Cultural and Environmental Change in a Period of Westernized Tourism: Bali, Indonesia

Barbara Buck
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Department of Atmospheric and Environmental Sciences, University at Albany, SUNY

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Dr. Aubrey Hillman

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Abstract

Dutch colonizers opened Bali for tourism at the beginning of the 20th century, and since that time tourism has led to changes in Bali’s culture, environment, and local resources. In the late 1900s, tourism grew to a new level, which resulted in a shift of industry control away from Balinese people. This project examines the problem of tourism from a social and environmental science lens. By compiling literature and science from various fields of study, this project aims to illustrate the complexity of Bali’s tourism problem in an interdisciplinary way. The lack of local control over tourism perpetuated and exacerbated the damage to Bali’s culture and environment resulting in over development, loss of natural resources, and poor waste disposal systems. Indonesia, and Bali specifically, need an improved system to control tourism which could promote sustainability of culture and land. Improvement of the Environmental Impact Assessment and incorporation of traditional Balinese knowledge could help promote sustainable tourism while making experiences more authentic for visitors. This project emphasizes the importance of looking at issues with an interdisciplinary lens to develop a comprehensive solution.

Introduction

Bali receives over a billion tourists per year resulting in over 2 trillion (USD) in income (Sutawa, 2012). The tourism industry is the primary GDP sector in Indonesia (Rimba, 2020). Bali was quickly developed to accommodate for its massive tourism industry, which in turn led to unsustainable land use change and development, poor waste management impacting access to clean water, and over consumption of local resources. Increased tourism in Bali put stress on traditional Balinese way of life because traditional Balinese systems are not suitable for the increased pressure of tourism. Tourism in Bali has changed to accommodate western tourists –
resulting in an increased loss of natural resources for local people (A. Vickers, personal communication, September 30, 2022). The large scale of the industry has undoubtedly impacted the nation, but to what extent? The goal of this paper is to investigate how Bali’s environment and culture have been shaped and changed by tourism. Despite these changes, it’s clear that tourism is prominent throughout the region and will continue. Balinese people are dependent on tourism for jobs and economic growth, but the continued growth relies on Bali having an environment and culture worth visiting – two issues that get increasingly difficult as climate change worsens. The tourism industry should shift to become more sustainable, so that visitors to Bali can appreciate the natural landscape and culture of Indonesia. Understanding the social and environmental impacts of tourism allows for a comprehensive analysis of the situation and can specifically address the human influence on an environment.

Understanding Indonesia’s Climate and Environment

The climate in East Java is shaped by several factors. The El Niño Southern Oscillation (ENSO) plays a role in how the Walker Circulation and the Intertropical Convergence Zone (ITCZ) change the hydrological conditions in East Java on millennia and multidecadal time scales (Rodysill et al., 2013). The Walker Circulation is a cell that represents the movement of air over the tropics – in this case specifically, over the Pacific. The ITCZ circles the Earth as a belt of low pressure near the equator. For places in the tropics, like Bali, the ITCZ influences the duration and strength of wet and dry seasons. The Indo-Pacific Warm Pool (IPWP) and Western Pacific Warm Pool impact global rainfall and impact the hydrological conditions in East Java (Rodysill et al., 2013; Rodysill et al., 2012). On a more regional scale, there is some evidence to suggest that volcanic eruptions and fire events have impacted climatic conditions in East Java (Rodysill et al., 2013; Cheung et al., 2021).
East Java is at the southern extent of the ITCZ, so the amount of precipitation and the length of monsoon season vary with changes in ENSO and the Walker Circulation (Konecky et al., 2013). ENSO and Walker Circulation patterns influence the strength of the monsoon season from November to March each year (Rodysill et al., 2013). Sediment records show that there has been increased rainfall over the past millennium (Rodysill et al., 2019) likely from the southward migration of the ITCZ (Konecky et al., 2013; Rodysill et al., 2012).

There is also some indication that a strong drought occurred in 1790 CE ± 20 years as inferred from changes in lake salinity because salinity increases in arid conditions (Rodysill et al., 2013). Multiple El Niño events from the late 18th century and volcanic eruptions in the early 19th century were likely responsible for a strong regional drought from 1790 to 1850 in East Java.

Figure 1. Adapted from Cheung et al. 2021. Changes in fire (2001-2015) and precipitation (1998-2009) across Indonesia. Also showing land use cover across the region in 2020.
This drought is believed to be strong throughout the region because there were multiple drivers that occurred close together (Rodysill et al., 2013).

The presence and timing of human activity in East Java varies among lake records throughout the region. Lake Logung records date human activity back to 1860 (Rodysill et al., 2012). Enrichment in nearby Lake Lading nitrogen isotopes suggests that human activity impacted water quality from 1825-1850 due to eutrophication, agricultural expansion and runoff, landscape erosion, and increased use of fertilizers and manures which changed nitrogen cycling (Rodysill et al., 2019; Rodysill et al., 2012; Cheung et al., 2021).

The 1800s saw an increase in fire activity from drying, deforestation, and agricultural expansion; these were all consequences of a growing human population needing more space and resources (Cheung et al., 2021). Anthropogenic fire activity decreased throughout the 20th century due to fire suppression (Cheung et al., 2021). These periods of suppression align with periods of low fire activity and forest preservation policies which indicates that fire was mitigated by humans (Cheung et al., 2021). Over the last four decades specifically, East Java has seen conversion of natural land to cropland with fire as the main land clearing tool, and smaller scale use of fire because of development increases throughout the region (Cheung et al., 2021).

In the modern era, 78 percent of Indonesian territories are water, and the nation has 81,000 kilometers of coastline with unique ecosystems: mangroves, coral reefs, and seagrass forests (Ayasari et al., 2021). 75 percent of Indonesian cities are in coastal areas resulting in 160 million people living on the coast (Ayasari et al., 2021).

Dutch Arrival to Indonesia and the Beginning of Tourism
The Dutch arrived in Indonesia at the end of the 16th century, which started their colonial rule over the Indonesian people (Van Imhoff and Beets, 2004). Indonesia was called the Dutch East Indies during its time as the most important colony of the Netherlands (Van Imhoff and Beets, 2004). In 1949, the colony separated from the Netherlands and became the Republic of Indonesia (Van Imhoff and Beets, 2004). In an effort to keep imperial ties, the Netherlands created a “loose commonwealth” with Indonesia until 1956 when the effort stopped unsuccessfully due to Indonesian fears that a commonwealth would create a Dutch superstate and continue Dutch power (Van Imhoff and Beets, 2004).

In 1914, while Indonesia was under Dutch control, they opened the colony up to tourism. Bali’s image was specifically publicized to portray the location as an exotic and risqué tourist spot with idealized accounts dating back to the 1930s (A. Vickers, personal communication, 2012).

Figure 2. Adapted from Vickers, 2012. Travel poster from the 1930s. "See Bali. Issued by the Travellers Official Information Bureau of the Netherlands. Indies. Batavia."

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September 30, 2022). In the 1960s, Bali tried to accommodate tourists by pursuing planned tourism modeled after Hawaii; this action resulted in the creation of beaches that eventually took over the natural landscape (A. Vickers, personal communication, September 30, 2022). By the 1970s, tourism was large scale throughout Bali, and by the 1980s, there was a large jump in tourism that caused a downhill slide in the sentiment and desire for tourism throughout the province (A. Vickers, personal communication, September 30, 2022). Originally, the Balinese people became prosperous from tourism and found the industry manageable, but by the end of the 1980s, the sentiment shifted because Balinese people did not want more development on their island (A. Vickers, personal communication, September 30, 2022).

In more modern times, control of tourism has shifted away from the Balinese people to cater for the large number of tourists that visit Bali (A. Vickers, personal communication, September 30, 2022). Part of the problem is that people local to Bali use less resources like water and electricity and have less overall consumption, but tourists, especially from western nations, expect to experience the same amenities that they have at home (A. Vickers, personal communication, September 30, 2022).

Noticeable changes to Bali’s environment occurred throughout the 20th century, which led to the adoption of the Environmental Impact Assessment (EIA). In 1982, the Environmental Management Law established the EIA to address and report physical, chemical, and ecological environmental problems, as well as socio-economic, social-cultural, and public health problems related to the impacts from tourism (Warren and Wardana, 2018). The policy surrounding the EIA has changed with political regimes, but the periods with the most productive and useful assessments included public input, planning stages, and summaries of tourism impacts (Warren and Wardana, 2018). In contrast, the least successful systems gave control and decision-making capacity to outside developers and investors (Warren and Wardana, 2018).
Tourism is used as a means for rapid economic development by the government, and in the past, this has led to unsustainable changes to the EIA policy. Developers have argued for changes to the EIA policy claiming that the process was too time consuming and resource-heavy – making it a development constraint (Warren and Wardana, 2018). Governments and their legal processes succumbed to vested interest groups, so their claims led to a shift in control away from local people; developers had more of a say on growth and management and use shifty language to promote large scale tourism projects (Warren and Wardana, 2018). A lack of local control meant that tourism developments overshadowed local concerns about cultural and environmental destruction (Warren and Wardana, 2018).

Methods

Scientific articles that reviewed lake sediment records were used to identify the primary forces that impact Indonesia’s climate on global and regional scales. Establishing a baseline for the climate and environment in Bali was necessary to identify changes throughout history. These articles also helped to identify when human influence started in Bali, and what features of the environment were specifically shaped or changed by humans.

A similar process was done for the cultural composition of Bali. Understanding the traditional culture of the Balinese people was crucial to identifying changes throughout colonial periods, the beginning of tourism, and to now. Cultural papers were also useful to understand how Balinese people traditionally interacted with their environment, and how sustainable those practices could be under heavy tourism.

To identify impacts of tourism, several articles were analyzed in relation to the environment and culture of Bali. Another important source was an interview with Dr. Adrian Vickers, University of Sydney, who has spent much of his career analyzing tourism in Bali and
authored the book *Bali: A Paradise Created*. His book was also used to understand the history of Bali with and without tourism, and to understand the perception of tourism from local Balinese people.

**Results**

The quick development of Bali allowed for more tourism in the nation through land use change and overdevelopment, along with changing access to natural resources.

*Unsustainable Land Use Change and Development*

While the Balinese people were initially open to tourism, the current consensus is that local people no longer want land development because of its environmental and cultural impacts (Warren and Wardana, 2018). As tourism increased in Bali, the economic gain and land control shifted away from local people to outside sources and real estate developers (Warren and Wardana, 2018). This meant the creation of golf courses and luxury residences; two types of massive projects that were not initially planned for in Bali’s tourism development (Warren and Wardana, 2018). Large projects like these took up more land and drained local resources, which resulted in a loss of sacred spaces that were traditionally used for religious and customary beliefs (Warren and Wardana, 2018). Losing those spaces also created social conflict and tension because local people lost connection to the land they value (Warren and Wardana, 2018). Expanding tourism projects resulted in less area for Balinese people to hold traditional Balinese rituals, and the spaces they have left often merge with tourist excursions to see the authentic Bali (Vickers, 2012).

Development in Bali became so extensive that the province reached its land carrying capacity over a decade ago and can no longer develop sustainably (Sutawa, 2012). In this period of tourism land use changes come from the development and urbanization of land. Agricultural land
in Bali shifted to accommodate tourists with resorts, villas, hotels, and restaurants (Sutawa, 2012). New coastal cities developed – creating tourism hotspots with lots of development and coastal pollution (Adysari et al., 2019).

There is not enough land capacity to support the increased urban growth and tourism facing Bali currently, which exacerbates other impacts of tourism such as poor garbage management and access to water (Rimba, 2020). Culturally, job conversion occurs along with land use changes. Land that could be used for tourism is in higher demand than agricultural land (Rimba, 2020). After selling land, farmers look for jobs in tourism or tourism related construction; 50 percent of Bali’s population works in a tourism related occupation (Rimba, 2020). The problem expands beyond Bali into other Indonesian provinces as people move to Bali seeking work and cause increased urbanization in nearby Denpasar City (Rimba, 2020).

Poor Waste Management and Access to Clean Water

Plastic pollution is decreasing the health of waterways throughout Bali (Warren and Wardana, 2018). This form of pollution clearly demonstrates the impact of humans on an environment because plastic is solely made and released anthropogenically (Adyasari et al., 2021). The decay of plastics results in microplastics that have been found in water and fish intestines in Jakarta Bay as well as mussels in Semarang Bay (Adyasari et al., 2021). Losing access to clean water and edible protein sources will further stress distribution of local resources for both Balinese people and tourists.

Fresh and coastal water quality are in decline in the region. Coastal water has excessive nutrients from agricultural runoff leading to cultural eutrophication (Adyasari et al., 2021). Dissolved Inorganic Nitrogen (DIN) in coastal water increased 145% between 1970 and 2000.
due to increased fertilizer use (Adyasari et al., 2021). Figure 3 shows the concentrations of DIN across Indonesia in 2021.

Hydrological conditions aid in making pollution transfer from the soil to the ocean easy – exacerbating water pollution (Adyasari et al., 2021). This is particularly problematic for the coral reefs located offshore of Bali. Adyasari et al., found nutrients in the reefs that were discharged from rivers and groundwater (2021). Like coral reefs, coastal communities and populations will bear the brunt of the impacts caused by decreased water quality (Adyasari et al., 2021). Local water pollution includes heavy metals from domestic wastewater, industry, and mining (Adyasari et al., 2021). Figure 4 overlays these pollution types on Indonesian ecosystems. Modelling

![Figure 3](image_url)  
*Figure 3. Adapted from Adyasari et al. 2021. Distribution of DIN nutrient pollution across Indonesia coastal water. Area of focus is at -8.409518, 115.188919.*

suggests that the hydrological conditions that facilitate the transfer of pollutants will only get worse with future climate change (Adyasari et al., 2021).
Large scale tourism developments like the Bali Benoa Marina (BBM) project are often proposed as revitalization schemes but end up worsening an already bad situation (Warren and Wardana, 2018). Benoa Bay is heavily polluted by the Suwund dump site, which is an issue for the mangroves in the area (Warren and Wardana, 2018). Tourism development companies proposed BBM, which called for the creation of islands in the bay by dredging the seafloor; since the completion of the project, sedimentation and erosion rates are 10 times worse because of the changes to the bay’s wave patterns (Warren and Wardana, 2018). Populations in low lying areas, such as Kuta, Tanjung, Benoa, and Sanur, are expected to experience increased water levels as a result of this project (Warren and Wardana, 2019). BBM is not the only project to cause drastic changes to Bali’s coastal water. In the past, other projects have been proposed and adopted, which altered the currents in the harbor and caused changes in turbidity, which impacted coastal reef systems (Warren and Wardana, 2018).

![Figure 4. Adapted from Adyasari et al. 2021. Distribution of pollutants across Indonesia in relation to various ecosystems. Area of focus is at -8.409518, 115.188919.](image)

Overconsumption of Local Resources

The tourism industry has strained and exceeded many local resources in Bali. Traditional Balinese culture connected the hydrological cycle to spiritual beliefs (Geria et al., 2023). The Subak Irrigation System originally managed water equitably throughout Indonesia and acted as a
system of common resource management (Geria et al., 2023; Benge and Neef, 2018). Traditionally, Balinese people believe that mountains relate to the hydrologic cycle, so ancestors created and incorporated worshipping symbols into the process (Geria et al., 2023). The upstream parts of the mountain were preserved because they were seen as “the source of life,” and all parts of the mountain were believed to impact the sea as well as people living downstream (Geria et al., 2023). Figure 4 illustrates the traditional understanding of hydrological cycle where the top dragon manifests the clouds and air, while the bottom dragon represents the flow and stream of water (Geria et al., 2023). The manifestations of symbols in control of ecological cycles shows the connections that Balinese people have with nature and keeping their land sustainable (Geria et al., 2023). Megalithic structures were built near water and reservoirs to demonstrate the spiritual meaning of water in their society (Geria et al., 2023). The Taman Sari Temple is an example of the built environment connecting to water management; the temple maintains water’s spiritual meaning while ecologically keeping the water supply equitable for people and land throughout Bali (Geria et al., 2023).
In Bali, water is a precious resource for agricultural irrigation and religious rituals and ceremonies; the Subak system helped resolve conflicts between villages with competing water resources (Benge and Neef, 2018). This is important in Bali’s dry season because water scarcity is high (Benge and Neef, 2018). With increased tourism and development, the Subak system is not sustainable because it is in competition with populations and companies that want development or economic gain (Geria et al., 2023; Benge and Neef, 2018).

Bali reached its water carrying capacity in 2008 and has been in a deficit with decreasing water availability each year since; the populations in Bali need around 5.46 billion m$^3$/year of water but are only able to supply 4.71 m$^3$/year (Sutawa, 2012). Because of this deficit and the increased human pressure on the natural water system, only 59 percent of Bali’s population has access to sanitary water (Adyasari et al., 2021).

Today, natural resource management lies with the most politically and economically powerful people (Benge and Neef, 2018). These people influence the governmental distribution of resources, which has resulted in a poor balance in the face of tourism development (Benge and Neef, 2018; Cole and Browne, 2015). The loss of agricultural land has caused food scarcity throughout the province as food is divided between tourists and the local population (Benge and Neef, 2018). Similarly to this, water is unfairly accessed by a small, privileged sector in Bali (Cole and Browne, 2015). There is disproportionate access for people belonging to low socioeconomic statuses (Cole and Browne, 2015). Tourists and resource managers have a poor understanding of their personal access to resources in comparison to the general population, which causes overconsumption (Cole and Browne, 2015).

Discussion
Managing the impacts of tourism on Bali will require a complex solution. The EIA should incorporate concepts of sustainable tourism. This would mean noting the availability of environmental resources and any impacts that tourism may have on them (Sutawa, 2012). The EIA would also need to include a plan for economic growth that prioritizes local people rather than large companies and developers (Sutawa, 2012). Finally, the EIA would need to discuss any negative cultural impacts of tourism (Sutawa, 2012). There would also be benefits to including Balinese Traditional Ecology Knowledge (TEK) into the EIA (Geria et al., 2023). On a macroscale, TEK would help shape the idea of sustainability in the province by protecting and managing nature and its resources (Geria et al., 2023). Microscale efforts from TEK would incorporate the idea of a sustainable built environment – using only the land that is necessary for people to remain connected to nature (Geria et al., 2023).

While both of the above actions would help to incorporate sustainable tourism in Bali, an official sustainable tourism program would be the most ideal. Working with stakeholders that will allow for sustainable development would limit land use change and promote equitable resource management. Short-term visitors should not have the most access or hold a majority of the natural resources in Bali. A truly sustainable tourism program would also give control of the industry back to Balinese people. Doing this would keep cultural autonomy and prevent exploitation of traditional Balinese practices and spaces. The profits from the tourism industry would also build the local economy and help local people live fairly. A sustainable plan could also include measures for educating tourists and stakeholders about their cultural and environmental impacts. On an individual tourist level, it is hard to understand why sustainability is important in a place that feels temporary, so expanding their knowledge of the systems and spaces they are visiting may help promote awareness. Once a plan was put in place, it is
important to evaluate and analyze the plan consistently from both an environmental and cultural lens.

There is a link between the destruction of natural land and traditional culture in Bali, both of which came from expanded and increased tourism in the province. Understanding that social and environmental change occur simultaneously can help establish the extent of human influence on an environment. Looking at the problem of increased tourism in the province from just the sociological or environmental lenses on their own would only give part of an explanation for the human impact on Bali; a solution looking at the problem needs to encompass social and environmental changes to be holistic. Now and in the future, the anthropogenic impact on our world cannot be underestimated. Tourism in Bali demonstrates the connection between society and sustainability, and their rising importance in the face of climate change.
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