

## Abstract

Small island sustainability is a very precarious topic involving the careful data collection of local resources and ensuring enough is available for use within the present and future generations to come. Trinidad and Tobago is a collection of islands in the Caribbean that is known for its once large natural gas reservoir that has continued to be the economic engine and mainstay of financial prosperity for the country, compared to relying heavily on tourism as a revenue source. However, as the reserve of fuel slowly depletes with an increasing population size and consumption rate, there has been discussion and policies developed in the process that encourage greater attention to and welfare of the limited resources, specifically fuel, freshwater and arable land. The research conducted in this study will identify the inventoried resources currently available in Trinidad and Tobago. In addition, the study will outline the difficulties and constraints that prevent Trinidad and Tobago executing a quick solution to an otherwise time-sensitive issue, with small islands continually experiencing the effects of global climate change and human development influencing the availability of local resources.

## Introduction

Trinidad and Tobago is a collection of small islands in the Lesser Antilles of the Caribbean Ocean that harbors 1.4 million residents (Worldometer 2021). Agriculture is a careful practice on islands due to limited access to resource availability.

Trinidad and Tobago's islands sit above a large fossil fuel reservoir. Trinidad and Tobago's access to natural gas has been utilized to power its population as well as for exportation to generate revenue from other countries. Precipitation is the primary source of surface water in Trinidad and Tobago. In terms of soil textures, most of Trinidad and Tobago is made up of clay and sandy soils. The topography of the main island, Trinidad, is covered in savannas, swamp forests, littoral woodlands and mangrove swamps (Day and Chynoweth 2004). It was projected back in 2016 that, with the current consumption rate, Trinidad and Tobago would run out of oil in 35 years which is determined to be around year 2051 (Worldometer 2021).

## Objectives

- This study will outline current agricultural development including the use of energy, water and soil.
- The proposed analysis is to describe the current status of agricultural management in Trinidad and Tobago for use of sustainable practices.
- Identifying Trinidad and Tobago's resources was the first step to this analysis.

## Methods

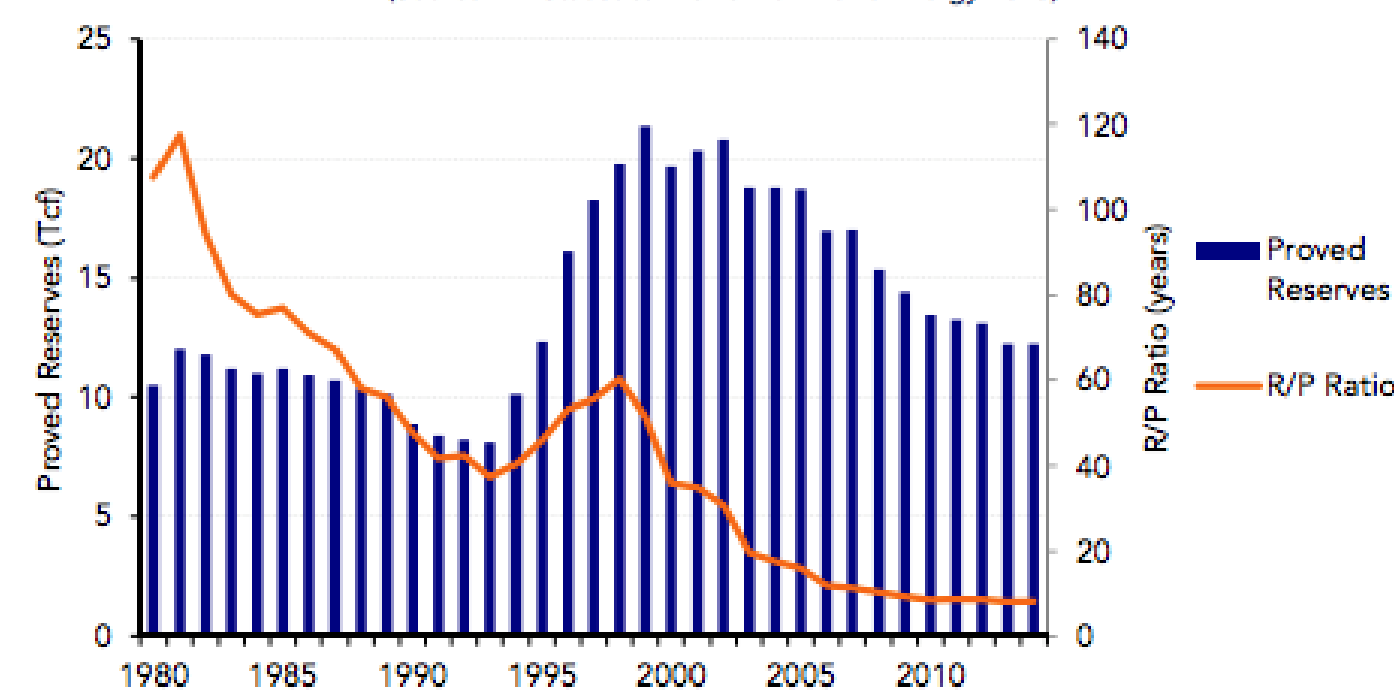
- A thorough scan of data collection from peer-reviewed papers was conducted.
- Material used for this study also included resources from local Trinidad and Tobago government websites that detailed policies and procedures.

## Results

- As of 2011, 10.6% of land use in Trinidad and Tobago is used for agriculture (IndexMundi 2021).
- Around 4.9% is arable (farming) land, 4.3% permanent crops, 1.4% permanent pasture, 44% forest (IndexMundi 2021).
- The agriculture sector in Trinidad and Tobago only contributes around 0.5% to the GDP (Shik et al. 2018).
- WASA (Water and Sewage Authority) owns the public water supply system, which is operated under the government Republic of Trinidad and Tobago.
- "WASA produces approximately 1.02 million cubic meters per day" with 62% of the supply volume going toward surface water requirements (Warrick and Ekwue 2013).
- Trinidad currently uses treated wastewater that is pumped into the river water and irrigated onto crops (Warrick and Ekwue 2013).
- Unfortunately, most of the wastewater treatment facilities located in Trinidad and Tobago are poorly managed or are abandoned, which is causing an influx of harmful water dispersion (Warrick and Ekwue 2013).
- Most of the food in Trinidad and Tobago is imported, while traditional island crops have declined over the years (Shik et al. 2018).
- Current constraints to agricultural development include land rights uncertainty due to over 200,000 families squatting on lands (Shik et al. 2018).
- In addition to squatting on lands, there is the continued challenge with farm theft and praedial larceny as well as low competition (Shik et al. 2018).

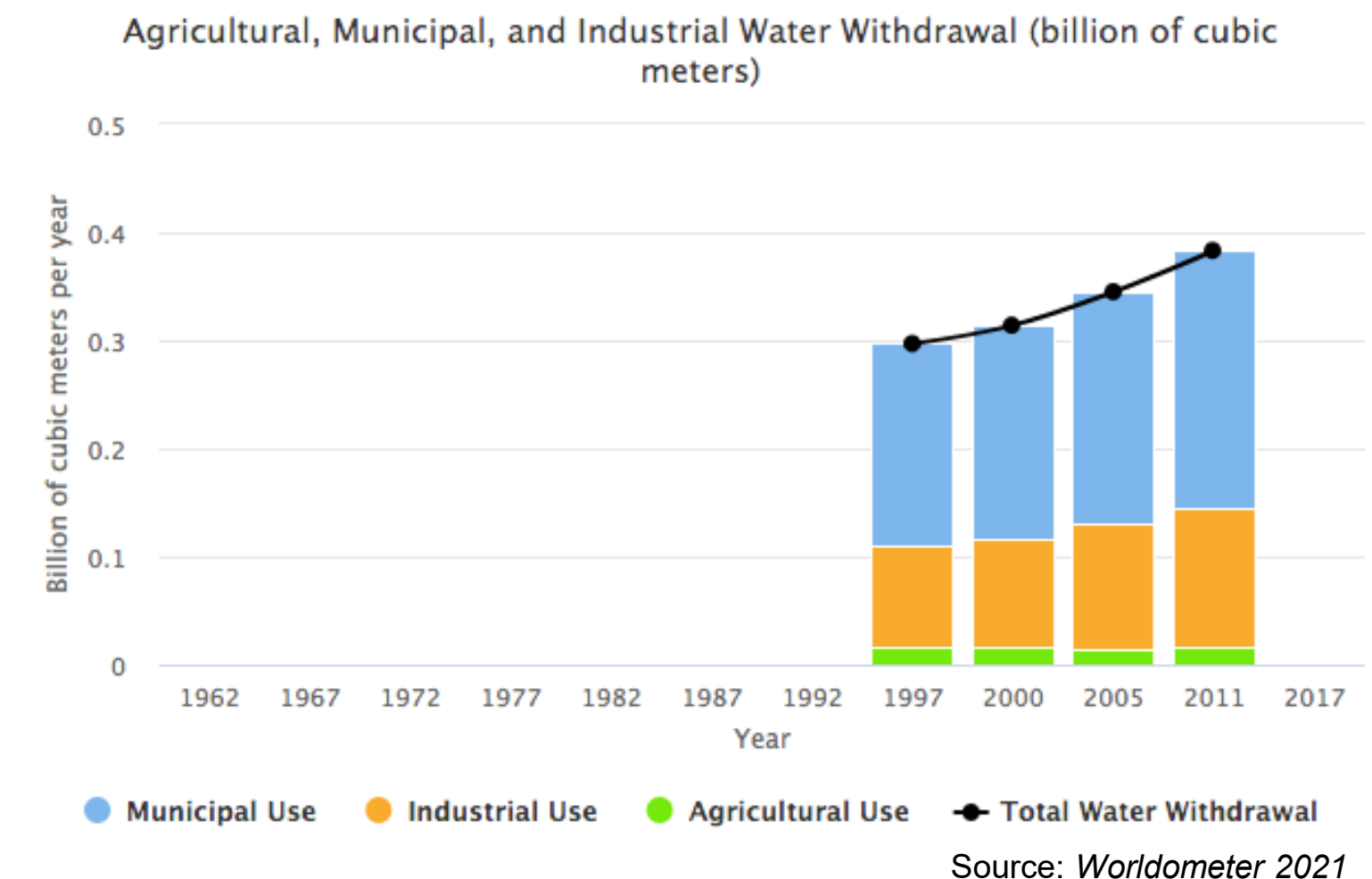
Figure 1-13 T&T Reserves Evolution

(Source: BP Statistical Review of World Energy 2015)



The ratio of reserves to production (R/P) provides a measure of the sufficiency of reserves to maintain production over the long term. Based on Ryder Scott data, as of end-2013, proven (1P) R/P ratio was 8.3 years and the Proven + Probable (2P) R/P ratio was 12.1 years. The BP Statistical Review of World Energy gives a proven (1P) R/P ratio of 8.2 years as of the end of 2014. However, due to the natural decline in deliverability of the gas fields as reserves are depleted, gas production will fall below the ~1.62 Tcf/y plateau demand level significantly earlier than the ~8-11 year durations implied by these ratios, even if such a plateau rate could be achieved.

Source: Worldometer 2021



Source: Worldometer 2021

## Conclusion

Trinidad and Tobago has begun the daunting task of introducing sustainable practices to their country through incentive programs both for residents and farmers. "The residential sector is almost fully electrified and consumes 29% of total electricity" (Ministry of Energy and Energy Industries 2021). In 2010, the legislation of Trinidad and Tobago offered incentives for homeowners if they invested in renewable energy sources like "solar water heater, photovoltaic cells and small wind turbines" (Chadee and Clarke 2018). In 2014, Trinidad and Tobago began an Agricultural Incentive Program that provided equipment to farmers to help get them started (Shik et al. 2018). By 2015, over 3,000 farmers applied for the compensations (Shik et al. 2018). Agriculture in Trinidad and Tobago is most strained during the dry season. In 2019, Trinidad and Tobago imported over \$200 million of agricultural and food items (ITA 2020). Most of their imports included sheep and goats, as well as cattle and dairy goats for milk products (ITA 2020). It is pertinent that in order to become sustainable, the country would have to focus on effective and proper management of island resources and continue to provide incentives to encourage the public to improve the usage and consumption of these finite resources. Land use management would also require effective oversight to the rights of lands as well as addressing residential housing for the homeless.

## References

1. Chadee, X.T. and Clarke, R.M., 2018. Wind resources and the levelized cost of wind generated electricity in the Caribbean islands of Trinidad and Tobago. *Renewable and Sustainable Energy Reviews* 81(2):2526-2540. <http://dx.doi.org/10.1016/j.rser.2017.06.059>
2. Day, M.J. and Chenoweth, M.S., 2004. The karstlands of Trinidad and Tobago, their land use and conservation. *The Geographical Journal* 170(3):256-266. <https://doi.org/10.1111/j.0016-7398.2004.00124.x>
3. Indexmundi, 2021. *Trinidad and Tobago Land Use*. [online] Available at: [https://www.indexmundi.com/trinidad\\_and\\_tobago/land\\_use.html](https://www.indexmundi.com/trinidad_and_tobago/land_use.html) [Accessed 13 March 2021].
4. International Trade Administration (ITA), 2020. *Trinidad and Tobago - Agriculture*. [online] Available at: <https://www.trade.gov/country-commercial-guides/trinidad-and-tobago-market-overview> [Accessed 23 February 2021].
5. Ministry of Energy and Energy Industries, 2021. *Oil and Gas industry*. [online] Available at: <https://www.energy.gov.tt/our-business/oil-and-gas-industry/> [Accessed 7 February 2021].
6. Shik, O., Boyce, R.A., de Salvo, C.P. and Egas, J.J., 2018. *Analysis of Agricultural Policies in Trinidad and Tobago*. International Development Bank (IDB) Monograph 576. Available at: <https://publications.iadb.org/publications/english/document/Analysis-of-Agricultural-Policies-in-Trinidad-and-Tobago.pdf> [Accessed 20 February 2021].
7. Warrick, J. and Ekwue, E.I., 2013. Preliminary feasibility of large-scale treated wastewater re-use for agriculture in Trinidad and Tobago. *The West Indian Journal of Engineering* 36(2):20-28.
8. Worldometer, 2021. *Trinidad and Tobago Oil*. Retrieved March 10, 2021, from <https://www.worldometers.info/oil/trinidad-and-tobago-oil/>

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