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MORALITY BEFORE KNOWLEDGE

Overtourism after the COVID-19 pandemic: Ecological degradation and social tensions in tourist destinations

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ABSTRACT

Background: Bali, one of the most popular tourist destinations in the world, has experienced a surge in visitor numbers following the COVID-19 pandemic. While tourism has significantly contributed to the recovery of the local economy, overtourism has emerged as a phenomenon that is causing various environmental and social problems. One of the issues caused by tourism in Bali is the increase in land and property rental prices, as well as the transformation and utilisation of traditional spaces for commercial purposes. This shift not only displaces local communities but also threatens the cultural heritage that makes Bali unique, prompting calls for more sustainable tourism practices that prioritize both the environment and the well-being of residents. **Methods**: The scope of this research is Bali, especially in the south Bali region, which has been reported to experience overtourism after recovering from the COVID-19 pandemic. This research uses secondary data from published research and other sources, as well as interviews with policymakers, local residents, and related institutions. **Findings**: This paper aims to analyse environmental degradation and social problems caused by overtourism, especially after the COVID-19 pandemic. The decline in environmental quality has raised concerns among local communities and conservation activists. Furthermore, the social fabric of the region has been strained, as the increasing number of visitors has contributed to increased competition for resources and changed the traditional way of life for many residents. **Conclusion:** Overtourism in Bali post-pandemic has led to environmental degradation and social disruptions. Sustainable tourism practices are needed to balance economic benefits with the preservation of local communities and cultural heritage. **Novelty/Originality of this article:** This study highlights the impact of overtourism in Bali after the COVID-19 pandemic, integrating environmental and social perspectives. By using secondary data and interviews with key stakeholders, it provides insights into the urgent need for sustainable tourism strategies.

KEYWORDS: Bali; overtourism; tourism; environmental degradation.

1. Introduction

Since the Dutch colonial era, Bali has been a popular tourist destination and has continued to grow over time. Bali's natural beauty and culture were well known even before modern tourism developed (Badrukamal & Dirgawati, 2024). In the 1970s and 1980s, Bali became internationally recognized after the Indonesian government's policy to promote the island as a global tourist destination (Central Statistics Agency, 2022). Tragic events, such as the Bali bombings in 2002, had a significant impact on Bali's tourism industry, reducing the number of foreign tourists for a long period (Cole, 2012). The bombings killed hundreds of people and injured many others, leading to a drastic decline in tourist arrivals and affecting Bali's image as a safe tourist destination (Gurtner, 2004; Dianasari, 2021). However, Bali gradually recovered. One of the main factors behind Bali's tourism revival

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was the 2009 film Eat, Pray, Love, which made Bali a symbol of spiritual destinations and self-discovery. The film, starring Julia Roberts, not only attracted new tourists but also introduced Bali to a wider global audience. Since then, Bali has seen a surge in visitor numbers, particularly from tourists seeking spiritual experiences, relaxation, and natural beauty (Detikcom, 2011).

Bali has developed rapidly since then, particularly in terms of tourism infrastructure, with the construction of hotels, restaurants, cafes, and new tourist attractions. However, in 2020, the COVID-19 pandemic struck, and most tourism activities came to a halt (Gonzalez et al., 2018). The pandemic caused the number of foreign tourists visiting Bali to drop to zero between July and September 2021. Only 51 foreign tourists visited during that year (Central Statistics Agency, 2022). During the pandemic, global tourism came to a standstill, and Bali, heavily dependent on international visitors, experienced a drastic decline in tourist arrivals (Goodwin, 2017). Many businesses dependent on tourism were severely affected, and many workers in the tourism sector were laid off. According to Dianasari (2021), the COVID-19 pandemic had a significant negative impact on the economy, increasing unemployment rates in Bali in general, and particularly in tourism villages. Furthermore, there was a decrease in income for local communities in tourism villages, leading to a rise in unemployment (Hayati et al., 2020). At the same time, several environmental benefits were observed. With fewer tourists, Bali's ecosystems, which had been under pressure for years, began to show signs of recovery. Coral reefs had a chance to heal, and waste accumulation decreased. Local residents also felt a temporary respite from the noise, traffic, and pollution associated with mass tourism. Additionally, water quality in tourism villages improved (Hitchcock & Putra, 2005).

To curb the spread of COVID-19, the government launched a global vaccination campaign and relaxed travel restrictions. In mid-2022, Bali reopened its borders to international tourists. It didn't take long for Bali's tourism to recover quickly, even faster than expected, driven by the phenomenon of revenge tourism (Vogler, 2021). Revenge tourism refers to the phenomenon where people, after being restricted from traveling due to COVID-19, embark on mass tourism to destinations that have reopened. In 2022, the number of foreign tourists visiting Bali reached 2,155,747 (Central Statistics Agency, 2022), and it surged to 4,247,231 in 2024. The concept of revenge tourism has also been observed in other countries or tourist destinations in Indonesia, including in Bali. The development of tourism in Bali Province is predominantly concentrated in the southern part of the island, particularly in Denpasar City, Badung Regency, Gianyar Regency, and Tabanan Regency (Tempo, 2023). The high number of tourist arrivals has made Bali one of the destinations facing overtourism pressures. According to the World Travel & Tourism Council, overcrowding has become a growing challenge in many popular global destinations, while media reports in 2023 placed Bali alongside cities such as Amsterdam, Athens, Paris, Phuket, and Barcelona as areas experiencing overtourism (Tempo, 2023; Tirto, 2024).

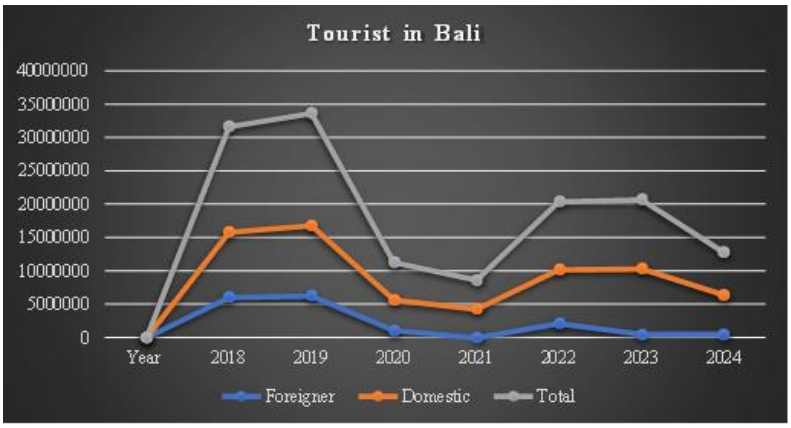

Fig. 1. Foreign and domestic tourist arrivals to Bali (2018–2024)
(Central Statistics Agency, 2022)

While the resurgence in tourism has been viewed positively for economic recovery, the sharp increase in the number of visitors has also reignited the problem of overtourism in the post-pandemic period (Bali Water Protection, 2019). The rapid return of tourists in such a short time has brought new challenges. The pressure on infrastructure, natural resources, and Bali's social fabric, which had weakened during the pandemic, has now intensified (Koens et al., 2018). This explosion of tourism has reintroduced the phenomenon of "overtourism," which has had negative impacts on both the environment and the social life of Bali. According to the United Nations World Tourism Organization (UNWTO, 2019), overtourism is the result of excessive tourism in a destination, which significantly affects the quality of life of residents and the experiences of visitors. The term overtourism was first used on Twitter as #overtourism in August 2012 (Goodwin, 2017). Five years later, stated that overtourism occurs when both residents and tourists feel that the number of people in a destination is too high, which diminishes the quality of life and the overall experience (Krisnayanti, 2024). Overtourism is the opposite of responsible tourism, which aims to use tourism to make places better for both residents and visitors (Lee et al., 2022).

Excessive tourism can also harm the environment and society by polluting water, disturbing wildlife habitats, altering local traditions, also noice pollution (Hayati et al., 2020; Sudipa et al., 2020a). Tourism activities, if not managed properly, can result in an ecological footprint that burdens the earth. An ecological deficit occurs when the accumulated ecological footprint exceeds the earth's biological capacity to regenerate resources and absorb the waste generated. In tourism, the ecological footprint of a destination increases due to the arrival of tourists from outside the region (Lee et al., 2022). Destinations that were previously not burdened by high local populations or consumption are now facing significant increases in the services required by tourists, which could lead to ecological disasters (Koens et al., 2018) highlighted that the negative impacts of overtourism significantly affect local residents and/or the natural environment. Social impacts are seen in the tensions between tourists and locals. In places like Barcelona and Venice, local residents have expressed feeling burdened by the overwhelming number of tourists (Miller & Spoolman, 2016). Additionally, the demand for housing has driven up prices, making it difficult for locals to afford living in their own city (Santos-Rojo et al., 2023). Locals also find themselves competing for jobs with foreign tourists, who not only come to vacation but also seek employment in the same fields as local workers. A similar situation occurred in Phuket, Thailand, where Russian tourists began taking jobs traditionally held by locals during the Russian-Ukrainian war, such as tour guides, hairdressers, and taxi drivers (Time, 2024). This phenomenon has also been observed in Bali, where Russian tourists have taken jobs from locals in areas like motorbike rentals, yoga instructors, and even Bali dance teachers (Saputri et al., 2017).

Overtourism also impacts the quality of life for local residents, affecting the cost of goods and services, property prices, infrastructure, culture, heritage, and the experiences of visitors (Wattanacharoensil & Weber, 2020). In Barcelona, for example, locals have reported that rental prices for houses and apartments have increased dramatically, forcing them to move to farther or cheaper areas (Treasury Information System, 2024). Moreover, many properties in Barcelona have been converted into tourist accommodations, reducing the number of homes available for local residents. The environment is also heavily affected by overtourism. As overtourism occurs, the excessive use of natural resources increases (Gonzalez et al., 2018). The conversion of green spaces into concrete buildings reduces the land's ability to absorb water and increases pollution levels. According to Santos-Rojo et al. (2023), overtourism is often accompanied by poor infrastructure development in tourist destinations. The rapid development of tourism infrastructure has caused agricultural land to be converted into hotels and resorts, contributing to environmental degradation. Environmental degradation is driven by various factors, including landscape changes, the use of clean water, energy sources, climate change, and economic development (Miller & Spoolman, 2016). These landscape changes include massive hotel and commercial building constructions that lead to the loss of green spaces, which serve as buffers for ecosystems. This development negatively impacts biodiversity, reduces habitats for flora and fauna, and

lowers overall environmental quality (Suyadnya, 2021). The reduction of green open spaces also impacts the environment's ability to absorb pollution and regulate the climate, worsening the overall environmental situation (Utami & Soemantojo, 2004).

The government has been criticized for its role in land-use changes that contribute to environmental degradation, including the issuance of hotel development permits (Krisnayanti, 2024). The Indonesian Hotel and Restaurant Association (PHRI) reports that there are currently 3,500 hotels with a total of 146,000 rooms. When the number of tourists in Indonesia reaches overtourism levels, hotel occupancy never reaches 100% (Aryastana et al., 2023). This indicates an excess of hotel capacity. The overcapacity of hotels reflects a larger problem in the management of development. Violations in hotel construction are not only related to the excessive number of hotels, but also to improper locations. Many hotels have been built along the beachfront or in hillside areas, despite regulations under Bali Provincial Regulation Number 3 of 2005 on the Regional Spatial Plan of Bali Province. This has the potential to damage the environment and ecosystems, as well as ignore regulations designed to protect the area's natural beauty and sustainability. In addition to hotels, the development of the tourism sector requires massive investment in infrastructure such as highways, airports, and various tourism services (shops, resorts, restaurants, and hotels). Therefore, it is not surprising that tourism can place a heavy burden on the environment. One of the severe impacts of overtourism in Bali was highlighted at the end of 2023, when severe traffic congestion toward Ngurah Rai International Airport depicted a spike in vehicles, with over 70,000 passengers and about 41,000 vehicles recorded on a single day (DetikBali, 2022a). This increases greenhouse gas emissions and reduces green areas. Furthermore, violations of hotel development regulations worsen the environmental condition (Gühnemann et al., 2021).

Another aspect affected by overtourism is the disruption in the availability of fresh water. Tourism has an impact on the environment, particularly the carrying capacity of water (Sudipa et al., 2020b). The carrying capacity of water is determined by water quality, which is related to water pollution. Environmental pollution is a consequence of the growing tourism sector, and the development of tourism places pressure on water sources. Bali has experienced a decline in groundwater levels of more than 50 meters in less than 10 years. Approximately 65% of Bali's water is used for tourism services (Bali Water Protection, 2019) The rapid growth in the number of tourists has caused a surge in demand for clean water. The majority of water usage is allocated to the tourism sector, putting pressure on the already limited water resources. Additionally, pollution from hotel waste and tourism activities further deteriorates water quality. This reality is an irony for Bali, which views water as *pratiti atma* (the soul's essence), as water is seen as the identity of the soul.

The high number of tourists has also led to an increase in waste. Waste in Bali has become a significant issue. The accumulation of waste in tourist spots, beaches, and streets not only damages the scenery but also creates health and environmental problems. Around 1,200 tons of waste are produced daily in Bali, and this number increases during peak seasons. Of this, about 60- 70% comes from households, while the remainder originates from commercial and tourism sectors.

Noise pollution has emerged as a critical environmental issue in tourism studies, influencing both ecological systems and human well-being in popular destinations. Previous research has shown that anthropogenic noise generated by tourism activities can alter animal behavior, disrupt natural ecosystems, and negatively affect residents' quality of life. In natural areas, Potvin et al. (2024) investigated how anthropogenic noise associated with ecotourism infrastructure affects local bird assemblages on K'gari (Fraser Island), Australia, UNESCO World Heritage Site and Important Bird Area. This finding highlights that anthropogenic noise, even when not directly linked to human presence, can subtly shape biodiversity patterns and should be considered in ecotourism management and infrastructure planning. In contrast, in urbanized tourism contexts, Nath et al. (2024) analyzed traffic, induced noise pollution in five major intersections of Cox's Bazar City, Bangladesh, one of South Asia's fastest-growing coastal tourist destinations. Prolonged

exposure correlated strongly with health complaints, including annoyance (84.44%), headaches (62.37%), and cognitive impairment (44.44%).

This research analyses the impacts of overtourism after the COVID-19 pandemic in Bali, focusing both on the environmental and social consequences. After identifying the impacts of overtourism, appropriate mitigation measures can be implemented to address these issues and develop sustainable tourism strategies in Bali. Development should not only focus on economic growth and increasing tourist arrivals. This study uses the theory of ecocentrism, which views the environment as an interconnected ecosystem, in contrast to an anthropocentric perspective that prioritizes human needs, to foster sustainable tourism in Bali. Currently, there is no research specifically addressing overtourism in Bali, but the phenomenon has already occurred. This paper serves as a foundation for understanding the phenomenon of overtourism in Bali and its impacts.

2. Methods

The scope of this study is focused on Bali, particularly the southern region, which has been reported to experience overtourism after recovering from the COVID-19 pandemic. Bali is the smallest province among the 34 provinces in Indonesia. Geographically, Bali is located at 8°25′23′′ South Latitude and 115°14′55′′ East Longitude, giving it a tropical climate similar to other parts of Indonesia. Bali is situated between the province of West Nusa Tenggara to the east, East Java to the west, and the Indian Ocean and Bali Sea to the south and north.

One of the regencies most frequently visited by tourists is Badung Regency, covering an area of approximately 418.52 km^2, or about 7.43% of Bali's total land area. This regency includes several major tourism hubs such as Denpasar City, Badung Regency, Gianyar Regency, and Tabanan Regency, which together form the economic and entertainment core of Bali's tourism industry. These coastal areas have been identified as the epicenter of overtourism-related issues, including congestion, waste management problems, and noise pollution from nightlife and beach clubs. The research was conducted using secondary data from previous studies, including academic journals, NGO and government reports, relevant books, and interviews with key informants focusing on tourism issues in Bali.

3. Result and Discussion

3.1 Environment impact

Bali has been significantly impacted by tourist activities, which have long been a mainstay of the region's economic revenue, both in terms of environmental and social aspects. Efforts to recover from the Covid-19 pandemic, which had severely affected Bali's tourism sector, have led to an influx of international tourists. Domestic tourists have also continued to choose Bali as their vacation destination. According to the Bali Central Statistics Agency, the number of foreign tourists visiting Bali from January to August 2024 reached 4,155,540, an increase of 21.55% compared to the same period in 2023, which saw 3,418,667 tourists. This increase in tourism has driven the uncontrolled development of infrastructure, with rising demand for tourism facilities such as hotels, restaurants, and transportation (Suyadnya, 2021) identified overtourism in Bali as early as 2021, using indicators such as capital investment, demographic changes, cultural and lifestyle shifts, and uncontrolled growth in facilities, landscapes, and infrastructure. This form of gentrification in Bali has led to the categorization of tourism as overtourism, particularly evident in the deteriorating quality of destinations like Kuta, Sanur, and Ubud. Bali has experienced overtourism, as emphasized by the statement of Putu Eka Giri Mariani, a native Balinese who was born and raised on the Island of the Gods. Giri is a professional with deep knowledge of Bali's tourism industry and joined Sungai Watch in 2020.

"The indicators of overtourism in Bali include excessive tourist density, severe traffic congestion, a lack of clean water, and increasing plastic pollution. In addition, economic pressures such as rising living costs and the erosion of local cultural identity are clear signs. Bali was once deeply rooted in its traditions and customs, but now, especially in the larger cities, everything seems to be measured in terms of money" (PEGM, a local resident of Bali).

One of the key factors affecting the development of the tourism industry in Bali is the construction of hotels and resorts, which leads to land conversion, resulting in the reduction of green spaces and agricultural land, and damaging ecosystems. Bali has experienced significant changes in its landscape, largely due to massive hotel and commercial building construction, causing the loss of green areas that function as ecological buffers. The rapid development and conversion of agricultural land have led to the disappearance of about 2,000 hectares of rice fields in Bali every year. In the Badung and Denpasar areas, the remaining rice fields dropped from about 7,000 hectares in 2000 to around 3,000 hectares in 2020, representing a reduction of 4,334.01 hectares, or 23.44% over the span of 20 years (Bali, 2024).

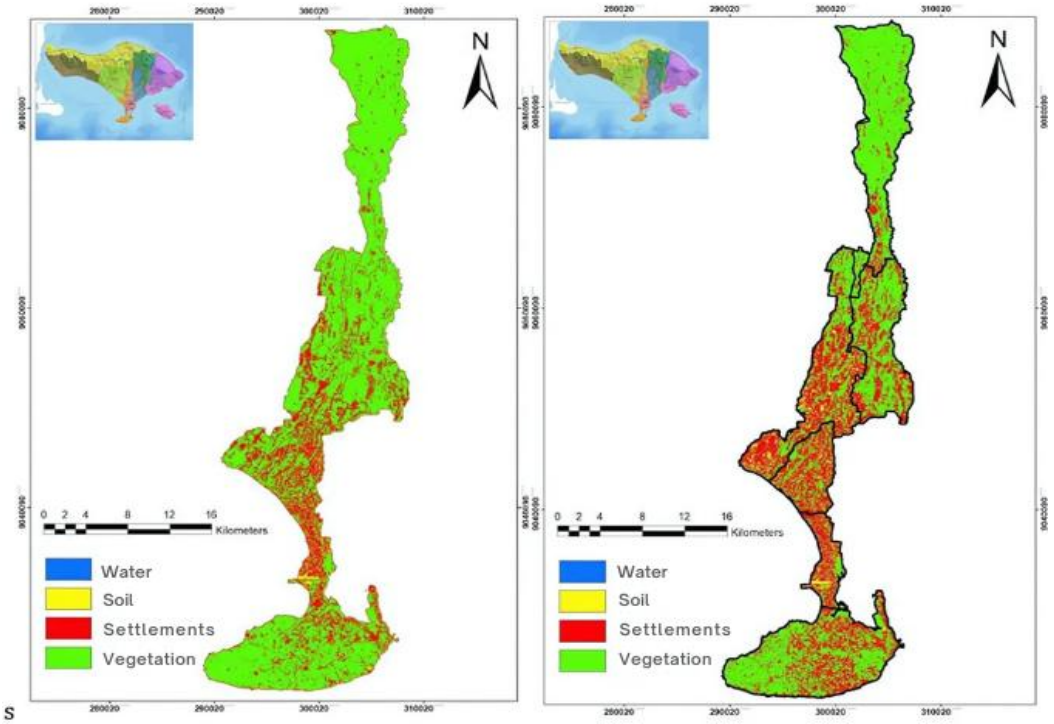

Fig. 2. Maps of the land cover decreased between 2015 and 2021 in Badung Regency, Bali Province (Aryastana et al., 2023)

Some of this land has been converted for hotel construction. The Bali Hotel and Restaurant Association (PHRI) reports that there are currently 3,500 hotels with a total of 146,000 rooms in Bali. Despite overtourism, hotel occupancy has never reached 100%, signalling a surplus in hotel capacity. In addition to hotels, the development of the tourism sector requires massive investment in infrastructure such as roads, airports, and other tourism services (shops, resorts, restaurants, and hotels). Thus, it is unsurprising that tourism imposes a heavy burden on the environment. The surplus hotel capacity reflects a broader issue in development management. Violations in hotel construction are not only related to an overabundance of buildings but also their inappropriate locations. Many hotels are built on the coastline or in the hills, despite regulations in the Bali Provincial Regional Regulation No. 3 of 2005. This can potentially harm the environment and ecosystems while ignoring regulations designed to protect the natural beauty and sustainability of these areas. Furthermore, land conversion impacts biodiversity by reducing habitats for flora and

fauna and lowers the overall environmental quality. With the reduction in green spaces, the environment's ability to absorb pollution and regulate the climate is also compromised, exacerbating the environmental crisis. The government has been criticized for its role in land conversion, which has contributed to environmental degradation, particularly by issuing excessive hotel development permits (Krisnayanti, 2024). There was a decrease in land cover between 2015 and 2021 in the vegetation class, amounting to 57.26 km^2. On the other hand, there was an increase in land cover for residential areas, bare land, and water bodies, with respective increases of 47.38 km^2, 4.08 km^2, and 5.80 km^2 (Aryastana et al., 2023).

A severe consequence of overtourism in Bali is the traffic congestion towards Ngurah Rai International Airport during Christmas 2023 and New Year 2024 holiday period, Bali experienced what local media described as horrific traffic congestion (DetikFinance, 2023). The particularly areas around Ngurah Rai International Airport, Kuta, and Seminyak, was paralyzed by heavy traffic, forcing some tourists to abandon vehicles and walk to the airport via the Bali Mandara Toll Road.

Fig. 3. Traffic congestion towards Ngurah Rai International Airport during Christmas 2023 and New Year 2024 holiday period (DetikFinance, 2023)

This situation reflects a surge in vehicle numbers, with over 70,000 passengers and approximately 41,000 vehicles recorded on a single day. This increase in vehicle traffic contributes to higher greenhouse gas emissions and further reduces green spaces (Gühnemann et al., 2021). While this number includes vehicles arriving for flights, the majority of these vehicles are private cars, buses, and rental vehicles used by tourists celebrating their holidays. The congestion causes severe traffic jams at key points around Bali, such as the main tourist areas (Kuta, Seminyak, Cangu, Ubud, Nusa Dua), as well as around the airport and port. The slower pace of travel exacerbates air quality issues, with vehicle emissions accumulating in the atmosphere. Motor vehicle greenhouse gas emissions, particularly from fossil fuel-powered vehicles (e.g., gasoline and diesel), release carbon dioxide (CO_2), which contributes to global warming and climate change. In addition to CO_2, vehicles also emit other pollutants, such as nitrogen oxides (NO_x) and particulate matter, which are harmful to human health and the environment. The air quality in Bali, particularly in Kuta, Seminyak, Denpasar, and Gianyar, tends to deteriorate significantly during these times, with increased concentrations of pollutants such as PM 2.5 (particles smaller than 2.5 micrometers), nitrogen dioxide (NO_2), and carbon monoxide (CO). In Bali, a region with a sensitive ecosystem, air pollution not only impacts human health but also

affects environmental quality, such as worsening coral reef conditions and other marine ecosystems already under stress from other forms of pollution (Boakes et al., 2022).

Another aspect affected by overtourism is the disruption of freshwater availability. Tourism puts pressure on the environment, particularly the carrying capacity of water resources (Sudipa et al., 2020b). The carrying capacity of water is determined by water quality, which is closely linked to pollution. Environmental pollution is a direct consequence of the tourism industry's growth, placing additional strain on water sources (Utami & Soemantojo, 2004) reported that the groundwater used by the tourism industry in Kuta was contaminated with E. coli bacteria in 2004, and several water quality parameters exceeded the standard limits (BOD, COD, Phosphate). Monitoring of wastewater quality from ten locations in 2004 revealed that six out of seven parameters were above the permissible limits (BOD, COD, TSS, NO3, PO4, and conform). There is a strong correlation between the volume of wastewater produced by the tourism industry (hotels and restaurants) and the quality of groundwater. Bali has experienced a drop in groundwater levels of more than 50 meters in less than a decade. About 65% of the water used in Bali is allocated for tourism services (Bali Water Protection, 2019).

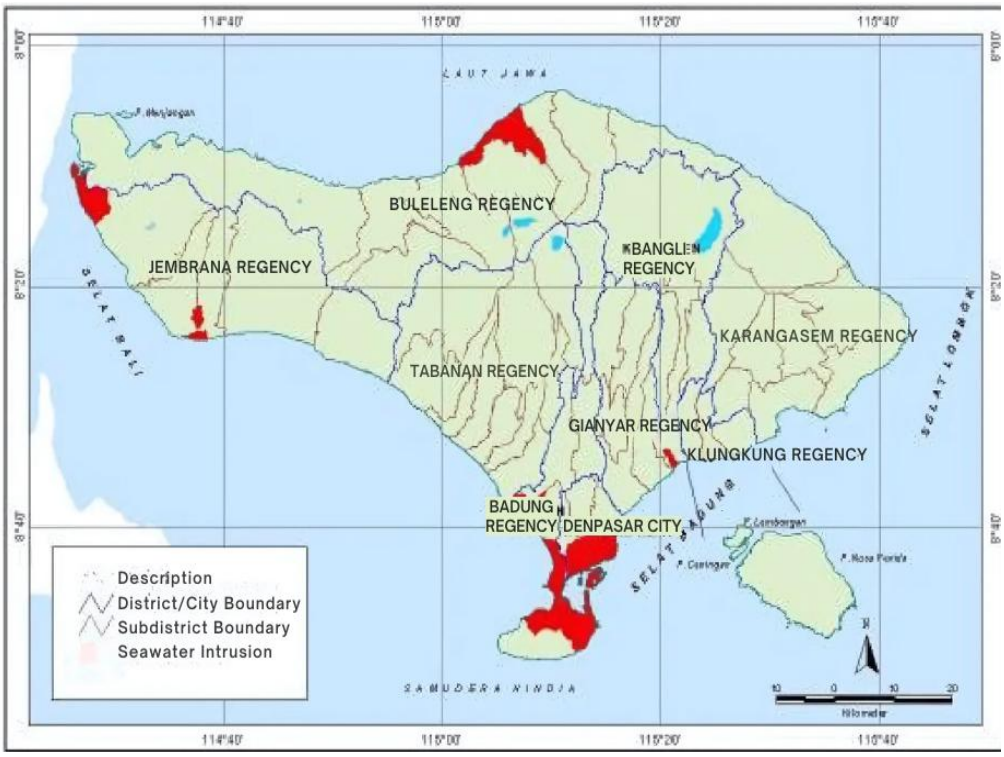

Fig. 4. Groundwater exploration areas with a high category
(Bali Water Protection, 2019)

The rapid growth of tourism has led to a sharp increase in the demand for clean water, much of which is allocated to the tourism sector, placing immense pressure on already limited water resources. Furthermore, pollution from hotel wastewater and other tourism-related activities has worsened water quality. This situation presents an irony for Bali, a region that views water as pratiti atma, water as the identity of the soul. Hotels have been identified as one of the major contributors to the water crisis in Bali. To meet their water needs, star-rated hotels rely on three sources of water: PDAM (local water utility), groundwater, and processed wastewater. Star-rated hotels are the second-largest consumers of water. In 2015, large industrial sectors, including star-rated hotels, used 302,201,755 m^3 of PDAM water and 12,366,200 m^3 of groundwater. Meanwhile, the local population consumed 8,385,357 m^3 of PDAM water and 7,661,000 m^3 of groundwater. The over-exploitation of groundwater in southern Badung has resulted in excessive groundwater use, reaching 3,067,200 m^3 per year, exceeding the maximum limit of

25,800,000 m^3 per year. The largest use of groundwater is found in Kuta and Kuta Selatan (Saputri et al., 2017). Additionally, there is a disparity in access to clean water. The shift from an ancient water distribution system, which ensured fair resource distribution over a thousand years, has largely been disregarded. Foreign investors, supported by local governments at various levels, have promoted unsustainable development without regard for water resources. Furthermore, excessive development and continuous land paving have led to increased runoff, with rainwater necessary for replenishing underground supplies flowing into drainage systems, gutters, rivers, and the sea. Moreover, despite some areas having designated green belts, a combination of ignorance and disregard for laws has allowed construction to continue unchecked across Bali (Cole, 2012). Water scarcity highlights the inequality in access to resources, which can be attributed to weak law enforcement in regulating tourism infrastructure development in prohibited areas such as green belt zones, coastal boundaries, and cliff edges, contributing to land conversion and affecting water availability.

The high number of tourists has also led to an increase in waste. Waste in Bali has become a significant problem, affecting both local residents and the tourism industry. Piles of waste in tourist destinations, beaches, and streets not only ruin the scenery but also create health and environmental issues. Approximately 1,200 tonnes of waste are generated daily in Bali, with this number increasing during peak seasons. Of this amount, around 60-70% comes from households, while the remainder comes from commercial and tourism sectors. However, data from the Bali Partnership, a coalition of the Bali government, academics, and NGOs (2019), found that of the total 1.6 million tonnes of waste produced annually, the 16 million tourists visiting Bali (6 million international tourists and 10 million domestic tourists) generate 3.5 times more waste per day than the local population, contributing 13% of the total waste in Bali. Of this waste, 303,000 tonnes are plastic (19.6% of the total waste). Only 48% of all waste is managed responsibly, and only 7% of plastic waste is recycled. As a result, 33,000 tonnes of plastic enter rivers, beaches, and the marine environment of Bali every year, posing a serious threat to the island's ecosystem.

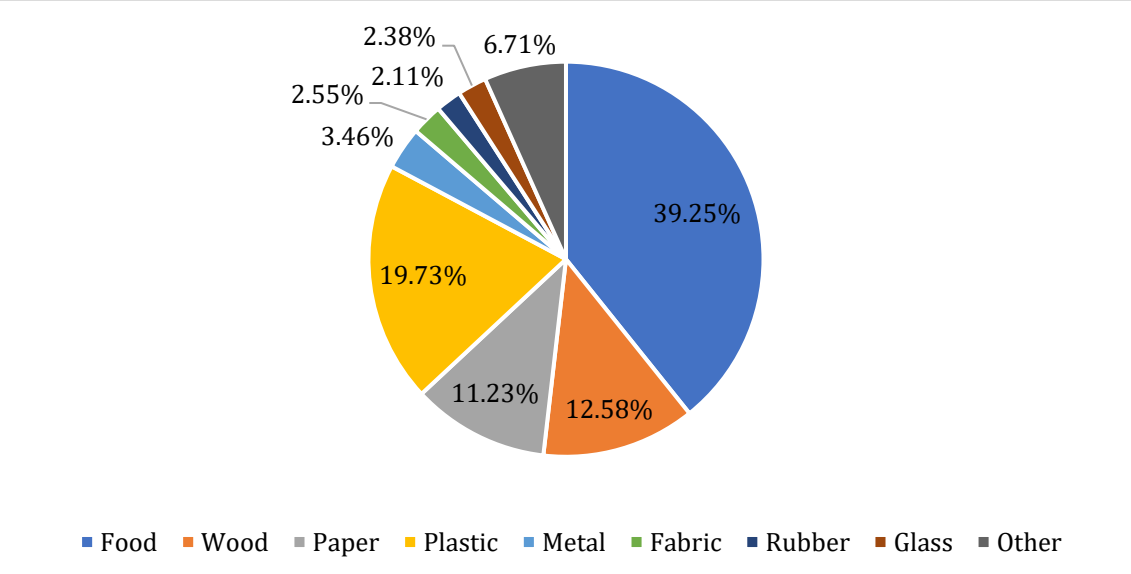

Fig. 5. Diagram of waste composition in Badung Regency in 2023
(Treasury Information System, 2024)

Referring to data from the National Waste Management Information System (Treasury Information System, 2024), the composition of waste in Bali in 2023 is dominated by wood or branches. Nearly half of Bali's waste consists of wood or branches, accounting for 49.1% of the total waste. Food waste in Bali's administrative areas does not exceed 30%, and plastic waste does not exceed 20%. On the other hand, the proportion of wood and branch waste in Bali's cities and regencies is usually around 40% of the total waste. Additionally,

15.61% of the waste in Bali in 2023 is made up of paper and cardboard (3.79%), metal (2.21%), rubber/leather (1.93%), glass (1.75%), fabric (0.97%), and others (4.96%). Specifically in Badung Regency, wood and branch waste makes up 33.3%, followed by plastic waste (28.4%), food waste (16%), and paper/cardboard (11.1%).

Waste management in Bali, particularly in Denpasar and Badung, is inadequate. Denpasar and Badung only have one Regional Final Disposal Site (TPA) called Sarbagita Suwung, located in the South Denpasar District of Denpasar City. TPA Suwung receives around 1,423 tonnes of waste daily. TPA Suwung covers an area of 32.4 hectares, but despite its large size, the landfill is already at full capacity. The height of the waste pile in TPA Suwung reaches 15-25 meters, and there is a potential risk of landslides. In addition to exceeding its capacity, waste management at TPA Suwung is insufficient, and the growing number of tourists further exacerbates the problem.

The coastal area of Kuta Beach in Bali faces serious challenges related to marine plastic waste that damages the surrounding environment of Badung Regency. The Kuta Beach area in Badung Regency is struggling with an increasing amount of waste, a phenomenon caused by rapid population growth, advancing technology, and high levels of social, cultural, and economic activity (Badrukamal & Dirgawati, 2024). Tourism in Kuta is a significant contributor to this issue. When waste is managed, the presence of tourists often slows down the process. Moreover, the lack of new technologies in waste management has become a major obstacle.

> *"The waste problem in Bali must be addressed immediately with the increasing number of tourist visits. Waste should be a priority for the Bali government. Waste management in Bali can be funded through the regional budget (APBD) and by collecting fees from foreign tourists. To resolve this issue, the government needs to provide infrastructure, waste collection services that can accommodate the narrow roads in Bali, reduce single-use plastics, and offer incentives for those who are already making efforts to reduce waste. The Bali Partnership (2019) mentions that the people of Bali are ready for change: 87% are willing to sort waste and are ready to engage in reduction, reuse, and recycling efforts" (RFH, co- founder of Eco Tourism Bali).*

Waste in Bali has become so unbearable that even the locals are frustrated. A vendor at Sanur Beach harbour expressed embarrassment over the piles of waste there.

> *The piles of waste at the harbour are an everyday sight. There's no routine garbage collection schedule, and there are no organised waste management workers. The same issue is happening in Nusa Penida, which is now a popular destination for tourists. This island, which can be visited by 7,000 tourists in a day, doesn't have a waste collection system or landfill. Meanwhile, tourists rely on bottled water, and these bottles pile up in many places around the harbour" (SI, a local vendor at Sanur Beach harbour).*

Waste is not only found on land. It has also contaminated the rivers in Bali. This condition was shared by Putu Eka Giri Mariani, a native Balinese who was born and raised on the Island of the Gods. Giri is also an advocate for tourism and has been a part of Sungai Watch since 2020.

> *"The quality of rivers in Bali briefly improved during the COVID-19 pandemic when tourism activities came to a halt, resulting in a reduction of waste and pollution. However, as tourism resumed, water quality declined again due to the increase in waste and uncontrolled water usage. The issue of water deficit has worsened because the needs of both the local population and the tourism industry have exceeded the capacity of infrastructure. Additionally, many locals have refocused on meeting their economic needs after the pandemic, leading to less attention being given to the quality of rivers. Therefore, collaboration between the government, the community, and the private sector is needed to ensure the environmental sustainability of Bali" (PEGM, a local resident of Bali).*

3.2 Social impact

Another problem Bali faces is its long-standing dependence on the tourism sector. Since the 1980s, tourism has grown rapidly and become a primary source of income for the Balinese people, providing jobs, local government revenue, and business opportunities. Tourism contributes around 50-60% of Bali's Gross Domestic Product (GDP) and creates the majority of jobs. The Balinese economy is highly dependent on the arrival of tourists, both domestic and international. Every year, Bali receives more than 6 million international tourists and tens of millions of domestic tourists. This makes tourism the main driver of other sectors, such as hospitality, restaurants, transportation, and tourism-related services. Additionally, tourism helps maintain the economic stability of Bali, as revenue from this sector is used to fund infrastructure development and public services. However, this heavy reliance on tourism also makes Bali vulnerable to fluctuations in the global economy, natural disasters, or health crises such as the COVID-19 pandemic, which can disrupt tourist arrivals.

In the past, Bali also developed agriculture and fisheries. Bali's agriculture is unique for its subak irrigation system, which has been recognised by UNESCO as a World Heritage site. Subak is not only a method for managing irrigation in rice fields but also a social and spiritual part of Balinese life. Each subak consists of farmers who manage rice fields cooperatively and is often organised in a social structure led by a subak leader. According to the National Archaeological Centre (now the National Research and Innovation Agency), between 1990 and the 2000s, around 750 hectares of rice fields in Bali were converted each year. In 2019, the area of rice fields in Bali reached 76,000 hectares, managed by 1,602 subak organizations. This year, the number of subak organisations in Bali has decreased to 1,596. In addition to rice as the main commodity, Balinese farmers also grow various other horticultural products such as vegetables, fruits, and spices. Agricultural land in Bali is distributed evenly, with areas like Tabanan, Bangli, and Karangasem being home to many fertile subak rice fields. Unfortunately, land conversion has become a challenge for Balinese agriculture. Other issues faced by Balinese agriculture include dependence on groundwater and soil degradation due to the excessive use of chemical fertilisers and pesticides (Bali, 2024).

The fishing sector also plays a crucial role in the economy of Bali, both for local consumption and to meet the growing demands of the tourism market. Bali has a long coastline with various traditional fishing areas, such as in Jimbaran, Sanur, Amed, and Candidasa. Many fishermen in Bali rely on marine products like fish, shrimp, squid, and other seafood. However, Bali's fishing industry faces numerous challenges, one of the main issues being marine pollution caused by tourism industry waste. The increasing number of tourists visiting Bali is directly linked to the rise in plastic waste and wastewater being discharged into the sea. This pollution contaminates the waters and threatens the coral reefs, which are vital habitats for many fish species. Additionally, the growing number of cruise ships and other maritime activities often damages fishing habitats. Overfishing is another concern. Many fishermen in Bali are trapped in unsustainable fishing practices, either due to a lack of supervision or because economic pressures push them to catch as much fish as possible to meet market demand. This reduces the biodiversity of Bali’s marine life and disrupts the food chain in marine ecosystems.

The social impact on the Balinese people is significant, as they are forced to compete with tourists for basic living necessities, including clean water, access to public spaces such as beaches, and affordable housing. Local residents also have to compete for jobs with foreign tourists, who not only come to visit but also work in the same fields as the locals. Jobs typically held by locals, such as tour guides, photographers, yoga and Balinese dance instructors, and motorbike rentals, are increasingly being taken over by foreign workers. Recently, many reports have highlighted an influx of Russian nationals who have taken over these jobs. Language barriers are cited as a key reason why Russian tourists, upon arrival, often seek out local services and facilities for their holiday needs. According to the 2020 Population Census conducted by the Central Statistics Agency, the number of migrants in

Bali was recorded at 681,224 people. The highest number of migrants is found in Denpasar City and Badung Regency. A person is considered a 'migrant' if they have lived in a new place or intend to stay there for at least one year. Central Statistics Agency data released in 2024 indicates that the three regions with the highest population density in Bali are Denpasar City, Gianyar Regency, and Badung Regency. The arrival of migrants, both from other provinces and countries, has driven up rental prices, which had previously dropped during the pandemic.

> *"I relocated to Bali six years ago due to my attraction to the island and my job search. When I arrived, rental prices were still affordable. Now, after Bali's recovery from the pandemic, the cost of renting a house has doubled" (S, a migrant from Sukabumi).*

The high price of housing or property in Bali is influenced by the fact that it is too easy to obtain permits to manage land ownership on the Island of the Gods. This ease of obtaining permits has led to a surge in investment, both local and foreign, driving up demand and, consequently, prices. As more people seek to buy property in this idyllic location, the market becomes increasingly competitive, making affordable housing a growing concern for residents.

> *"Online Single Submission (OSS), created by the Ministry of Investment and the Investment Coordinating Board, was meant to simplify licensing procedures. However, the growth of investment and businesses has ultimately driven up land and property prices" (RFH, co-founder of Eco Tourism Bali).*

The BBC also noted that locals are struggling to own land due to competition with foreign migrants (Wahyuni, 2024). This situation was highlighted by Ni Made Fitri Apriyani, a Balinese woman who was born and raised on the island. She expressed that owning a house or land in Bali is impossible and remains just a dream for her. With an income of Rp 3 million to 5 million per month as a staff member at a villa, she is unable to meet basic needs.

> *"Not to mention if there's a religious ceremony. It feels like buying land [or a house] is so far out of reach" (F).*

Overtourism in Bali, particularly in the southern areas such as Canggu, Kuta, and Seminyak, of the areas located in Badung Regency, southern Bali have increasingly led to environmental and social disturbances, including noise pollution. Bali among global destinations experiencing overtourism pressures, alongside Amsterdam, Athens, Paris, and Phuket.

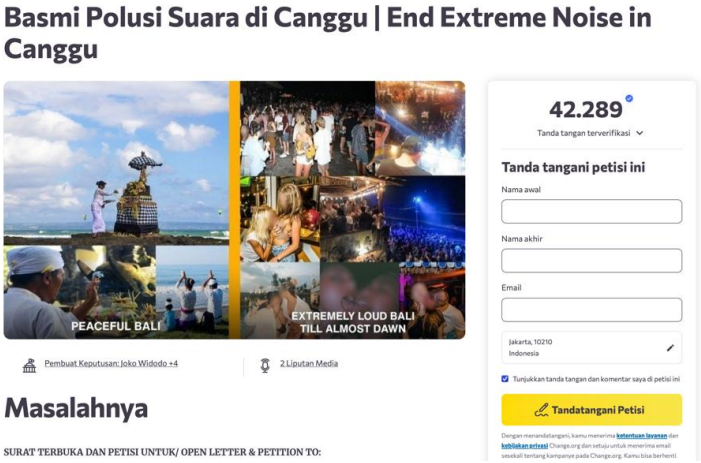

Fig. 6. End extreme noise in Canggu petition
(Change.id, 2022)

In Canggu, excessive nightlife activities, traffic congestion, and continuous loud music from bars and beach clubs have triggered public complaints. Measurements by local residents and environmental observers show that noise levels in some nightlife areas often reach 80 decibels (dB), far exceeding Indonesia's environmental noise standard of 55 dB for residential zones as regulated by Minister of Environment Decree No. 48/1996 Concerning Noise Level Standards.

> *"For everyone to know, in the Canggu area, almost every night of the week, every week, every month, both before and after the pandemic, it has been impossible for people to get proper rest at night during normal sleeping hours after 10 p.m. The deafening sounds from open bars, both in Batu Bolong and Berawa, located right next to sacred Balinese temples, are so loud that windows and doors shake. It feels worse than an earthquake. This noise disturbance continues almost every night, lasting until 1, 2, 3, or sometimes even 4 in the morning" (PD, creator of the "End Extreme Noise in Canggu" Petition").*

A petition titled "End Extreme Noise in Canggu" garnered more than 8,000 signatures in 2022, reflecting widespread frustration with unregulated entertainment venues (DetikBali, 2022b). Although traditional village regulations (perarem) limit loud music to before 11 p.m., many venues continue operating past midnight. Indonesia's Minister of Tourism and Creative Economy, Uno (2022) urged compliance and emphasized that tourism must respect local communities' rights to rest. This situation exemplifies how overtourism exacerbates urban noise pollution, threatening residents' well-being, reducing environmental quality, and challenging the island's vision of sustainable and community-based tourism (Aletta & Kang, 2019; Potvin et al., 2024; Nath et al., 2024).

4. Conclusion

Bali is facing a complex set of issues in the wake of unsustainable tourism growth. The environmental impacts are evident in ecosystem degradation, water availability, air quality, and waste management. Therefore, more sustainable development approach is needed, one that balances tourism development with environmental preservation, while enhancing infrastructure to support the efficient and sustainable management of a natural resources and the environment. To achieve this, Bali must implement sustainable tourism management that prioritizes environmental conservation and the well-being of a local communities. This includes revitalising green areas, optimising zoning policies and spatial planning, and improving water resource management by adopting more efficient water management systems and limiting groundwater use. Furthermore, waste management infrastructure should be upgraded with a modern and integrated system.

Bali also needs to tighten supervision of the development of a hotels and other tourism facilities, as well as educate the public to foster collective awareness and reduce the negative impacts of tourism. In addition, Bali must reduce its dependency on the tourism sector. To do so, the government should focus on developing other sustainable economic sectors, such as organic farming, sustainable fisheries, and creative industries based on local wisdom. Lastly, it is crucial for Bali to limit the number of tourists in the southern parts of the island to ensure long-term environmental and social sustainability.

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