

Sustainability of Water Availability: A Study of Tanjung Pinang, Bintan Island

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Abstract

Water is a basic need of all living things. Since the beginning of life all living things really need water for their survival, so that water needs must be met properly. The fulfilment of water needs in Tanjungpinang City comes from Sei Pulau Reservoir and Gesek Reservoir which are fully rain-fed reservoirs. However, the condition of Sei Pulau Reservoir is damaged so that its sustainability is worrying. The damage to the condition of the reservoir is caused by various factors that are very complex until finally the water discharge has decreased. This research was conducted with the aim of describing the condition of water availability in Tanjungpinang City and analysing the urgency of management carried out by the government in meeting the needs of Water Resources in the perspective of public administration. Through a qualitative approach, the results showed that the water needs in Tanjungpinang City had only been fulfilled around 35.27%. With the increasing population in the future, the need for water will certainly also increase, requiring the government to be present to solve the problems that occur and carry out the best management in fulfilling water needs.

Keywords:

management; reservoir; water demand

Introduction

Water is a basic need for living things, so water resources are one of the most important factors for the sustainability of life for all creatures, including humans. The availability of water is a right for every individual for their survival. The 8th World Water Forum in Brazil in 2018 revealed that around 1.9 billion people still live in water-scarce areas. It is estimated that by 2050, this figure will continue to increase by around 3 billion people. Without water, human social and economic life will inevitably be disrupted.

Due to the importance of water, Article 33 of the 1945 Constitution states that water resources that concern the livelihood of many people are controlled by the State and used for the greatest prosperity of the people in a fair manner. This means that the state must be able to perform/implement its functions as a state organiser in managing water resources (Sudirja, 2006: 7), especially through the implementation of public policies. As stated by Kismartini (2009), government intervention is important in serving and realising the wishes of the community through policy. Policies that are able to create justice and protection, peace for the community and goodness for nation building through sustainable environmental management (Purnaweni et.al, 2017).

Water management is something that absolutely must be done, so that water continues to be available in sufficient quantity and quality, through good environmental management. Environmental mismanagement, especially in water management, has the potential to cause flooding in the rainy season, but drought in the dry season.

In the case of water shortages, such mismanagement in the long run has the potential to lead to catastrophic water resource drought. Drought is the availability of water that is far below the water needs for living, agriculture, economic activities and the environment, so the lack of clean water is always a scourge for citizens and is a public problem that must be addressed by the government. Therefore, careful approaches are needed in the management of water resources management.

Water management cannot solely be resolved through structural approaches, but also through non-structural approaches. As public goods, Umar (lipi.go.id 18 April 2004) said that water and waters are important elements that require active integrated management that is collaborative, cross and multidisciplinary, cross-sectoral and has a vision of sustainable life.

A sense of urgency is needed in addressing water issues. According to Kotter (2008) if no action is taken in the present, it will become a serious problem in the future and worsen the situation, so that in state administration, the State must be present to provide solutions through actions or programmes to save water resources. Sense of urgency and sense of crisis are needed in every practice of government work, in this case especially for exploited areas (Purnaweni, 2014) as faced by small islands in Indonesia. Public administration sees the government's presence as important to solve the problems faced by the community through comprehensive planning (Syafiie, 2015), for densely populated areas that require a lot of resources as well as Tanjungpinang City, the capital of the Riau Islands.

Tanjungpinang City, the capital of Riau Islands Province, is located in the northeast of Sumatra Island. The province was originally part of Riau Province, but in 2002 it was established as a separate province from mainland Riau Province. Tanjungpinang is now experiencing serious problems related to the availability of water resources. Water from the Sei Pulai Reservoir, which is a natural resource for residents of the capital city, has been managed by PDAM since 1971 as a means of fulfilling the residents' clean water needs. However, the condition of this reservoir is now experiencing an increasingly serious threat of drought due to the continued reduction in the reservoir's water discharge, which may be partly due to the destruction of the protected forest area that surrounds it. Riau Islands Governor Nurdin Basirun has even determined that the water crisis in the Sei Pulai reservoir has entered stage 1 (one), and it is possible that it could even enter stage 4 (four) if there is neglect without protection and preservation of the reservoir (Tanjungpinangpos, 7 April 2017).

The Riau Islands Province is divided into 7 (seven) regencies and cities. Natuna Regency has the largest land area at 2,814.26 km² (26.56%), while Tanjungpinang City is the smallest with only 239.50 km² (2.26%). The capital is located on Bintan Island, in Bintan Regency which has a land area of 1,739.44 km² (16.41%). With a population growth of 1.28% per year (BPS, 2017), land availability on Bintan Island is considered to still have the potential to be utilised effectively.

The need for land is crucial in the government's efforts to carry out development in various sectors for the construction of settlements, agriculture, plantations, and the construction of various facilities and infrastructure for people's lives. On the other hand, the fulfilment of water needs is also an urgent matter for people living on islands that are not large. There are many challenges, as small islands are limited in size, accessibility, resources and vulnerability to disasters (Tompkins et al., 2005).

Water resources available in Tanjungpinang City consist of only two reservoirs, namely Sei Pulai Reservoir located between Tanjungpinang City and Bintan Regency, and Gesek Reservoir located in Bintan Regency. Based on data from the Public Works, Spatial Planning and Land Agency of Riau Islands Province in 2017, the fulfilment of water needs by two reservoirs is only able to meet around 35.27% of the clean water needs of residents. Sei Pulai Reservoir has long been unable to meet the needs of residents. Meanwhile, the presence of the Gesek Reservoir has also not had a major effect on meeting the water needs of Tanjungpinang City due to the inability of the reservoir to store water so that the reservoir continues to experience a decrease in water discharge. The following can be seen the water level trend of Sei Pulai Reservoir and Gesek Reservoir according to PDAM Tirta Kepri data in 2018.

Figure 1.

Sei Pulai Reservoir Water Level 2015 to 2018 (cm)

Source: PDAM Tirta Kepri 2018

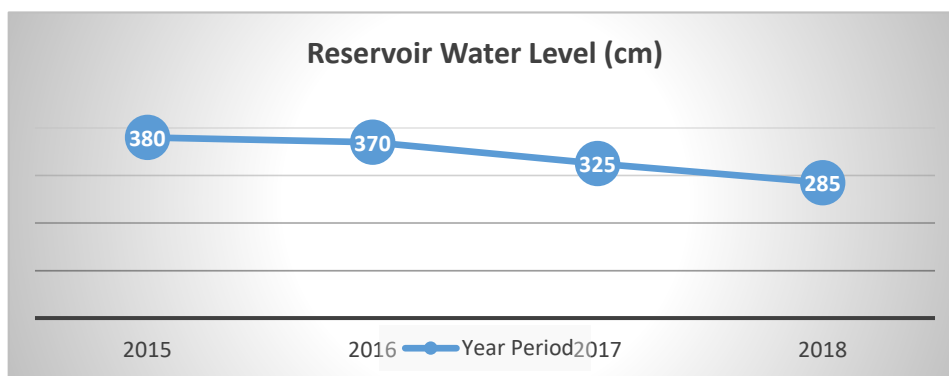
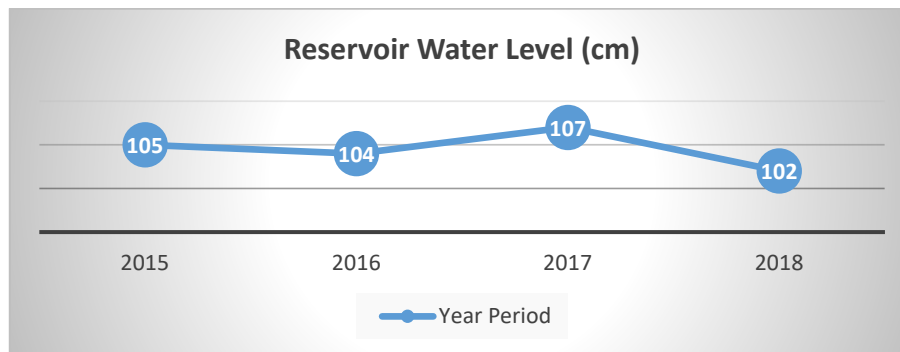


Figure 2.**Water Level of Gesek Reservoir 2015 to 2018 (cm)**

Source: PDAM Tirta Kepri 2018

The diagram above shows that since 2015 the reservoir water discharge level has decreased. The highest water level in Sei Pulai Reservoir in 2015 was 380 cm, then in 2016 it decreased to 370 cm, then in 2017 it fell back to 325 cm and in 2018 to 285 cm. This means that there was a decrease in water level of 95 cm in a period of 3 (three) years. While in Gesek Reservoir the highest water level in 2017 was 107 cm and decreased in 2018 to 102 cm.

The results of previous research conducted by Prastya and Putri (2017) entitled Water Resources Management in the Islands Region (Study in Tanjungpinang City, Riau Islands Province) stated that water management in Tanjungpinang was not optimal, due to the complexity of the problem, such as limited infrastructure to protect forests, the absence of a forest management unit, the existence of oil palm plantations, and limited budget. These things affect the availability of water in Tanjungpinang.

Pasandaran (in Arsyad, 2012: 194) said the existence of water resources today is under enormous pressure due to the increasing population and the increasing demand for water due to economic growth and the urbanisation process. Climate change also affects the condition of reservoirs. As temperature and rainfall change, it also affects the hydrological system, which has an impact on water reserves (Bergkamp et al., 2003). The discharge of Sei Pulai Reservoir and Gesek Reservoir is highly dependent on rainfall, so erratic rainfall greatly affects water availability.

As a result, residents of the capital city of Tanjungpinang Province are facing a clean water crisis (tanjungpinangpos, 27 February 2018) due to the very poor condition of the reservoir water, even threatened with drying up. This condition has forced PDAM Tirta Kepri to start reducing production and distribution due to increasingly limited water sources, even though demand is increasing, so this is a serious public administration problem. The government must do something to address this serious public problem.

Based on the description above, this research intends to describe the government's urgency in fulfilling the needs of Tanjungpinang City's Water Resources from a public administration perspective.

Theoretical Basis

Public Administration

The new paradigm of public administration emphasises that the presence of the government is very important to solve the fate of its people, what the people need and how to solve the problems faced by the people through comprehensive planning (Syafiie, 2015: 61). The purpose of public administration is how to solve public problems through improvements and enhancements, such as in organisations, human resources, finance, and so on (Keban, 2004: 3).

The New Public Service (NPS) concept pioneered by J.V. Denhardt and R.B Denhardt (Keban, 2014: 37) states that the state must serve and prioritise the public interest. Public problems should be resolved through various public administration activities. The role of public administration can be interpreted very broadly, including how to provide and protect public interests, in this case providing certainty to the community on the fulfilment of water needs and ensuring the safety of the environment that is a water resource.

Nicholas Henry (1995) (maybe there is a more recent source) in the public administration paradigm states that the focus of public administration is organisational theory, management theory and public policy. Meanwhile, the locus is issues of public interest. One of the scopes of public administration is public management, which is related to management systems and science, programme evaluation and productivity, public budgeting and human resource management.

Public Management

Basically, public management is the management of government agencies. Public management is an interdisciplinary study of the general aspects of organisations. According to Overman (Keban 2014: 92) public management is 'an interdisciplinary study consisting of general aspects of the organisation, and is a combination of management functions such as planning, organizing, actuating, and controlling on the one hand with Human Resources (HR), finance, physical, information and politics.'

The management dimension in public administration is how to apply management principles in the implementation of public policy. Donovan and Jackson (Keban, 2004) view management as a series of skills and tasks as activities carried out by certain organisations. The public management

perspective projects what should be done and the reality that has been done by public managers in public agencies (Chung and Megginson, 1981).

Methods

The approach in this research is through a qualitative approach. The types and sources of data used include primary data and secondary data. Primary data was obtained from interviews with informants from the Riau Islands Province Regional Research and Development Planning Agency (BPLitbang), the Public Works Office of Spatial Planning and Land (DPUPRP), the Riau Islands Province Environment and Forestry Office (DLHK), the Sumatra IV River Basin, and PDAM Tirta Kepri. Observations were made at Sei Pulai Reservoir and Gesek Reservoir.

Secondary data is indirect data obtained from relevant literature materials to strengthen primary data. In this research obtained from records, literature books, documents related to environmental damage and water resources, in particular. In collecting data, triangulation techniques were used by combining several techniques, namely interviews, observation and documentary techniques.

Results and Discussion

Water Availability in Tanjungpinang City

Tanjungpinang City is located on Bintan Island with geographical conditions located at 0051' to 0059' North latitude and 104023' to 104034' East longitude. The administrative boundaries of Tanjungpinang City are as follows:

1. Northern Boundary : Teluk Bintan Sub-district - Bintan Regency
2. Southern Boundary : Mantang sub-district - Bintan district
3. Western boundary : Pangkil Village - Bintan Regency
4. Eastern Boundary : East Bintan sub-district and Toapaya sub-district - Bintan Regency 4

The 258.82 km² area of Tanjungpinang City consists of 150.86 km² of land (**58.29%**) and 107.96 km² (**41.71%**) of ocean. Tanjungpinang City is the centre of government of Riau Islands Province as well as being the centre of economy, education, and culture which is an attraction for transmigration and job seekers.

Tanjungpinang City has several water resources that are used to meet the needs of citizens. Water needs are currently supplied from Sei Pulai Reservoir and Gesek Reservoir. Both reservoirs are fully operational and managed by PDAM Tirta Kepri. Some residents who are not reached by PDAM channels only rely on artificial wells and rainwater.

Tanjungpinang City's water demand is projected to increase with a population of 318,555 people in 2038 with a population growth rate of 1.21% per year. The increase in population every year will directly increase the demand for clean water. The following table shows the availability of water in Tanjungpinang City in 2017:

Table 1.
Mainstay Discharge, Raw Water Source Availability, and Raw Water Source Needs
in Tanjungpinang in 2017

| No | Regency/City | Reliable Discharge | Availability of Raw Water Source (M ³ /Year Requirement) | Raw Water Source (M ³ /year) | Percent |
|----|--|--------------------|---|---|---------|
| 1 | Tanjungpinang • Sei Pulai (Tanjungpinang) • Sei Gesek (Bintan) | 330,00 | 1.769.170 | 6.166.997 | 35,27% |

Source: BPLitbang Prov. Riau Islands, 2017.

The table above shows that the mainstay water discharge for Tanjungpinang City has only reached around 35.27%. Where the availability of raw water sources is 1,769,170 M³/year, while the need for raw water is 6,166,997 M³/year. Sei Pulai Reservoir has a production capacity of 200-250 litres per second and Gesek Reservoir with a capacity of 100 litres per second. So that the production of the Water Treatment Plant (IPA) from the two reservoirs is only 300-350 litres/second. Meanwhile, the need for clean water in Tanjungpinang reaches 700-800 litres/second specifically for registered customers. This means there is a shortage of 400-500 litres/second. The number of customers of the regional water company in December 2017 was around 16,350 thousand customers, while the waiting list for new customers reached 6000 customers. While the total population of Tanjungpinang City is around 204 thousand people.

The limited water discharge produced by Sei Pulai Reservoir and Gesek Reservoir in meeting water needs forced the government to take a series of actions to anticipate natural resource shortages. As revealed by BPLitbang Riau Islands Province, the government has planned to fulfil water needs through water resource mapping.

The mapping of water resources is carried out to anticipate the increasing demand for water in the future by taking into account the factors of population growth and raw water needs. With the existence of new natural resources, it is expected that water availability in the future can be fulfilled. Although it is still a potential study and has not been fully realised, the points that will become natural resources on Bintan Island have been included in the long-term planning study. Water resources development planning for Tanjungpinang City can be seen in Figure 3:

Public Administration Perspective in Fulfilling Water Resources Needs for Tanjungpinang City

The existence of problems in fulfilling water needs for the community is the responsibility of the government in providing solutions. The public administration perspective views the lack of water as synonymous with the condition of not meeting the needs of the community by the government due to the government's inability and lack of planning or programmes related to meeting water needs. When this condition is left without paying attention to the urgency of the problem that occurs, it can have various impacts, ranging from the loss of life, property, and disruption of the social and economic sectors.

In public administration, the government has projected the losses and socio-economic impacts that will be experienced by the community in the event of a water resource drought. Thus, efforts to prepare new water sources continue to be made to avoid future losses. In the relationship between the state and its citizens, the people are the right holders, while the state is obliged to protect and guarantee the human rights of citizens (duty holders). One of them is to fulfil the needs of the right to water.

Efforts to fulfil water needs in Tanjungpinang have been made through several plans, including:

1) Sea Water Reverse Osmosis.

The seawater reverse osmosis project was built by the Ministry of Public Works (MPW) with a 2014-2015 state budget of Rp.97 billion. This project is designed to be able to overcome the needs of 4000 customers with a capacity of 50 litres per second. The SWRO development has gone through a study of the Riau Islands Provincial Government and the Tanjungpinang City Government regarding the availability of clean water needs when Tanjungpinang City was hit by a clean water crisis due to a long drought.

On 3 March 2018 the project was inaugurated and began operating. The SWRO project is able to process seawater into fresh water and is ready for consumption, using technology that requires expensive production costs. The high production and operational costs are not comparable to the selling price given to customers, so the SWRO project that has been operated is stopped. In addition, SWRO asset management also does not have a clear status so that the existence of SWRO becomes neglected.

2) Mapping Potential New Water Resources

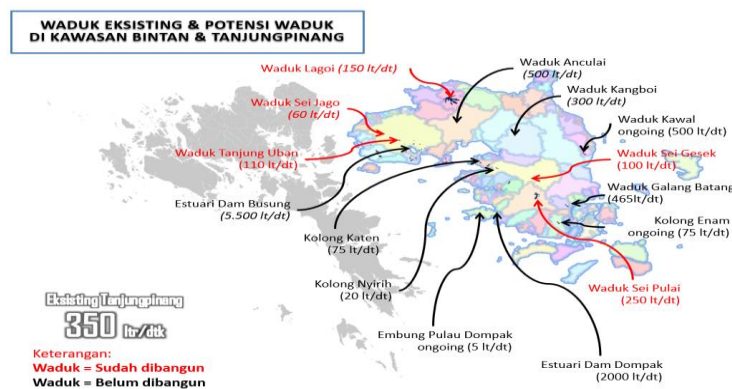
There are several alternative new water resources for Tanjungpinang City. Most of the reservoir natural resources are located in the Bintan Regency area. In addition to Sei Pulau Reservoir and Gesek Reservoir, currently in Tanjungpinang City there is Embung Pulau Dompok with a capacity of 5 litres/second, but the embung has not been able to function. Currently,

Embung Pulau Dompok has been completed, but supporting facilities and installations have not been prepared so that it cannot be used. Furthermore, there is a plan to build the Dompok Estuary Dam with a capacity of 2000 litres/second. The construction of the Estuary Dam has not yet been carried out because there is no detailed study.

Bintan Regency is expected to support the fulfilment of water needs in Tanjungpinang City, because Bintan has a larger land area and has the potential for abundant water resources. Based on data from the Balai Besar Wilayah Sungai Sumatera IV, there are several reservoirs that have been operating in Bintan Regency, namely, Lagoi Reservoir, Sei Jago Reservoir, Tanjung Uban Reservoir. Meanwhile, there are still many reservoirs that are planned to be built until 2030, including: Busung Estuary Dam, Anculai Reservoir, Kangboi Reservoir, Kawal Reservoir, Galang Batang Reservoir, Kolong Keten, Kolong Nyirih and Kolong Enam. The following is a development plan that will be implemented in Tanjungpinang City and Bintan Regency.

Figure 3.

Water Resources of Tanjungpinang City Reservoir



Source: Balai Besar Wilayah Sungai Sumatera IV, 2018.

3) Collaborate with Related Stakeholders

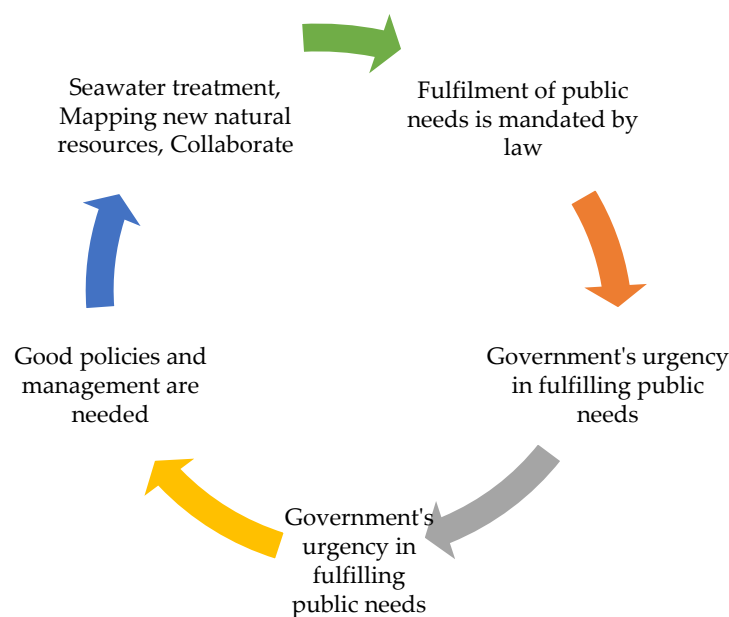
The solution to the fulfilment of water needs in Riau Islands, especially for Tanjungpinang City, has been planned together by various parties such as BPLitbang Prov. Kepri, Kepri Provincial PUPRP Office, Kepri Provincial DLHK Office, and BWSS IV by building new reservoirs on Bintan Island with the aim of maintaining future water availability for Tanjungpinang City and Bintan Regency. Although this takes a long time and a long study, the government sees it as part of a long-term investment. Building new water resources is considered a step forward because it is part of innovation in fulfilling water needs. Water demand planning has been planned until 2038 by building new reservoirs in the Bintan Island area, but the follow-up of the planning has not been fully realised, because a very large budget is needed in the provision of new natural resources. Currently, only the Kawal Reservoir is under construction. Kawal Reservoir is expected to help fulfil the water needs that have been supplied by Sei Pulau Reservoir and Gesek Reservoir.

Planning for the provision of new water resources has become a priority for the government, but planning has not paid attention to the importance of maintaining existing natural resources so that they are protected, not damaged and polluted. The urgency of protecting forests and the environment around natural resources is as important as the urgency of efforts to fulfil water needs. This is because a damaged environment will affect water discharge, so prevention efforts are needed to minimise, reduce and soften the impact (Haryono, et.al. 2010).

Meeting the needs of existing water resources requires comprehensive efforts with bold policies and management in its management. Consistency and sustainable action on water resources policies are required. So that it can be known as early as possible any problems that arise. Is it forest destruction that is the problem, low rainwater absorption, excessive water usage, lack of rain or limited raw water sources. The fulfilment of water needs is a complex matter that requires the intervention of the government and various related parties such as local communities, the private sector (Purnaweni et.all, 2017). Appropriate policies and management will ensure the fulfilment of water needs and the resilience of water resources so as to be able to meet current needs and for future generations.

The urgency of efforts to fulfil water needs is required not only in the provision of new reservoirs but also conservation measures or handling water damage to existing reservoirs, namely Sei Pulai Reservoir and Gesek Reservoir. Pursuing new programmes in the short term is necessary to maintain the availability of existing water, and the longevity of the reservoirs in the future. Although this is not a cheap investment, it will be better than sacrificing people's lives and destroying the socio-economic order that has been built.

Flow of Thought



Source: Processed by the author, 2019.

Conclusion

The increasing need for water and the limited amount of water produced by Sei Pulai Reservoir and Gesek Reservoir, requires the Tanjungpinang City government to coordinate and collaborate with the Riau Islands Provincial Government and related parties in managing the fulfilment of water needs. Through various management plans that have been carried out, such as, 1) seawater treatment, 2) mapping new water resources, and 3) collaborating with relevant stakeholders, Tanjungpinang City should have the potential to fulfil future water needs.

In meeting the water demand in Tanjungpinang City, the government sees the importance of providing new water resources for the community, but the government 'forgot' to implement excellent programmes to save existing reservoirs. The alignment of new reservoir provision programmes and programmes for the sustainability of Sei Pulai Reservoir and Gesek Reservoir is equally important in anticipating efforts to meet water needs.

Suggestions

Real follow-up is needed to realise the excellent programs that have been prepared in meeting the water needs of Tanjungpinang City, including: restoring the function of the SWRO which was stopped, accelerating the construction of planned reservoirs, restoring the function of protected forests in the Sei Pulai Reservoir area in particular, empowering local communities in protecting forests and reservoirs

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