Warwick Think Tank

Environment

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The current unsustainable situation Bali faces

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Introduction

Taking a closer look at the area of Bali, this report explores multiple environmental concerns that affect the island. It will discuss tourism, the dependence on coal plants, water management, waste management and government action to present how these problems intertwine and discuss how they have affected the community.

The topic was chosen to narrow down the focus of the report onto a single area, which would then establish deeper comprehension to the environmental issues which surround Bali, their interconnections and from there how to best resolve them. Currently, the increase of popularity in Bali has drawn a lot of tourism in the area which has created environmental concerns for the local communities, further impacting previous concerns of waste disposal and water management as these become more pronounced.

With our research we hope to deepen the understanding of the relationship between environmental concerns in Bali. The extent of the research in the report presents details of the situation that highlight the gravity of each concern, so that our policy recommendations are understood in the context of urgency and immediate action.

Our report will provide a briefing of three main concerns: Tourism, Coal plants and Water Management and Pollution. Having evaluated these problems, the following section expands on these and provides further detail on the social, economic and political aspects of these problems. Finally, we present policy recommendations taking into account the specific case study dealt with and suggesting sustainable tourism, installing a centralised waste management and water usage.

Energy & Environment briefing note

Overview

This section discusses three interconnected problems that the island of Bali currently faces and are a motive of concern: the reliance on tourism and coal, and the current water and waste management. Given the detrimental effects of these problems, the current situation is argued to be unsustainable in the long-term. We can categorise the negative effects into environmental problems, and cultural and social problems.

Tourism in Bali has aggravated existing environmental and economic problems, while creating new ones. Plastic pollution has significantly increased with the arrival of tourists as they can generate up to 3.5 times more waste per day than locals. Their careless behaviour is also shown through their contribution to the degradation of ecosystems, the development of (harmful) wildlife tourism, and the growing tensions between them and locals as a result of their lack of respect.

Similar negative effects produced by tourism can be perceived in Bali's dependence on coal. Regarding the environment, the coal plant is driving fish further from the coast, harming coral reefs and reducing the number of hectares of primary forest. The negative effects on people are also concerning. Not only does the reliance on coal lead to illnesses and even premature death due to the release of pollutants, but also it provokes anger among locals as a result of the lack of power they have in coal-related matters.

Lastly, water and waste management are also worth-mentioning given the unsustainability of the current system. On the one hand, Bali has faced water scarcity for years and the development of tourism has created significant problems in terms of water allocation and the use of techniques such as the extraction of groundwater to obtain more drinkable water. On the other, tourism has also shed light to the mismanagement of plastic by showing the lack of an efficient system that can deal with the excessive amount of plastic Bali currently generates.

Tourism:

Tourism has magnified underlying infrastructure, socio-economic and environmental problems.

- According to the Global Institute for Tomorrow (GIFT), tourists in Bali generate 3.5 times more waste per day than locals. The impact of tourism accounts for 13% of Bali´s total waste.[1]
- The presence of tourists aggravates the problem of plastic pollution, which is either burned, dumped in illegal dumping sites or ends up in rivers or beaches. While 1,6 million tonnes of waste are produced a year, 33,000 tonnes end up in Bali's waterways.[2]
- Indigenous communities are against the government's tourism project 'New Bali' in the island of Lombok whose intention is to replicate the experience of Bali in other parts of the country. This would entail the eviction of 121 households.[3]

The welfare of endemic species is under threat given the development of wildlife tourism in Bali.

- The birds and reptiles in the Reptile Park and Bali Bird Pars were found to have direct interaction between them without the opportunity of exiting the situation when feeling distress or attacked. Patchy feathers were noticed in some birds, which can be a sign of self-plucking, related to feelings of stress and uncomfortableness.[4]
- Wild animals such as elephants, dolphins and orangutans are exploited for touristic activities while suffering from severely inadequate captive conditions.[5] Animals are chained up or living in very small cages and marine animals do not have adequate size of pools to swim.
- Four Paws Australia warns tourists that many places that call themselves 'sanctuaries' are in fact scams.[6] Most animals there are "often sedated or

[1] Global Institute for Tomorrow, 2023, Creating a Circular Plastic Economy for Bali, Indonesia.
[2] Syakriah, A., 2024, Three Siblings and Their Team, Sungai Watch, are Fighting Against Bali´s Pollution Problem; Rizka, A (2023) Bali´s Plastic Waste Problem: A red Warning for Everyone
[3] Simangunsong, T., 2021 Indigenous Group Faces Eviction for "New Bali" Tourism Project in Sumatra
[4] World Animal Protection (2023) Holidays That Harm. Bali 2023 Report.
[5] Ibid.
[6] Evans, J., 2023, Aussies Urged to Practice "Ethical Animal Tourism" When Heading to Bali

psychologically beaten down to the point of submission to perform unnatural acts against their instincts".[7]

The degradation of ecosystems and the environment is severely increasing as a result of the tourists footprint.

- The coast of Bali is suffering a significant rise in plastic waste, especially in the beaches in Kuta and Legian. The waste mainly comes from hotels near the coast or bad practices by tourists, such as littering. In 2021, during Bali's Biggest Clean Up, 90 tonnes of rubbish were collected over a weekend.[8]
- Several studies[9] have noticed a positive relationship between scuba diving tourism and the degradation of coral reefs. The lack of ecologically conscious diving practices has been highlighted. Tourists have been reported stepping on the corals, or breaking them while colliding with them.
- The construction of infrastructures for touristic purposes contributes to decreased biodiversity and forest degradation. The new Gilimanuk-Mengwi Toll Road has been argued to have a negative impact on the environment due to the destruction of protected forests and rice fields.[10]

There are growing tensions between locals and tourists due to the latter's lack of respect.

- Luiza Kosykh, a Russian woman, was arrested and deported after posing naked in front of a 700-year old sacred tree in Bali. The same outcome happened to another Russian influencer, Alina Fazleeva, when she posed naked at a holy site.[11]
- Tourists do not behave or dress accordingly when visiting temples or other religious buildings.[12]

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[7] Four Paws Australia, 2023, Keep Bali Beautiful and Travel Kinder this Holiday Season

[8] Bright Vibes, 2021, Bali's Biggest Beach Cleanup 2021 Received more Sign Ups Than Ever.

[9] Suparno et al., 2019, Ecological Changes in the Coral Reef Communities of Indonesia's Bali Barat National Park

[10] The Bali Sun, 2022, Bali Environmentalists Call Out "Destruction of Nature" in the Name of Tourism Development

[11] Heinz, V., 2023, Negative Impacts of Tourism in Bali: A Comprehensive Guide

[12] Iverson, T.J., 2010, Cultural Conflict: Tourists versus Tourists in Bali, Indonesia

- In 2023, a new ban forbidding tourists from renting motorbikes was implemented after many incidents involving drunk driving, speeding, driving without shirts or helmets.[13]

[13] Khalil, S., 2023, Bali tourist filmed having heated exchange with officers over helmet

Coal plants:

Fossil fuel companies lack of transparency towards the community permitted social concerns

- Despite the community's general consensus against the coal plant, many sold their land due to the lack of transparency and lack of information given by the coal operators.[14] Since 2015, the public relations officer of the PT Dewata Energi Bersih (PT DEB) emphasised to the community that the plant is safe, and doesn't violate the rules.
- PT DEB claimed the project to be part of the public sector, misleading the information to appear to be a government project.[15] The indigenous community, Sanur Bali, showed strong opposition to the plan which was ignored due to these false claims. Furthermore, interviews showed residents' frustration with the lack of transparency and use of a middle man to buy land for cheap.[16]
- The plant has not acknowledged the existence of a temple nearby, which is held to be sacred, with concerns of civilians on construction interfering with its sanctity and no initiative responding to ensure it's respected.[17]

The plant has been responsible for a number of pollutants being released, which have had adverse consequences.

- The PT DEB's installation has been shown to decrease the air quality as a result of their PM 2.5 pollutants. These are particles so small that they can penetrate our respiratory service, even entering our bloodstream, causing inflammation and irritation of our lungs, and in more serious cases premature death.[18] The air quality life index (AQLI) forecasts the average Indonesian to lose 1.2 years of life expectancy due to poor air quality.[19]
- Coal-fired power plants are associated with mercury pollution, releasing it into the atmosphere when burned. It eventually ends up in land or water bodies where it has environmental and health concerns.[20] Bioaccumulation is responsible for the

[14] Hartatik, 2022, LNG Terminal construction in Bali: 'No violation, just lack of information'
[15] Putri, N.M.L.K., 2023, Walhi says Energy Gods Spread Stock Ownership Hoax
[16] Gokkon, B., 2018, Report blames coal-fired plant in Bali for pollution, loss of livelihoods
[17] Hartatik, 2022, LNG Terminal construction in Bali: 'No violation, just lack of information'
[18] Kumar, M., 2023, How PM2.5 Pollution is Threatening the Tourism Industry in Bali
[19] Greenstone and Fan, 2019, Indonesia's Worsening Air Quality and its Impact on Life Expectancy
[20] Basel Convention Regional Centre for Southeast Asia (2017) FINAL REPORT MERCURY EMISSIONS FROM COAL-FIRED POWER PLANTS IN INDONESIA

mercury being consumed by us through fish that have built up mercury in their system, and can lead to cognitive development issues, neurological disorders and cardiovascular problems.

- The district environmental agency found pH levels and temperature to be below limits in the water near the plant, with pH samples showing levels of 8.37 near the plant while the limit is 8.5, and temperature being recorded at 30.9˚C while limit being 35˚C. Yet residents have claimed these reports do not accurately represent the poison that the plant continues to emit.[21]

Despite the lack of transparency when initiating the project, the plant has had adverse effects on the environment.

- Fishermen have made claims reporting the plant for being responsible for driving fish further from the coast, forcing them to go further out to support themselves and therefore having consequences on the economy of the area and available resources. This has led to adverse consequences to the food security, employment and export revenue besides changing fishing practices to illegal techniques (such as use of cyanide fishing) and harming the environment.[22]
- Sensitive habitats such as coral reefs and wetlands which are present near the coal power plant installation, are at risk from the contamination produced. Bali's coral reefs have experienced severe losses from runoff pollution, with efforts already underway to preserve them, involving the coastal community.[23] Furthermore, the unsustainable fishing practices resulting from fish being further from the coast has also led to habitat destruction.
- From 2001 to 2022 Bali lost 53 hectares from the original 59.5 thousand hectares of primary forest.[24] PT DEB has been associated with being responsible for mangrove land impacts, which although not recognized as primary forests, make up 2.7 million hectares of Indonesia, playing a vital role in Indonesia's coastal environment.[25]

[21] Gokkon, 2018, Report blames coal-fired plant in Bali for pollution, loss of livelihoods

[22] Warren and Steenbergen, 2021, Fisheries decline, local livelihoods and conflicted governance: An Indonesian case - ScienceDirect

[23] Lilley and De Suriyani, 2021, Coastal communities help restore Bali's coral reef

[24] Global Forest Watch, n.d., Bali, Indonesia Deforestation Rates & Statistics

[25] Basyuni et al., 2022, Mangrove Biodiversity, Conservation and Roles for Livelihoods in Indonesia | SpringerLink

Tourism project

‘New Bali’

in the island of Lombok

Water Management and Pollution:

Bali is increasingly inflicted with flooding that causes damage to the local communities and Balinese economy

- Bali is increasingly affected by flooding, one example would be that in between January and May 2012 191 floods were recorded in Buleleng, in the Northern region of Bali.[26]
- In recent years there has been a significant expansion in Urban settlements, in the Augung watershed, between 2012 and 2017 some 647.8 ha of farmland was lost, much to the expansion of urban settlements, this means that less water is absorbed into the ground, increasing runoff and the chance of flooding.[27] In all of Bali, one study estimated that around 1000 ha of rice paddy's were being lost a year.[28]
- The disposal of waste, particularly by the tourist industry, into water channels and bodies during the dry season, can lead to blockages and more flooding in the wet season.[29]

The allocation of water resources has become increasingly contested and difficult in Bali

- The Subak system is the Traditional balinese system of water management, closely tied to balinese culture and religion, as well as being a form of administration that is increasingly under threat. Rather than the traditional method of accessing water, as the economy has become a free market one water is distributed based on economic value, meaning that corporations and the tourism industry have greater access and farmers and local residents less.[30]
- According to one 2015 study, some 65% of water in Bali is allocated to the tourism industry, which employs 25% of Bali workers and constitutes 30% of the local economy directly, with an even bigger indirect economic effect. This power-disbalance has a big impact, tourist utilities, such as Spa and golf courses are

[26] Suyarto et al., 2023, Hydrological Approach for Flood Overflow Estimation in Buleleng Watershed, Bali
[27] Dharmayasa et al., 2022, Investigation on Impact of Changes in Land Cover Patterns on Surface Runoff in Ayung Watershed, Bali, Indonesia Using Geographic Information System
[28] Cole and Browne, 2015, Tourism and Water Inequity in Bali: A Social-Ecological Systems Analysis
[29] Kusmiyarti et al., 2018, Flood Risk Analysis in Denpasar City, Bali, Indonesia
[30] Sriartha et al., 2015, The Effect of Regional Development on The Sustainability of Local Irrigation System

highly water intensive, whilst many in Bali lack water in their homes for much of the day. large businesses flout rules, for example classifying themselves as smaller operations to make getting permits easier, whilst monitoring of compliance is poor.[31]

- Additionally the growing population has led to increased extraction of groundwater, this leads to falling water tables and saltwater intrusion, meaning that the amount of potable, or 'drinkable' water is increasingly limited. Due to the depletion of groundwater it is increasingly necessary to dig deeper wells, for example, despite the department of mining stating that wells only need to be 40m deep, they are often dug to more like 60m deep.[32]
- Bali is facing water scarcity in the most densely urban and touristic areas. The use of water for consumption is negatively affecting agriculture, and thus, food production.[33] Local farmers have seen a reduction in their rice harvest, since now they only get one harvest a year instead of two or three.[34]

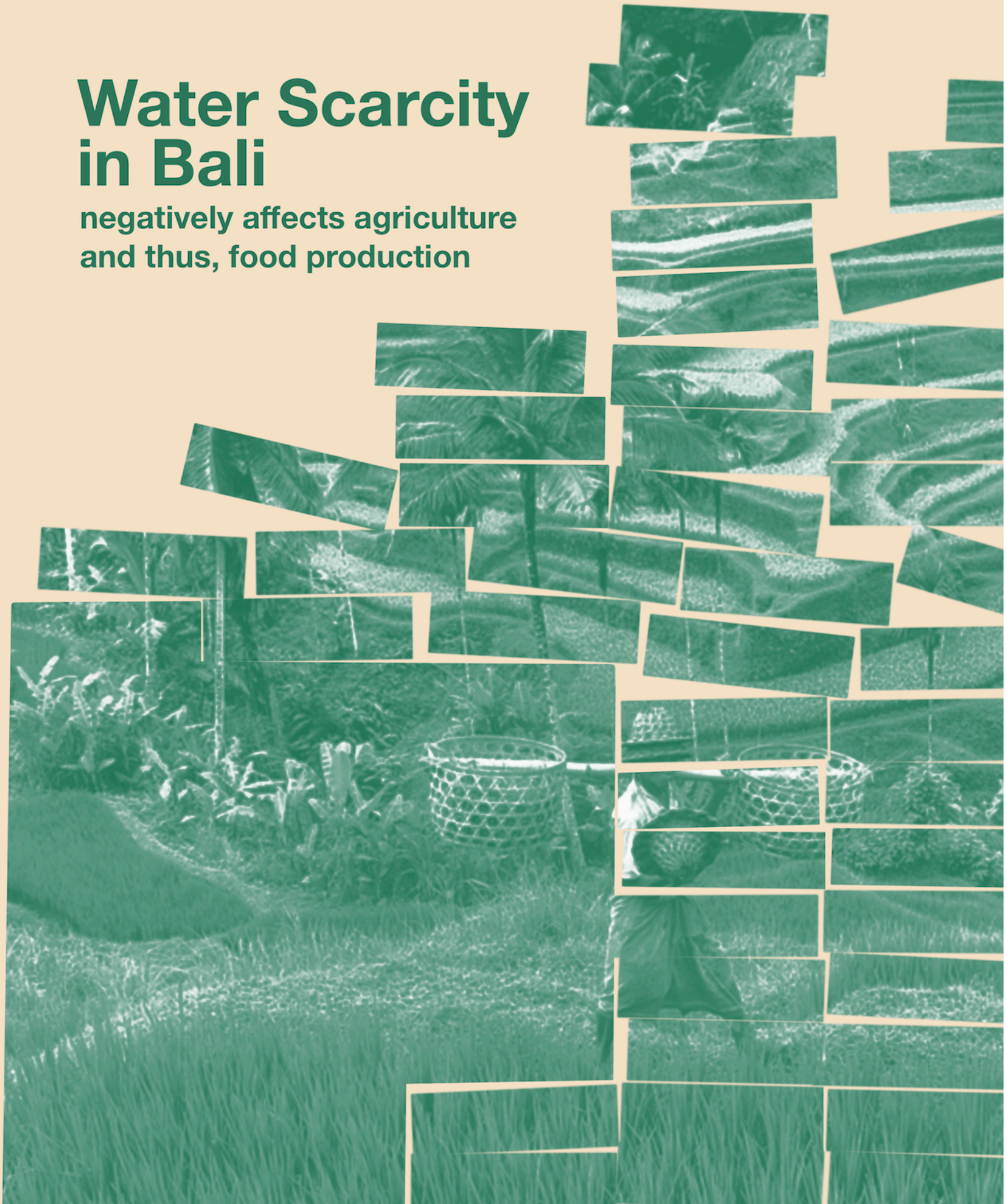
Pollution, particularly of Plastics is increasingly affecting Bali's waterways and beaches

- Bali's waste management infrastructure continues to struggle to cope with growing amounts of waste. This is particularly difficult due to the huge amount of plastic pollution. Indonesia overall is the 2nd largest producer of plastic waste globally, only second to China. National Geographic estimated that Bali produced 4281 tonnes of waste a day, of which only 48% was 'responsibly managed' (that includes going to landfill/recycling), as such they estimated that each year some 33,000 tonnes of waste ends up at sea every year.[35]
- Plastic often washes up on beaches, for example it is estimated that each year some 60 tonnes of plastic washes up on the beaches of Kuta and Legian, which are popular tourist spots. Plastic also finds its ways into river channels and other water bodies.

[31] Cole and Browne, 2015, Tourism and Water Inequity in Bali: A Social-Ecological Systems Analysis
[32] Ibid.
[33] Milko and Jatmiko, 2022, Bali's water crisis threatens local culture, UNESCO sites
[34] Ibid.
[35] Siddharta, A.T., Bali fights for its beautiful beaches by rethinking waste, plastic trash

Water Scarcity in Bali

negatively affects agriculture and thus, food production



Insights

Overview

Having explained the three problems that make the current situation of Bali, the following section expands on them and explains some key causes that have contributed to the creation of such a situation.

The first factor worth-mentioning is the overdependence of tourism on the island's economy. Its heavy reliance on this sector makes Bali vulnerable to the detrimental effects of over tourism, and especially of mass tourism due to their cheap prices relative to other touristic destinations. The second key cause that will be explored is the institution's prioritisation of economic growth to the detriment of the Balinese environmental-awareness mindset and lifestyle. In fact, while the balinese population is proud to uphold environmentally friendly attitudes and values, the latest governmental decision to welcome multi corporations has contributed to some of the negative consequences mentioned in the briefing, especially those related to environmental degradation and local's feeling of discontent. Lastly, the third theme addressed in this section will be the poor water management system of Bali. While water scarcity on the island can be attributed to natural causes, for example, limited natural resources, others have been the result of human action including the pollution of water, the expansion of urban settlements and the tourism industry.

The Overdependence Of Tourism Of The Balinese Economy.

The tourism industry has become one of the largest and fastest growing sectors in the world. While tourism in Bali has been common since the 1930s, mass tourism only occurred after the Ngurah Rai Airport was inaugurated in 1969.[36] In the early 1970s, the island's economy still relied on the agriculture sector. However, Bali became more and more popular among visitors in the 1980s, and the economy quickly shifted towards a tourist-based economy.

This phenomenon was not a characteristic of Bali, but rather apart of the country's State Policy 1998,[37] which emphasised the importance of developing the tourism industry given its capacity to stimulate economic growth, increase employment, local revenue, and recognition of Indonesia within the international sphere. Nevertheless, it is worth mentioning that Bali took a different course to the rest of Indonesia. While several East Asian countries, including Indonesia, experienced a shift from agriculture to the tourism industry in the 20th and early 21st century, given the lack of industry in Bali, the dependence on tourism of this island is more acute.

In fact, Bali is considered the tourism capital of Indonesia, and one of the most popular destinations in the world. In 2017, it was TripAdvisor's top global destination, overcoming popular cities such as Paris and London.[38] Bali's contribution to the total tourism makes the island a key asset for the country. In 2019, before the pandemic hit, 40% of Indonesia's total tourism income stemmed from Bali.[39] Out of the 16.1 million foreign visitors that came to Indonesia, nearly 40% chose Bali as their destination. While there is no recent data, in 2020 it was claimed that the tourism sector accounted for over 70% of activities in the island.[40] This has a significant impact on employment rates, as more than half of the population relies on this sector as their source of income. For example, in Kuta, an area inBali, 90% of the people there rely on tourism.[41]

However, Bali's heavy reliance on tourism can be considered problematic. As mentioned in the briefing, Bali is facing environmental and socio-economic issues as a result of the massification of tourism. Natural landscapes are filled with plastic, water scarcity is aggravated by the increasing number of visitors and plastic management plans are

[36] Cole et al., 2020, Making an impact on Bali's water crisis: Research to mobilize NGOs, the tourism industry and policy makers
[37] World Trade Organization, 1998, Indonesia: December 1998
[38] NZ Herald, 2017, Bali named as best destination in the world by TripAdvisor
[39] Bali Post, 2019, Pariwisata Bali sumbang 40 persen devisa pariwisata nasional
[40] Badan Pusat Statistik Provinsi Bali, n.d., Percentage of Poor People of Bali Province by Regency/Municipality 2019-2021.
[41] Sudapet et al., 2021, Bali Government Support To Blowed Up Tourism

lacking. While the latter is a problem in itself, the massification of tourism magnifies the problem. Note that tourists create 3.5 times more waste per day than locals.[42]

Moreover, cultural issues are also on the rise, as tensions between locals and visitors increase. As mentioned in the briefing, tourists disrespect Bali´s Hindu culture and engage with reckless behaviour. Given their economic dependence on tourism, this puts the Balinese population in a vulnerable state where the growing presence of tourists is at odds with their culture, natural resources, and lifestyle.

For example, although overcrowding in Bali has been acknowledged as a critical problem, official authorities have made efforts to revive the industry after Covid-19. For example, several campaigns to advertise Bali on social media by the Ministry of Tourism and Creative Economy,[43] hosting international events,[44] and in May 2023, the Ministry of Foreign Affairs participated in an event to promote Bali as a holiday destination.[45] While a significant decrease of tourists (as Covid-19 has shown) would be extremely detrimental to Bali's economy and population, it is argued that the overdependence of tourism is also harmful to the environment and the local population.

[42] GIFT, 2023, Creating a circular plastic economy for Bali, Indonesia
[43] Bangso et al., 2023, Revitalizing Bali's Tourism: The Government's Role in Driving Innovation and Change After Covid-19
[44] Meigar, K., 2022, Revisiting Indonesia´s Communication Strategy in Amplifying “New Bali” Tourism Project
[45] Ministry of Foreign Affairs of the Republic of Indonesia, 2023), The Ministry of Foreign Affairs Collaborates with the Ministry of Tourism and Creative Economy to Promote Bali Tourism for the Indian Market

Bali's Institutions' vs. Individuals Environmental Awareness.

Individuals and communities in Bali have often responded to environmental demands in ecocentric ways; it is part of Indonesia's culture to care for the environment and make decisions with it in mind. Yet there is a disconnection between this environmental individual awareness and the responses of different establishments which affect the area, such as multinational corporations and government's prioritisation of economic growth before environmental impacts, such as was the case with tourism.

Despite environmental awareness not being accessible to everyone, Bali still upholds environmentally friendly attitudes and values, as well as having multiple environmentally concerned educational programs available in different schools since 2006. Most prevalent environmental concerns arise from big companies, such as Danone, whose plastic emissions and unconcern for the community have made unsuitable decisions for Bali.

Environmental education is not mandatory in Bali, despite multiple projects and programs taking part around the region to bring environmental education in school, there is still a gap in rural areas and public schools. Public schools, which form part of 90% of primary schools, and 50% of high schools and 50% of universities, offer the ministry of education and culture curriculum, which since 2006 has had the Adiwiyata Program.[46] This program takes part in 463 schools around 28 provinces in Indonesia, encouraging schools to adopt environmentally friendly practices and integrate environmental education into their curricula, inspired by Institute for European Environmental Policy (IEEP).[47] However, rural schools are likely to have less exposure to these kinds of programs due to lack of interest, awareness or support for environmental concerns.

Since 1975, the IEEP has inspired and worked alongside a variety of nations to integrate elements of environmental education into their systems. The curriculum presents students with environmental attitudes through the teaching methods which bring students closer to their surroundings. However, differences in accessible equipment and opportunities in school systems in Bali mean that rural areas are at a disadvantage to learning about environmental issues, and therefore taking less concerns or knowing how to solve the problems. This means that corporations are more readily willing to take advantage of them, giving little alternatives that incorporate the culture's ecocentric

[46] Geep, n.d., Indonesia
[47] Dominata, A., 2023, Building a Green School Curriculum from Elementary in Indonesia as an effort to Maintain Environmental Sustainability

demands.[48] This was seen in the construction of PT DEB coal plant, as well as Danone-Aqua.

An industry that has mismanaged the community interests has been Danone, more specifically Danone-Aqua Indonesia, a subsidiary of Danone International.The Angga Swara neighborhood in Jimbaran has called out the company for irregularities in establishing Danone's Integrated Waste Processing Facility (TPST Smtaku Jimbaran). Among concerns, the community pointed out the "forging of several communities signatures to obtain the permit."[49] Furthermore, the community has complained of foul smells from the facility, disturbing the area and creating an unhealthy environment. Danone-Aqua has recognized the concerns in the amount of disposable plastic Indonesia faces, whith the country being one of the largest contributors to plastic pollution globally,[50] with a statement from the General Manager saying "AQUA delivers more than two thirds of our water in returnable, reusable jugs."[51] Beyond this, AQUA has also invested in recycling "more than half" of PET bottles and intends to do more to reduce waste, however this is something hard to accomplish considering Bali's current waste disposal system. The poor waste management in Bali means that plastic produced by corporations is not disposed of responsibly, yet is becoming a more regular aspect of household consumption. Bali lacks a comprehensive centralised waste collection and treatment system, leading to a large number of illegal open dump sites with around 1000 sites scattered across the island.[52] Despite ongoing prioritization focusing on waste disposal, waste and plastic that is currently in the environment has negative implications on the communities health, with potential risks including cancer, metabolic disorders and neurodevelopmental conditions.

Furthermore, there is discontent from the community on corporate decisions, with locals' wishes not being taken into account before executive decisions, due to their prior lack of information on how to handle these changes from a direct result of having no practical environmental education. For example, PT DEB was shown to not have fully transparent conversations with residents and led them to believe that government involvement would force them to sell their land, when it was not a public project.[53] This manipulation of information presented caused different responses from the public to the companies

[48] Alaydrus, U., 2022, G20 Indonesia: Steps Towards Sustainable Environmental Sustainability
[49] Ismawati, Y., 2023, Bali Community Tells Danone: Stop Poisoning Us with Toxic Plastic
[50] Nexus3 Foundation, 2015 Waste and Plastic Solution | Nexus3 Foundation
[51] Danone, 2018, AQUA pledges to remove more plastic from the Indonesian environment than it uses
[52] The Straits Times (2023) Indonesia's tourist hot spot Bali has a $53m rubbish problem
[53] Tatix, N., 2022, LNG terminal construction sacrifices mangroves and the Bali marine ecosystem

demands, disconnecting their answers from their ecocentric values and therefore the company is not representative to the culture.

The Poor Management of Water In Bali.

As outlined in the briefing, Bali faces significant issues with the management of water resources. The root of these issues come down to the allocation of water resources, as well as their poor maintenance leading to flooding as well as the pollution of water.

The way in which water resources are allocated in Bali is changing. Traditionally, a system known as 'Subak' is used. This is a democratic association of farmers that is based upon elements of Balinese culture and religion, which focuses on ensuring a harmonious relationship between God, mankind and nature.[54] These Subak's carry out proper rituals related to water and water temples, as water itself is considered a 'sacred substance'.[55] However, the Subak system of water management is increasingly under threat, according to one study which analysed 69 Subak's, road construction, urban expansion and the tourist industry is connected with the declining sustainability for Subak's.[56]

The growth of the tourist industry has caused problems relating to the proper allocation of water resources. The industry is huge, as some 5 million international visitors come each year. As mentioned in the briefing each year around 1000 ha of rice paddies are lost. This is in part due to land taxes, which are based not on the actual usage of land but on the expected value of it - as tourism has driven up land values this has made the tax unaffordable for farmers forcing many to sell. Ironically, as this idealistic agricultural image is vital to the touristic appeal of Bali, some tourist companies have been reported on paying farmers to continue to farm to maintain the image, which their own industry undermined.[57]

The Tourist industry also runs operations which are highly water-intensive. For example, golf courses and spas which use large amounts of water. In contrast many Balinese struggle to get regular access to water throughout the day. Much of the water that they do have access to is unsanitary, leading to health issues, for example the rates of diarrhoea in Bali (13%) is 4% higher than the Indonesian national average.[58]

[54] Sriartha et al., 2015, The Effect of Regional Development on The Sustainability of Local Irrigation System
[55] Cole and Browne, 2015, Tourism and Water Inequity in Bali: A Social-Ecological Systems Analysis
[56] Sriartha et al., 2015, The Effect of Regional Development on The Sustainability of Local Irrigation System
[57] Cole and Browne, 2015, Tourism and Water Inequity in Bali: A Social-Ecological Systems Analysis
[58] Ibid.

Much of these issues other than the allocation of water resources can be traced back to the failure of political systems in Bali. Since the fall of the 'New Order' regime in Indonesia in 1998, there has been a trend towards devolution, with 'regencies' given more autonomy in 1999. Bali is subdivided into nine regencies, combined with interdepartmental competition, this made enforcing clear water policy harder. Additionally, the tourist industry, owned mostly by foreigners (85%), has been able to avoid the enforcement of existing rules on water use.[59]

There are further issues with water resources. Between 1980 and 2020, the total population of Bali grew by some 70% to 4.3 million people, as people from other islands migrated to Bali's growing economy.[60] This put further strain on the water resources of Bali. The water table is increasingly shrinking, going as deep as 50m in some places, wells increasingly have to be dug as deep as 60m. As a result some wells are running dry whilst others are being contaminated with salt, which can occur when wells are dug too deep.[61]

Outside of the allocation of water resources there are issues with water management. Flooding has become an increasing risk in Bali. The growth of Bali's population, and the expansion of urban settlements contributes to flooding. This is because the 'concretisation' of the landscape means less water can be absorbed into soil, increasing the amount of water that 'runoffs' into water channels such as rivers and canals hence increasing the chance of flooding. As mentioned in the briefing, urbanisation can be quite drastic, one study showed that in the Agung watershed in between 2012 and 2017, 647.8 ha of farmland was lost to Urban growth.[62]

[59] Ibid.
[60] Cole and Browne, 2015, Tourism and Water Inequity in Bali: A Social-Ecological Systems Analysis
[61] Milko and Jatmiko, 2022, Bali's water crisis threatens local culture, UNESCO sites
[62] Dharmayasa et al., 2022, Investigation on Impact of Changes in Land Cover Patterns on Surface Runoff in Ayung Watershed, Bali, Indonesia Using Geographic Information System

Insight Conclusion:

- Bali's economy depends on the tourism sector, accounting for over 70% of activities in the island. Given the reliance on this sector, Bali is facing environmental and socio-economic issues as a result of the massification of tourism. Moreover, cultural issues are on the rise as tensions between locals and visitors increase.
- The government's prioritisation of economic growth has created discontent from the community. On the one hand, the population considers that their wishes are not being taken into account before executive decisions that concern them, and on the other, they believe that their environmentally friendly attitudes are under threat by multinationals' presence on the island.
- Water scarcity has become more acute in the last couple of years as a result of tourism and the increase in population. Consequently, the extraction of water from wells is becoming more popular, albeit at the risk of water pollution. Similarly, urban settlements are being expanded even if this contributes to flooding.

Policy Recommendations

Overview

In this section we will recommend policies that will help to address the problems facing Bali and its sustainable development. We make three main suggestions. Firstly, Bali should move away from an overdependence of tourism, which has negatively impacted its environment. We then suggest the improvement of various systems to manage ongoing problems. We suggest improvements to waste management systems to deal with the colossal amounts of plastic pollution. Finally we suggest changes to deal with flooding and the mismanagement of water resources. These do not help to fully solve the problems at hand, but rather would be steps in the correct direction that stakeholders could make to create a more sustainable Bali.

Action 1: Sustainable tourism as an alternative to mass tourism.

One of the main problems faced by Bali is the massification of tourism. Given the reliance of this sector for its economy, the island faces a dilemma. On the one hand, the economy relies on tourism, but on the other hand, the massification of tourism is causing detrimental effects on the environment, the culture and the population. After ignoring the problem for years, the government has decided to charge a tax in order to address overtourism in the island. By being one of the cheapest tourist destinations in the world, Bali attracts many 'low-income' foreign tourists.

The tax, which came into force in February 2024, forces tourists to pay 150,000 Indonesian Rupiah (approximately £8) in an attempt to move away from cheap tourism.[63] Moreover, the levies will be used to fund government programs focused on preserving the culture and the environment. This is not a new measure, as many cities around the world have implemented it as a way to tackle the same problem and ensure that the experience of both residents and tourists is not diminished by overcrowding issues. Examples of this are Venice, Barcelona or Vienna.

Based on the government's goal to address mass tourism, this section encourages the promotion of other types of tourism to reduce the reliance on mass tourism. A more sustainable type of tourism is slow tourism. The latter allows the reconciliation of nature, locals and tourists by stressing the benefits of engaging with local culture and history while being respectful of the environment. In this case, the term 'slow' refers to the idea of living meaningful and authentic experiences rather than experiencing as many commercial activities as possible. This type of tourism is very applicable to Bali given the natural landscapes and rich culture the island possesses. In fact, spiritual tourism, a common type of tourism in Bali, is compatible with slow tourism. This is because spiritual tourism focuses on discovering the significance of one's life by living experiences that connect one's inner self.[64] It is also a critique against consumerism and the need to do as much as one can.

However, the current spiritual tourism in Bali is not necessarily a type of 'slow tourism'. For it to be slow tourism, apart from being respectful of the Balinese culture and not engaging with inappropriate behaviour, spiritual slow tourists embrace the local culture by engaging with the locals. Consequently, spiritual tourism from a slow tourism approach is encouraged.

[63] Habtemariam, D., 2024, Bali Charges Tourist Tax to Address Overtourism
[64] Nair and Dileep, 2021, Drivers of spiritual tourism: A destination-specific approach

This would bring cultural benefits in the form of reducing the tensions between local communities and tourists. It would also be environmentally and economically beneficial. On the one hand, people that practise slow tourism are concerned about the impact tourism has on the environment and try to reduce it as much as possible. Moreover, given that slow tourism is about slowing down and living each experience to the fullest rather than trying to see as much as possible, slow tourists do not need create as much carbon emissions as other types of tourism, On the other hand, slow tourism can be good for the local economy as it promotes local jobs, supports small business and usually slow tourists stay longer than traditional tourists. This implies that overall they might spend more than traditional tourists.

For the success of this policy, numerous actors are involved. The government and travel agencies should carry out the role of promoting this type of tourism. It should not be too difficult as the government has already expressed its desire to move away from mass tourism. The government would also have the role to help local communities that want to engage with this sort of tourism to establish their businesses.

Overall, this section has encouraged the promotion of (spiritual) slow tourism in Bali following the government's decision to reduce mass tourism. To do that, the social, environmental and economical benefits of slow tourism have been highlighted. This sort of tourism is growing in popularity among the world, thus, now would be the perfect time to implement it in Bali. It is worth-remarking that this type of tourism would be beneficial for the economy. Slow tourism promotes local jobs and local activities to the detriment of more mainstream activities organised by corporate or multinational companies. Moreover, the stay of slow tourists is on average longer than traditional tourists, and usually they have a higher purchasing power than the latter.

Action 2: Installing A Centralised Waste Management System.

Affecting the environment and economy, plastic waste and mismanagement of trash is an ongoing problem in Bali. The proximity to the coast has caused plastic to collect in their beach, with rubbish from neighbouring cities and countries to pile up in Bali's beaches. The collection of illegal dump sites, with 1000 around the island, act as responses to the increase of single use plastic and the lack of infrastructure to care for it. Government action and changes in individuals responses would have to take place for there to be a reduction in waste mismanagement and reduce the impact that plastic has on the environment.

Bali's government has already taken a multitude of recent initiatives to mitigate the problems surrounding waste pollution. In December 2023, Bali governor Wayan Koster introduced an all-encompassing ban against single-use plastic which targets consumers and sanctions plastic use through taxing and banning. Retailers in the city of Denpasar have proven to adopt this rule, after the entire island had a six-month grace period.[65] This target aims to reduce marine plastic pollution by 70% within 12 months, a promising policy, yet one that has been argued to only provide a surface solution to the fundamental waste mismanagement. To further improve this policy, there would have to be changes in industrial packaging, considering the majority of waste disposed stems from food and beverage packaging, with 70% of marine debris being made up of this.[66] For this to happen there would have to be changes in both individual consumption, changing instead to homemade meals rather than pre-packaged meals, as well as opportunities to do so, such as affordable local produce and markets in closer proximity. Some efforts taken by cities to improve food affordability and accessibility have been: community gardens and urban farming, farmers' markets, subsidised programs and vouchers, food cooperatives, and public-private partnerships, which would involve direct local government action.

Beyond reducing the production of waste that is produced in the island, there needs to be a centralised system installed in the city, connecting waste collection, waste disposal and recycling facilities. The lack of this has been estimated to result in 52% of Bali's garbage being mismanaged.[67] Following examples from Indore and Delhi (in India), Bali would need to have connected collection systems, with locals knowing where to deposit their garbage, and consistent transportation that would take the waste into a focused disposal

[65] Giving Compass, 2019, Bali bans plastic as Indonesia moves towards tackling marine pollution
[66] Minh, T.C., 2019, Bali bans plastic as Indonesia moves towards tackling marine pollution
[67] The Straits Times, 2023, Indonesia's tourist hot spot Bali has a $53m rubbish problems

site.[68] To provide information on proper waste disposal, education programmes and workshops could be provided to the community, highlighting the importance of proper waste disposal and discussing forms of collaboration in tight communities. In this disposal site, there should be a waste-to-energy (WtE) infrastructure. This would be leveraging the existing regulations which encourage investment in new WtE power projects, suggesting investment in enterprises which have the facilities and technology to set up. To make sure there is a positive local response to the facilities, representatives are encouraged to engage with communities early on in the planning process, ensuring that concerns and benefits are pointed out. The Balinese government is already converting the Suwung landfill into an eco-park with integrated WtE facilities which should then be well connected to the city and monitored to conduct environmental impact assessments.[69]

[68] Baronti, L., 2022, Decentralized vs Centralized waste management systems
[69] Woima, n.d., Drowning in waste - Case Bali, Indonesia

Action 3: Improved management of water resources.

Bali's management of water resources, as has been outlined, suffers from significant limitations. These are threefold, namely the pollution of water resources with plastic, the inequitable distribution of water resources - tied to poor governance and economic inequality and the increased risk of flooding in certain regions of Bali. It is beyond the scope of this report to remedy these deep seated issues, however we would suggest two policies to handle them, namely changes to governance structure in Bali, and changes to the Urban environment to reduce flooding.

The risk of flooding is considerable and growing. This has been primarily caused in Bali by the growth of urban regions. The increased amount of concrete spaces and a decrease in vegetation leads to greater flooding. This is because with less vegetation water cannot be absorbed and instead runoffs into water channels causing flooding. As such to tackle flooding, Bali needs to change its urban environment. Increasingly on the question of reducing urban flooding there has been a greater move towards techniques which absorb water, rather than attempting to channel water away.[70] Some techniques focus on allowing water to infiltrate the ground soil. For example permeable pavements would allow water to infiltrate the soil below, rather than flowing to rivers and other channels. Additionally, there are 'above-ground' options which allow for the retention/absorption of water. Some have suggested vegetated roofs, rather than slanted roofs designed to remove water could be beneficial. Additionally more vegetation and trees in urban spaces would increase the capacity for absorbing water.[71]

There is a greater issue when it comes to the distribution of water as a resource in Bali. Governance is poor, whilst water is generally favoured for use by the economically vital tourist industry. On the matter of governance one suggestion could be that water policy should be centralised under one government department or regency. The current decentralisation of water policy amongst several different regencies leads to inefficiency and poor enforcement of existing regulations. As such, we recommend a centralisation of administration of water resources. With policy being overseen by one agency or government organisation on Bali, rather than a host of competing departments and regencies. Additionally, in line with the 2030 United Nations sustainability goals clean water access is a priority.[72] As such any reenergized government efforts should work to a more equitable distribution of water resources. Namely, that clean drinking water and

[70] Qin, Y., 2020, Urban Flooding Mitigation Techniques: A Systematic Review and Future Studies
[71] Ibid.
[72] Mottech Water Management, n.d., Water Distribution Systems & How They are Changing the World

sanitation should be prioritised over water-intensive projects of the tourist industry, such as spas and golf courses.

Conclusion

To finish off, the environmental concerns in Bali present a complex challenge that requires immediate and sustained action. The island's biodiversity is under threat from rapid tourism development, water scarcity, poor waste management and coal energy plants. The government in Bali has already focused initiatives and policies which strive to improve environmental problems of the area, however much can still be attained. Policy recommendations we outlined that the government could include or improve for further environmental development are sustainable tourism, striving to ensure that areas are preserved rather than accessible to the whole public. Furthermore, following on the new initiatives to create waste to energy facilities, new policies can increase focus on proper waste disposal by enabling accessible information and education on the process as well as creating and maintaining infrastructure that would decrease plastic pollution, and improve recycling. Lastly, the government needs to increase their focus on water management, prioritising basic human needs and forcing water conservation for tourist destinations, such as Spas and golf courses. The recent prioritisation of the environment in Bali means that there is much hope for the situation to improve, and much priority from the government and policy makers on focusing efforts on conservation.

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