

# The Impact of Inter-Basin Water Transfer between Johor and Singapore on Johor's Water Supply System, 1927 to 1941

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## Abstract

Inter-basin water transfer between Johor and Singapore from 1927 to 1941 had a significant impact on Johor's water supply system. This study aims to assess the consequences of this transfer and provide a contemporary perspective on its implications. Existing research on inter-basin transfers and their impact on water

systems between Singapore and Johor is abundant, but there is a notable lack of research specifically addressing Johor's water system during this time. By examining the historical context and socio-economic dynamics that shaped the inter-basin transfer, this study aims to contribute a unique perspective to the existing body of knowledge. The findings will enhance our understanding of the impacts of inter-basin water transfers and provide valuable insights for water resource management in the region. It also contributes to a comprehensive understanding of the impact of such transfers on contemporary water scarcity issues and provides practical insights for sustainable water resource management globally.

### Keywords

inter-basin water transfer – Malaysia – Singapore – Johor – British Malaya

## 1 Introduction

Inter-basin water transfer between Johor and Singapore refers to the agreement and infrastructure established between these two regions to transfer water from the Johor River to Singapore. Johor agreed to a water supply contract with Singapore due to historical agreements, economic benefit, diplomatic relations, legal obligations, and the purpose of enhanced water security. Singapore, on the other hand, depends on this agreement to meet its water needs due to limited local sources. As such, Johor and its agreement with Singapore contribute to the latter's economic development by providing it with a reliable water supply, a relationship forged in the historical context of colonialism (Chuah et al. 2018, 1–15). What makes the Johor-Singapore water relationship so interesting is the inter-basin transfer. Very few places in the world have this arrangement, and the incidents of post-colonial history and the separation of Singapore as a city-state make this transfer even more strange. Another example of inter-basin transfer can be found between India and Pakistan in the Indus Waters Treaty. As part of the treaty, India agreed to build infrastructure projects to store and divert water from the eastern rivers for irrigation and hydroelectric power generation (Alam et al. 2002, 341–353).

The inter-basin transfer within the water relationship between Johor and Singapore is intriguing, especially within the historical context of pre-independent Malaya. The diversion of water from the Johor River to Singapore during this era carries significant implications and draws attention to the intricate dynamics of water governance between the two regions. Furthermore,

it illuminates the challenges encountered in managing water resources within a colonial framework. Inter-basin transfer played a crucial role in addressing the water demands of Singapore, a burgeoning city even before Malaya gained independence. With limited freshwater sources in Singapore, the transfer from the Johor River became essential for ensuring a stable water supply for the growing population and industrial development (Otaki et al. 2007, 259–265). This arrangement also signifies the unequal power dynamics and economic control exerted by the British colonial forces in Malaya. The construction of infrastructure for water transfer, such as dams and pipelines, was part of British efforts to establish their dominance and secure their economic interests in the region (Abdullah et al. 2023, 2–10).

Furthermore, Singapore also shared its knowledge on water conservation practices as well as infrastructure development with Johor. Singapore had invested significantly in building reservoirs, water treatment plants, and an extensive network of pipelines. By sharing its experiences in planning, designing, and constructing such infrastructure, Singapore aimed to assist Johor in improving its own water infrastructure and enhancing overall water security. Through these collaborations, Singapore aimed to strengthen water resilience not just for itself but also for Johor. By offering its expertise and knowledge, Singapore sought to build stronger water infrastructure, reduce water scarcity issues, and enhance the overall quality of water supply in the region (Kaplan 2016, 125–138).

Imperialism and colonialism have traditionally involved the acquisition and control of territories by powerful nations for economic, political, and strategic gains. The management of natural resources played a crucial role in the colonial enterprise, as colonies were often seen as sources of valuable commodities for the colonial powers (Tvedt 2011, 173–194). Inter-basin water transfer between Johor and Singapore, in particular, occurred during the period of British colonial dominance in the region. Singapore was a British colony, and the transfer of water from the Johor River to Singapore can be seen as an extension of the colonial power's control over natural resources. The British administration in Singapore recognised the importance of securing a reliable water supply for the rapidly growing colony, and the water transfer project was part of their strategy to ensure the availability of this vital resource for their own interests. By diverting water from the Johor River, the colonial power exerted control over a natural resource that belonged to Johor, exploiting it to meet the water needs of Singapore. This case represents a classic example of how colonial powers utilised the management of natural resources for their own benefit, often at the expense of the colonised territories. Furthermore, it highlights the power imbalances and inequalities inherent in colonial

relationships, where the needs and interests of the colonial power take priority over those of the local population. This study's focus on the Inter-Basin Water Transfer between Johor and Singapore and its impact on Johor's water system from 1927 to 1941 is justified due to the extensive research already conducted on inter-basin transfers and their impact on water systems in Singapore.

## 2 Research Methodology

This study, rooted in historical research, employed qualitative research methods to accomplish its objectives. The research process involved various actions and methodologies, including critique, analysis, heuristics, and historiography. To comprehensively explore sources related to water supply construction in Perlis from 1927 to 1941, the researchers conducted library research, focusing on both primary and secondary sources. To compile a thorough list of relevant materials, visits were made to key repositories, such as the National Archives of Malaysia, the National Archives of Singapore, the National University of Singapore, the National Library of Malaysia, and the Libraries of Public Institutions of Higher Learning (IPTA) in Malaysia. The research heavily relied on official documents, including British office records, secretary files, and journal books.

The commencement of the research involved a heuristic process wherein information from newspapers, official documents, and other pertinent materials was collected and scrutinised. Subsequently, a source critique was conducted to compare and validate the obtained information against other sources, such as books, journals, and scholarly works. This critical step aimed to eliminate inaccuracies related to the research topic. Following the critique, an analytical process was employed, involving inferences drawn from both primary and secondary sources. This analytical phase contributed to the synthesis of the specified sources, ultimately shaping the findings of the study. The concluding phase involved the writing of history, referred to as historical historiography (Mohd Noor 2006, 1–53).

## 3 Literature Review

Inter-basin water transfers have played a crucial role in addressing water scarcity and meeting the growing water demands in various regions around the world. In the context of this study, many researchers have focused on water agreements between Malaysia (namely, Johor) and Singapore. For instance,

Huxley (1991), Ganesan (1998), Abdullah (2013; 2014), Onn (2003), Long (2001), Tortajada (2006), Lin (2003), Chakraborti & Chakraborty (2018), Mohamed Fadzil et al. (2020), Rukmana (2022), Che Ismail et al. (2012), Padzil (1998; 2007), and Abdan and Hussin (2011) have concluded that the rapid growth of Singapore as a strait state, especially before its independence, was due to its success in controlling and developing raw water resources in Johor before being channelled to Singapore. In this in-depth study, we realised that research on the inter-basin water transfer between Johor and Singapore and the impact on Johor's Water Supply System has not yet been highlighted by researchers. The current research, therefore, offers a new dimension to the discourse on imperialism in Malaya.

However, research on inter-basin water transfer in foreign countries has long been a subject of interest among scholars and researchers. Ghassemi and White (2007) state that inter-basin water transfer projects focusing on Australia, the United States, Canada, China, and India are a viable solution for addressing water scarcity and imbalances in water availability. The research argues that these projects, when properly planned, implemented, and managed, can contribute to sustainable water resource management by ensuring water supply for various sectors, such as agriculture, industry, and domestic use. In addition, Rollason et al. (2022) highlight the increasing popularity of inter-basin water transfer as a viable supply-side solution for addressing water scarcity. Their findings suggest that inter-basin water transfer is not only gaining recognition but is also likely to become a key tool in the hands of water managers in the future. This emphasis on its potential as a long-term solution further underscores the importance of studying and understanding the implementation and outcomes of inter-basin water transfer projects in various regions worldwide. On the other hand, de Andrade et al. (2011) argue that the Brazilian experience with large-scale inter-basin water transfer projects, particularly in the metropolitan regions of Rio de Janeiro and Sao Paulo, highlights the importance of effective communication and conflict resolution strategies. In Brazil, the need for these projects, driven by the clear and undisputed demand for water, is undeniably strong. However, numerous factors create barriers that hinder their implementation. These factors include the significant investments required, the lengthy time needed for construction, the necessity to garner public and political support, and the need to comply with national and regional environmental laws.

## 4 Results and Discussion

### 4.1 *Inequality of the Water Agreement between Singapore and Johor in 1927*

The Water Agreement of 1927 between Singapore and Johor stands as a cornerstone in the historical relationship between these two entities. However, beneath the surface of this agreement lies a complex web of issues pertaining to inequality and imbalance. This section delves into the disparities inherent in the Water Agreement, shedding light on the nuances of power dynamics, economic disparities, and historical legacies that continue to shape the water relationship between Singapore and Johor. By examining the intricacies of this agreement, we aim to uncover the underlying issues and challenges that have persisted over time, ultimately contributing to a deeper understanding of the complexities surrounding water governance in the region.

When the British gained control of Malaya, it was apparent that they were coveting control of its water sources due to the importance of these sources for the regional water system (CO 273/313). Thus, it is imperative to understand the nature of the regional water system as it elucidates the rationale behind the British decision to build a dam, which can be regarded as an astute and rational imperialism strategy (Abdullah and Mohd Noor 2020, 89–113). In the early 20th century, the Singapore City Council realised that the country would face a critical water supply issue due to economic development and a growing population. Hence, the City Council had decided to add to the water supply, and subsequently began to obtain information on raw water supplies in Lenggü and Sisik Baharu upon the promotion of a British agent in Johor, D. G. Campbell, in 1910, a position as of 1914 known as the General Adviser. In the beginning, Singapore had offered its expertise to develop a reservoir area at Gunung Pulai, with some of that water supply to be distributed to Johor according to local demands (CO 273/313). The Johor state government at that time had consented to proceed with the research plans for water supply at Gunung Pulai since the location was ideal as an efficient freshwater supply and was closer to Singapore.

At one period of the investigation, it was thought that this area would provide a scheme superior to that of Pulai, but when worked up it was found that the water supply which could be so obtained, although ample in quantity would have been costly, as the distance from Singapore is greater and the whole quantity of water would have had to be pumped.

GAJ 677/20

Previously, the Johor Public Works Department had planned to make the water reservoir area in Gunung Pulai the state's main source of water. However, in discussion with Singapore, Johor agreed to hand over Gunung Pulai to the Singapore Municipal Council to be developed. Through this scheme, Johor would receive a constant water supply, while the gravity method would be used to distribute water to tanks in Singapore. To ease the management of the Johor-Singapore water supply, the Singapore Municipal Council representatives asked Johor to determine the amount of water needed by the state (Singapore Municipality 1924). At first, Singapore agreed to provide for the entire cost of developing the reservoir, while the annual payment for machine maintenance, including the maintenance and cleaning of machines, would be borne by both parties. In addition, the Singapore Municipal Council suggested that all reservoirs in the country, inclusive of state lands, must be given a guarantee for no cost involved (GAJ 67/21) and that the Johor government must consider the use of those lands as part of the implementation of plans to develop reserved lands for public use. The same applied to the cost of and investment in water supply works, which were divided between Johor and Singapore. For water supply distribution, Singapore would receive 7,200,000 gallons of water, while Johor would get 1,200,000 gallons, or 1/6 of the total amount. As for the rough estimation, the payment for clean water supply, which was used by Johor, was 39 cents per 1,000 gallons. However, the proposed price was rejected by the Johor General Adviser as it was of no benefit to the state. If the agreement was sealed, Johor would have to pay the original price for 600,000 gallons of supply per day, whereas the extraction of untreated water from Johor cost only 30 cents for each 1,000 gallons. The Singapore administration finally consented to a payment of 600,000 gallons from the Gunung Pulai water source and explained that:

... the less Johor took from the new scheme, the more Singapore would be pleased, and it was pointed out that a partial supply of 3,000,000 gallons would be available for about 3 years, while the full supply would be available for some years.

GAJ 67/21

Finally, on 19th December 1921, both parties agreed to produce a memorandum of understanding to ensure the success of the water supply scheme for the countries. A signing ceremony for this purpose was attended by representatives of the Singapore Municipal Commission and the Johor state government. Johor was represented by a General Adviser, the Head of Engineer for the state, and the President of the Singapore Municipal Council. Singapore was represented

by the President of the Singapore Municipal Council, the Head of Engineer in Singapore, and a water engineer from a special department. An agreement for the construction work for water supply in Gunung Pulai was the main issue discussed. Some of the contents of the memorandum were:

- I. For the first water supply, Johor had a right to 500,000 gallons of water per day, beginning in 1924 until the scheme was ready. When the scheme was completed in 1928, the Johor State Government had a right to 800,000 gallons of water per day at 35 cents for each payment of 1,000 gallons.
- II. The Johor State Government guaranteed the Singapore City Council that they would not be charged for any land reclamation at Gunung Pulai.
- III. The Johor State Government would provide tools, while Singapore would provide the capital to prepare for materials needed to carry out tasks related to water supply.
- IV. The Muntahak Reservoir would be turned into reserved land. For 10 years, any type of development was prohibited in the area until 1930. The City Council could only conduct research. After 1930, Singapore was required to give one year's notice to Johor if it was interested in developing the area (CLMJ 2465/20).

At the same time, the Singapore City Council continued to conduct research in several identified areas, namely, Muntahak, Pelepah, Lenggiu, Semangar, Jengeli, and Kangkar. In addition, they also did some research on Sungai Johor. The various research projects conducted in these areas were a sign that Singapore was making early preparations to face future water scarcity. The preparations were made based on the increase in water usage in the city.

The consumption in 1921 amounting to 10,057 gallons was in excess of the maintainable yield of your existing sources, and as the demands are increasing from year to year, it is obvious that the position is an extremely precarious one, and if an additional and satisfactory supply cannot be found within the island, there is no alternative, but to go further afield.

SINGAPORE MUNICIPALITY 1922

To continue Singapore's efforts to obtain a water catchment area in Johor, Singapore appointed Messrs. Drew and Napier as legal advisors in its preparation to seal a water supply agreement with Johor (Singapore Municipality 1924). Finally, on 5th December 1927, the Johor government, which was represented by the Sultan of Johor, and the President of Singapore City Council officially signed a water supply agreement between Johor and Singapore (CO 273/313). Some of the agreements for water supply recorded between the Johor government and Singapore City Council are listed below:



- I. Singapore could construct a reservoir and carry out work related to water supply at Gunung Pulai, which has a land area of about 2,100 acres. Singapore would pay an annual rental fee of 30 cents per acre without a premium.
- II. For an additional area of 21 square miles, any inhabitation is without the consent of the Singapore Municipal Council, and if they were interested in using the land, a rental fee of \$5.00 would be charged.
- III. Reserved land for Singapore Municipal Council would be used only for works related to water supply.
- IV. The government of Johor was allowed to obtain as much as 800,000 gallons of water per day through the Singapore Municipal Council for 25 cents per 1,000 gallons.
- V. In 1929, if the demand for domestic use increased, Johor could add to supply, but the difference could not exceed 1,200,000 gallons per day at the same price.
- VI. If the government of Johor and the Singapore Municipal Council failed to come to a consensus on adding to the supply, the dispute could be brought to court.
- VII. The fee of 25 cents per 1,000 gallons of water was inclusive of the cost of construction and equipment, as well as additional tasks for water supply. The government of Johor would not be responsible for any costs except for those involving the laying of water pipes from one area to another in the state.
- VIII. A meter was installed by the Singapore Municipal Council to ensure the quantity of water supplied to Johor. Johor engineers or other parties that were entrusted with the task were to check the meter or other relevant matters. The installation of the meter was not charged.
- IX. The Singapore Municipal Council Commission would be responsible for any damage to the road or elsewhere during the ongoing water supply works.
- X. Singapore would not bar or cut off the water supply if there was no emergency, and notice had to be given to the Johor government prior to any disruption. If there were disputes between the two parties, the matter would be referred to the Governor of the Straits Settlement.
- XI. After 15 years of treated, clean water service from Singapore to Johor, the Commissioner would submit the account to be audited by those appointed to re-evaluate the agreement in order to discuss the royalty issue or reduction in payment if the account showed any profit (CO 273/313).

Singapore's control over the natural resource from Johor sparked uneasiness among the dignitaries, particularly with the handover of Gunung Pulai to Singapore. One wrote:

... Johor has lost its feelings and administration as well as inquiry over something which is its responsibility to the extent that it does not occur to the state that Gunung Pulai has numerous wealth and potentials. Hence, Johor has forgotten, and it is confused in the matter pertaining the mountain's reservoir like a cooped-up fowl and a puzzled, defeated gambler". Since the state does not think through the matter, has lack of faith, ambition, hope, and worries about the future, the serene Gunung Pulai has abundant of water which is priceless to the Singapore city. The city spent money and divided the land area to construct a huge, invaluable water reservoir with very few conditions that are related to Johor's benefits as though Johor has handed the mountain together with its water pipes to Singapore for a duration of time. Johor could only depend on a small amount of water from this project.

Gunung Pulai reservoir was not a pond or pool, which could dry up as we have already learned from the water ponds that were constructed upstream or streams. Water from the mountain, by nature, would not dry up, lessen in quantity or completely dry up as rivers and the source of water from the mountains are created by Allah to sustain the lives of His servants: Everybody and everything requires water as it is crucial for all types of businesses, transports, and vehicles be it those which could move or the ones that remain stagnant, those who are used on land or at sea, in the ground, or ... for each of their types, every day the number keeps on increasing and the need for water and its importance to a country is long-lasting. Therefore, it is undeniable that buying water is compulsory and every relevant item becomes the state's priceless product that will not cause poverty until the annihilation of this earth due to wars. People will not stop using even when Johor hands over Gunung Pulai and a big area of land to Singapore to be governed.

If Johor itself had to spend a large sum of money, which could amount to ten million of ringgit, it would be easy and quick for the state to re-collect the money as a revenue from the water on the mountain. Undeniably, water from Gunung Pulai is a big scale business as each drop becomes money (valuable) and the mountain can be a ransom for Singapore. By population, Singapore has only 5,000,000 people and each person will

use 50 gallons of water a day and the price is one cent per two gallons. This amounts to 25,000,000 gallons per day and it will cost \$ 31,250 daily, or \$ 937,500 a month or \$ 11,250,000 annually. In other words, with the capital of ten million ringgit, a year is needed to break even. Even if Johor did not have that ten million ringgit and had to loan with interest, it would be easy and quick for the state to pay back and matters pertaining Gunung Pulai and its water would become a prized possession among the people. Johor would be the most distinguished water merchant in Peninsular Malaysia, and the state was not scared or shaken even when rubber only costs a cent per kati.

The calculation above is limited to one issue. Do count the millions of gallons that will be used by vessels belonging to the people of Johor town and for warships as well as the army at the Naval Base. Roughly, let's say the vessels need 6,250,000 gallons per day with annual income of \$ 2,812,5000 and the warships require 4,000,000 gallons per day, which amounts to \$ 2,250,000 per year and the army uses 2,500,000 gallons per day that brings an income of \$1,125, 000 annually. Altogether, the amount of accumulated income is \$ 61,875,000 per year, which is added to other revenue collected from Singapore. The amount is a staggering \$ 17,437,500 per year—look at the number and imagine whether or not Johor would benefit or lose out if it takes charge of Gunung Pulai reservoir?! ....

CJMJ 794/25

It is obvious that the water treaty mentioned in the letter caused losses as well as the deprivation of Johor's main natural source for the sake of Singapore. It was felt by people from all walks of life in Johor since the treaty between both parties was dominated by Singapore. Johor completely embraced the agreement, even though Sultan Ibrahim's decision to accept it with a payment made through a land concession was considered less valuable for the state. Referring to a recorded statement from one of the elites, if Johor developed its own water supply sector without the assistance of Singapore, even when facing debt from the Federated Malay States, the state would still make a lucrative income through water and the sale of water to Singapore (CJMJ 794/25).

#### 4.2 *The Increasing Demand of Water Supply in Johor During 1927–1941*

Water scarcity was a threat that could not be avoided due to an increase in urbanisation and industrial activities in Johor. The period from 1927 to 1941 marked a crucial juncture in the water relationship between Johor and Singapore, characterised by the signing of the Water Agreement in 1927. This

agreement, while initially aimed at addressing the water needs of both regions, laid the groundwork for significant shifts in water dynamics, particularly in Johor. This section explores the increasing demand for water supply in Johor during this period, focusing on the impact of the 1927 agreement. By delving into these issues, we aim to gain insight into the evolving dynamics of water governance in Johor and the broader implications of the 1927 agreement on water resource management in the region.

The early water supply in Johor Bharu was dependent on Singapore and a reservoir close to Sungai Chat. The reservoir had already been in use for 60 years by the time of the agreement, with a filtration system constructed in 1914. Hence, the Johor Public Works Department needed to introduce a new system. A reservoir planned earlier was able to provide 300,000 gallons of water daily in 1921 to sustain the needs of 15,000 people. Nevertheless, water shortages in this area began on 1st July 1929. As a solution, the Public Work Department sent notices to the Johor Municipal Council for an additional purchase of 600,000 gallons from Singapore (SEJ 742/31). To address the increasing water demand, the Johor government allocated a budget of \$104,469 from \$110,700 for this issue (SUJ 1701/29). This included \$27,914 spent to buy 9,600,000 gallons of water from a reservoir in Singapore (Gunung Pulai reservoir) over the course of a year. In all, the total amount of water supplied to Johor in 1936 was approximately 14,280,000 gallons (Annual Report P. W. D. Malaya 1935).

Other than paying for treated water supply from Singapore, Johor Bharu also received water from Ayer Molek (Annual Report P. W. D. Malaya 1935). If the reservoir in Ayer Molek was contaminated, the Johor government planned to obtain additional water from Gunung Pulai for the whole of Johor Bahru, where in 1932, the use of water was close to 800,000 gallons of water per day. Later, water supply problems became a crucial issue when Johor Bharu sustained a dry season of 10 weeks in 1937. The source of water from a reservoir close to Sungai Chat could not be supplied to the city. At that time, 400,000 gallons of water were needed from that source to support 28,000 people.

While it is known that very considerable waste of water is prevalent at the present time, it is clear that the population is still increasing and that with a gradual introduction of modern bathing and sanitary facilities, the consumption per head has been more than doubled.

SSJ 33/40

Through the existing water supply, Johor Bahru could only get 600,000 gallons of water per day. Water scarcity therefore gripped the lives of the population

during the dry season when the state could only provide 200,000 gallons per day. To obtain additional supply, the Johor government paid for water from reservoirs in Air Pulai and Pontian, which belonged to Singapore, but the amount bought from Singapore was limited to only 1,200,000 gallons per day. The Chief Minister of Johor voiced his concern over water scarcity issues in Johor Bharu.

I do not think the Singapore Municipality can help us much more than the present amount as they themselves are facing the same problem of meeting an increasing demand for water on the island. At this stage, I do not advocate the proposition of utilising our advantage to demand water from the Municipality. We should wait until the end of the period agreed upon when we shall be able to examine their accounts and perhaps, we might be able to get a reduction of charges for water.

SSJ 33/40

As an initial step to overcome this issue, the engineering department in Johor submitted proposals to the Chief Minister of Johor to develop Tebrau. The increase in water demand in 1940 for as much as 1,800,000 gallons of water daily had caused the Chief Minister to call for research to be conducted at the water catchment area in Tebrau in 1941. The scheme was expected to supply water for 20 years for Johor Bahru. Johor Bahru, as a thriving city, required 2,000,000 gallons per day. However, through the Tebrau scheme, Johor had hoped to provide 3,000,000 gallons per day. This amount was needed as a preparation to distribute water to Tampoi Hospital, schools, and the neighbouring villages (SSJ 1903/33).

From the Tebrau scheme developed by the government of Johor, the state expected that 50,000 people who resided in the state would be getting sufficient water supply. On 29th June 1941, a detailed report from the research on the source of water supply in Johor was completed, and three new areas were identified: the source of water from Singapore, Sungai Chat, and Sungai Bala, as well as the catchment area at Sungai Tebrau. Buying water from Singapore was not profitable since the Johor government had to pay a rate of 25 cents for 1,000 gallons. Hence, the state planned not to prolong its dependency on Singapore for future water supply. From research findings on the construction of reservoir service, the cost would be 19 cents for 1,000 gallons of water (MBJ 282/41).

At that time, the amount of water stored in the reservoir at Sungai Chat was 21,000,000 gallons. The total amount was supported by the water catchment area at Sungai Chat, which was 1.4 square miles, while the water catchment

area for Sungai Bala was 1.2 square miles. On normal days, the amount of water supplied was 1,600,000 gallons. Unfortunately, during the dry season in 1937, the amount of water supplied was only 600,000 gallons per day. Hence, there were suggestions made to elevate the reservoir. However, the plan fell short due to the condition of the spillway, which was old and needed to be replaced, thereby increasing the expenditure (MBJ 282/41).

The Tebrau scheme launched earlier would have a catchment area of 26 square miles. With such a large area, the reservoir would be able to supply water to Johor Bahru at 3,000,000 gallons per day and sustain the needs of as many as 75,000 people at a rate of 40 gallons per individual. The Tebrau scheme was inclusive of the construction of a reservoir, catchment pond, filtration centre, and pump station in the valley of Sungai Tebrau. One low-level service reservoir with a capacity of 1,500,000 gallons was proposed to be distributed to east Johor Bahru city. As a temporary measure, the water supply was obtained from a water tank located on Bukit Senyum with a capacity of 50,000 gallons (MBJ 282/41).

The estimated cost for the construction of a pond, filtration centre, pump station, and waterpipes, as well as land reclamation, was \$1,143,000. The cost required to obtain 1,000 gallons was 8 cents for the production of 2,000,000 gallons of water, or 15.6 cents for 3,000,000 gallons of water. G. R. Percy, the state engineer, had requested that the Johor government consider the implementation of the Tebrau scheme since it could provide an affordable water supply and operate in the long run. He suggested that Johor should buy water from Singapore only for emergency cases. As for the water catchment area at Sungai Chat, it would not be developed if the scheme was successfully executed (MBJ 282/41).

G. R. Percy proposed that the government of Johor re-consider the water agreement between the state and Singapore in the discussion to renew the treaty. This was because Johor Bharu had just recorded an increase of 100,000 gallons of water per day. However, while waiting for completion of the Tebrau scheme, the Johor government had to ask for assistance from Singapore to provide the amount of water required.

I intend to approach the Municipal Water Department Singapore and say, the Johor Government is going to build the reservoir at this place as soon as possible and in the meantime, as a purely temporary measure, kindly allow me to tap your rising main.

SSJ 299/40

The water supply had previously been obtained from the Tampoi and Jalan Tebrau areas. However, in order to meet the increased demand from various sources, including the Tampoi Hospital and the army officers residing in Bukit Senyum and the east side of Johor Bahru, a service reservoir with a capacity of 1,500,000 gallons of water was planned for construction. This reservoir would not only cater to the water requirements of the police and J. M. F. Barracks but also necessitated the implementation of a suitable water supply distribution method. Given the topography of the area, it was determined that a gravity flow system would be the most effective method for distributing water from this reservoir (SSJ 299/40).

#### 4.3 *Effects from the Implementation of Water Supply Plans in Johor*

The water supply development in Johor during this time had its own effects on revenue and health (CO 715). Undeniably, all projects regarding water supply were profit-oriented so that the income generated could be used to develop more water supply projects for future use. At the same time, a constant increase in revenue from water supply would indicate that the people of Johor had embraced modernization regarding water supply. However, convincing people to shift from the traditional way of obtaining water ingrained into their daily routines to a new way was not an easy task. In addition, significant income from water supply would also show that there was an increase in the use of water in the Johor economic sector. A consistent increase in revenue would also signify the success of the Johor state government in developing the water supply sector in the early 20th century. The water supply charges were structured as follows:

- I. For private residences, the charges ranged from 30 cents to \$1 per 1,000 gallons consumed.
- II. For commercial and industrial purposes, the charge was set at 50 cents per 1,000 gallons of water utilised.
- III. The cost for water supply units was split into two options: either 25 cents per unit consumed or a rate of 6 cents per unit in addition to a flat fee for electricity (CO 715).

Based on the presented data (figure 1), starting from 1930, the revenue generated from water supply amounted to \$115,276. From 1930 to 1933, there was a decline of \$19,303 in water supply revenue, leaving a total of \$95,973. This decline can be attributed to the implementation of various water supply projects, such as the construction of the water catchment area in Gunung Ledang, aimed at meeting the increasing demand in the specified locations. From 1934 to 1939, it was observed that water supply profits in Johor exhibited a consistent increase. For instance, in 1934, the revenue generated was \$116,894. By 1939,

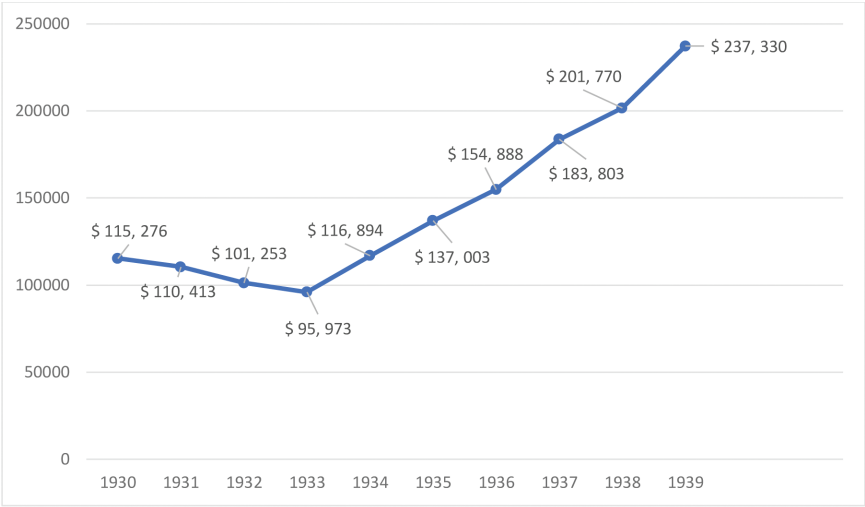


FIGURE 1 The Revenue of Water Supply in Johor, 1930–1939.  
SOURCE: CO 715, ANNUAL REPORT ON THE SOCIAL & ECONOMIC PROGRESS OF THE PEOPLE OF JOHOR FOR (1939): 47.

this figure had risen by \$120,436, culminating in a total revenue of \$237,330. Notably, there is a gap in the available data for the year 1940. The upward trend in revenue aligns with the development of water supply infrastructure, particularly the successful operation of projects completed in Muar and Johor Bahru. Additionally, the Johor state government’s strategic decision to procure treated water from Singapore at a cost of 25 cents and subsequently resell it to domestic and economic sectors within the state significantly contributed to the increase in water revenue (CO 715: Johore Annual Report, Annual Report on the Social and Economic Progress of the People of Johore for 1939; Ya’acob et al. 2023, 81–106). These measures underscored efficient fiscal management and resource utilisation, ultimately bolstering the state’s income. According to the Johor Health Department:

Water supply on the whole is satisfactory in quantity and quality. The supplies are examined regularly and chemically as well.

A positive statement from the health department itself indicated that the water supply distributed to the people in Johor was guaranteed in terms of quality and quantity. Furthermore, the population in Johor was spared from contagious diseases such as cholera and dysentery (Sahidan et al. 2023, 162–178). The quality of health among the locals increased since many of them



were employed in the Johor economic sectors, such as pineapple, gambier, coconut, and other industries. Indian workers, who were important labourers in the Johor water supply sector, were also provided with clean water for their daily use. Lastly, it was apparent that Johor had succeeded in developing water supply in its state even when the main natural source assets were managed by Singapore (State of Johor, Medical Report for The Year Ending, 31st December 1939).

#### 4.4 *Lessons from the Inter-Basin Water Transfer between Johor and Singapore from 1927 to 1941*

The period from 1927 to 1941 marks a crucial chapter in the inter-basin water transfer between Johor and Singapore, offering valuable lessons and insights into geopolitical dynamics, resource exploitation, and bilateral relations. This section aims to explore the significant geopolitical implications of the water transfer agreement, shedding light on the intricate interplay between these two nations within the context of a globalised world. By examining this historical case, we can draw parallels with other instances of resource exploitation and geopolitical struggles globally, illuminating broader patterns and trends. Moreover, the lessons learned from this period hold profound implications for the relationship between Malaysia and Singapore, particularly in the context of the ongoing water issue. Through a comprehensive analysis of this historical episode, we seek to uncover valuable lessons and perspectives that can inform contemporary discourse and policymaking surrounding water governance and interstate relations in the region.

The inter-basin water transfer between Johor and Singapore from 1927 to 1941 had significant geopolitical implications, illuminating the intricate dynamics between these two nations in a globalised world. This initiative, which involved negotiations between the British colonial government and the Johor Sultanate, reflected power dynamics and sovereignty issues (Kathirithamby-Wells 1988, 35–62). As Singapore's economic importance grew, it became reliant on Johor's water resources. The result was a complex economic interdependency with potential influence on political relations. The control over water resources also provided strategic advantages for Singapore, thereby enhancing its water security and potentially influencing its regional relationships. Additionally, the inter-basin water transfer highlighted the need for transboundary cooperation on water management, particularly given the potential for water-related issues to impact diplomatic relationships. Furthermore, the environmental impacts and ecosystem effects of large-scale water transfers raise questions regarding sustainability and conservation, adding another layer to the geopolitical implications. The lessons learned from this water transfer can serve as valuable

insights for international water governance in a globalised world, with emphasis on equitable sharing, sustainable management, and the establishment of legal frameworks for transboundary water resources.

Inter-basin water transfer between Johor and Singapore from 1927 to 1941 resembles other instances of resource exploitation and geopolitical struggle (Mohd Nor 2017, 23–50; Zakariah 2017, 30–78). This case study offers insight into the interplay between nations and the complex dynamics surrounding resource control and management. Throughout history, water has been a source of conflict and cooperation between nations. The Johor-Singapore water transfer reflects the challenges and complexities associated with resource exploitation and the potential geopolitical struggles that can arise. Similar situations have been observed in other regions where water scarcity or resource abundance has sparked tensions between neighbouring states. For example, the Nile River Basin has been a focal point of geopolitical struggle as countries seek control over water resources. Disputes over the distribution of water from the river have emerged between Egypt, Sudan, and Ethiopia. The implications of these struggles extend beyond water management to political relations, regional stability, and even the potential for armed conflict. The impact on Johor's water system caused by inter-basin water transfer parallel these instances with common themes of resource exploitation, sovereignty, power dynamics, and environmental consequences. It underscores the broader global patterns in which natural resources become sources of conflict or cooperation, often influencing geopolitical relationships and shaping the actions and policies of states. By examining the specific case of the Johor-Singapore water transfer, we gain a deeper understanding of the universal challenges and complexities associated with resource control and the geopolitical struggles that can arise. This case study offers insights that can inform the study of similar instances globally and contribute to a broader understanding of the interplay between nations in a globalised world.

The lesson from the inter-basin water transfer between Johor and Singapore from 1927 to 1941 has profound implications for the relationship between Malaysia and Singapore, particularly in the context of the water issue. This historical investigation enables a comprehensive understanding of the origins and evolution of the water problem between Johor and Singapore, which in turn contributes to a shared perspective and empathy between the two nations. By exploring the ramifications of the water transfer on Johor's water system during that particular timeframe, researchers can uncover the grievances and concerns that Johor may have harboured, illuminating potential instances of water scarcity or system disruptions. Such an in-depth understanding is paramount for Malaysia to effectively present its position and engage in fruitful

negotiations with Singapore. Moreover, the research findings can inform policy formulation processes, providing crucial insights into past agreements and policies related to inter-basin water transfer. By examining the political, economic, and social factors that shaped these policies, researchers can pinpoint any inadequacies or imbalances, empowering Malaysia to advocate for revised terms or alternative solutions that are fair and sustainable for both nations. Disseminating the research outcomes can also play a pivotal role in building public awareness and shaping public opinion on the water issue. By sharing evidence-based research with the general public, policymakers, and stakeholders, a more informed and engaged public debate can be fostered.

## 5 Conclusion

The research on the inter-basin water transfer between Johor and Singapore from 1927 to 1941 provides several critical issues and findings. Firstly, the inequality of the Water Agreement signed between Singapore and Johor in 1927 stands out as a significant issue. This agreement, which heavily favoured Singapore, highlighted the disparities in bargaining power between the two parties and underscored the need for more equitable water agreements in the future. Secondly, the increasing demand for water supply in Johor during the period under study revealed the pressing need for sustainable water management strategies. Population growth, urbanisation, and industrialization placed immense pressure on Johor's water resources, necessitating proactive measures to ensure adequate supply for both present and future needs. Thirdly, the effects stemming from the implementation of water supply plans in Johor underscored the complexities of managing water resources in a rapidly developing region. These effects ranged from ecological disruptions to socio-economic impacts, emphasising the importance of holistic and inclusive water management approaches.

Lastly, the lessons gleaned from the inter-basin water transfer between Johor and Singapore offer valuable insights for policymakers and stakeholders. By examining the successes, failures, and unintended consequences of past water agreements and transfers, policymakers can devise more informed and effective strategies for addressing contemporary water challenges. In summary, this research underscores the imperative for sustainable water management practices, equitable resource distribution, and enhanced cooperation between Malaysia and Singapore. By addressing the identified issues and leveraging the significant findings, policymakers can work towards securing a more resilient and mutually beneficial future for both nations. Continued research

and collaboration are essential to navigate the complex dynamics of water governance and ensure the well-being of present and future generations. Additionally, it highlights the imperative for Malaysia and Singapore to enhance dialogue and cooperation, especially concerning water issues, in order to foster a more robust and mutually beneficial relationship.

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