



# ASSESSING THE NECESSITY OF ARANMULA AIRPORT: AN ECONOMIC & ENVIRONMENTAL COST-BENEFIT ANALYSIS

<sup>1</sup>Ishan Anshul

<sup>1</sup>MBA Batch of 2023,

<sup>1</sup>Indian Institute of Management Indore, India

**Abstract:** The Aranmula airport project in the Pathanamthitta district of Kerala was initially approved in 2009 but was later scrapped in 2016. This ruling resulted from the National Green Tribunal not providing clearance due to the potential environmental damage associated with the project. Owing to the recent proposal to build an airport in the nearby area of Sabarimala, it is interesting to investigate the feasibility of the Aranmula airport project in 2023, especially with the increasing demands of many diasporic Keralite populations. This study also gives a perspective on the seemingly conflicting ideals of environmental protection and economic development. It lists significant damages and gains associated with the project and uses a cost-benefit analysis approach to check its feasibility in the current situation. It uses primary data to evaluate the value of some important local species through the Contingent Evaluation Technique. Secondary data is also used to assess the various costs and benefits of establishing the airport. From the data collected and the ensuing calculations, this study argues for the claim that even in the current scenario, it is infeasible to proceed with the Aranmula airport project because the costs related to it outweigh its benefits.

## INTRODUCTION

Aranmula, located in Pathanamthitta District of Kerala and about 120 km north of the capital city, Thiruvananthapuram, is hugely populated with non-resident Indians and non-resident Keralites. Chennai-based **KGS group** constructed an **international greenfield airport at Aranmula** in 2011. They had also received in-principal approval for the **Rs. 2000-crore project** from the union government, with a 10% stake in the Kerala government.

However, the project met much opposition and protests from various stakeholders like environmentalists, social workers, and politicians. The activists claimed the project would harm the environment and the town's inhabitants. Research conducted by some activist groups revealed that the project would harm the wetlands, paddy fields, and paddy farming in Aranmula; it would likely affect the groundwater in the region, along with around 212 species of plants, 60 species of fish, and would lead to the evacuation of around 3000 individuals, among other findings. These findings were diametrically opposite to the **project's Environmental Impact Assessment (EIA)** conducted by the consultancy agency Enviro Care India Pvt Ltd. The agency received backlash for its incompetency while preparing the EIA report, which should have reported more facts and figures and should have mentioned the impact on the large areas of wetlands and paddy fields.

Eventually, the project was scrapped due to widespread protests and opposition from various stakeholders, including the local villagers, even though it would have benefited the NRIs in the surrounding regions and tourism in the pilgrim village Krishna and Sabarimala temple. The National Green Tribunal & the Ministry of Defence objected, forcing the state government to **scrap the project in 2016**. With international airports already existing close to the region - at Trivandrum and Cochin - the need for another airport, which would be detrimental to the environment, was not felt at the time.

However, recently, a greenfield international airport has been proposed in **Sabarimala** instead of in the Kottayam-Pathanamthitta border, which has already received the cabinet's approval. The airport is expected to reduce traffic during the pilgrim season in Sabarimala, cater to travellers' needs in central Travancore, and help boost regional tourism. In this current context, it would make sense to **revisit the Aranmula airport project** to estimate whether the airport would be feasible now with the changing situation and increasing demand in the current year, adjusting for the inflation rate and the expected air traffic.

## RESEARCH METHODOLOGY

The study relies on primary and secondary data collection for analyzing the costs and benefits related to the airport. The **Contingent Valuation Technique** computed the monetary value of the keystone species in the region. The study assumes the airport's lifetime

to be 50 years and calculates the present value of the costs and benefits at two social discount rates – 5% and 10% to perform sensitivity analysis.

Benefits	Costs
Revenue from air traffic	Relocation & Resettlement costs
Lease & Ad Revenue stream	O <sub>2</sub> loss due to deforestation
Direct employment	Carbon sequestration loss
Indirect employment- logistics, cab & allied business	Paddy cover wetland loss
Supply chain efficiency improvements	Loss in bequest value
Urbanization	Fixed infrastructure cost
Investment enabler	Loss of habitat for species like the Labeo Dussmeiri, Oriental Darter, and Black-Headed Ibis

Table 1: Potential costs and benefits

### Measurement of benefits

The study restricts itself to the following critical benefits associated with an airport.

1. Revenue from air traffic: Airports charge Passenger Service Fees (PSF) to use the airport for boarding or deboarding any flight. **PSF is a significant source of revenue** for the Airport Authority of India (AAI). The PSF (Rs 225) and expected air traffic have been retrieved from the AAI website.
2. Lease & ad revenue streams: Airports earn a significant portion of their revenue from leasing shops and advertisement hoardings. The **size of the area up for leasing to shops** has been retrieved from the airport proposal document. The average revenue an airport earns from leasing the spaces is based on an Economic Times article. It was assumed that the new airport would have the same leading price as Mumbai airport.
3. Direct Employment benefits: An airport needs many ground -staff, housekeeping staff, and administrative officers. The expected number of people directly employed at the **airport is based on Chandrapur airport** figures. It was assumed that Aranmula was envisioned as a low-cost airport. Different airports in India have average salaries of the directly employed employees ranging from 3 lakhs to 6 lakhs. Considering that Aranmula was envisioned as a low-profile airport, Rs 3 lakhs is a conservative estimate.
4. Indirect benefits: An airport often helps other businesses usher and prosper. Though the list of **business job opportunities** created due to an airport can be extensive, the indirect benefits have been restricted to employment or business opportunities for cab or taxi drivers and logistics-related businesses. The estimated number of people to be indirectly employed from the airport's establishment is based on the calculations of KGS Aranmula airport.

### Measurement of Costs

While there is a plethora of direct and indirect costs, the study restricts itself to the following critical cost headers:

1. Fixed infrastructure: The construction of an airport is a capital-intensive job due to modern and expensive structures like the runway, building, and monitoring towers. Cumulating all the component-wise infrastructure costs, the total cost was estimated to be Rs 2000 crores according to the Environmental Justice Atlas.
2. Relocation & Rehabilitation costs: An article published on the Moneylife website estimates that approximately 3000 family members must be relocated and resettled due to the airport. For the computation of the compensation amount, due to the lack of appropriate land price data in the region, it has been considered that the resettlement and relocation costs will be the same as the relocation costs for Sardar Sarovar Dam Madhya Pradesh.
3. Loss of paddy cover: The area selected for the project overlaps with the agricultural land for paddy. Paddy has a significant ecological value. The direct use of the paddy as a staple food source yields profits for the farmers. The indirect benefits include using its residuals as organic manure and compost. The total economic value of paddy, except the profits, is based on the study, "*Economic Valuation of Rice Paddy Biomass: Case Study at Village of Sukakarya, Regency of Bekasi.*" Due to the unavailability of exact details of profits earned by the farmers in Aranmula, the average profits across Kerala for paddy farmers have been used as the average profits earned by Aranmula farmers.
4. Loss of carbon sequestration: Trees play a crucial role in storing CO<sub>2</sub>, which is necessary to stabilize global climate change. The mega project would lead to the deforestation of the forest. The monetary value of CO<sub>2</sub> emissions has been obtained from the CO<sub>2</sub> European emission allowance website. The Global Forest Watch database was used to find the forest cover of different canopy densities in the Pathanamthitta district. However, to calculate the exact area of different canopies in the proposed area, a weighted distribution of the forests of different canopies has been assumed, the weights being the size of Aranmula concerning the district area—the emissions according to the regression equation given by *Arturo Balderas Torres and co-authors* in a 2013 study. The following equation gives the carbon content in tons CO<sub>2</sub> equivalent/ha.

$$\text{Carbon content} = -1.235CC^2 + 513.48CC + 5.186 \quad CC \text{ stands for canopy cover (1)}$$

5. Loss of oxygen due to deforestation: The loss of oxygen liberated from deforestation has a significant economic and environmental value. The economic valuation of oxygen has been taken from the Delhi Greens Report, 2013. The average canopy density of the forest area is calculated from the Global Forest Watch database.

6. WTP for key species: The individuals residing in Kerala aged between 15-54 were surveyed. The sample size for the paper is 137 (greater than 30 for statistical analysis). The willingness to pay has been recorded through a questionnaire for all three species. The three essential species in the region are:

- "Labeo dussumeiri, or the Malabar Labeo (otherwise called Thooli/Pullan), is perhaps the most notable fish of the Pumba stream fisheries, and it is found in this locale on the planet. The dishes produced using this fish, particularly the fish fry, are acclaimed neighbourhood delights. Along these lines, this fish is likewise one of the imperative income generators due to its utilization esteem."
- "The Oriental Darter (*Anhinga melanogaster*) is a water-winged creature of tropical South Asia and Southeast Asia. Some populace of this transient winged animal is found in the Western Ghats. It sticks a fish submerged, bringing it over the surface, throwing and shuffling it before gulping the fish head first. The body stays lowered as it swims, and the slim neck is noticeable over the water, representing the conversational name of snakebird."
- "The Black-Headed Ibis (*Threskiornis melanocephalus*), otherwise called the Oriental white ibis or the Indian white ibis, is a wild type of South-and Southeast Asia from India toward the west and as far east as Japan. It is the solitary local ibis species reaching a general white plumage with a dark neck and head. The down-bended mouth and legs are additionally dark. Even though it is frequently alluded to as a wetland animal category, the dark-headed ibis is found in a scope of characteristic and human-made territories. This ibis settles during the stormy season (or rainstorm)."

The proportion of people in each age category in Kerala has been retrieved from the Census 2011. The willingness to pay is segregated based on the age group. The sample WTP for each age category has been extrapolated to the entire population of Kerala.

## RESULTS AND DISCUSSION

The following results are tabulated at two social discount rates: R1=5% and R2=10%.

Benefits for 50 years	Monetary value	Costs for 50 years	Monetary value
<i>Air traffic</i>			
PV(R1=5%)	Rs14,196,800,125.69	<i>Fixed infrastructure cost</i>	Rs20,000,000,000.00
PV(R2=10%)	Rs5,550,670,901.37	<i>Relocation &amp; Resettlement Cost</i>	Rs28,500,000,000.00
<i>Lease ad revenue streams</i>		<i>Total WTP for the three species</i>	Rs71,486,440,966.25
PV(R1=5%)	Rs27,552,308,392.08	<i>Wetland loss</i>	
PV(R2=10%)	Rs10,772,413,156.74	PV(R1=5%)	Rs9,804,790,897.80
<i>Direct employment benefits</i>		PV(R2=10%)	Rs3,833,481,280.90
PV(R1=5%)	Rs18,929,066,834.25	<i>O2 loss</i>	
PV(R2=10%)	Rs7,400,894,535.17	PV(R1=5%)	Rs163,206,986,659.92
<i>Indirect employment benefits</i>		PV(R2=10%)	Rs63,810,736,485.25
PV(R1=5%)	Rs69,406,578,392.26	<i>CO2 loss</i>	
PV(R2=10%)	Rs27,136,613,295.61	PV(R1=5%)	Rs18,026,400,360.44
		PV(R2=10%)	Rs7,047,969,616.49
		<i>Paddy production loss</i>	
		PV(R1=5%)	Rs15,795,464,981.33
		PV(R2=10%)	Rs6,175,717,560.95

Table 2: Present value computation

Table 2 gives a snapshot of the benefits and costs of the airport for 50 years. The net present value becomes negative at 5% and 10% social discount rates based on the computation of all the benefits and costs. It means that the costs of the project outweigh the benefits associated with it.

$$NPV (R1=5\%) = -Rs196,735,330,121.44$$

$$NPV(R2=10\%) = -Rs149,993,754,020.94$$

Thus, the project is **infeasible**, and the airport should not be built even in 2023. Even at a high social discount rate of 10% (which means that less value is put on intergenerational equity), it is evident that the NPV of the project is negative, which means that the benefits that the airport will reap in 50 years are not worth the initial investment costs as the net returns are negative.



## CONCLUSION

Kerala covers an area of 38863 sq. km and has four operational international airports. While Greenfield Airport has its list of merits, in the case of Aranmula, the **environmental costs are higher** due to the ecological sensitivity of the location. This factor is essential in determining the airport's worth, making Aranmula Greenfield Airport infeasible.

While it makes sense for Kerala to want a new airport considering its huge expatriate population and increasing demand for air travel, Kerala's existing average land covered per airport ratio (area of the state/no of airports in the state) is significantly much lower than the national average. Kerala has more than two airports for every airport in the country w.r.t area covered. Thus, the government can look **into the feasibility of upgrading the existing airport's infrastructure** to cope with the increasing inflow of tourists in Kerala rather than build a new airport from scratch.

## LIMITATIONS

The study focuses on only the high costs and benefits of the project. There are other unaccountable factors, and some are listed below.

### a. Unaccounted benefits

- ✓ Indirect employment apart from the logistics sector
- ✓ Benefits of urbanization in the region
- ✓ Creation of an economic hub around the region

### b. Unaccounted costs

- ✓ Value of other forest products that are lost
- ✓ Pollution during construction and post-it commencement

The costs and benefits of each factor may vary from **region to region**. However, the national average was used due to the non-availability of region-specific data. The national average may need to represent the figures in Aranmula accurately.

The survey's sample size is relatively small to capture Kerala's diverse population's preferences. Moreover, the data was self-reported to by the respondents. Hence, the reliability of the results is restricted to the selected sample only. There may be self-reporting errors due to information asymmetry.

## Acknowledgement

The Author thanks Joseph and Ram for their help in survey data collection.

## REFERENCES

- [1] A. (n.d.). Retrieved from <https://www.aai.aero/en/services/airport-charges>
- [2] Airport construction at Aranmula would be an ecological disaster, warn activists. (2013, July 23). Retrieved January 13, 2023, from <https://www.moneylife.in/article/airport-construction-at-aranmula-would-be-an-ecological-disaster-warn-activists/33747.html>
- [3] Balderas Torres, A., Torres, A., Enríquez, R., Skutsch, M., & Lovett, J. (2013, December). Potential for Climate Change Mitigation in Degraded Forests: A Study from La Primavera, México. Retrieved March 30, 2023, from [https://www.academia.edu/26825687/Potential\\_for\\_Climate\\_Change\\_Mitigation\\_in\\_Degraded\\_Forests\\_A\\_Study\\_from\\_La\\_Primavera\\_M%C3%A9xico](https://www.academia.edu/26825687/Potential_for_Climate_Change_Mitigation_in_Degraded_Forests_A_Study_from_La_Primavera_M%C3%A9xico)
- [4] Baral, S., Basnyat, B., Khanal, R., & Gauli, K. (2016, October 17). A Total Economic Valuation of Wetland Ecosystem Services: An Evidence from Jagadishpur Ramsar Site, Nepal. Retrieved January 13, 2023, from <https://www.hindawi.com/journals/tswj/2016/2605609/>
- [5] CO2 European Emission Allowances PRICE Today | CO2 European Emission Allowances Spot Price Chart | Live Price of CO2 European Emission Allowances per Ounce | Markets Insider. (n.d.). Retrieved June 17, 2023, from <https://markets.businessinsider.com/commodities/co2-european-emission-allowances>
- [6] Correspondent, S. (2010, September 03). Airport project for Aranmula gets approval. Retrieved July 13, 2023, from <https://www.thehindu.com/news/national/kerala/Airport-project-for-Aranmula-gets-approval/article15901473.ece>
- [7] Ejolt. (2018, October 19). Aranmula greenfield Airport (AGA) project, Kerala, India: EJAtlas. Retrieved March 15, 2023, from <https://ejatlas.org/conflict/aranmula-greenfield-airport-aga-project-india>
- [8] FocusEconomics. (n.d.). India Inflation Rate (CPI) - India Economy Forecast & Outlook. Retrieved September 1, 2023, from <https://www.focus-economics.com/country-indicator/india/inflation>
- [9] Khan, K. (2016, October 18). Retail turns hot property at Airports as footfall takes off. Retrieved August 18, 2023, from <https://economictimes.indiatimes.com/retail-turns-hot-property-at-airports-as-footfall-takes-off/articleshow/54927385.cms?from=mdr>
- [10] Najmulmunir, N., Kamilah, A., & Amaliah, S. (2019, September 09). Economic Valuation of Rice Paddy Biomass: Case Study at Village of Sukakarya, Regency of Bekasi). Retrieved September 25, 2023, from <https://eudl.eu/doi/10.4108/eai.1-4-2019.2287292>
- [11] Population of Kerala. (n.d.). Retrieved April 16, 2023, from <http://statisticstimes.com/demographics/india/kerala-population.php>
- [12] Radhakrishnan, S. (2020, June 14). Sabarimala airport project set to take off. Retrieved June 18, 2023, from <https://www.thehindu.com/news/national/kerala/steps-to-acquire-land-for-sabarimala-airport/article31827512.ece>
- [13] Report on Economic Valuation of Oxygen Supplying Ecosystem Service of Healthy Trees. (2013, August 13). Retrieved from [http://www.compassionateliving.in/Report\\_Economic\\_Valuation\\_of\\_Oxygen\\_Producing\\_Capacity\\_of\\_One\\_Tree.pdf](http://www.compassionateliving.in/Report_Economic_Valuation_of_Oxygen_Producing_Capacity_of_One_Tree.pdf)
- [14] Salaries. (n.d.). Retrieved September 18, 2023, from <https://www.jobted.in/salary/airport-manager>
- [15] Suchitra, M. (2014, February 15). Rice at risk. Retrieved September 18, 2023, from <https://www.downtoearth.org.in/coverage/rice-at-risk-43367>