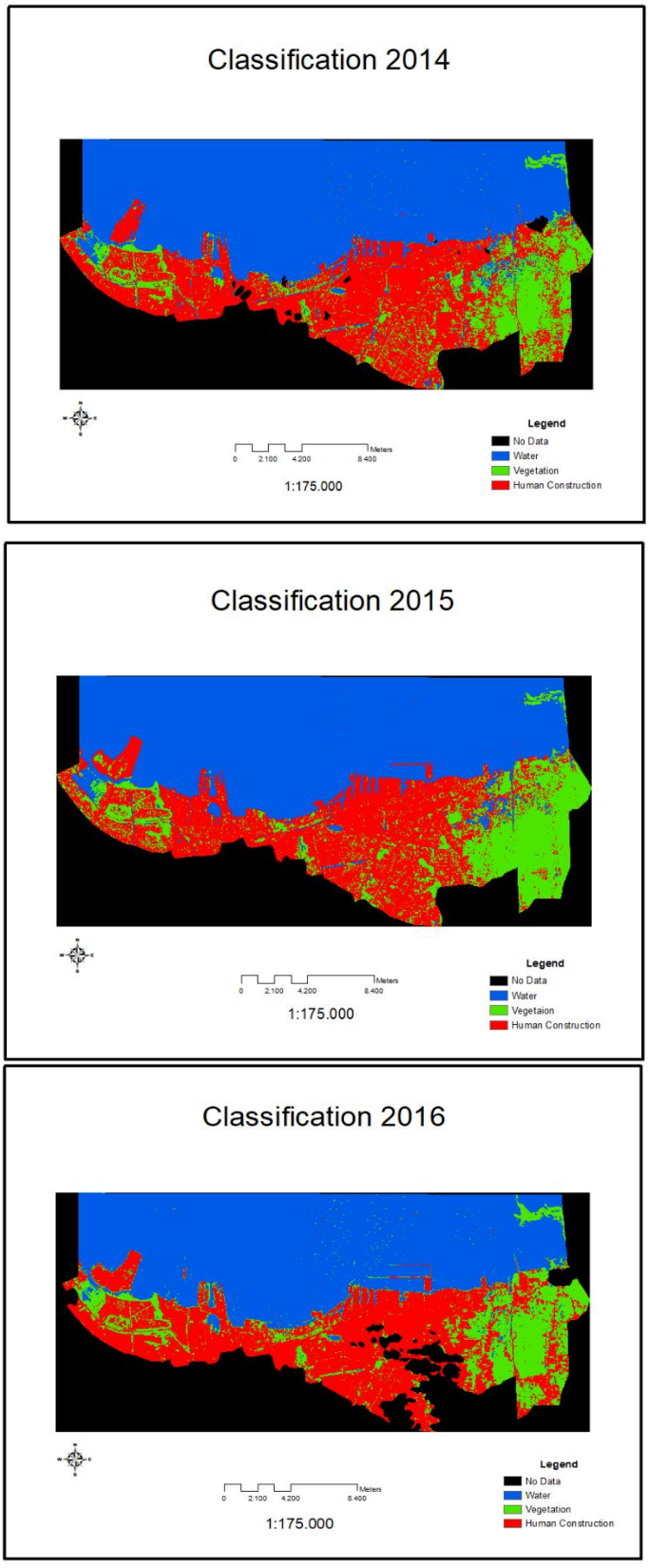

Figure 3 The classification result from 2014 to 2016

Most change is in the change of human construction and vegetation. This means that there is a change of land function from vegetation into construction land or human

building. This can be seen in the district of Penjaringan, located in western area of the map. In that area the area which was initially vegetation converted into residential area. In addition, the class that undergoes the next change is from grade 3 to class 2. It means there is a change of land function from construction to vegetation. Of course, this is not quite right. As mentioned earlier in addition to representing class 3 constructions it also represents a vacant lot. This means there is empty land that becomes vegetation. In the area of Cilincing, eastern part of the map, there is a large area of rice fields. So that can be understood before the area in 2012 in dry conditions and in 2013 began to be planted. Changes in land function in this area will continue to occur because the rice fields tend to change according to the growing season and harvest. Therefore, if in 2012 dry soil conditions because it is not planted, then in 2013 the conditions to be green because it has been planted. It could be in the next year the area becomes a class 1 of the waters because it will enter the planting season.

Cover changes in 2013 to 2014 are relatively similar to changes in the previous year. From the map can be seen the more extensive reclaimed island. Then the class changes this year are also quite similar to the previous year where there is still land conversion from vegetation to housing in Cilincing area. The year 2014 to 2015 also experienced similar things. The island of reclamation is getting expanded. In 2015 and 2016 the islands of reclamation are no longer expanding. The changes in land functions that occur in the bay of Jakarta can be seen from various aspects. In general, the division is as follows

Geography aspect

Geographical aspects are the easiest to see. From the results shown in figures 2 and 3 it can be seen that there is an increase in the area of vegetation and human construction. The creation of a reclaimed island in Jakarta bay makes the geographical conditions changed. The making of the islands E and N is the most visible. Until 2017, these two islands are evidence of the most significant geographic changes in the bay of Jakarta. Later, if the reclamation project is really finished, then the appearance of Jakarta will also really change

Economic aspect

Since the beginning of the island bay reclamation bay has been planned to support economic activities. This has been prepared since the beginning, based on city regulation No. 8 of 1995. In the document, the reclaimed island will be divided into 3 parts, namely the west, the middle, and the east as shows in figure 4.

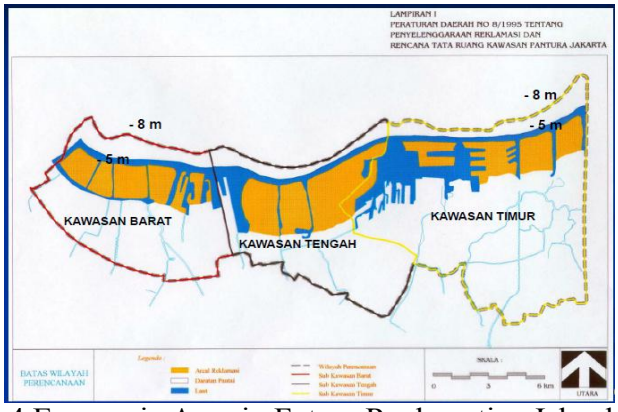

Figure 4 Economic Area in Future Reclamation Islands

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Poverty is one of the biggest problem in Jakarta. Figure 5 shows the total population of poor people in Jakarta area. As can be seen the number of poor people in North Jakarta is the largest among other regions. Figure 6 shows the graph of the poor population of North Jakarta more specifically. From the graph it can be seen that the population of poor people in Jakarta tend to increase.

As described above, the reclaimed island will be the economic region. This will certainly be very supportive of the economy in the bay area of Jakarta. There will be many industrial areas and trade means more jobs will be created. This means that in the future the number of poor people in Jakarta bay is expected to decrease.

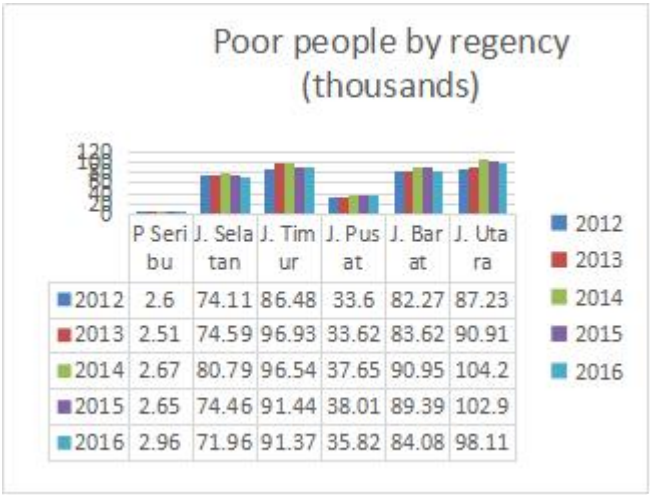

Figure 5 Poor people by regency In North Jakarta

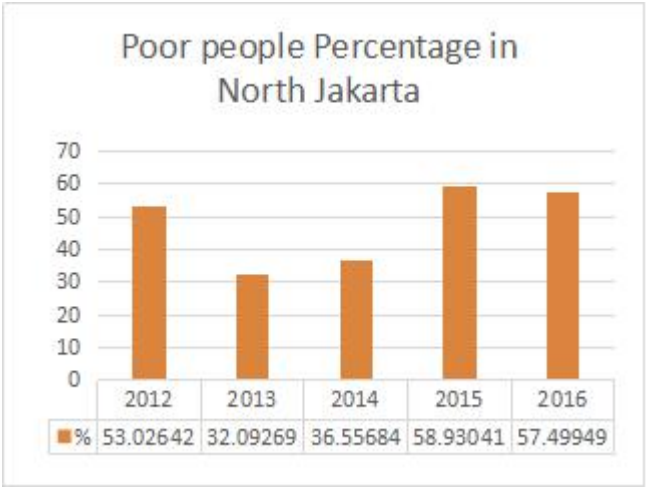

Figure 6 Poor people percentages in North Jakarta

Besides that, the bay area of Jakarta is a submarine cable line that is quite a lot. The picture shows a submarine cable map belonging to a number of agencies and companies. In addition to cable, there are also underwater pipelines located under the water. There has been concern that reclamation will disrupt the pipeline and cable. Like a statement from the navy saying that the government needs to pay attention to the existence of pipelines and submarine cables. Figure 7 shows the cable route in north Jakarta.

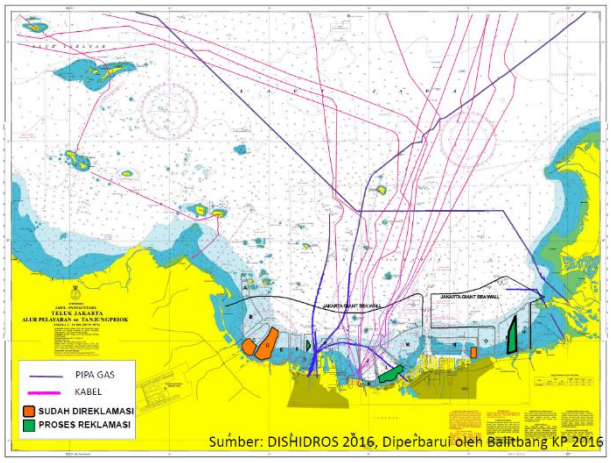

Figure 7 The cable map in North Jakarta (Source DISHIDROS)

D. Conclusion

Based on result and analysis from previous chapter, there are some conclusions that can be made There is a change of coastal land function in the bay area of Jakarta, especially around reclamation area. In the area, the reduced water area is replaced by reclamation island. There is a change in the geography because of the emergence of the island of reclamation. Reclamation island is planned to be a new economic area in the bay of Jakarta, with a very large population of poor people in the area, it is expected that the reclamation island will support the economy of the bay community of Jakarta. For the future works, there are more aspects to be analyze. Some aspect like demography and resource can be added to see another impact of the coastal use change which lead to more complex but also a better result.

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