

# Stream of Contention


Pathways to Just Development  
in Subak's Hydrosocial Territories, Bali

P5 Report  
Julia Sumarthinningrum Dahlan | 5219086

Source: Silas Balsch (2022)



Tourism Facilities developed inside the  
Subak landscape in Canggu  
Source: Tiny Villas Bali by Balitecture (2025)

An aerial, black-and-white photograph of a rural landscape in Bali. The image shows a mix of agricultural land, including terraced rice fields with distinct patterns, and some built-up areas with buildings and roads. The text is centered over the middle of the image.

*For whom does Bali's current  
development serve?*

# Colophon

## Stream of Contention Pathways to Just Development in Subak's Hydrosocial Territories

### Master Thesis P5 Report

Department of Urbanism

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Faculty of Architecture and the Built Environment, TU Delft

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Delft University of Technology - TU Delft



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A bold message through art  
installation in Subak Landscape  
Source: NOW Bali, Edward Speirs (2022)

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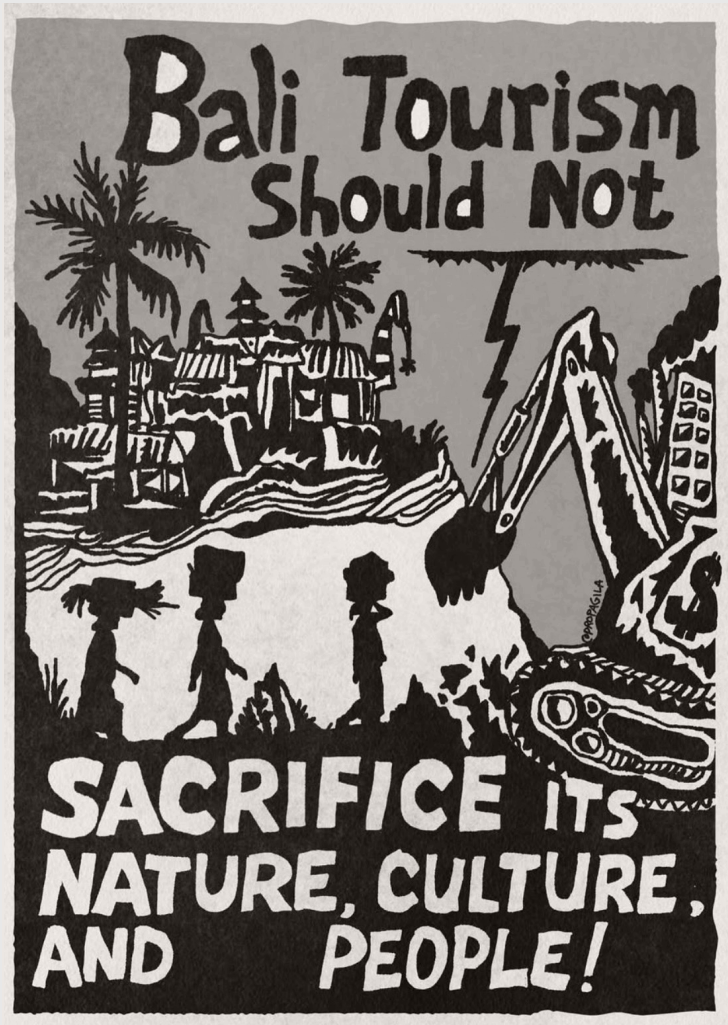
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# Abstract

*In the name of “economic development”,  
Indegenous communities are marginalized in their own land.*



Provocative Painting by Gilang Propagalia  
Authored edited from instagram @gilangpropag (2024)

Bali, Indonesia, has experienced accelerated urbanization and overtourism over the past decade, resulting in multifaceted social, economic, cultural, and environmental challenges. These dynamics have driven land conversion, exacerbated water shortages, intensified environmental degradation, deepened social inequalities, and contributed to the erosion of indigenous cultural practices. As competing claims over land and water resources intensify, Indigenous communities are increasingly marginalized, and the island faces escalating ecological pressures. Central to these dynamics is the Subak, an ancient community-managed irrigation and water management system that exemplifies the concept of hydrosocial territories—spaces where water and its management are deeply intertwined with social, cultural, and power dynamics. This system, fundamental to Bali's agricultural landscape and cultural heritage, now faces growing strain as tourism investors and industries encroach on Subak territories, threatening its sustainability and the communities that depend on it.

This research investigates pathways for reconstructing Subak's hydrosocial territories to promote just development through spatial planning and governance frameworks. By focusing on the interplay between the hydrological systems of Subak, institutional governance structures, Indigenous community practices, and environmental sustainability, the study examines how the principles of spatial justice and learning from values can inform the reform of spatial and governance policies to protect and sustain Subak's social and ecological significance without neglecting its Traditional Ecological Knowledge.

Keywords: Subak, Hydrosocial Territories, Just Development, Tourism-driven Development, Traditional Ecological Knowledge.

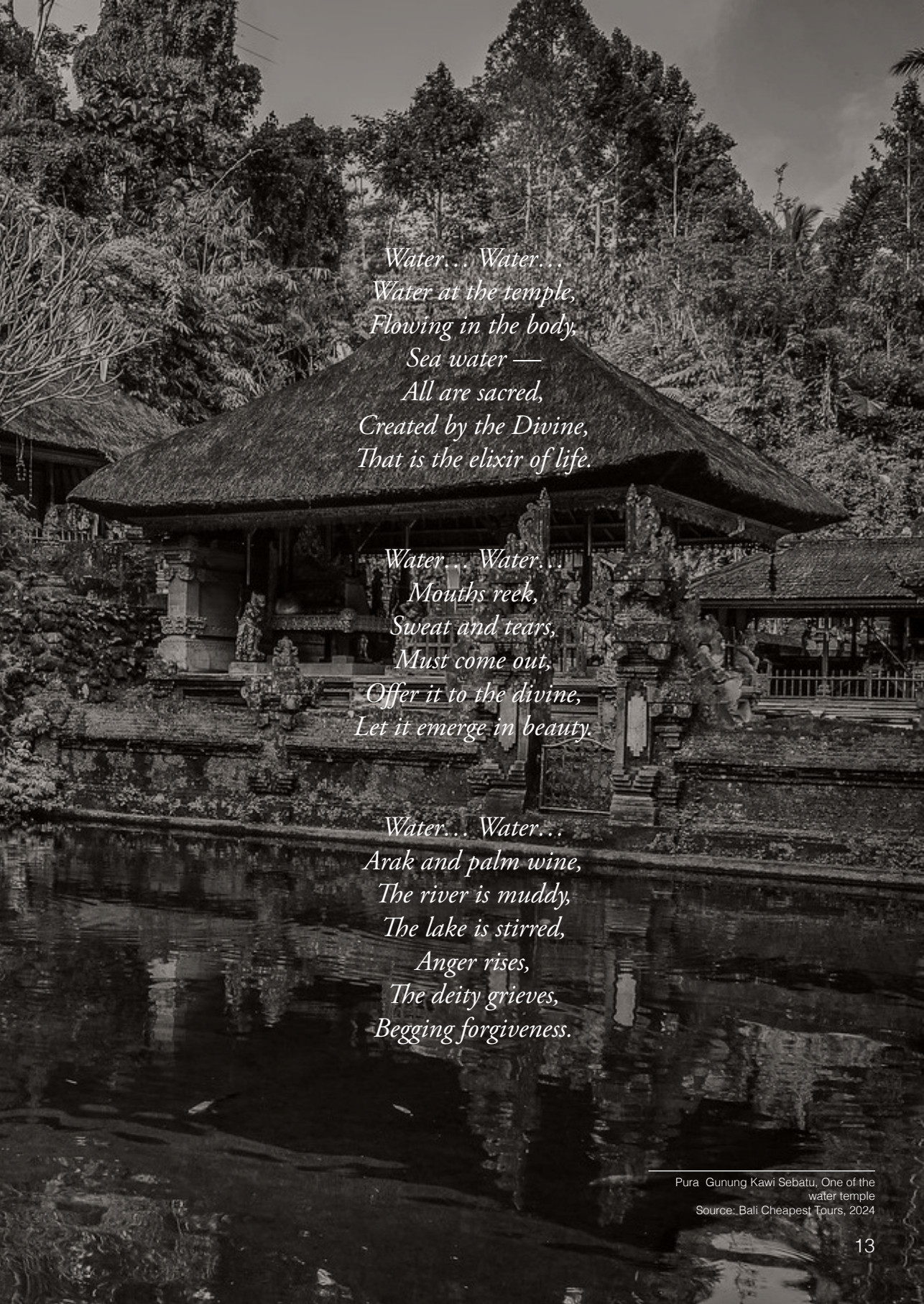


*Yéh... Yéh...  
Tirta ring pura,  
Rah ring angga,  
Toya ring segara  
Sami utama,  
Pakardin Ida  
Nika amerta*

*Yéh... Yéh...  
Widuh cangkem tuh,  
Manyuh lan peluh,  
Patut metu,  
Paica ratu,  
Meru ayu*

*Yéh... Yéh...  
Arak lan tuak  
Tukadé puek,  
Danuné osak,  
Mungguh piduka,  
Duka Betara  
Nunas ampura*

*poem Yéh..Yéh.. by I Putu Gede Raka Prama Putra*



*Water... Water...  
Water at the temple,  
Flowing in the body,  
Sea water —  
All are sacred,  
Created by the Divine,  
That is the elixir of life.*

*Water... Water...  
Mouths reek,  
Sweat and tears,  
Must come out,  
Offer it to the divine,  
Let it emerge in beauty.*

*Water... Water...  
Arak and palm wine,  
The river is muddy,  
The lake is stirred,  
Anger rises,  
The deity grieves,  
Begging forgiveness.*





volume 1  
the beginning

# Forgotten Harmony

A 'new normal' in Canggu, rice fields encircled by  
ongoing building construction. (2025)

# I

## Introduction

- i. Prologue
- ii. Motivation
- iii. Bali Context



Fig 1.1 Walter Spies painting "A View from The Heights" in 1934 illustrate the balinese way of living  
Source: Arts.com

# i. Prologue

*As a Balinese, I have come to realize that we have often taken for granted the profound gifts inherited from our ancestors, our culture, our land, and the harmonious way of life rooted in nature. For a long time, I was unaware of how much my homeland had changed. The wave of globalization, largely driven by tourism, has fundamentally altered not only our landscapes but also our collective mindset. From a young age, we were taught, implicitly or explicitly, that urbanization and modern cities were signs of progress. As a result, many of us grew up believing that our lives in the villages were inferior to those in places like Jakarta or to the lifestyles of foreign tourists. This internalized perception, that our traditions were outdated and less valuable, gradually eroded our sense of pride and belonging.*





Fig 1.2 A metaphor painting by Made Budhiana: Bali is like a hen forced to constantly lay golden eggs to satisfy the greed of tourism Industry. Source: instagram @sugi.lanus (2025)

Fig 1.3 "Berebut Bali" or Contemporary Bali: Contested Space and Governance book by Agung Wardana as my inspiration painted by Slinat in 2015. Source: Insist Press (2024)

*Over time, without realizing it, we began to participate in a system that slowly undermines us, our communities, our environment, and our cultural identity. Today, the signs of imbalance are evident: congested roads, frequent flooding, polluted rivers, and unchecked development have become normalized in what was once a carefully balanced island ecosystem. The equilibrium that once defined Bali, between people, nature, and spirit, has been disrupted, and the consequences are increasingly visible. This reflection is not just a critique, but a call to reimagine what development should mean in a place like Bali.*

## ii. Motivation

I was born and raised on the island of Bali, Indonesia, spending nearly three-quarters of my life immersed in a culture that intricately balances humanity, nature, and the divine. As a Muslim, a minority in Bali, I was welcomed and embraced by a community that values respect to all living things. Bali's cultural ethos also instilled in me a profound respect for nature, even as a non-Hindu (see fig1.4). I observed and appreciated how Balinese traditions honored the environment, particularly through practices by intertwining spirituality with ecological conservation and ecological stewardship. For instance, forests are considered sacred spaces, and there is a widespread belief that environmental destruction leads to disaster. In the indigenous village of Desa Tigawasa, sacred forest areas are protected as spiritual sites and regarded as places of prayer and ancestral connection. The community enforces strict regulations, requiring permission for entry and discouraging careless behavior to preserve the sanctity of the forest (Septiari, 2025). This practice reflects the broader Balinese philosophy of maintaining harmony between nature and human activities.

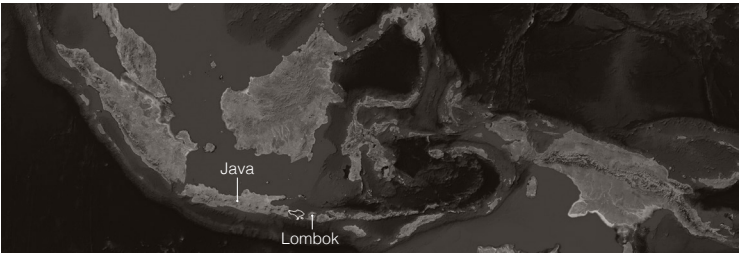
However, the Bali I see today fills me with sorrow, as it has transformed drastically from the island of my childhood. While tourism has indeed driven economic growth in Bali, it has exacted a heavy toll on the environment and local communities. For instance, nearly 260 out of 400 rivers have dried up (Cole, 2012), leaving residents without access to clean water for one to two days each week, a reality I have experienced firsthand. Since 1990, approximately 1,000 hectares of rice paddies have been lost annually to accommodate tourism developments (MacRae & Arthawiguna, 2011). This expansion not only displaces local residents but also exacerbates economic inequality, creating a troubling divide between communities. The unchecked growth of tourism has overshadowed the sacred connection between the Balinese people and their land, jeopardizing the future of indigenous culture and the environment that sustains it. Witnessing these changes firsthand has deeply impacted me and reshaped my purpose. Through my thesis, I aim to foster discussions on spatial justice in the context of Bali's tourism-driven development, inspiring broader movements to advocate for Bali's sustainable future and address the spatial injustices affecting its indigenous landscape.





Fig 1.4 Bali's culture — its connection to nature, humanity, and the arts — has profoundly shaped who I am today and how I view the world. Author edited from Unsplash

### iii. Bali Positioning



Located strategically between the islands of Java and Lombok in the central part of the Indonesian archipelago (see figure 1.5). Geographically, Bali serves as a cultural and economic bridge between western and eastern Indonesia, making it a critical node in the country’s tourism network. The island’s proximity to major population centers like Java enhances its accessibility and connectivity, both domestically and internationally. Ngurah Rai International Airport, located near the capital city of Denpasar, acts as a key gateway for Indonesia, welcoming millions of international and domestic visitors annually. Bali’s unique blend of natural beauty and cultural richness has made it one of the most recognized global representations of Indonesia.

Bali plays a pivotal role in Indonesia’s economy, primarily through its robust tourism industry. As one of the country’s most visited destinations, Bali contributes significantly to Indonesia’s foreign exchange earnings. In 2019, prior to the COVID-19 pandemic, Bali accounted for over 40% of Indonesia’s total international tourist arrivals.

Fig 1.5 Bali positioning in Indonesia Archipelago.  
Author edited from Google Earth Satellite Images.

Fig 1.6 Bali Island information. Author edited from Google Earth Satellite Images.



## Bali's Economic Drivers

As of today, Bali is home to approximately 4.4 million residents (BPS, 2024), a number that has steadily grown over the years due to its economic opportunities and global reputation as a prime tourist destination. The economy of Bali is predominantly driven by tourism. From sectors directly related to tourism, such as accommodation, food and beverage, and transportation, the combined contribution reached 26% of Bali's Gross Regional Domestic Product (GRDP) in the third quarter of 2022. Including supporting sectors like trade, construction, real estate, and company services, the figure rose to 52% (Nasution, 2022). In 2023 alone, Bali welcomed 5.27 million foreign tourists, which generated USD 7.5 billion in revenue for the island (Bali Exception Team, 2023)

The island attracts millions of visitors annually, drawn by its natural beauty, cultural richness, and world-class hospitality. In addition to tourism, agriculture remains a significant sector, with rice, fruits, and coffee being notable exports. Bali also benefits from its vibrant creative industries, including arts, crafts, and textiles, which are integral to its cultural identity and economy.

## Bali's Global Recognition

Bali is widely recognized for its unique culture, which intricately blends Hindu traditions with indigenous customs. Known as the "Island of the Gods," it is famed for its traditional dances, music, temple ceremonies, and art forms, such as painting, woodcarving, and weaving. Iconic cultural landmarks like the terraced rice paddies of Jatiluwih (see fig 1.7), the Uluwatu Temple (see fig 1.8), and the sacred Tirta Empul Temple attract visitors who seek to experience Bali's spiritual and artistic essence. Beyond its cultural allure, Bali is celebrated for its hospitality, making it a global hub for wellness tourism, yoga retreats, and eco-tourism. This distinct combination of natural beauty and cultural heritage positions Bali as a unique and cherished destination on the global stage.



Fig 1.7 Subak Jatiluwih. Source: Eyestetix Studio on Unsplash(2024)



Fig 1.8 Uluwatu Temple. Source: Levi Morsy on Unsplash (2015)

# II

## Problem Definition

- i. Cultural Fascination
- ii. Problem Field
- iii. Problem Statement
- iv. Research Aim
- v. Research Question



Fig 2.1 Villa's construction in the middleof rice paddy field in Canggu  
Source: Mitchell Woolnough (2024)

# i. Cultural Fascination

Bali is globally recognized not only for its rich cultural expressions, such as traditional dance, ritual ceremonies, and spiritual practices, but also for its distinctive cultural landscapes. Among these, the Subak system stands out as a particularly captivating feature. Often admired for its jewel-like terraced rice fields (see fig. 2.2), Subak is more than a scenic attraction; it is a sophisticated water management system that dates back to the 11th century AD. Rooted in the Balinese cosmological philosophy of Tri Hita Karana, which emphasizes harmony between humans, nature, and the divine, Subak represents a living manifestation of local belief systems. As a cultural landscape, it embodies not only agricultural ingenuity but also a complex socio-religious structure that integrates ecological stewardship with communal governance and spiritual ritual.

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Fig 2.2 Fascinating rice terrace landscape.  
Source: Norbert Braun on Unsplash (2022)



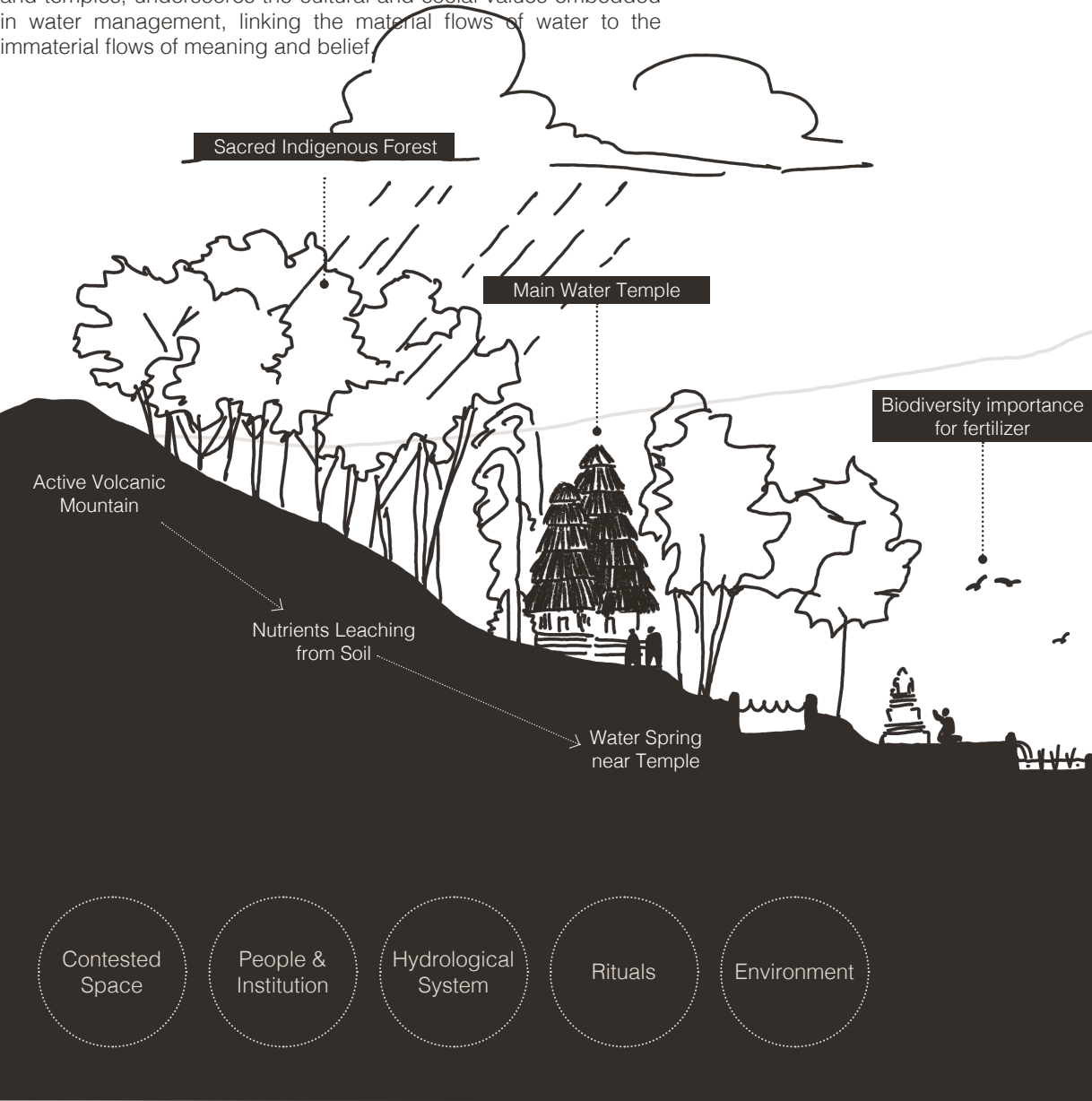


Fig 2.3 Fragmented tourism development in subak landscape. Source: Tiny Villas by Bali Architecture website (2025)

Despite its resilience over centuries, the Subak system now faces significant challenges due to water privatization, land conversion, and modern infrastructure development. Since the 1990s, approximately 1,000 hectares of rice paddy fields have been converted annually (MacRae & Arthawiguna, 2011), driven by systemic economic pressures. Farmers often prefer to sell their land because maintaining rice paddy fields requires substantial time and financial resources, while the market prices for agricultural products remain low (Agung Wardana et al., 2019). The rate of land conversion is particularly high in Subak areas near urban centers or tourism developments, where land prices have skyrocketed (result in landscape can be seen in fig 2.3). Consequently, selling farmland is perceived as more profitable, as the income can be deposited in banks to generate passive annual interest (Sutawan, 2001).

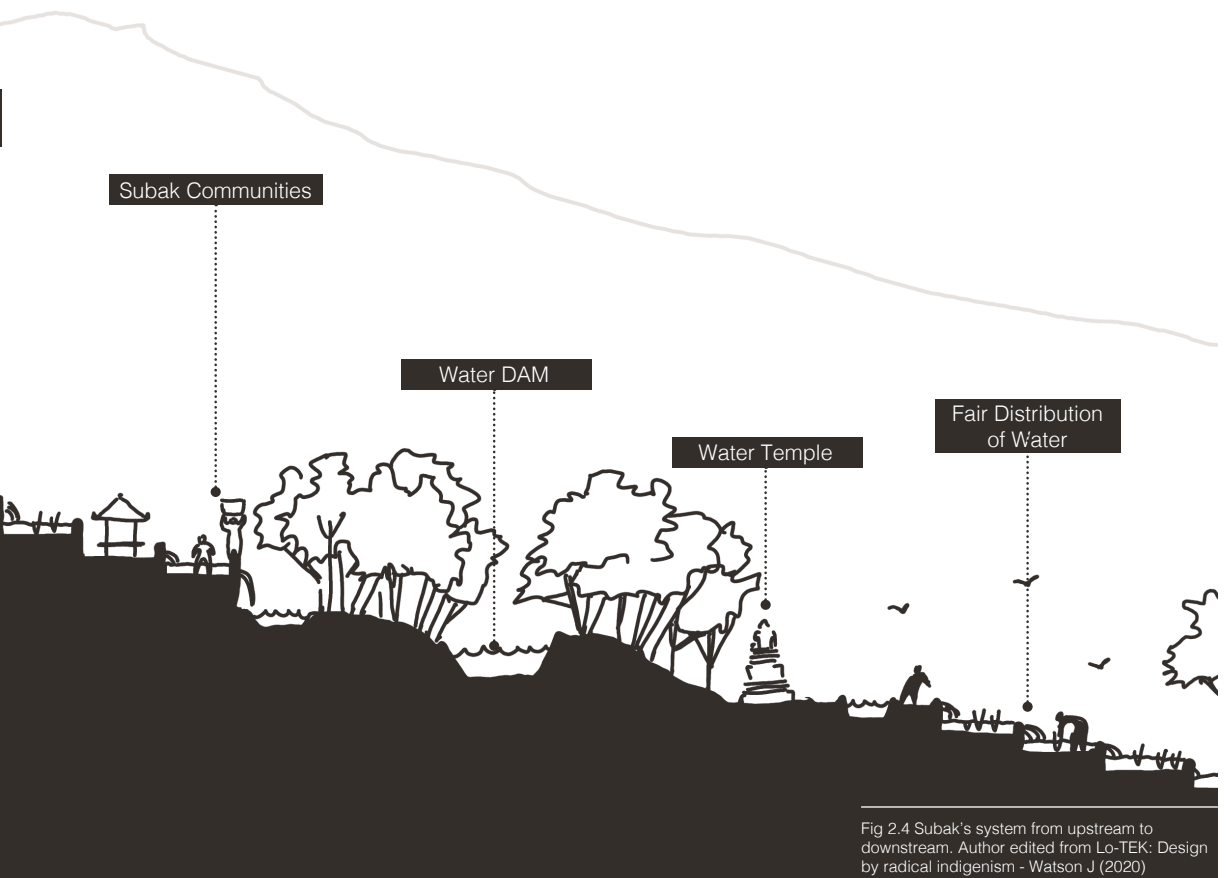
# Subak as Hydrosocial Territories

The Subak system in Bali can be understood as a classic example of a hydrosocial territory, where water governance is shaped by the interplay of social, cultural, political, and ecological factors. Hydrosocial territories refer to spaces where water, society, and power are co-produced, emphasizing that water governance is not merely a technical or natural phenomenon but deeply embedded in social and political processes (Boelens et al., 2016). In the context of Subak, water is more than a physical resource, it is a sacred and communal element, distributed and managed through complex networks of farmer cooperatives and guided by the philosophy of Tri Hita Karana. The spiritual dimension of Subak, with its rituals and temples, underscores the cultural and social values embedded in water management, linking the material flows of water to the immaterial flows of meaning and belief.



Subak works as whole system from upstream to downstream (see fig 2.4) Sacred forests located in highland, managed by indigenous groups, play a crucial role in as water catchment area. Water from upstream catchments, enriched by volcanic minerals, flows through canals fed by rivers, streams, and springs into rice paddies. At the heart of the Subak system is water temple as spiritual connection. The subak community is lead by Pekaseh, Subak leader that coordinate irrigation schedules and ensure fair water distribution from upstream to downstream rice paddy fields. This collaborative practice not only sustains agriculture but also upholds a deep cultural and spiritual connection to the land.

As a hydrosocial territory, Subak reflects the decentralized governance of water resources, where decisions are collectively made by farmers through democratic processes. According to Lansing and Fox (2011), this localized management enables Subak to function as a self-organizing system, effectively balancing the needs of agriculture, community, and the environment. The hydrological infrastructure, canals, tunnels, and weirs, forms the physical basis of this system, but its operation is deeply influenced by social agreements and shared responsibilities. For instance, water allocation within Subak is closely tied to religious rituals, such as ceremonies at water temples, which symbolize the harmonious relationship between humans and nature. This integration of water governance with social and cultural practices makes Subak a living hydrosocial territory that adapts to environmental changes while maintaining its cultural integrity.



## ii. Problem Field

### Bali's Tourism-Driven Development

Bali's tourism-driven development has profoundly reshaped its economic, social, and environmental landscape. Since the surge of international tourism in the late 20th century, Bali has transformed into one of the world's most sought-after tourist destinations, driven by its rich cultural heritage, natural beauty, and iconic landscapes (Picard, 1996). This growth has significantly contributed to the island's economy, creating employment opportunities and stimulating local businesses, from hospitality and dining to art and handicrafts. However, the rapid expansion of the tourism industry has also fostered an over-reliance on tourism as the primary source of income, often at the expense of traditional livelihoods such as agriculture. Land once dedicated to rice paddies and Subak irrigation systems has increasingly been converted into hotels, resorts, and luxury villas to cater to the growing influx of tourists (Sutawan, 2001). Consequently, the shift in land use reflects the pressures of modernization and global economic integration, with tourism acting as the primary driver of these changes (see the effect in fig 2.6).

While tourism has brought significant economic benefits to Bali, it has also given rise to numerous challenges that threaten the island's sustainability (fig 2.5). The demand for infrastructure to support the tourism industry, such as roads, airports, and water supply systems, has led to environmental degradation, resource depletion, and cultural

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Fig 2.5 Cliff collapse during hotel Construction in Southern part of Bali. Source: Bali Live blog (2024)





Fig 2.6 The escalation of land conversion of subak landscape in the past 20 years. Source: Mitchell Woolnough (2024).

Fig 2.7 The Autonomous Problem of Tourism-Driven Development in Bali. Authors edited.

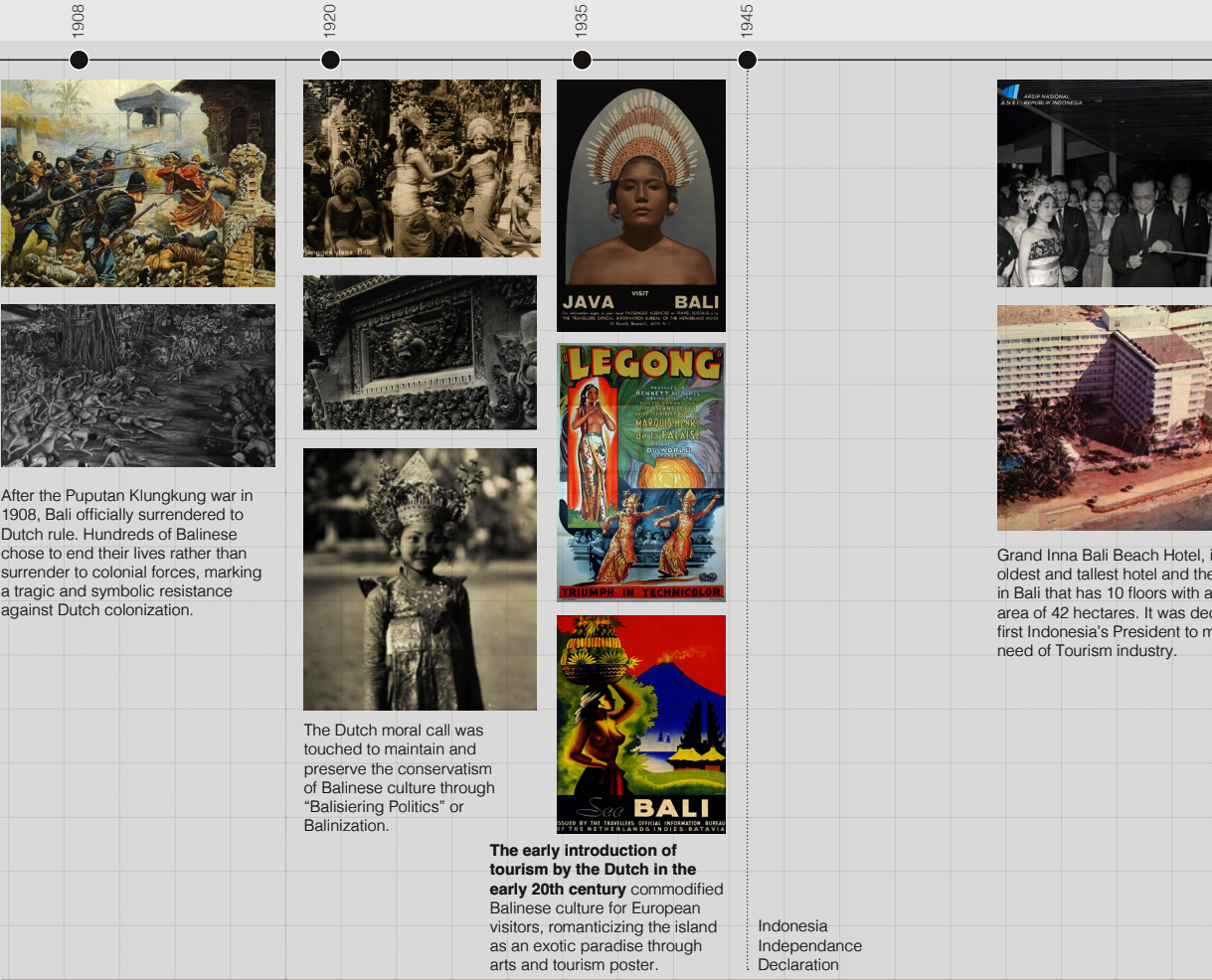
commodification (Cole, 2012). Water privatization to meet the needs of resorts and hotels often diverts resources away from traditional agricultural communities, exacerbating inequalities (Agung Wardana et al., 2019). Additionally, the proliferation of urban development and the increasing price of land have marginalized local communities, compelling many to sell their ancestral lands and abandon traditional practices (Cole & Browne, 2015). This tourism-driven growth often overlooks the long-term implications for Bali's cultural and ecological integrity, raising critical questions about balancing development with sustainability and preserving the island's unique heritage amidst global pressures (fig. 2.7).



# How Tourism Reshape Bali's Landscape?

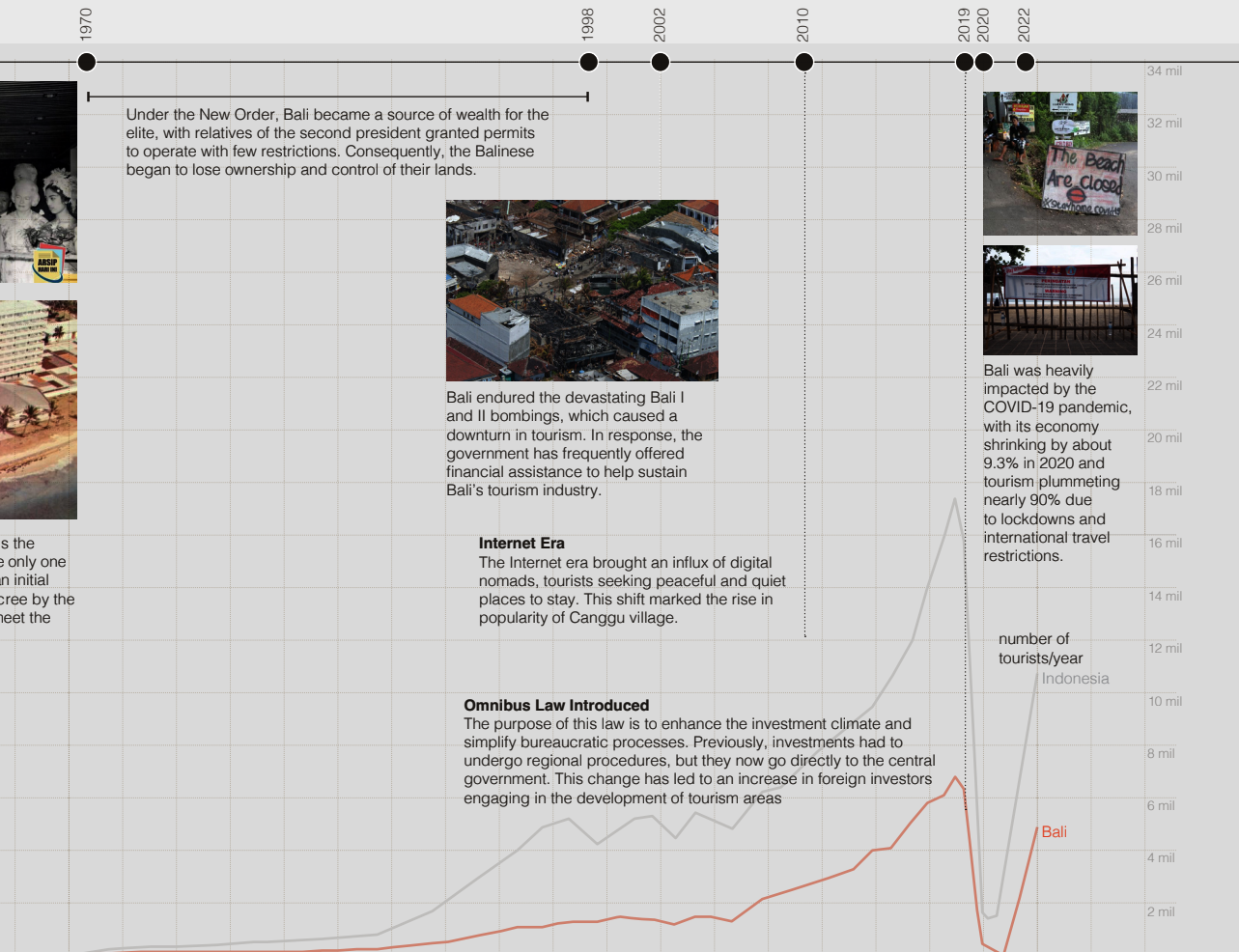
Tourism in Bali began in the early 20th century when the Dutch colonial government promoted the island as an exotic cultural paradise, attracting Western visitors intrigued by its art, dance, and spirituality (Picard, 1996). This image, crafted during the 1920s and 1930s, laid the foundation for Bali's reputation as a tourism icon. Following Indonesia's independence, the development of Ngurah Rai International Airport in 1969 marked a turning point, enabling mass tourism and solidifying Bali as the nation's primary tourist destination. To this day, the Indonesian government continues to rely heavily on Bali as a major source of revenue, often prioritizing tourism development over environmental and cultural sustainability. This ongoing exploitation underscores Bali's role as the country's "pocket money," with little regard for the long-term impacts on its people, culture, and ecosystems. Further explanation in detail can be seen in figure 2.8.

Fig 2.8 Historical Analysis on How Tourism influence Bali. Author edited from Gede Mahaputra 10th World Water Forum presentation and media information (2024)





After COVID-19 pandemi Indonesia government tried to push Tourism industry to get back with a lot of mega project, inviting International big event as boost for the tourism industry in Bali. With the tag line "Recover" they promoted the need to recover the Balinese economic in the way it is more extractive.



# Rapid Acceleration of Land-Use Conversion



Bali has experienced rapid land-use conversion in recent decades, driven largely by the pressures of tourism-driven development and urbanization. Since the 1990s, an estimated 1,000 hectares of agricultural land have been converted annually, particularly rice paddies supported by the Subak irrigation system (Agung Wardana et al., 2019). This trend is most evident in areas close to urban centers and tourism hotspots, where rising land prices and the demand for hotels, villas, and commercial facilities have made agricultural livelihoods increasingly unsustainable (see fig 2.9). The economic disparity between traditional farming and tourism-based income has incentivized many farmers to sell their land, abandoning rice cultivation in favor of more profitable opportunities. This shift has not only undermined agricultural productivity but also threatened Bali's cultural heritage, as the Subak system represents a centuries-old tradition of communal water management and spiritual harmony.

Fig 2.9 Drastic transformation of Subak landscape in Shortcut Canggu, Badung, from 2002 to 2024 to accomodate tourism infrastructure. Source: S Arkadiynght on Unsplash (2023)

# Massive Hotel Development, 2,000 Hectares of Rice Fields in Bali Disappear per Year

Rizki Setyo Samudra - detikBali

Tuesday, 10 Sep 2024 14:16 WIB



Illustration - Several foreign tourists walk through the rice fields while visiting the Jatiluwih Tourist Attraction (DTW), Tabanan, Bali, Saturday (3/8/2024). (Photo: ANTARA FOTO/Nyoman Hendra Wibowo)

**Denpasar** -The Indonesian Environmental Forum (Walhi) Bali urged the government to immediately impose a moratorium on the construction of hotels and villas on the Island of the Gods. The massive development and conversion of agricultural land has resulted in around 2,000 hectares of rice fields in Bali disappearing per year.

CNA Insider

Not quite the Bali it used to be? This is what overtourism is doing to the island



Bali's landscape is changing. The question is, how sustainable is its urban development?

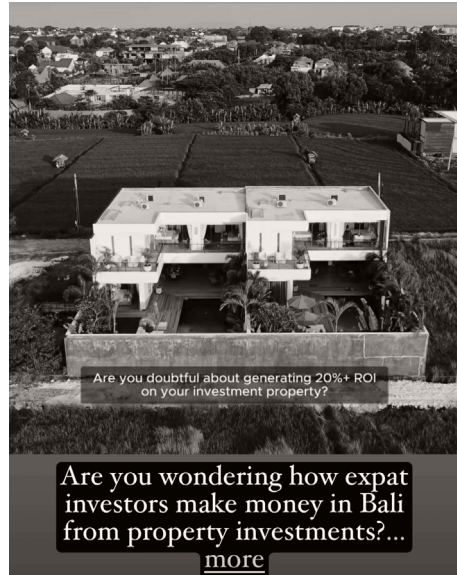


Fig 2.10 Media coverage highlighting the impacts of development in Bali. Author edited from screenshots of various electronic news sources.

The acceleration of land-use conversion is further fueled by systemic factors, including low agricultural product prices and a lack of government support for local farmers. Maintaining rice paddies is labor-intensive and costly, while the income generated from farming often fails to meet the rising cost of living. In contrast, selling land provides farmers with immediate financial relief and, in many cases, the opportunity to invest in other ventures or secure a passive income by depositing the proceeds in banks (Sutawan, 2001). This dynamic has been particularly pronounced in peri-urban areas, where developers target farmland for luxury tourism projects, exacerbating the marginalization of farming communities.

The long-term implications of this rapid land-use conversion are significant. The loss of agricultural land not only threatens Bali's food security but also increases environmental risks such as flooding, soil erosion, and water scarcity. The conversion of rice paddies, which traditionally act as natural water reservoirs, has disrupted the island's hydrological balance, compounding water management challenges already worsened by tourism-related demands (Cole, 2012). Furthermore, the cultural fabric of Bali is at risk, as the erosion of the Subak system symbolizes a broader decline in the island's connection to its agricultural roots and communal traditions. This rapid transformation raises critical questions about how Bali can balance economic growth with the preservation of its environmental and cultural heritage.

# Water Drought



Tourism-driven development in Bali has significantly contributed to environmental degradation, particularly in terms of water availability. The rapid expansion of resorts, hotels, and tourism-related infrastructure has placed immense pressure on the island's water resources, with tourist facilities consuming far more water than local households. Research indicates that the average tourist in Bali uses up to 2,000 liters of water per day, compared to approximately 200 liters for the average local resident (Cole, 2012). This disparity has exacerbated water scarcity, particularly in densely developed areas such as South Bali, where tourism activity is concentrated. Additionally, the privatization of water resources to cater to the demands of luxury resorts and villas has reduced water availability for local communities and agricultural practices, including the Subak irrigation system, which is vital for maintaining Bali's rice paddies.

The over-extraction of groundwater to meet tourism demands has also led to significant environmental consequences. Excessive groundwater pumping has caused saltwater intrusion in coastal areas, threatening both freshwater supplies and agricultural productivity. At the same time, the loss of agricultural land to tourism development has disrupted Bali's natural water catchment areas, further compounding water management challenges. For example, rice paddies traditionally act as reservoirs that absorb rainwater and replenish groundwater supplies, but their conversion into hotels and villas has reduced the island's ability to regulate its hydrological cycle (Cole, 2012). These issues highlight the urgent need for sustainable water management policies that balance the needs of tourism with those of local communities and the environment.

Fig 2.11 Media coverage addressing water shortages in Bali. Author edited from screenshots of various electronic news sources.

# Local Marginalization

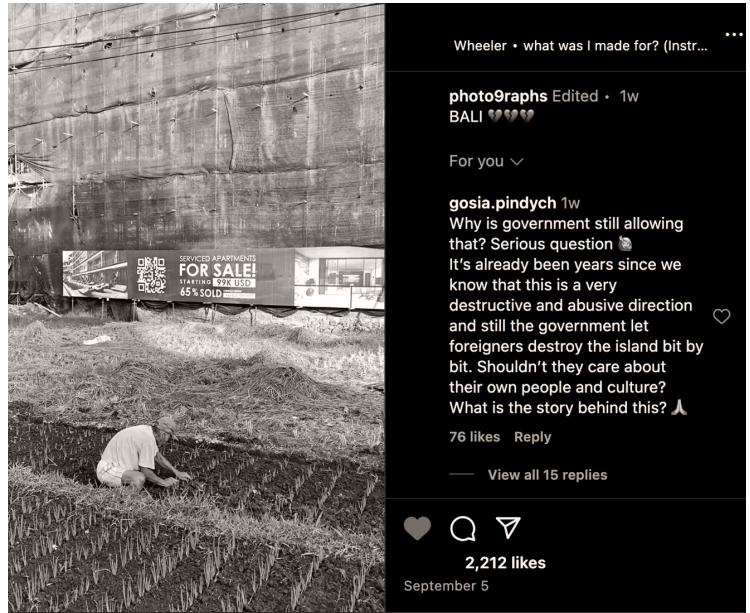


Fig 2.12 Behind the farmers cultivating the rice, there looms the shadow of development. Author edited from screenshot of @photo9graphs instagram account.

As land prices soar in areas near urban centers and tourism hotspots, many local farmers find it increasingly difficult to compete with developers who seek to convert agricultural land into hotels, villas, and commercial facilities. Farmers, burdened by the high costs of maintaining rice paddies and low agricultural product prices, often sell their ancestral lands as a more viable economic option (Agung Wardana et al., 2019). However, this decision often comes with long-term consequences, as it erodes their traditional livelihoods and forces them into low-wage jobs in the tourism sector, such as hotel staff, drivers, or informal workers. These roles often provide less economic stability and are far removed from the cultural and communal values rooted in Bali's traditional agricultural practices.

Additionally, the cultural commodification driven by tourism has further marginalized local communities by reducing their cultural practices to mere performances for tourist consumption. Festivals, rituals, and traditional dances, once integral to Balinese spiritual life, are increasingly tailored to meet tourist expectations, often stripping them of their original significance (Picard, 1996). The influx of wealthier expatriates and investors into Bali's property market has also displaced many locals from their homes, as the rising cost of living and land pushes them to less accessible areas (Cole, 2012). This dynamic not only creates social inequalities but also disrupts the social fabric of Balinese communities, where interdependence and communal cooperation have traditionally been central. The prioritization of tourism profits over local well-being underscores the need for more inclusive and equitable development policies that consider the rights and aspirations of local communities.

### iii. Problem Statement

Bali's rapid development, driven predominantly by tourism, has led rapid acceleration of land conversion, exacerbated water shortages, intensified environmental degradation, deepened social inequalities, and eroded indigenous cultural practices. These challenges are the result of planning, policies, and governance frameworks that allowed injustice to persist, relying heavily on a single industry, tourism. The current Bali development prioritize short-term economic gains over long-term ecological and cultural resilience. This unchecked development threatens Bali's heritage landscape, particularly the Subak Hydrosocial Territories, which embody ecological stewardship, cultural heritage, and community resilience. This situation underscores the need for a critical reevaluation of spatial planning and governance practices to enable just development.

## iv. Research Aim

Aim 1

To understand the injustices within Subak's Hydrosocial Territories as a result of tourism-driven development and its socio-environmental impacts.

Aim 2

To develop spatial planning strategies & propose governance reforms that prioritize ecological sustainability, cultural preservation, equitable development, and procedural justice, particularly for Subak communities & Bali's Indigenous population affected by tourism expansion.

Aim 3

To initiate acts that engage the broader public, mainly the young generation, fostering awareness, empathy, and active participation in supporting just development for Subak communities.

Fig 2.13 Tegalalang Rice Terrace. Source: Tiny Villas by Bali Architecture website (2025)

## v. Research Question

The development of Bali as a global tourist destination has come at a cost to its environmental sustainability, cultural heritage, and social equity. The Subak system, a hallmark of Balinese culture and a UNESCO-recognized heritage, is at the center of these pressures, facing challenges from rapid land conversion and water shortages. In this case, it is essential to explore the role of spatial planning and governance in promoting change that can foster justice and safeguard the importance of Subak's hydrosocial territories. However, it is worth noting that to understand why the current system failed to address the issue, and what we can learn from traditional or indigenous practices previously.

Main Research Question:

*“How can spatial planning and governance be reconstructed to enable just development in Subak’s Hydrosocial Territories without neglecting its Traditional Ecological Knowledge?”*

Sub Research Question

To thoroughly address the main research question, the framework of my sub-research question draws upon Peter Marcuse’s approach to Critical Planning. This approach was chosen because it effectively unravels the complex issues within urban environments, allowing to tackle the root causes of urban inequality rather than merely addressing its symptoms.

## EXPOSE (Understanding Dynamics & Challenges)

SQ1. What Subak TEK practices are currently recognized within Bali's development, and how do these demonstrate capacities for resource management and spatial justice?

SQ2. How tourism-driven development generate injustices in Subak's Hydrosocial Territories?

## PROPOSE (Designing Solution)

SQ3. What spatial and governance strategies can enable just development within Subak's Hydrosocial Territories?

SQ4. How can Subak's indigenous practice (TEK) be effectively integrated into spatial planning and governance to enable just development?

## POLITICIZE (Implementation Strategy)

SQ5. What actionable pathways can transform the competing priorities of tourism-driven development and ensuring just development in Subak's Hydrosocial Territories?

## REFLECT (Broader Impact)

SQ6. What lessons from Subak's experience can inform broader sustainable and just tourism development across Indonesia?

# III

## Research Structure

- i. Theoretical Framework
- ii. Conceptual Framework
- iii. Research Framework
- iv. Methods
- v. Timeline

RESEARCH AIM	MAIN RESEARCH QUESTION	SUB RESEARCH QUESTION
<div> <p>To understand the injustices within Subak's Hydrosocial Territories as a result of tourism-driven development and its socio-environmental impacts.</p> </div>	<div> <p>How can spatial planning and governance be reconstructed to enable just development in Subak's Hydrosocial Territories without neglecting its Traditional Ecological Knowledge (TEK)?</p> </div>	<div> <p><b>EXPOSURE</b></p> <p>                     SQ1 What is the recognition and how is justice?                 </p> <p>                     SQ2 How to generate Hydrojustice?                 </p> </div>
		<div> <p><b>PROPOSAL</b></p> <p>                     SQ3 What can emerge from Subak?                 </p> <p>                     SQ4 How do (TEK) planning develop?                 </p> </div>
<div> <p>To initiate acts of care that engage the broader public, mainly the young generation, fostering awareness, empathy, and active participation in supporting just development for Subak communities.</p> </div>		<div> <p><b>POLITICAL</b></p> <p>                     SQ5 What is the co-developed development Territory?                 </p> </div>
		<div> <p><b>REFLECTION</b></p> <p>                     SQ6 What information develop?                 </p> </div>

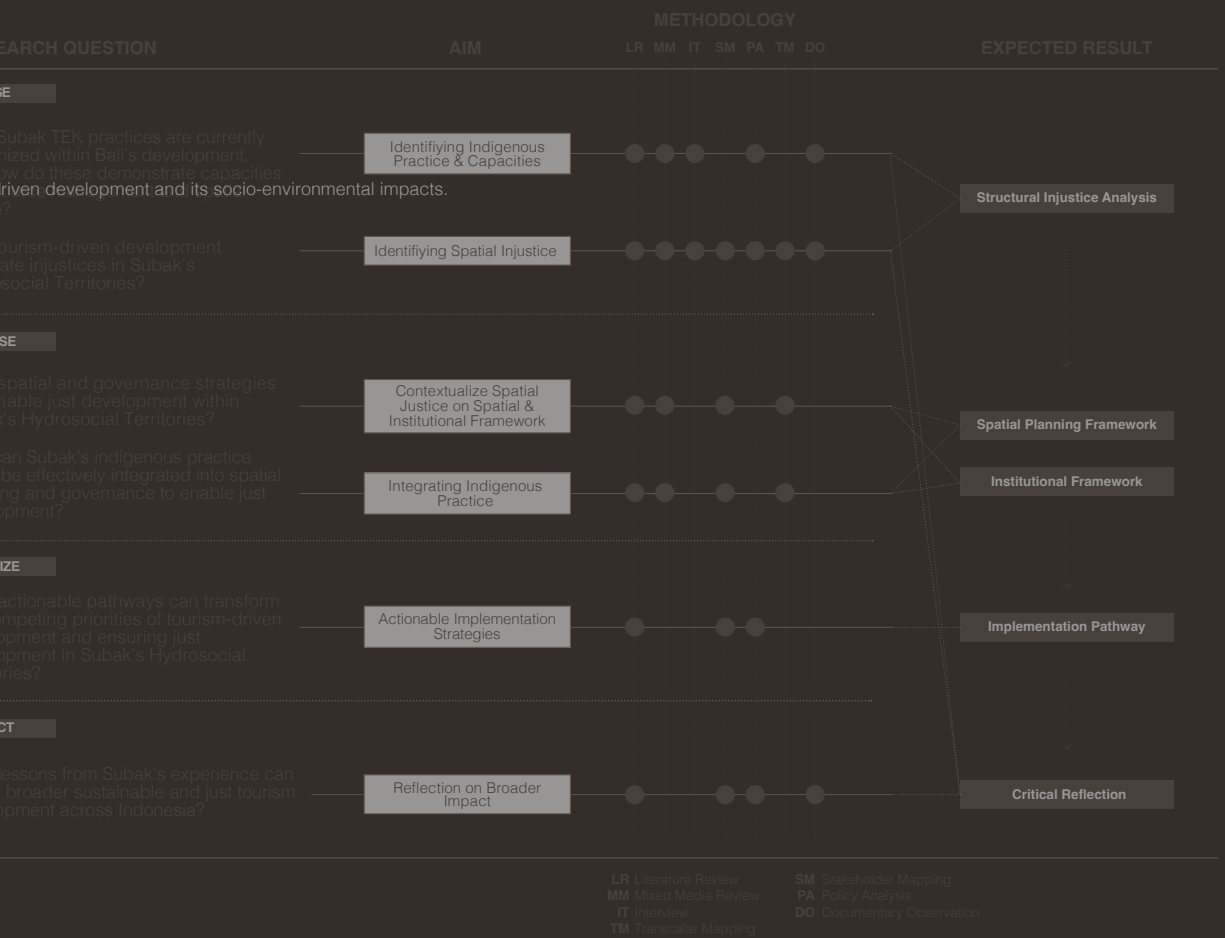
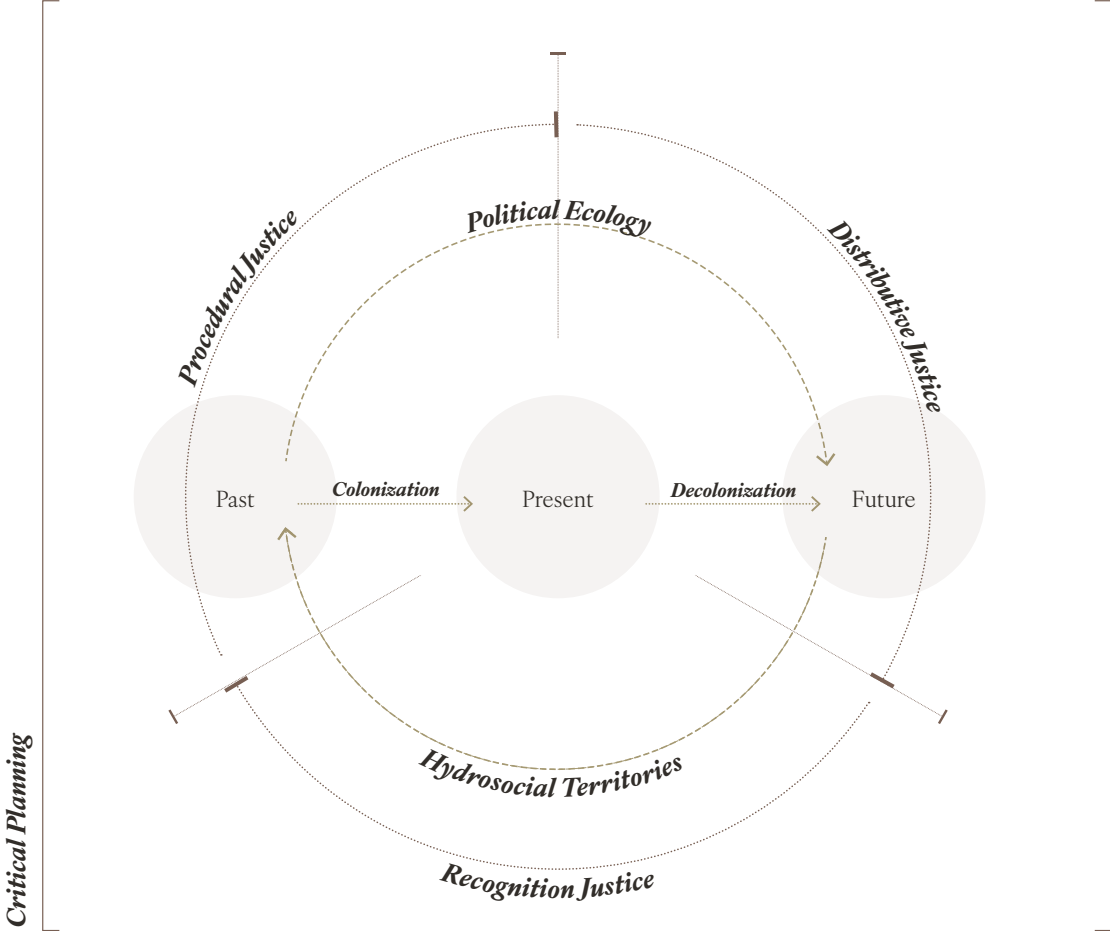


Fig 3.1 Research Structure

# i. Theoretical Framework



The theoretical framework for this research illustrates the interrelation of the concepts used to establish the foundation of the study. The project draws on four main theoretical frameworks: Hydrosocial Territories that come from Political Ecology, Spatial Justice, Local Traditional Ecological Knowledge, and Decolonization. Each framework plays a distinct role in analyzing the research problem. Hydrosocial Territories provides a lens to understand the socio-cultural and political dimensions of Subak as a landscape shaped by the interaction of water, power, and social dynamics (Boelens et al., 2016). Spatial Justice, on the other hand, is utilized to unpack the injustices that have emerged within these territories, particularly those arising from tourism-driven development and

Fig 3.2 Theoretical Framework

inequitable spatial planning (Soja, 2010).

Achieving spatial justice in this context requires a critical examination of Indonesia's spatial planning and governance systems, which remain deeply influenced by colonial legacies. These systems often marginalize indigenous populations and their ways of managing landscapes (Peluso & Vandergeest, 2001). Consequently, Decolonization serves as a critical tool in this research, enabling a radical rethinking of governance and planning practices to advance spatial justice. Decolonization emphasizes the importance of reclaiming indigenous knowledge and practices, particularly the Local Traditional Ecological Knowledge embedded within the Subak system, as a foundation for sustainable and equitable landscape management (Berkes, 1999; Howitt & Suchet-Pearson, 2006). By integrating these frameworks, the study seeks to propose strategies that balance ecological sustainability, cultural preservation, and equitable development.

## Hydrosocial Territories & Political Ecology

Boelens, R., Hoogesteger, J., & Swyngedouw, E. (2016). "Hydrosocial Territories: A Political Ecology Perspective."

Cole, S. (2012). A Political Ecology of Water Equity and Tourism: A Case Study from Bali. *Annals of Tourism Research*, 39(2), 1221–1241.

Lansing, J. S. (1991). "Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali."

Swyngedouw, E. (2009). The political economy and political ecology of the hydrosocial cycle. *Journal of Contemporary Water Research & Education Issue*, 142, 56–60.

The Subak system exemplifies a hydrosocial territory, where water is not merely a physical resource but a central element in the social, cultural, and spiritual fabric of Balinese society. Rooted in the philosophy of Tri Hita Karana, Subak operationalizes this balance through an intricate system of water temples (*pura subak*), collective rituals, and community-based governance. The equitable distribution of water is actively constructed and maintained by social hierarchies, religious obligations, and the mediating role of the *pekaseh*, who ensures coordination across upstream and downstream users. In this context, water becomes both materially and symbolically embedded in everyday life, reflecting the socio-political organization of Balinese agrarian communities (Boelens et al., 2016; Lansing, 2006).

However, this hydrosocial balance is increasingly undermined by tourism-driven development, which introduces competing claims over water resources. Tourism infrastructure diverts water away from traditional irrigation channels, prioritizing commercial use over agriculture. These dynamics reconfigure Subak as a contested hydrosocial territory, where unequal power relations and neoliberal land-use transformations shape the flow of water. Integrating insights from political ecology, this conflict reveals how broader socio-political structures mediate access to and control over natural resources. Political ecology examines the distribution of power, resources, and decision-making processes, revealing how institutions, incentives, and interests influence environmental outcomes (Swyngedouw, 2009). In the case of Subak, it becomes evident that water governance is not only a matter of tradition and culture but also of contested authority, capitalist encroachment, and shifting institutional arrangements. Understanding Subak through the combined lenses of hydrosocial territories and political ecology offers a critical framework for analyzing the socio-environmental transformations currently threatening Bali's agrarian systems.

Local Traditional Ecological Knowledge (LTEK) is central to the functioning of Subak, embodying the indigenous wisdom that has sustained Bali's iconic rice terraces for centuries. The Subak system demonstrates a deep understanding of ecological processes, from water flow to pest management. For instance, synchronized planting schedules, guided by the Balinese calendar and overseen by temple priests, help control pests naturally and maintain soil fertility. The terraces themselves are designed to optimize water usage, prevent soil erosion, and support biodiversity. These practices reflect an intimate relationship between the community and their environment, rooted in spiritual and cultural traditions.

However, LTEK in Subak is under threat due to modernization and the lure of more lucrative opportunities in urban and tourism sectors. Younger generations are increasingly abandoning farming, leading to the erosion of traditional knowledge. Additionally, external pressures, such as the introduction of high-yield, chemical-intensive farming methods, undermine Subak's sustainable practices. By framing Subak through the lens of LTEK, your research can emphasize the importance of preserving this indigenous knowledge, not only as a cultural asset but as a practical tool for addressing contemporary challenges like climate change and land degradation (Berkes, 1999; Lansing, 1991).

The framework of spatial justice highlights the unequal distribution of resources, opportunities, and rights in a given territory. In the case of Subak, spatial justice is vital for understanding how tourism and urbanization have exacerbated inequalities in resource allocation and decision-making. Tourism-driven development often leads to the reallocation of water and land from agricultural use to commercial enterprises, resulting in distributive injustice. This disrupts the delicate balance of water sharing and directly impacts the livelihoods of farmers who depend on Subak.

In addition to distributive injustice, procedural injustice and recognition injustice are also evident. Farmers and Subak leaders are often excluded from critical decisions regarding land-use planning, despite their intimate knowledge of the landscape. Government policies tend to prioritize short-term economic gains from tourism over the long-term sustainability of Subak, sidelining the voices of local communities. Furthermore, Subak's cultural and ecological value is often overlooked, diminishing its recognition as a vital part of Bali's heritage. Spatial justice provides a powerful lens to analyze these injustices, emphasizing the need for participatory governance and equitable resource management to ensure the survival of Subak as both a cultural and functional system (Soja, 2010; Harvey, 1973).

## Local Traditional Ecological Knowledge (LTEK)

Berkes, F. (1999). "Sacred Ecology."

Watson J. & Davis W. (2020). *Lo-tek: design by radical indigenism*. Taschen.

Lansing, J. S. (2006). "Perfect Order: Recognizing Complexity in Bali's Water Temples."

## Spatial Justice

Soja, E. W. (2010). "Seeking Spatial Justice."

Harvey, D. (1973). "Social Justice and the City."

# Decolonization

Howitt, R., & Suchet-Pearson, S. (2006). "Rethinking the Building Blocks: Ontological Pluralism and the Idea of 'Management'."

Mignolo, W. D. (2009). Epistemic Disobedience, Independent Thought and Decolonial Freedom. *Theory, Culture & Society*, 26(7–8), 159–181. <https://doi.org/10.1177/0263276409349275>

Peluso, N. L., & Vandergeest, P. (2001). "Genealogies of the Political Forest and Customary Rights in Indonesia."

Decolonization offers a critical framework to challenge the dominance of colonial and neo-colonial practices in Bali's governance and spatial planning systems. The Subak system has historically been marginalized by policies that prioritize profit-driven land use, which can be traced back to the Dutch colonial rule and its centralized governance structures. For instance, the introduction of formal land ownership during colonial times disrupted the communal land management that was integral to Subak (Wardana et al., 2019a). Post-independence, Indonesia's national development policies further sidelined traditional governance systems in favor of large-scale infrastructure projects and tourism development. This trend was further facilitated by the introduction of the Omnibus Law by the national government, which aimed to streamline the entry of foreign investment into Indonesia. Under this law, licensing processes were centralized through a single national system, removing the authority of local regional heads to issue permits (Wardana et al., 2019b).

Decolonizing Subak involves reclaiming its autonomy and recognizing its value as a locally-led governance system. This means shifting from top-down governance to participatory planning models that empower Subak communities to take an active role in managing their territories. It also involves integrating indigenous ecological knowledge into formal spatial planning policies, ensuring that Subak is not just preserved as a cultural artifact but as a living, functioning system.

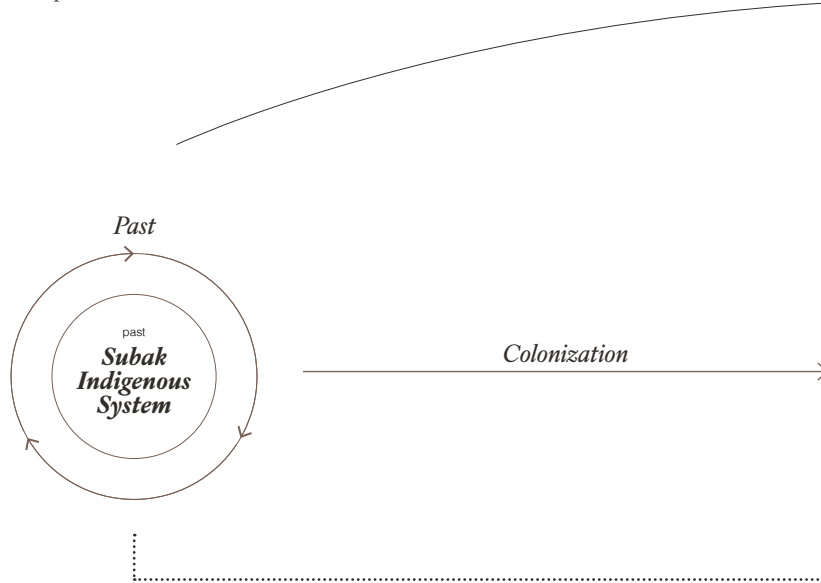
Drawing from Mignolo's (2009) notion of epistemic disobedience, decolonizing practice entails not only political reform but also the co-production of knowledge with those historically silenced by colonial and technocratic systems. This approach affirms the epistemic rights of Subak communities and positions their lived experience and ancestral knowledge as central to future spatial strategies. Decolonization thus provides a pathway to restore the balance of power and advocate for governance reforms that align with the principles of spatial justice and sustainability (Peluso & Vandergeest, 2001; Howitt & Suchet-Pearson, 2006)

# ii. Conceptual & Analytical Framework

This research develops a conceptual framework grounded in the objective of understanding how Subak practices have changed over time. By comparing past and present configurations of Subak, I apply an analytical lens structured around three layers of inquiry. The first layer is the ontological layer, which seeks to uncover the worldviews and belief systems that underpin Subak as a cultural and ecological practice. The second layer focuses on the relational fields that constitute the Subak system: culture, ecology, and prosperity. The third layer examines the interactions among these relational fields, analyzing how different actors navigate tensions, make decisions, and adapt to changing socio-economic and environmental conditions.

By applying this three-layered framework to both historical and contemporary readings of Subak, I derive lessons that inform a vision for a future, Altered Subak, one that retains its foundational values while adapting to present-day pressures. This same framework is then used to guide the development of design strategies proposed in the final chapter.

Conceptual Framework



Analytical Framework  
**Three Layers of Inquiry**



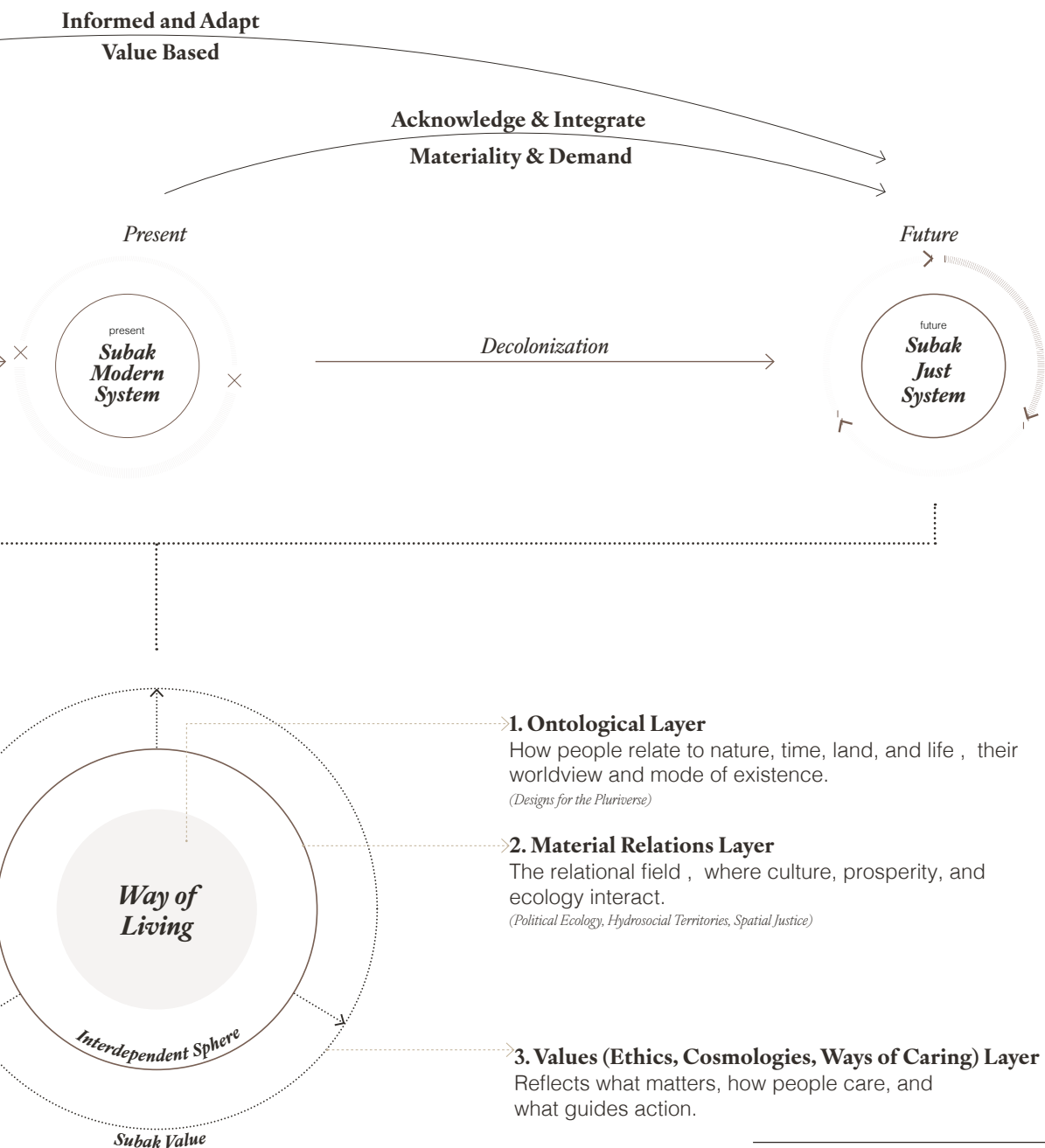


Fig 3.3 Conceptual and Analytical Framework

# iii. Research Framework

Based on the main research question, Peter Marcuse's Critical Planning approach is employed as the analytical framework, dividing the inquiry into six sub-research questions. Each sub-research question corresponds to a specific phase of the Critical Planning process, expose, propose, politicize, and reflect, ensuring that each phase builds upon the previous one in a structured and purposeful manner. This framework not only guides the research process but also outlines the expected outcomes of each sub-research question, providing clarity on how they contribute to addressing the overarching research problem.

MAIN RESEARCH QUESTION	SUB RESEARCH QUESTION
How can spatial planning and governance be reconstructed to enable just development in Subak's Hydrosocial Territories without neglecting its Traditional Ecological Knowledge (TEK)?	<div>EXPOSE</div> <div>SQ1 What Subak TEK practices are currently recognized within Bali's development, and how do these demonstrate capacities for resource management and spatial justice?</div> <div>SQ2 How tourism-driven development generate injustices in Subak's Hydrosocial Territories?</div>
	<div>PROPOSE</div> <div>SQ3 What spatial and governance strategies can enable just development within Subak's Hydrosocial Territories?</div> <div>SQ4 How can Subak's indigenous practice (TEK) be effectively integrated into spatial planning and governance to enable just development?</div>
	<div>POLITICIZE</div> <div>SQ5 What actionable pathways can transform the competing priorities of tourism-driven development and ensuring just development in Subak's Hydrosocial Territories?</div>
	<div>REFLECT</div> <div>SQ6 What lessons from Subak's experience can inform broader sustainable and just tourism development across Indonesia?</div>

- LR** Literature Review
 **MM** Mixed Media Review
 **IT** Interview
 **TM** Transcalar Mapping

**SM** Stakeholder Mapping
 **PA** Policy Analysis
 **DO** Documentary Observation

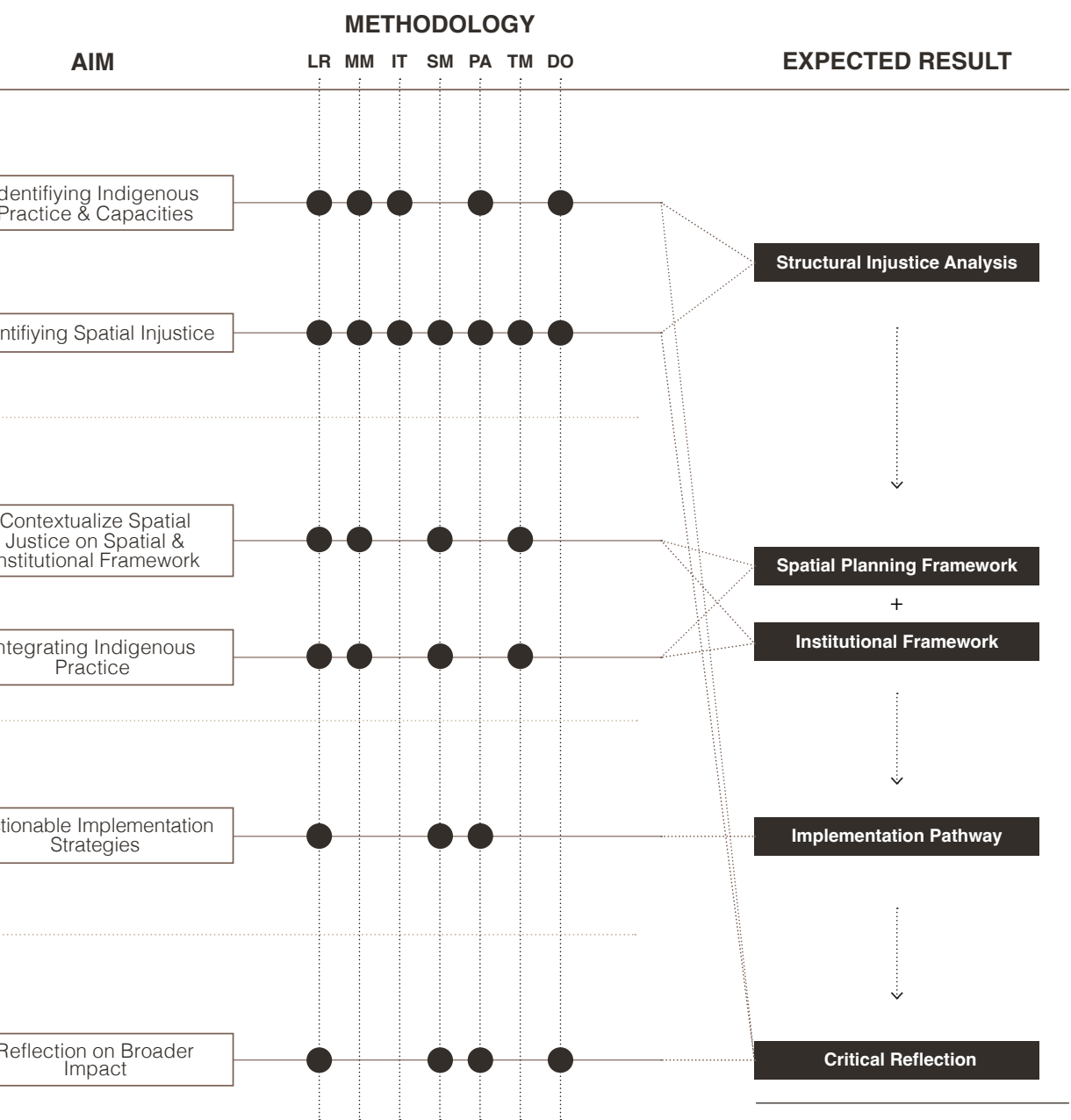
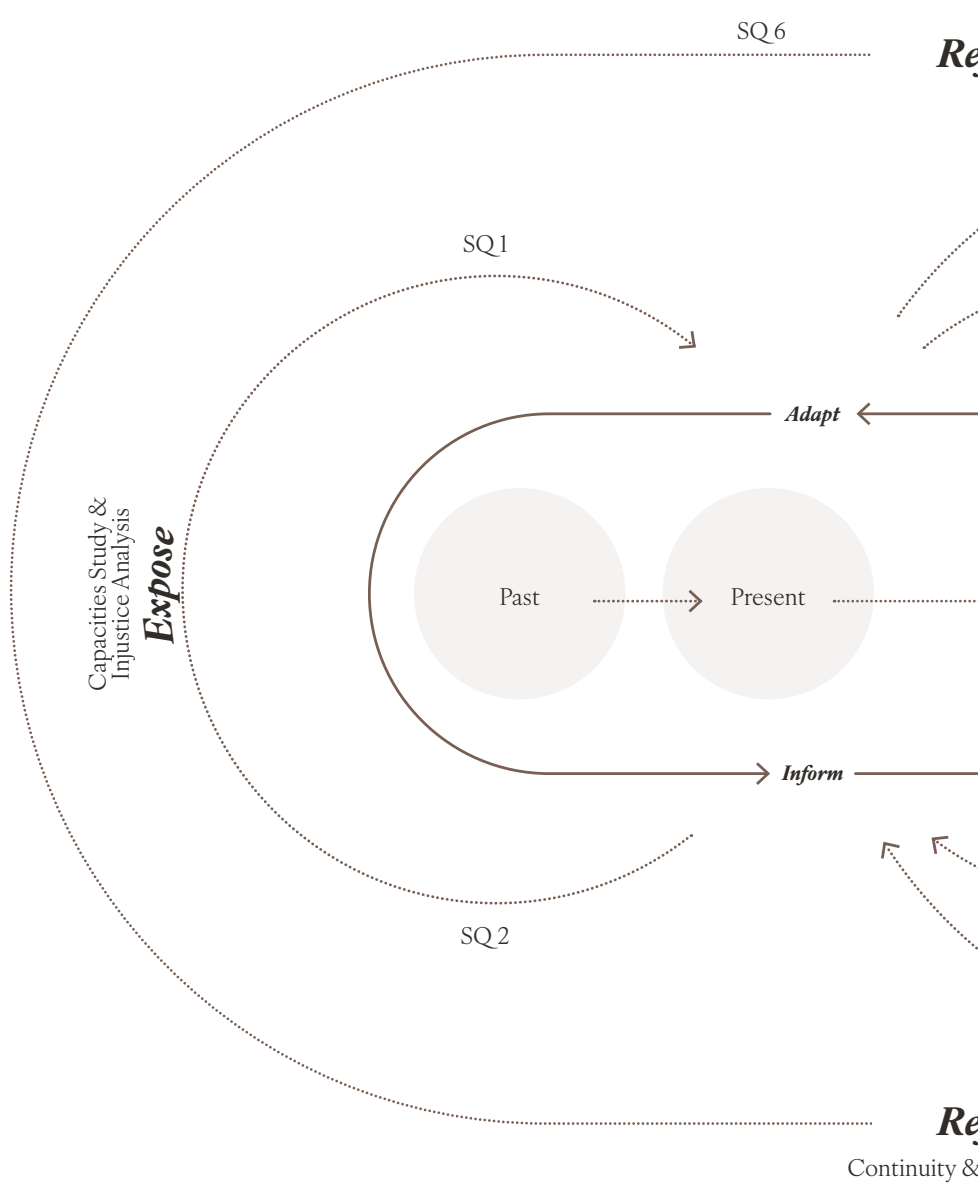


Fig 3.4 Research Framework

# iv. Methods

To answer these sub-research questions, an exploratory research by design is utilized, incorporating a combination of methods. These include literature reviews to establish the theoretical foundation, qualitative analysis to interpret findings, interviews and fieldwork to gather primary data, and documentation to capture the nuances of the research context. This mixed-methods approach enables a comprehensive exploration of the issues and ensures a robust analysis aligned with the aims of each research phase.



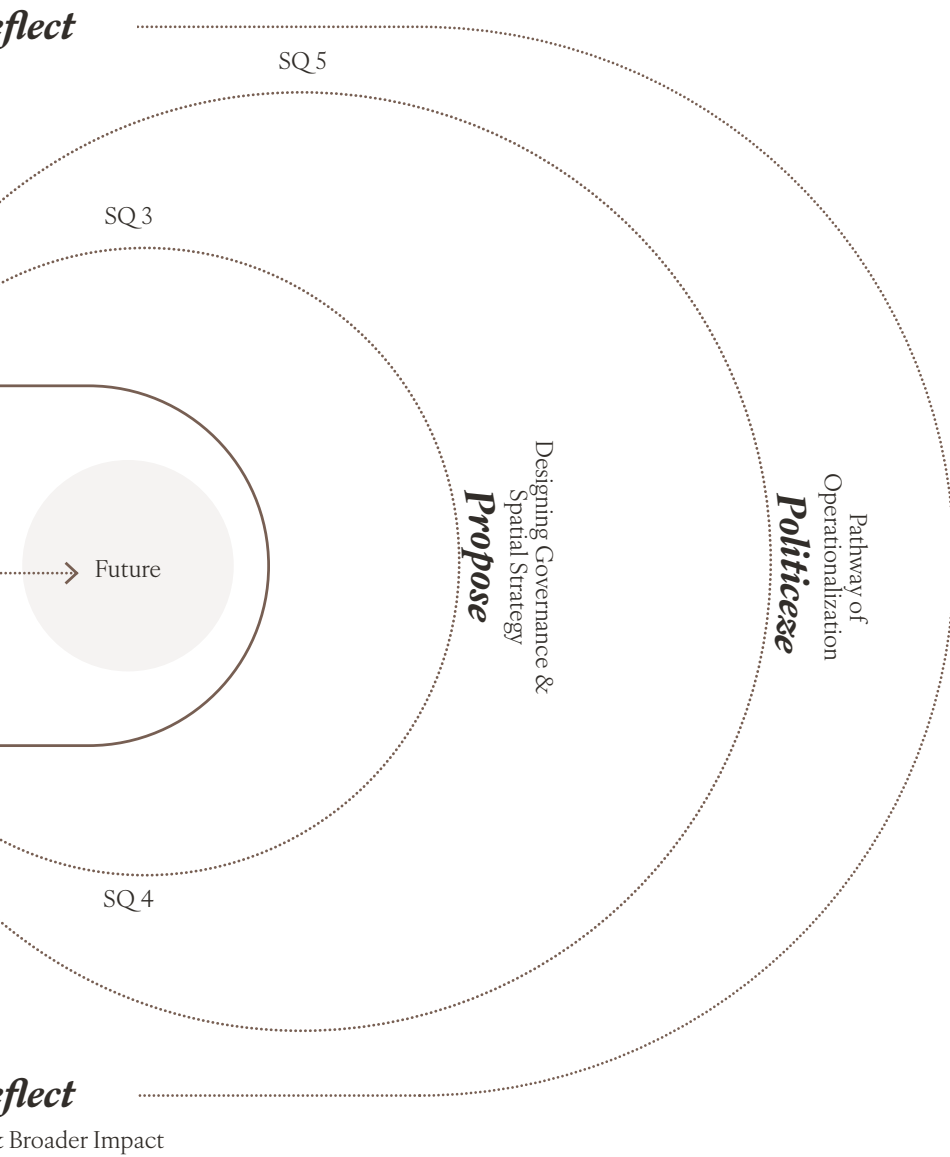
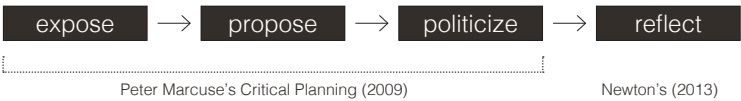


Fig 3.5 Methodology

To thoroughly address the main research question, the framework for the sub-research questions draws upon Peter Marcuse's approach to Critical Planning. This approach was chosen for its effectiveness in unraveling the complex issues present in urban environments, enabling a focus on addressing the root causes of urban inequality rather than merely mitigating its symptoms. Additionally, the framework includes a reflection phase, which serves two purposes: to critically assess the process undertaken so far as an urban planner and designer (Newton, 2013) and to act as a provocation, inspiring the next steps toward transformative action.



This study employs an exploratory research approach that incorporates a diverse range of methods to address each sub-research question effectively. These methods include:

## 1. Literature Review

The literature review explores academic and policy literature on Subak, Bali's development, Hydrosocial Territories, and Spatial Justice. This method establishes the theoretical foundation for the research while identifying gaps in practical and scholarly discussions. The literature review is applied throughout the research process to critically ground findings and proposed solutions within the context of existing theories and practices.

## 2. Mixed Media Review

This method synthesizes information from various media sources, such as posters, news articles, photographs, documentaries, historical accounts, and seminar recordings, to develop a comprehensive understanding of the topic.

## 3. Interview

Semi-structured interviews were conducted to gain deeper insights from key actors and stakeholders. These interviews also served to validate assumptions formed during the literature and media reviews. Conducted both before and during fieldwork, this method facilitated closer engagement with stakeholders to better understand their challenges and potential.

## 4. Transcalar Mapping

This method visualizes spatial changes across Subak's Hydrosocial Territories, considering them as an interconnected system. By analyzing changes across multiple scales, it uncovers relationships between different aspects of the system to understand their interdependencies and cascading effects.

## 5. Stakeholder Mapping

Stakeholder mapping identifies key actors and their roles within Hydrosocial governance. This provides a clear understanding of the current governance landscape, which is essential for designing effective governance solutions.

## 6. Policy Analysis

Policy analysis reviews and evaluates existing governance frameworks to identify gaps in addressing spatial injustices resulting from tourism-driven development. This method assesses the effectiveness of current policies and informs the development.

## 7. Documentary Observation

Photography and video were used as tools to document the challenges and opportunities within Subak communities, creating a narrative through documentary filmmaking. This immersive fieldwork approach allowed for a deeper understanding of the lived experiences and cultural nuances of the Subak communities.

# Research Structure Overview

PROBLEM FIELD	PROBLEM STATEMENT	RESEARCH AIM	MAIN RESEARCH QUESTION	SUB RESEARCH QUESTIONS
<div>Rapid Land Conversion</div> <div>Tourism Dependency</div> <div>Environmental Degradation</div> <div>Local Marginalization</div>	<p>Bali's rapid development, driven predominantly by tourism, has led rapid acceleration of land conversion, exacerbated water shortages, intensified environmental degradation, deepened social inequalities, and eroded indigenous cultural practices. These challenges are the result of planning, policies, and governance frameworks that allowed injustice to persist, relying heavily on a single industry, tourism. The current Bali development prioritize short-term economic gains over long-term ecological and cultural resilience. This unchecked development threatens Bali's heritage landscape, particularly the Subak Hydrosocial Territories, which embody ecological stewardship, cultural heritage, and community resilience. This situation underscores the need for a critical reevaluation of spatial planning and governance practices to enable just development.</p>	<p>To understand the injustices within Subak's Hydrosocial Territories as a result of tourism-driven development and its socio-environmental impacts.</p> <p>To develop spatial planning strategies &amp; propose governance reforms that prioritize ecological sustainability, cultural preservation, equitable development, and procedural justice, particularly for Subak communities &amp; Bali's Indigenous population affected by tourism expansion.</p> <p>To initiate acts of care that engage the broader public, mainly the young generation, fostering awareness, empathy, and active participation in supporting just development for Subak communities.</p>	<p>How can spatial planning and governance be reconstructed to enable just development in Subak's Hydrosocial Territories without neglecting its Traditional Ecological Knowledge (TEK)?</p>	<div><div>EXPOSURE</div><div>SQ1</div><p>What factors contribute to the recognition and healing for resilience and justice?</p><div>SQ2</div><p>How to generate Hydro-social Justice?</p></div> <div><div>PROPOSAL</div><div>SQ3</div><p>What can be learned from Subak's experience?</p><div>SQ4</div><p>How can the current planning and development be improved?</p></div> <div><div>POLITICAL</div><div>SQ5</div><p>What are the political implications of the development of Subak's Hydrosocial Territories?</p></div> <div><div>REFLECTION</div><div>SQ6</div><p>What are the implications of the development of Subak's Hydrosocial Territories?</p></div>

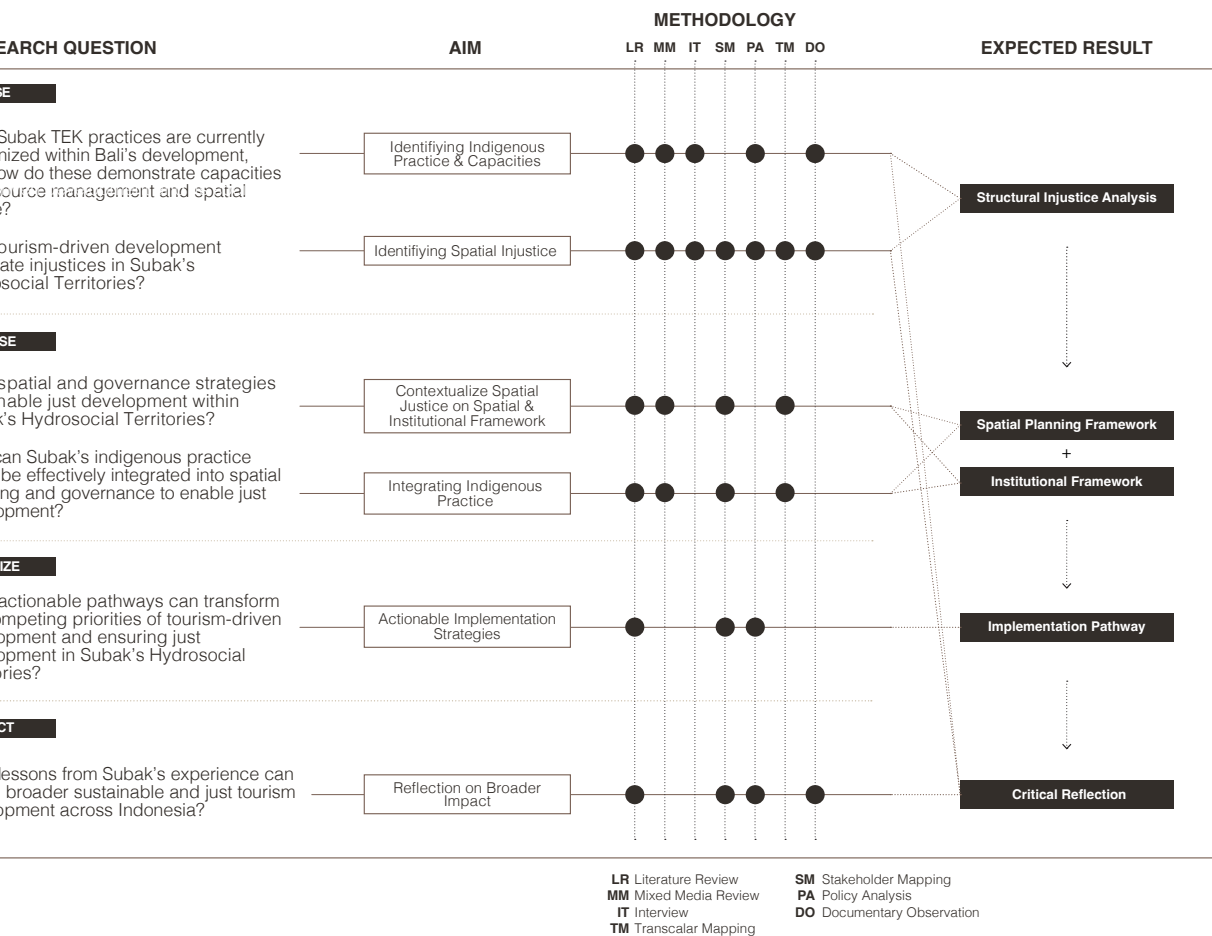
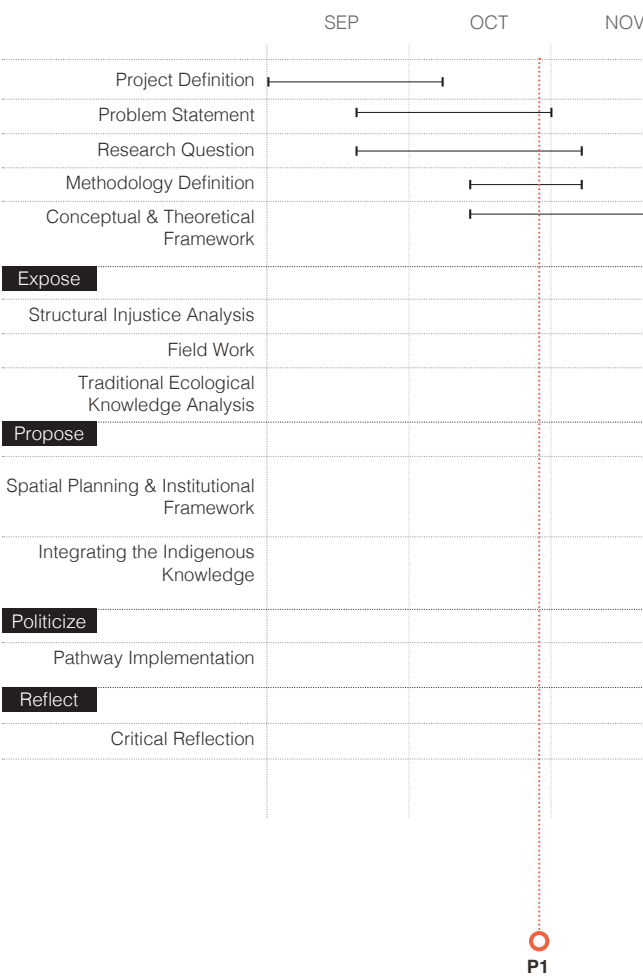


Fig 3.6 Research Structure

# v. Timeline

The timeline for the research process is structured sequentially, aligning with the progression of each sub-research question. Each phase is designed with specific time-bound objectives to ensure that the expected aims are achieved within the allocated timeframe. Fieldwork, as a critical component of the research, is conducted prior to the P2 phase to gather qualitative data through semi-structured interviews and to observe the on-ground realities within the study area through field observation. Additionally, the fieldwork provides essential visual and contextual data to support the creation of a short documentary, which will serve as a reflective and communicative output at the conclusion of the project.



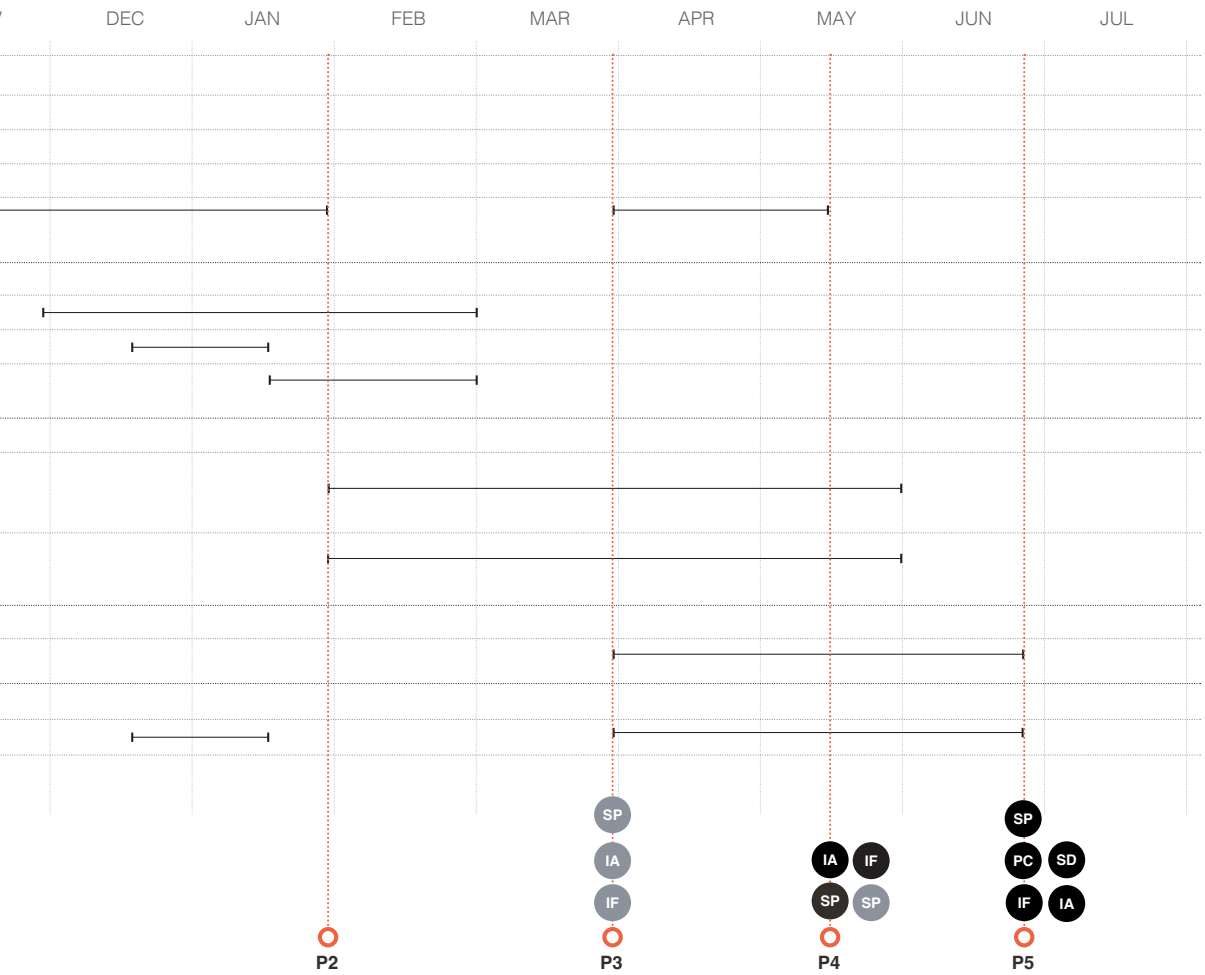


Fig 3.7 Research Timeline





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# Vulnerable Landscape

Historical depiction of Subak farmers using cattle-  
drawn plows to cultivate rice fields.  
Source : Rice Field Bali, KITVL (1920)

# IV

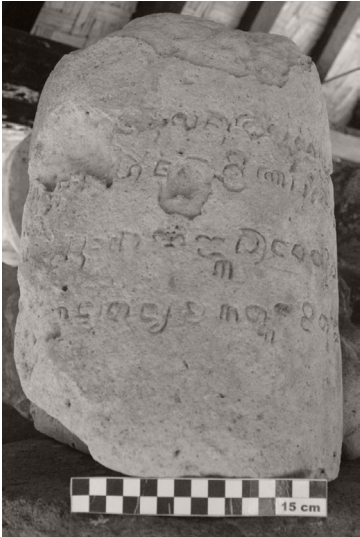
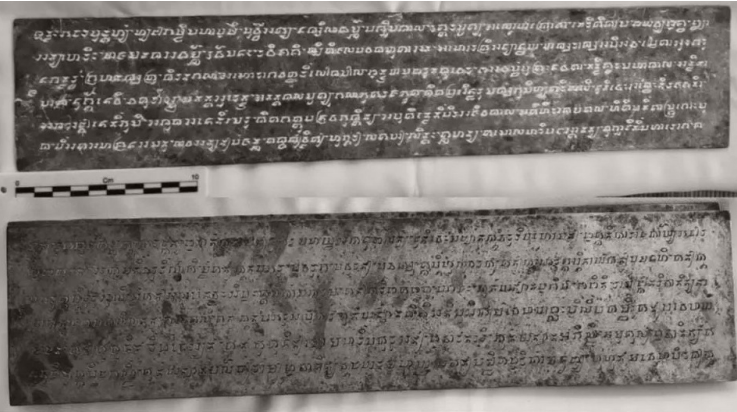
## Subak as Indigenous Knowledge System

- i. History of Subak
- ii. Embodied Wisdom in the Landscape
- iii. Practicing Subak Across Scales
- iv. Subak Governance
- v. Recognition of Subak
- vi. Sustaining the Values of Subak



Fig 4.1 An early 20th-century photograph depicting the Subak landscape circa 1930. Source: KITVL, around 1930

# i. History of Subak



The origins of agriculture in Bali trace back even further, with evidence suggesting the existence of farming systems as early as 600 AD. At that time, two primary forms of agriculture were practiced: *parlak* (dryland farming) and *huma* (wetland or rice field farming), both of which were conducted collectively to meet local subsistence needs (Norken et al., 2007). These early systems laid the foundation for more complex water management structures that would later evolve into Subak. Over time, the concept of *huma* expanded from referring simply to rainfed rice fields to encompassing irrigated systems. This development is documented in several ancient Balinese inscriptions, which include terms such as *kasuwakan* or *kasubakan*, early references to organized irrigation networks. The Pandak Badung inscription from 1071 AD, for example, records the term “*kasuwakan rawas*” in a passage:

*“...masukatang huma di kedandan di errara di kasuwakan rawas...”*

that translates as “...rice field measurements in Kadandan, along the Yeh Aa River, within the Subak Rawas...” (Purwita, 1993, as cited in Kumarananda, n.d.). The following year, the Klungkung inscription of 1072 AD further affirmed the formalization of Subak as a named and institutionalized irrigation system.

Fig 4.2 Historical inscription and Balinese Lontar script documenting the origins and evolution of the Subak system. Source: balinesia.id (2023)

Beyond inscriptions, the structure and governance of Subak are described in Balinese lontar manuscripts. These texts elaborate on the roles within the Subak organization, stating:

*“sang mikukuhang sawah kewastanin subak,  
sang mikukuhang toya kewastanin pekaseh, ika  
mawenang mangepah toya punika,”*

This can be translated as: “Individuals actively cultivating the rice fields are referred to as Subak members, while those responsible for regulating water distribution are known as pekaseh; both are collectively accountable for managing the equitable distribution of water among Subak members.” This early institutional model reflects a sophisticated understanding of collective governance and environmental adaptation.

Despite such documentation, the precise invention of Subak remains uncertain. What is clear, however, is that the system emerged as a response to Bali’s challenging topography. Given that many water springs are located in lower elevations, irrigating upstream rice fields would not have been naturally feasible without human intervention. The development of Subak thus reflects deep ecological knowledge and collaborative innovation by Balinese farmers, who created a water-sharing network capable of ensuring equitable access and sustainable rice production. This system has been preserved and transmitted through generations, demonstrating the resilience of local knowledge systems.

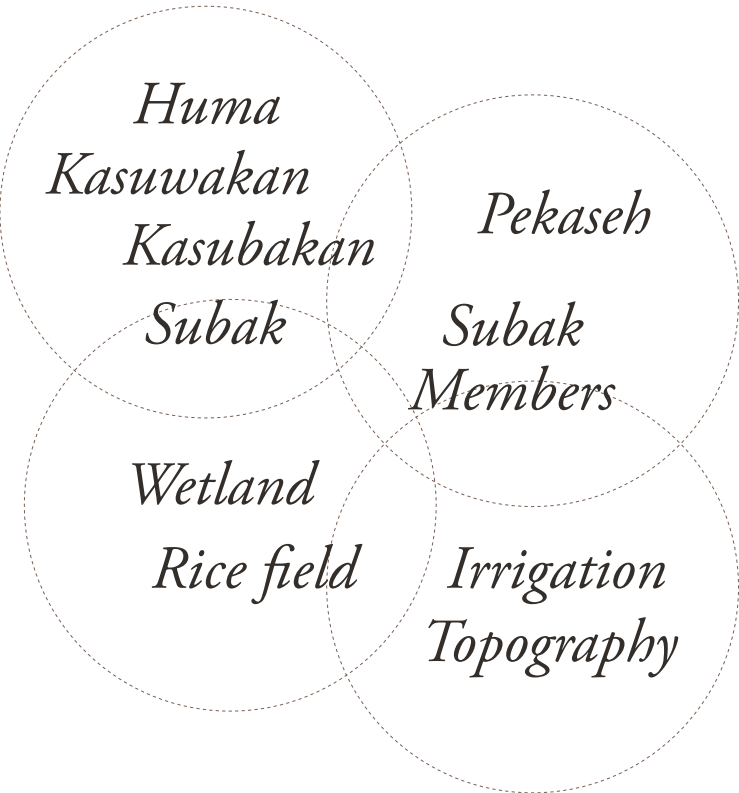
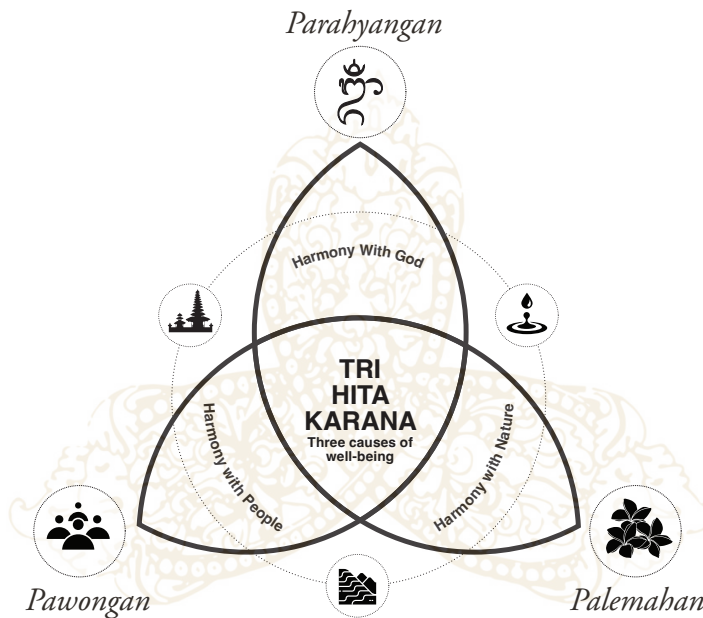


Fig 4.3 Lexical terms found in historical scripts related to the origin of the Subak irrigation system.

## ii. Embodied Wisdom in the Landscape



At its core, Subak is a traditional water management system used to sustain Bali's rice terraces, reflecting the island's complex interplay between human activity and nature. According to J. Stephen Lansing, the success of Subak lies in its socio-ecological approach, where water is allocated through a decentralized network of farmer cooperatives. This system is guided by the philosophical principles of Tri Hita Karana (see figure 4.4), which emphasize harmony between humans, nature, and the divine (Lansing, 2006). Subak temples, which are integral to the system, serve as spiritual hubs where rituals are performed to honor water deities and ensure the continuity of this life-giving resource. Lansing's research highlights how Subak's structure is not only an agricultural tool but also a reflection of the Balinese worldview, where religion and ecology are deeply intertwined.

Beyond its spiritual foundations, Subak demonstrates a remarkable understanding of ecological and hydrological systems (See fig 4.5). Farmers collectively manage the flow of water from volcanic lakes and rivers to irrigate rice terraces, using weirs, tunnels, and canals. This cooperative approach ensures equitable water distribution while maintaining ecosystem balance. Studies by Lansing and colleagues (2007) have shown that the Subak system operates as a "complex adaptive system," with farmers using centuries of empirical knowledge to adjust water flow, planting schedules, and pest management. This adaptive capacity has allowed Subak to remain resilient in the face of environmental challenges, such as changing weather patterns or resource scarcity. Subak's practices also align with modern principles of sustainable agriculture, emphasizing biodiversity, soil health, and efficient water use.

Fig 4.4 Tri Hita Karana as the philosophical foundation guiding the Subak irrigation system.

# Manifestation to Subak Value



## Rituals and Ceremonies

- Rituals and ceremonies to the goddess for the gift of water and productive land



## Subak Communities

- The subak organization
- Awig-awig (traditional regulations)
- Proportional distribution of water to member farms using the concept of tektek
- Cropping and planting are agreed by consensus
- Ability to lend and borrow water among farmers or subaks



## Management of Land & Water

- Management of water resources
- Sediment control
- Design of irrigation system by consensus
- Agricultural activities by consensus
- Inlet-outlet system to facilitate sharing of water among farmers or subaks

Fig 4.5 Expressions of Tri Hita Karana philosophy as reflected in the social, spiritual, and environmental dimensions of the Subak system

### iii. Practicing Subak Across Scales

Subak is not only a localized system of irrigation and farming, it is a multi-scalar socio-ecological institution that connects individuals, communities, landscapes, and cosmologies across different spatial and temporal levels (see fig 4.6). While its most visible form may be seen in the terraced rice fields of Bali, the practice of Subak spans from sacred highland lakes and mountain forests to lowland farming villages, encompassing both ecological flows and ritual networks. As a hydrosocial system, Subak reflects a mode of governance where water, land, labor, and ritual are collectively organized (Lansing, 2006; Astawa et al., 2022). Its operations are deeply embedded within the Balinese philosophy of Tri Hita Karana, which informs not only local practices but also broader territorial relationships between upstream and downstream communities.

The continuity and resilience of Subak depend on the coordination of various actors across spatial scales, from individual farmers and *pekaseh* (water temple leaders), to regional temple networks and watershed-level governance. Zen et al. (2024) note that Subak's functionality is inseparable from its territorial embeddedness: the upstream-downstream logic of water flow requires active cooperation and spiritual stewardship across different ecological zones. Thus, to fully understand how Subak operates, one must consider its nested scales of practice, including the island-wide temple and lake systems, the watershed territories that form the core of its ecological infrastructure, and the local Subak units where everyday rituals and agricultural work take place.

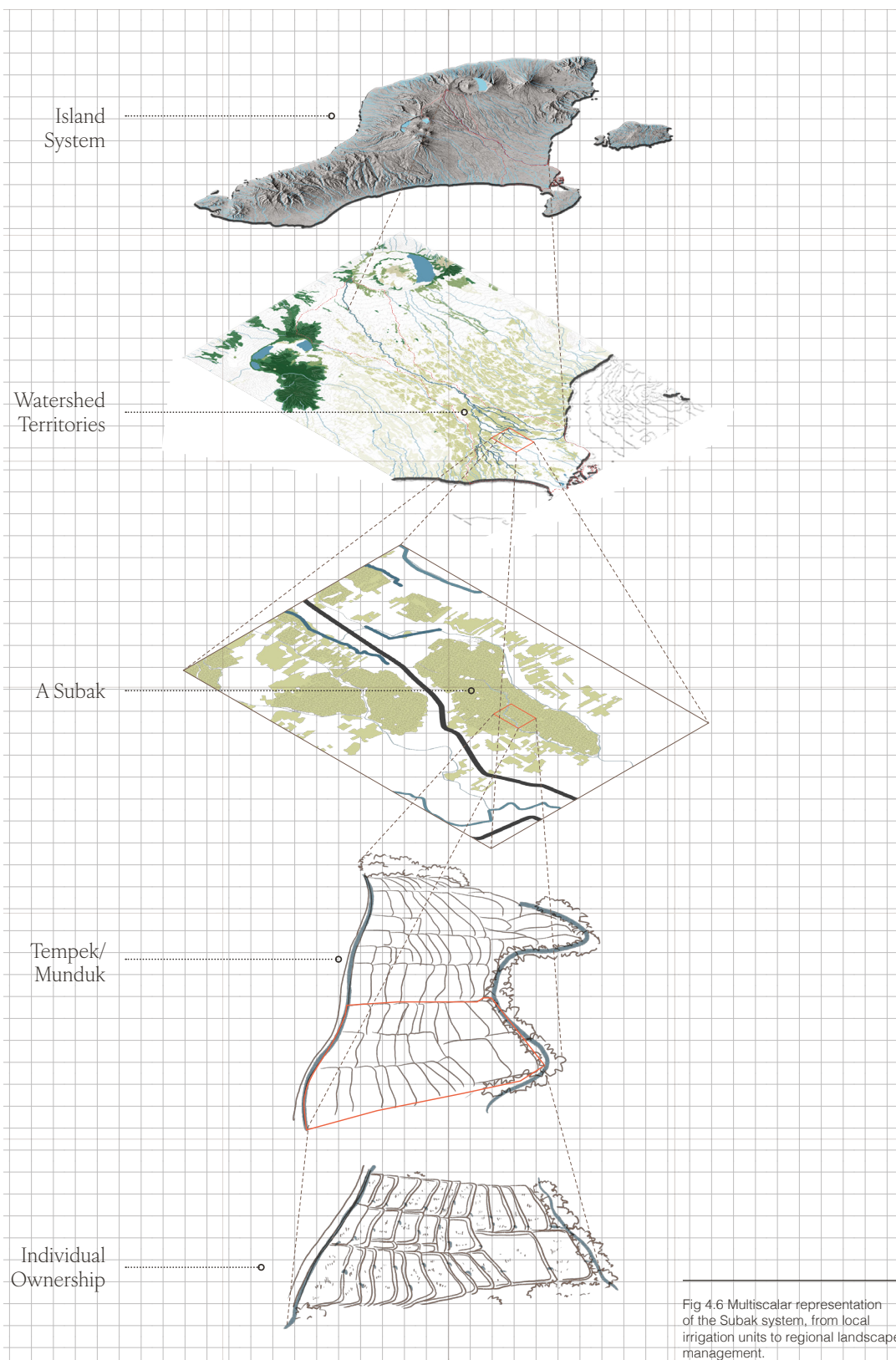
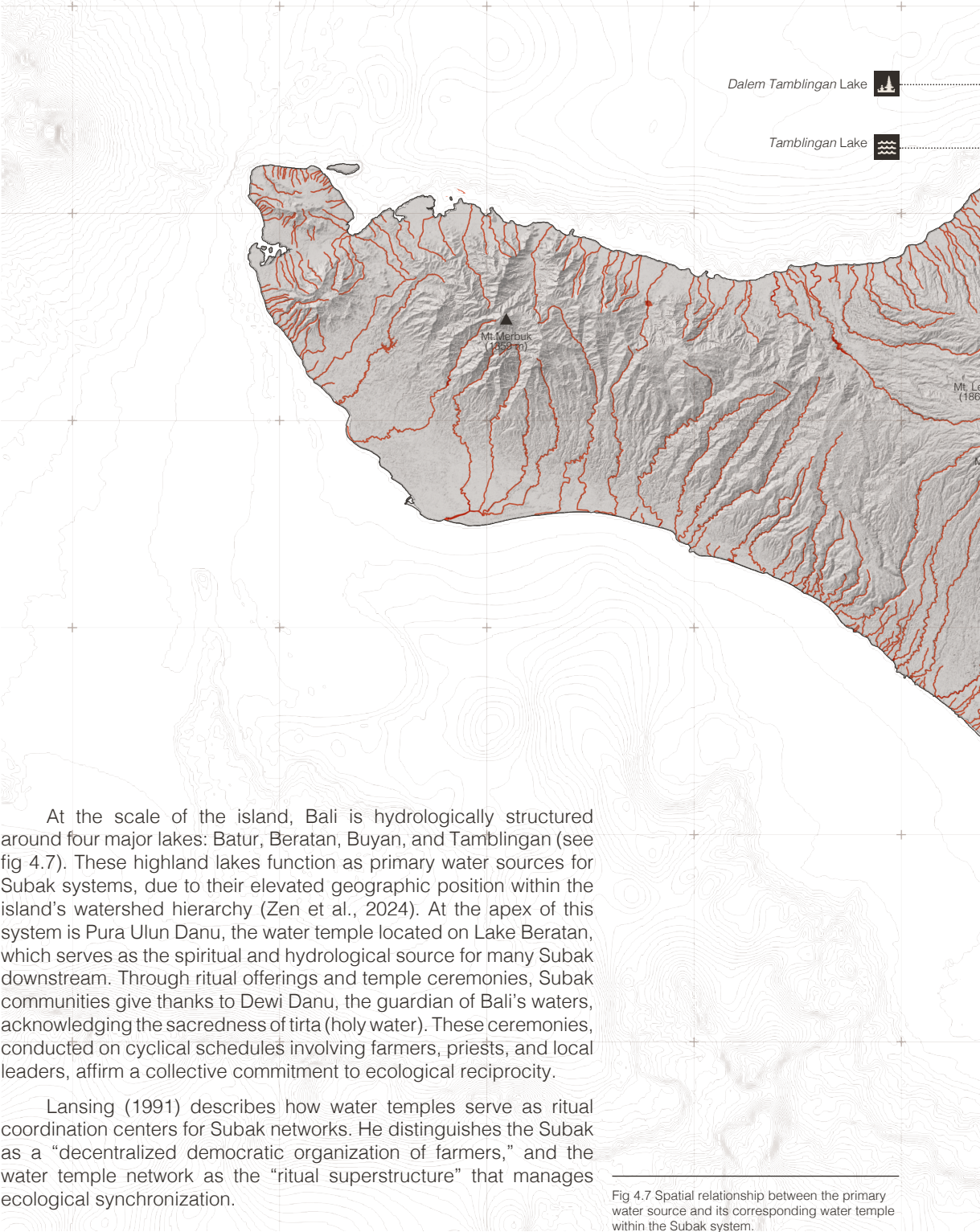


Fig 4.6 Multiscalar representation of the Subak system, from local irrigation units to regional landscape management.

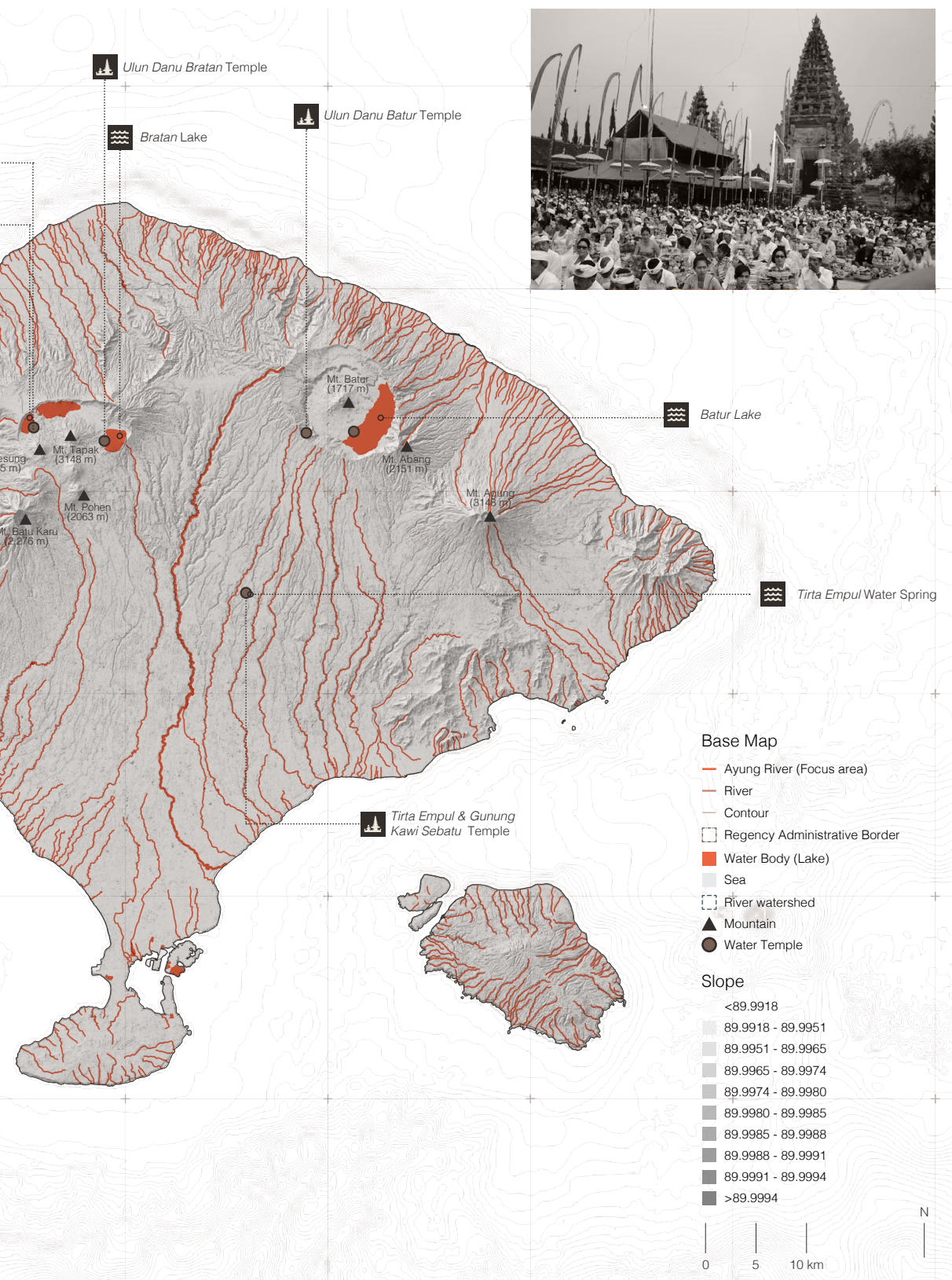
# On Island System Scale



At the scale of the island, Bali is hydrologically structured around four major lakes: Batur, Beratan, Buyan, and Tamblingan (see fig 4.7). These highland lakes function as primary water sources for Subak systems, due to their elevated geographic position within the island's watershed hierarchy (Zen et al., 2024). At the apex of this system is Pura Ulun Danu, the water temple located on Lake Beratan, which serves as the spiritual and hydrological source for many Subak downstream. Through ritual offerings and temple ceremonies, Subak communities give thanks to Dewi Danu, the guardian of Bali's waters, acknowledging the sacredness of tirta (holy water). These ceremonies, conducted on cyclical schedules involving farmers, priests, and local leaders, affirm a collective commitment to ecological reciprocity.

Lansing (1991) describes how water temples serve as ritual coordination centers for Subak networks. He distinguishes the Subak as a "decentralized democratic organization of farmers," and the water temple network as the "ritual superstructure" that manages ecological synchronization.

Fig 4.7 Spatial relationship between the primary water source and its corresponding water temple within the Subak system.



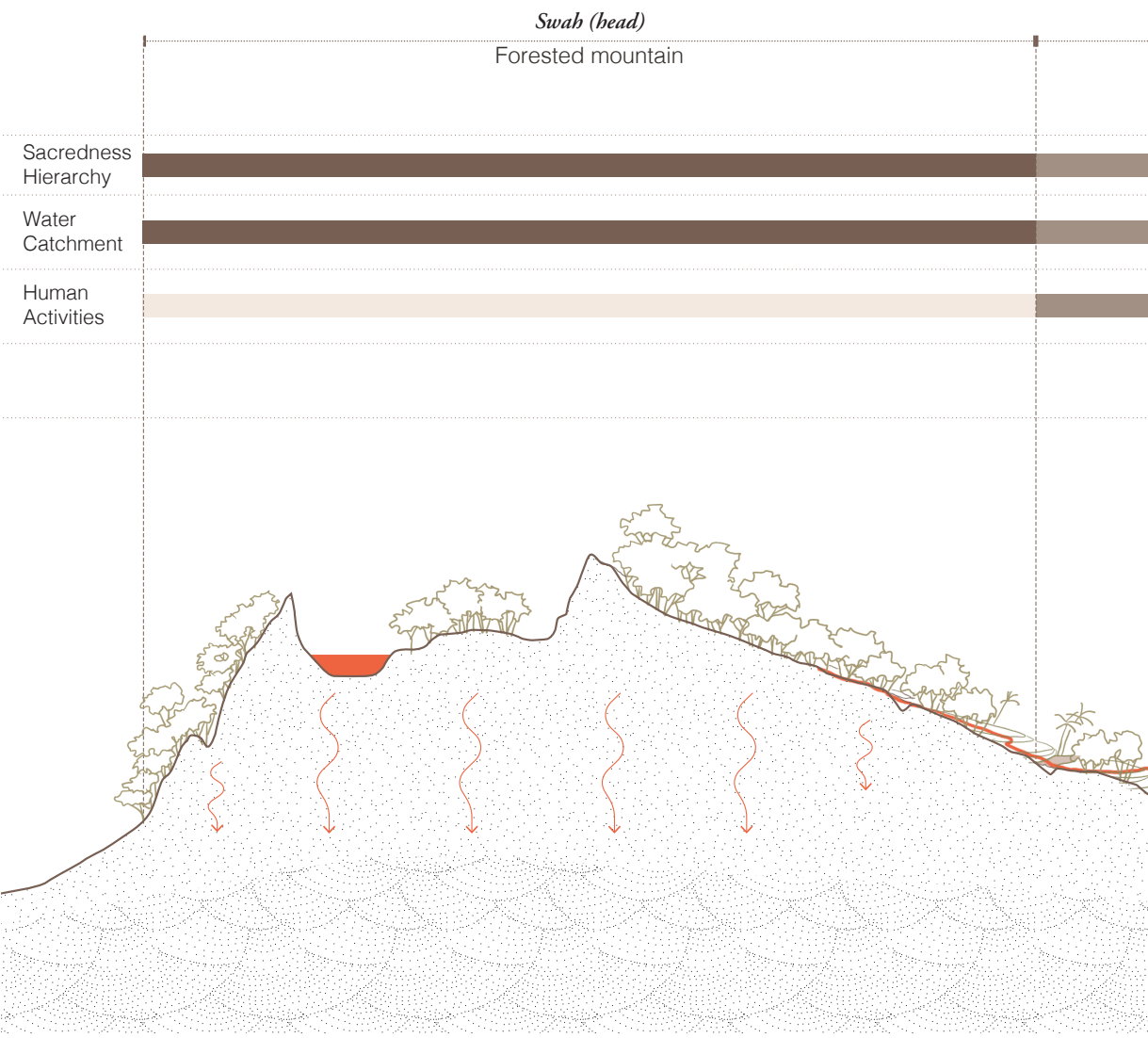
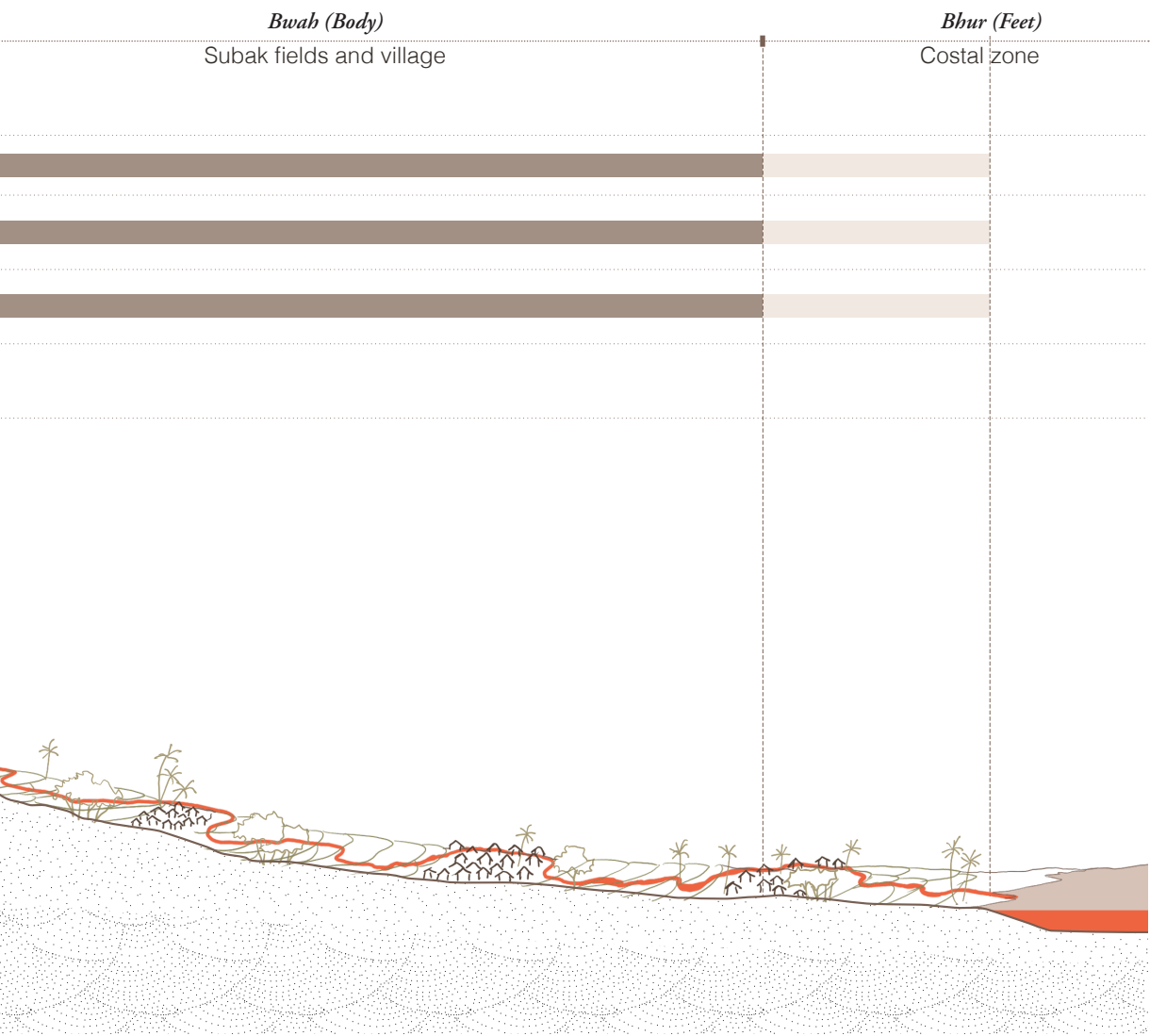


Fig 4.8 The Subak system functions within a watershed context, depending on upstream water catchment and hydrological flow to sustain downstream irrigation.

The wisdom of Tri Hita Karana is also expressed in the physical organization of land, which divides the island into three symbolic zones. According to Zen et al. (2024), the swah (head) comprises forested mountain areas that serve as water catchment zones, the bwah (body) encompasses the Subak fields and villages where agriculture takes place, and the bhur (feet) includes the coastal zones (see fig 4.8). Maintaining the integrity of the swah is critical, as it directly affects downstream Subak irrigation. Additionally, the volcanic geology of the mountains enriches upstream water with essential minerals, enhancing soil fertility for rice cultivation. Within the bwah, communities manage land collectively, sustaining both ecological functions and customary economic life. This structuring of landscape as a cosmological body reveals how Subak is embedded within a broader understanding of sacred geography.



# On A Subak Scale

Within a single Subak, multiple interconnected elements shape its structure and function, including a hierarchical system of irrigation channels and canals, as well as organized social groupings. In cases where a Subak spans a large area, it is often subdivided into smaller units known as tempek or munduk. These subdivisions typically correspond to specific irrigation branches or smaller community clusters within the broader Subak territory, allowing for more localized coordination of water management and agricultural activities.



Additionally, each farmer or landowner is traditionally associated with a Bedugul temple, a sacred site dedicated to the worship of the water deity and the spiritual stewardship of agricultural land. These temples serve not only religious purposes but also reinforce the cosmological and ritual dimensions of Subak's agro-ecological system.

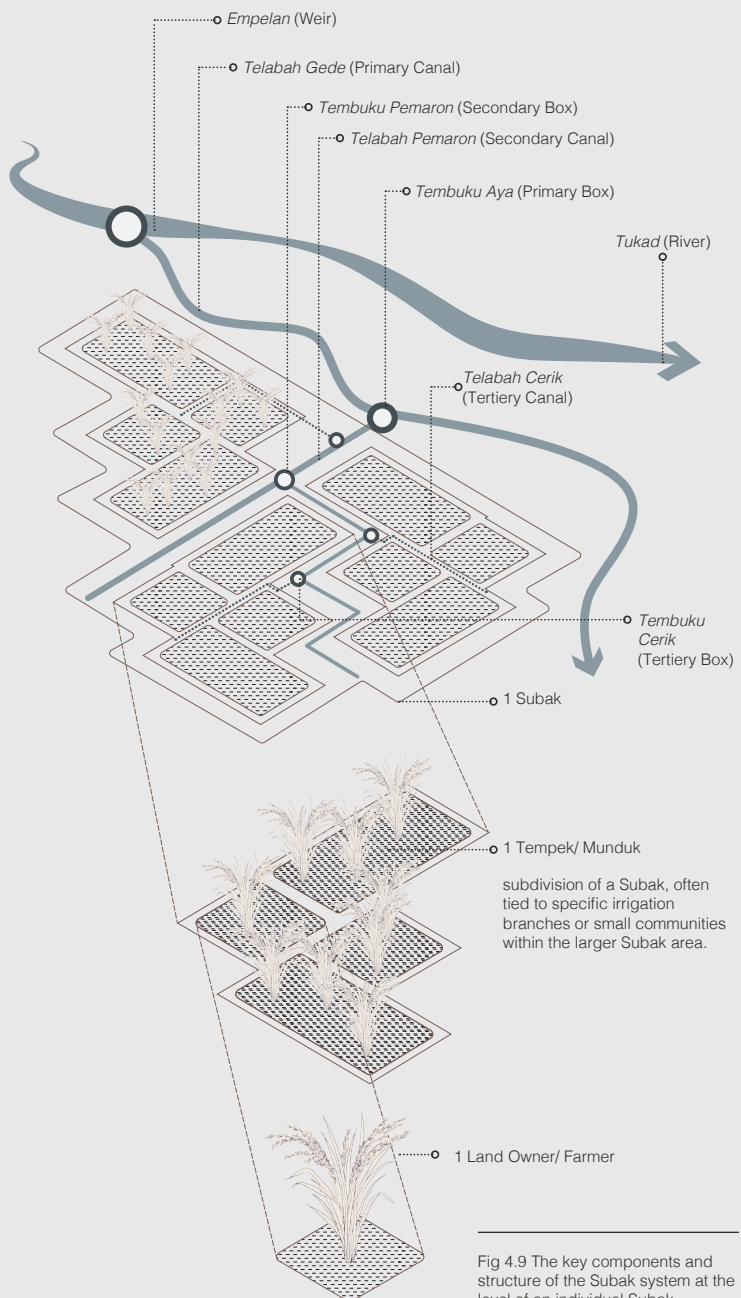


Fig 4.9 The key components and structure of the Subak system at the level of an individual Subak

# iv. Subak Governance

## A Subak Organisation

Subak refers not only to a traditional irrigation system but also to a socio-institutional arrangement that has governed water management and agricultural practices in Bali for centuries. Each Subak is organized through a decentralized, community-based administrative structure led by a *Pekaseh* (head of Subak), who is elected by the *Krama Subak* (Subak members). This leadership is supported by other functionaries such as a secretary and treasurer. Although the *Pekaseh* is responsible for day-to-day coordination, collective decisions are made through the *Paruman Krama Subak*, a general assembly in which members deliberate on issues of mutual concern. These include equitable water allocation, mobilization of communal labor (*ngayah*), rice cultivation scheduling, ritual planning, and conflict resolution. At the core of Subak governance is the *Awig-awig*, a set of customary regulations developed through mutual agreement among members. These locally specific rules vary across different Subak, adapting to distinct environmental and socio-cultural contexts.

The structure and function of Subak institution reflect Elinor Ostrom's (1990) design principles for sustainable common-pool resource management. Key principles such as clearly defined boundaries, collective-choice arrangements, locally adapted rules, conflict-resolution mechanisms, and community-based monitoring are all present within the Subak system. Through these mechanisms, Subak institutions maintain ecological resilience and social cohesion by embedding water governance within ritual, custom, and collective accountability.



Fig 4.10 *Krama Subak* meeting held at *Bale Subak* or *Bale Banjar* own by Customary Village. Source: Tribun Bali, 2020.

Fig 4.11 Workshop that involving *Krama Subak* activities was held at *Bale Subak Sembung*.

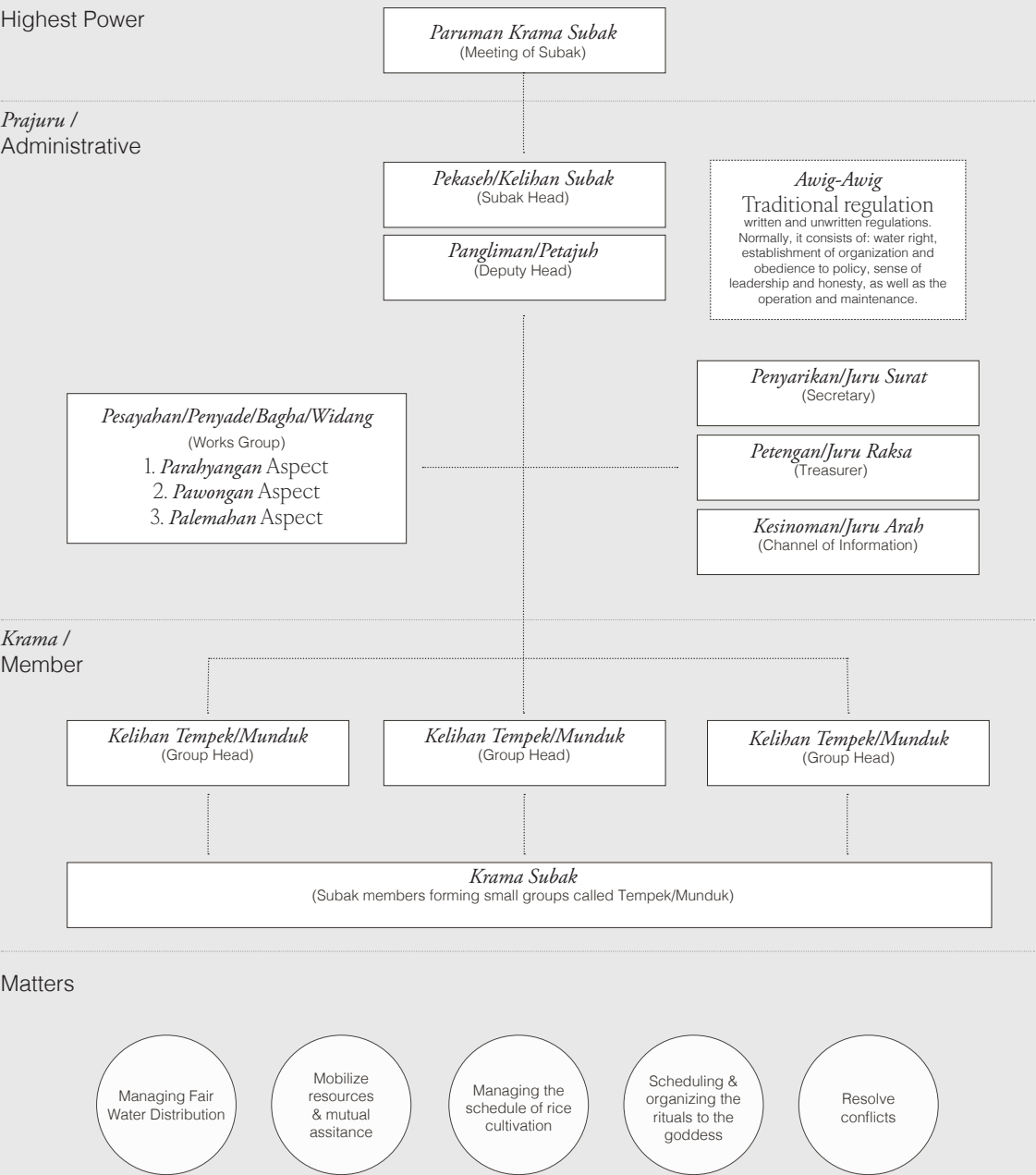


Fig 4.12 Community-based governance and hierarchical organization in an individual Subak, highlighting the distribution of authority and decision-making processes.

# Cycle of Rice Cultivation

During the *Paruman Krama Subak* (Subak members' assembly), decisions are made not only regarding water distribution but also concerning the timing of rice cultivation and the scheduling of rituals associated with each stage of the agricultural cycle (see fig 4.13). The ritual calendar begins with *Mapag Toya*, a ceremony for

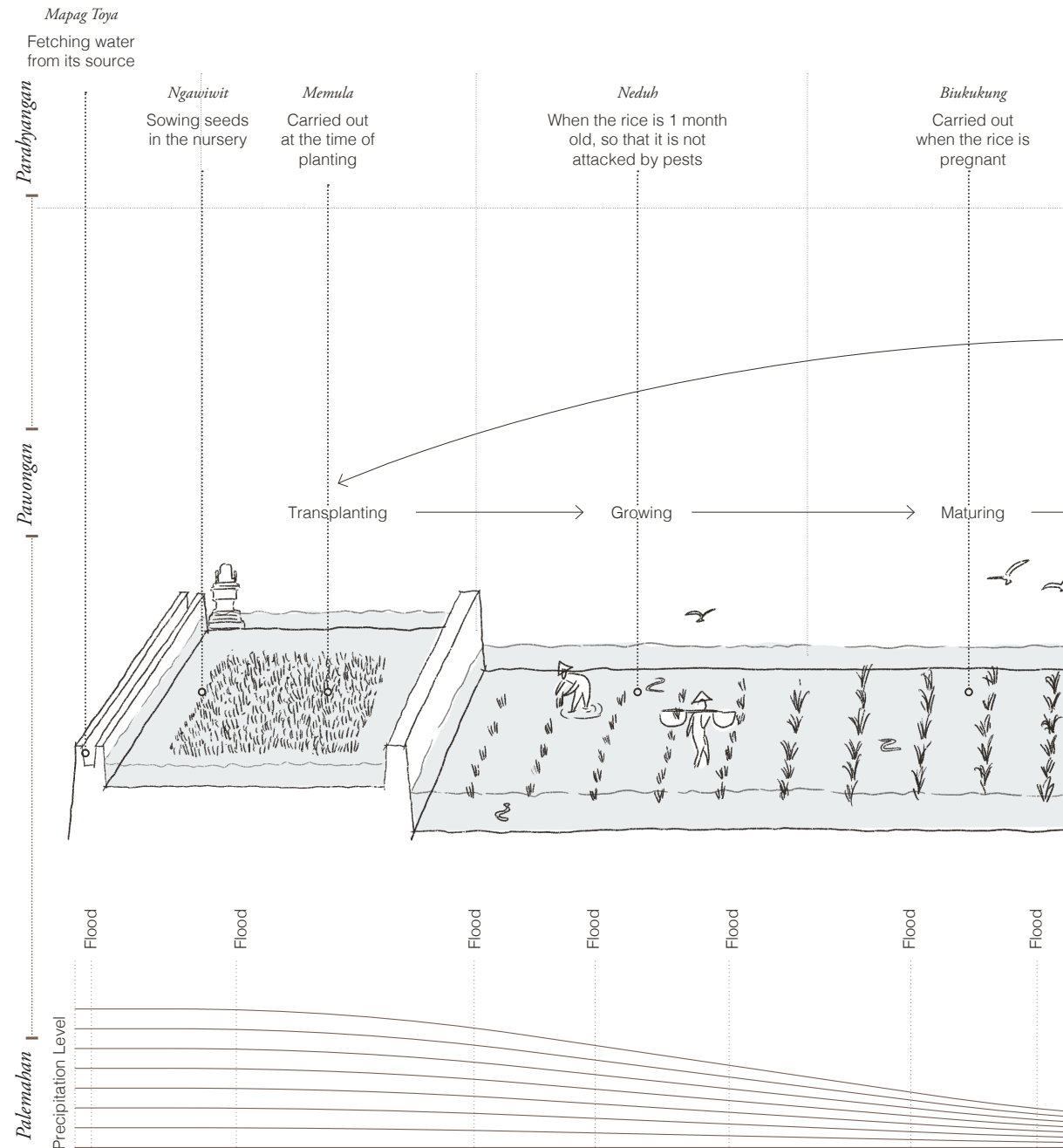
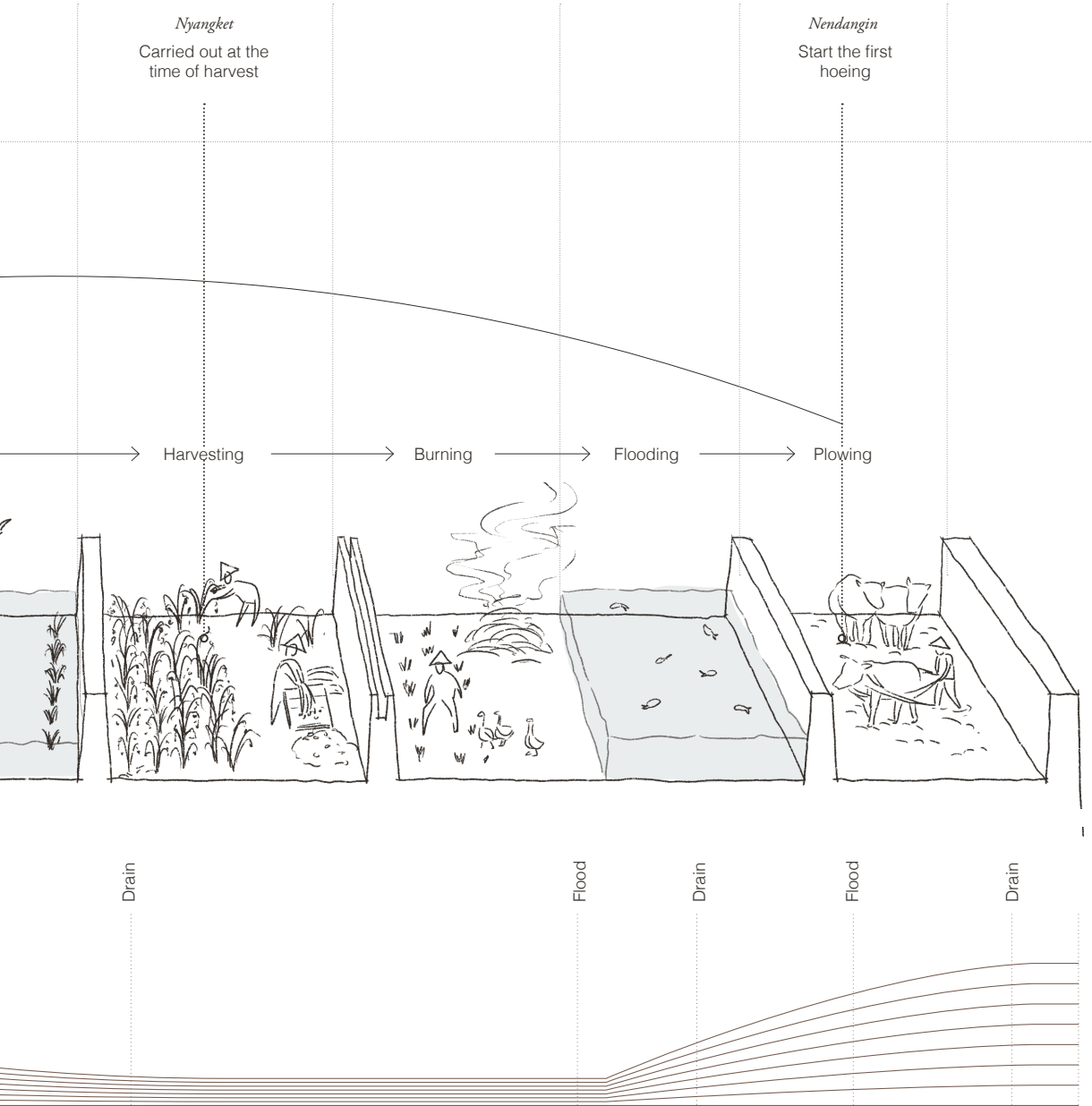


Fig 4.13 Correlation between traditional Subak rituals and the sequential stages of rice cultivation. Author edited from Lo-TEK: Design by radical indigenism - Watson J (2020)

fetching water from its source, signifying the spiritual and ecological commencement of the cultivation process (Zen et al., 2024). Typically, the entire rice cultivation cycle spans approximately 30 weeks, integrating agricultural activities with a sequence of religious and communal rituals.



Based on interviews with two *Pekaseh* (Subak leaders) and a review of relevant literature, most rice farming cycles within Subak systems occur twice annually, while a third cycle is considered relatively intensive. The commonly practiced crop rotation pattern is rice–rice–palawija (secondary crops such as legumes or vegetables), although this can vary depending on agreements made among Krama Subak (Subak members). The scheduling of planting cycles is typically decided during Paruman Krama Subak, the formal meeting of Subak members, where they collectively agree on key agricultural activities, including sowing, transplanting, water distribution from upstream to downstream plots, and harvesting dates.

According to an analysis of one Subak Gede conducted by Lorenzen and Lorenzen (2005), the optimal period to begin rice cultivation during the dry season is in June or July, and has the best yield result. In contrast, another commonly practiced planting season begins around January, aligning with the onset of the wet season.

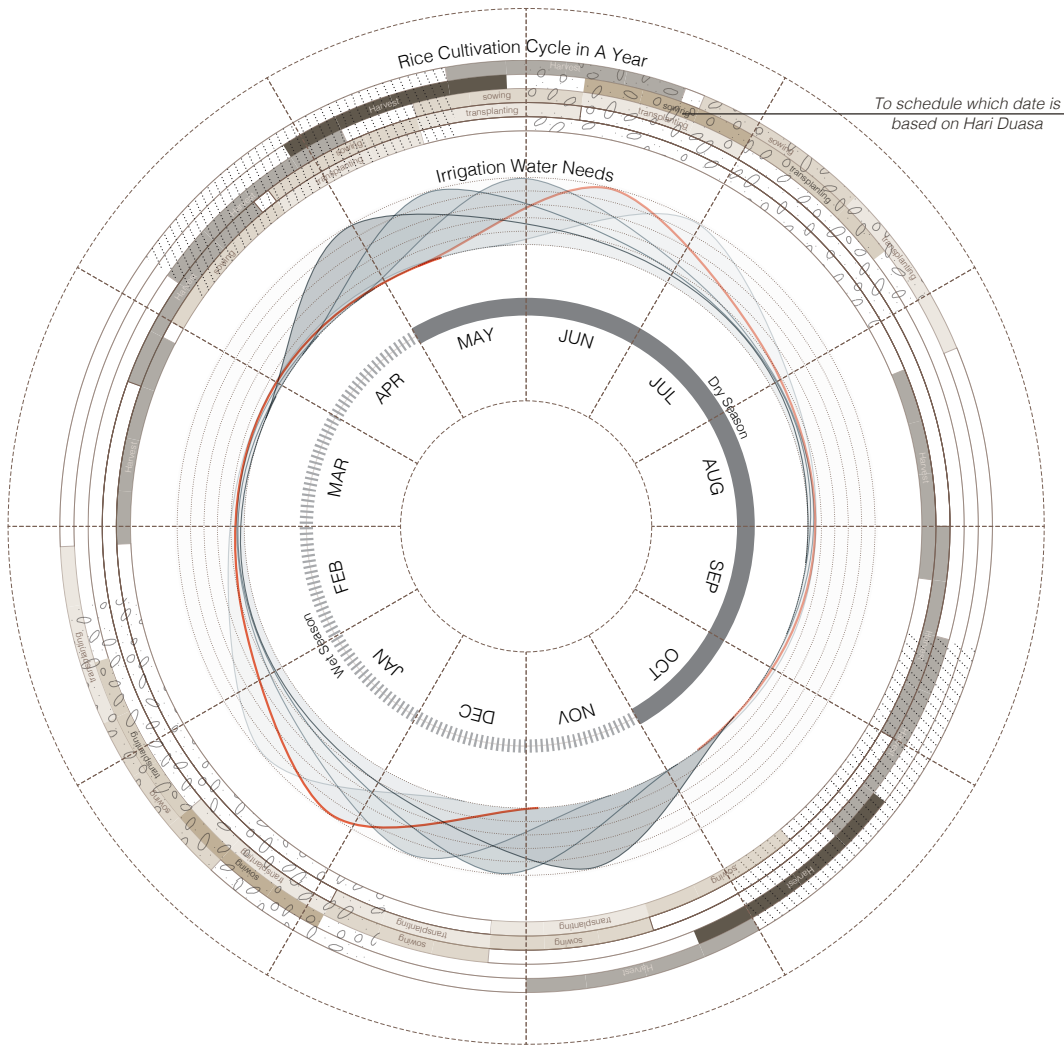
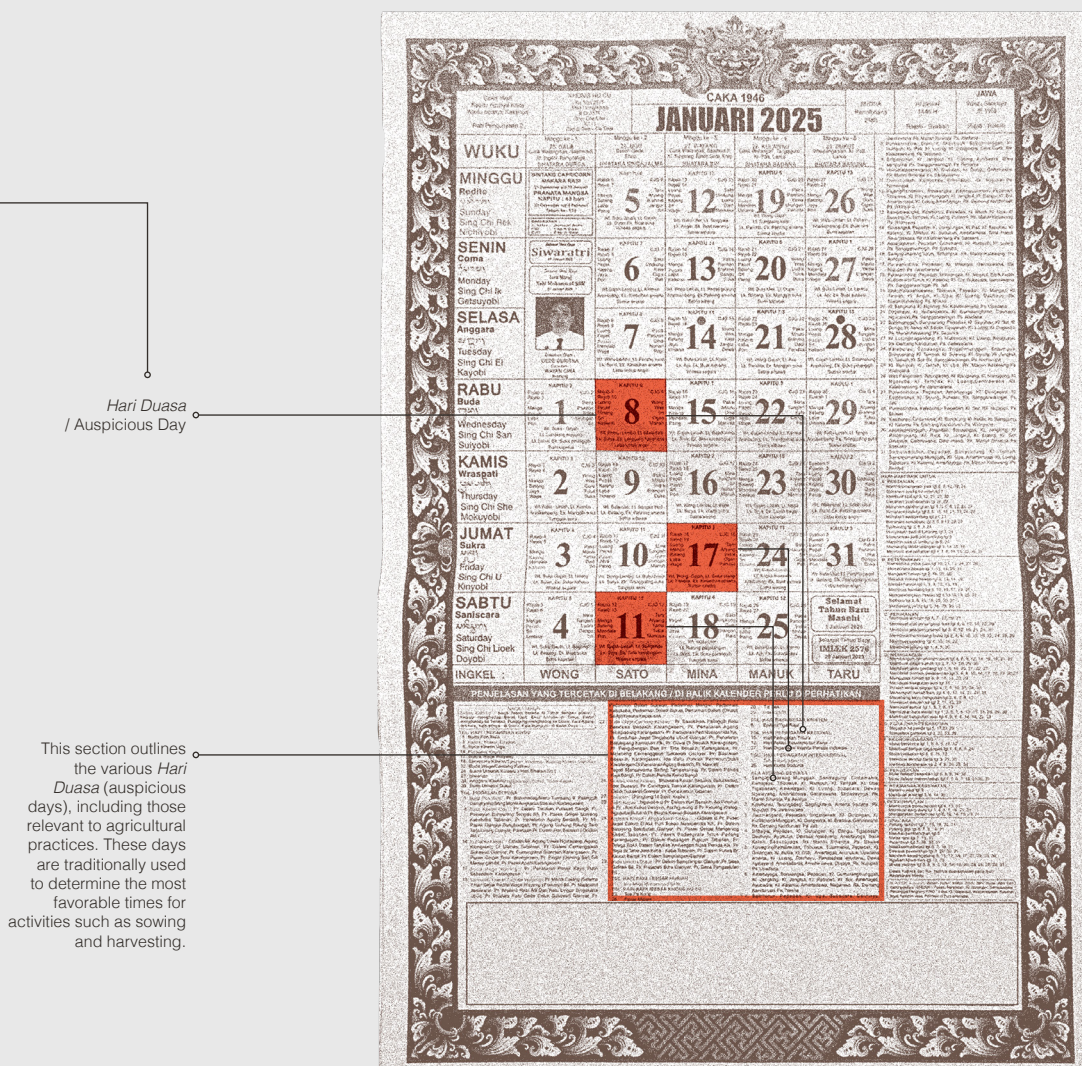


Fig 4.14 Integration of rice cultivation scheduling in the Subak community with traditional beliefs and the Balinese religious calendar.

The detail scheduling of agricultural activities in Subak is not solely determined by technical or climatic factors but also deeply connected to the spiritual and cultural rhythms of Balinese life. Subak communities refer and consult to these calendars to determined and identify the best dat or Hari Duasa (auspicious days) that are deemed spiritually appropriate for key aggriculture activities, for sowing to harvesting (see fig 4.14). The intention is to ensure synchronizing rice plannting and also religious activities that related to the process. Also, it is preserving the community cooperation.



# Multi-Scalar Governance in Subak

Water management in the Subak system extends beyond the level of individual farmers or single Subak units; it also necessitates coordination among multiple Subak that share a common river basin or water source (Pitana, 2005). A major river often supplies irrigation water to several Subak, with distribution managed through a network of diversion weirs that allocate flow to each Subak territory. To enhance coordination and improve irrigation management efficiency, the Indonesian government established an additional institutional tier in 1981: Subak Gede, a federation comprising multiple Subak that share common irrigation infrastructure (Lorenzen, 2005). Although officially recognized in the 1980s, the concept of Subak Gede, literally translated as “large Subak”, originates from the Dutch colonial period (Sutawan, 2000), reflecting a long-standing acknowledgment of the need for supra-local water governance mechanisms.

As formal government involvement in irrigation governance expanded, and as different sectors brought varying interests, an intermediary institution was introduced to mediate between Subak communities and state authorities: the Sedahan Agung (see fig 4.15). Positioned at the district or regional level, the Sedahan Agung is a government-appointed official tasked with linking Subak communities to policymakers. This role is intended to ensure that traditional water management practices remain integrated within broader administrative and regulatory frameworks, while also facilitating communication and negotiation between local customary institutions and formal state actors.

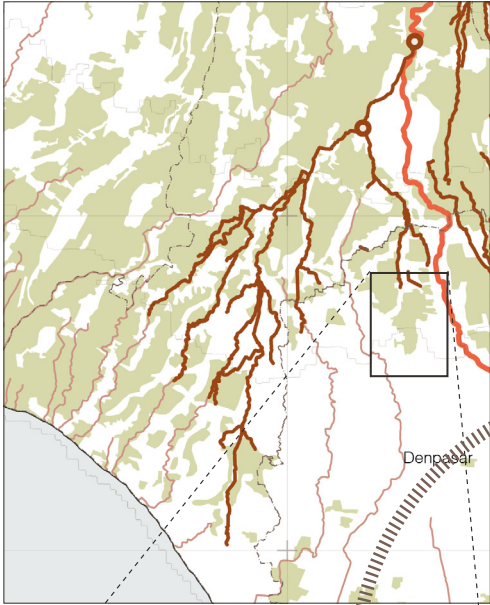
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Fig 4.15 The governance structure of the Subak system, illustrating its foundations in indigenous practices and its linkage to formal institutional frameworks.

Indigenous Community

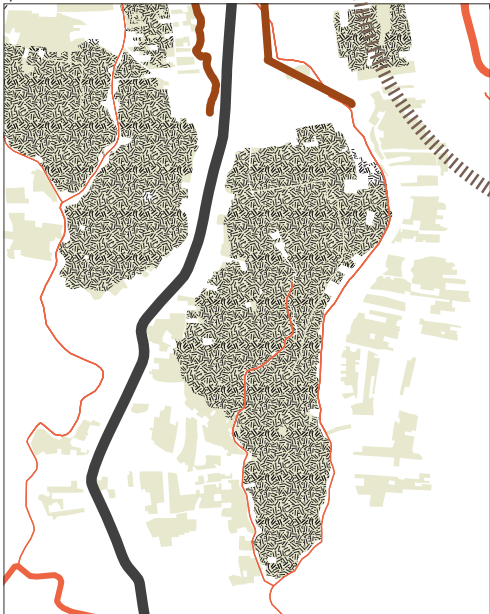
Formal Government

*Subak Gede*



Led by a Pekaseh Gede

*A Subak*



Led by a Pekaseh

*Sedahan Agung*

National

Provincial

Regional

Local

# v. Recognition of Subak

The formal recognition of Subak marks a significant turning point in acknowledging indigenous systems as essential elements of sustainable land and water governance. Subak’s unique integration of ecology, religion, and social cooperation has been increasingly acknowledged through legal, institutional, and global frameworks, which aim to safeguard its cultural and ecological integrity in the face of modernization.

## Local Recognition

The earliest formal recognition of Subak at the governmental level came with the issuance of Regional Regulation No. 02/PD/DPRD/1972 by the Bali Provincial Government. This regulation defines Subak as:

*“A customary legal community in Bali with a socio-agrarian and religious character, historically established since ancient times and continuously evolving as a land-governing organization responsible for water management and other functions related to rice cultivation within a specific watershed area”*

This regulation legally acknowledges Subak’s autonomy as a customary law community (Windia, n.d.) and supports its integration into regional irrigation planning. At the same time, it formalizes the province’s authority over water resources to ensure that both customary rights and broader public needs are addressed.

## National Recognition

At the national level, Subak was further recognized through Law No. 11/1974 concerning Irrigation Water system and Government Regulation No. 22/1982 regarding water resource management, which outlines irrigation management and the role of farmer organizations. These laws affirm the legitimacy of traditional irrigation systems such as Subak within the national water governance framework. However, while these regulations acknowledge Subak’s organizational structure, they often frame it within a top-down administrative logic that may not fully align with the decentralized, ritual-based coordination central to Subak’s operation.

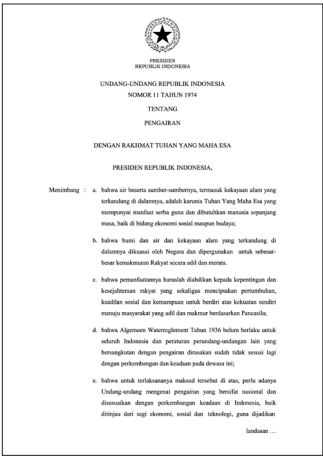
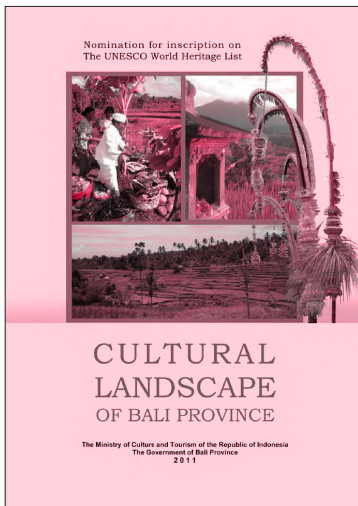


Fig 4.19 Recognition of Subak in Local level.

Fig 4.20 National-level recognition of the Subak system as an integrated agricultural and water irrigation management system.



## International Recognition

In 2012, Subak received global recognition when UNESCO inscribed the Cultural Landscape of Bali Province: The Subak System as a Manifestation of the Tri Hita Karana Philosophy as a World Heritage Site. This designation recognizes the Subak landscape as an outstanding example of a living cultural system shaped by spiritual, ecological, and communal values. UNESCO's listing highlights the significance of Subak not only as a technical solution to irrigation but as a philosophical and ritual-based approach to human-environment relations.

This international recognition emerged in response to growing threats to Subak systems from rapid urban development, tourism, and agricultural intensification. While it has brought global visibility and conservation efforts, it also raises new tensions between traditional land-use practices and the demands of heritage tourism and economic development.

*“The Subak landscape includes forests that protect the water supply, terraced rice fields, temples and villages... At the heart of the Subak system is the temple network, especially the water temples where rituals ensure harmony between humans and nature.”*

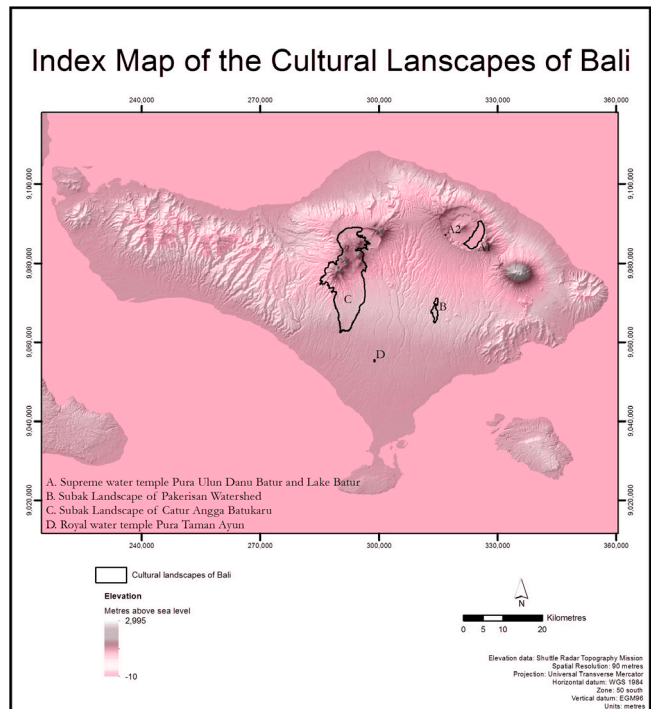


Fig 4.21 Official document recognizing the Subak system as a UNESCO World Heritage site (2012).

Fig 4.22 Index map of the designated Cultural Landscapes in Bali, associated with the Subak World Heritage inscription.

## vi. Sustaining the Values of Subak

The enduring strength of Subak lies in the indigenous knowledge systems that underpin it. This knowledge can be analyzed through three layers of inquiry: ontological foundations, interdependent spheres, and core values (see fig 4.16 and 4.17).

### Ontological Layer – Tri Hita Karana

At its deepest level, Subak is grounded in the Balinese ontological worldview of Tri Hita Karana, the “three causes of well-being”, which emphasizes the harmonious relationship between humans (pawongan), nature (palemahan), and the divine (parahyangan). This worldview is not a conceptual abstraction but a lived reality that structures how Balinese communities engage with their land, water, and spiritual life. It positions agriculture not merely as economic production but as a sacred duty to maintain cosmic balance.

### Interdependent Spheres – Prosperity, Ecology, and Culture

The ontological principles of Tri Hita Karana are expressed through three interdependent spheres that Subak communities actively sustain:

- Prosperity: Subak enables communal access to fertile land and water, ensuring food security and shared economic benefit through rice cultivation.
- Ecology: The management of irrigation and land is ecologically embedded, maintaining soil fertility, biodiversity, and sustainable use of water resources.
- Culture: Rituals, customary laws, and temple networks shape the cultural landscape of Subak. Practices such as communal offerings and water temple ceremonies reinforce shared identity and collective memory.

These spheres are not separate domains, but relationally maintained through rituals, labor exchange, seasonal calendars, and land-use decisions. Each supports and reinforces the others, sustaining Subak as a socio-ecological institution.

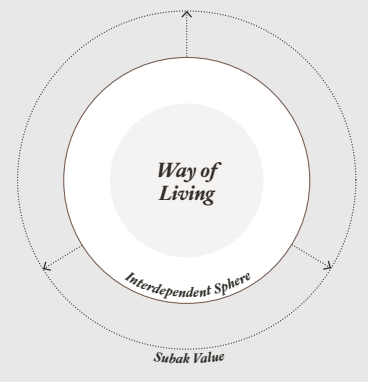


Fig 4.16 Three-layered analytical lens as an inquiry framework for understanding the Subak system across timelines (based on Conceptual and Analytical Framework on Chapter III).

# Value Layer

From this foundation emerge key values that guide the governance and daily practices within the Subak system. These include mutual cooperation in managing common resources; ritual ecology, where ecological actions are embedded within sacred responsibilities; *desa kala patra*, or context-sensitive governance that adapts decisions to specific temporal and spatial conditions; and traditional ecological knowledge, particularly in water management and natural pest control. Subak communities also practice ecological stewardship, taking resources from nature with a sense of responsibility and balance. Collectively, these values provide a moral and cultural framework for everyday decision-making, ensuring that Subak functions not only as a technical irrigation system but also as a socially just and culturally embedded institution.

Viewed through this layered perspective, Subak emerges not merely as a legacy of the past but as a living, adaptive system of indigenous governance, capable of responding to contemporary ecological, political, and spiritual challenges while maintaining its foundational principles.

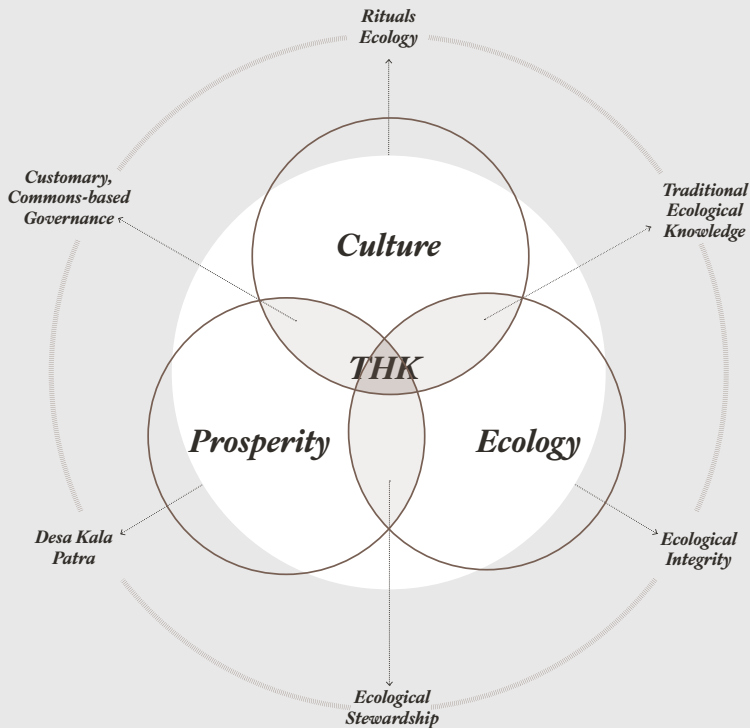


Fig 4.17 A synthesis of insights gained from reading indigenous practices through a three-layered analytical lens.

*“Subak was a subject, a living system that balance the  
harmony of culture, ecology, & prosperity”*



Fig 4.18 Illustration of a Subak system that reflects a balanced relationship among ritual/cultural practices, community prosperity, and ecological sustainability.

# V

## Subak as Contested Territory

- i. Contemporary Expression of Subak
- ii. The Disruption of Subak's Rhythms
- iii. The Struggle of Subak Practice
- iv. Landscape in Transition
- v. Displaced Prosperities and Power Struggle
- vi. The Paradox of Preservation and Development
- vii. Degraded Value



Fig 5.1 The impact of fragmented urban development on the traditional Subak landscape in southern Bali. Source: Balitecture Realty (2023).

# i. Contemporary Expression of Subak

## Subak Mental Mapping

*Workshop at World Water Forum 10, SE37 program  
“Water for Shared Prosperity.” Capacity Building for Subak Longevity*



To this day, Subak continues to thrive despite growing pressures from globalization and rapid landscape transformation. Its cultural and ecological logic, along with the social practices that sustain it, remains alive, continually remembered, practiced, and reinterpreted by diverse stakeholders engaged in the management of the landscape. This ongoing relevance was evident during a workshop held as part of the 10th World Water Forum in Bali in 2024, under the theme “Water for Shared Prosperity: Capacity Building for Subak Longevity.” The workshop aimed to explore how local actors perceive and understand the Subak landscape today, particularly through the lens of lived experience and embodied knowledge.

Participants were invited to respond to the question: “What elements and spaces do you associate with the Subak landscape, especially in relation to its water systems?” The activity combined mental and physical mapping of both tangible and intangible features within Subak’s hydrosocial territory. Using aerial imagery and hand-drawn sketches, participants annotated key elements of the system, including weirs, canals, rice fields, water temples, and the flow paths of irrigation networks. Particular emphasis was placed on visualizing

Fig 5.2 Mental mapping workshop identifying elements and spaces related to the Subak system by the local community, conducted during the 10th World Water Forum side event. Source: Dewa Kresnantara (2024)

how these elements connect Subak units across broader territorial scales, linking upstream water sources, forested catchments, rivers, and downstream communities along elevation gradients. From this exercise, several themes consistently emerged:

- The irrigation system as an interconnected web: Participants described the Subak irrigation network as a multi-layered structure, consisting of primary, secondary, and tertiary channels, that connects all parts of the Subak.
- Temples as sacred and spatial anchors: Water temples were consistently identified as critical landmarks within the landscape. Participants emphasized their dual role, as spiritual sites for rituals that maintain harmony with the water deities, and as organizing centers around which the Subak's physical infrastructure and social practices are arranged.

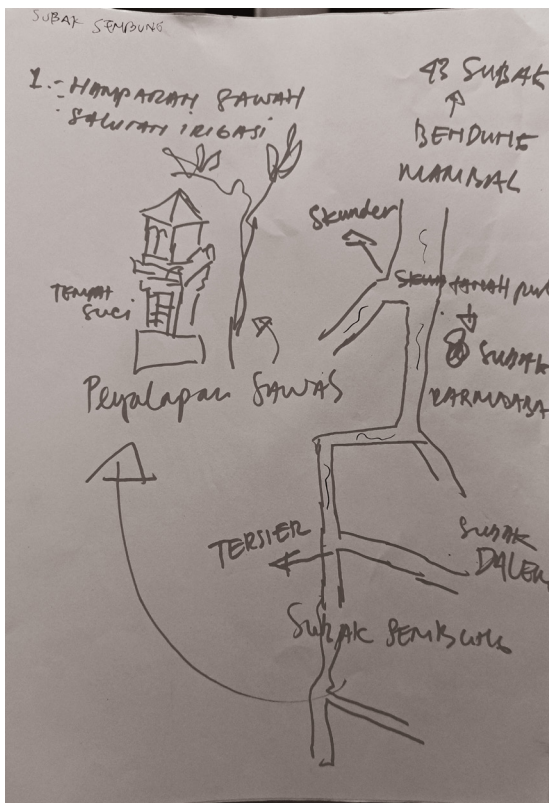


Fig 5.3 Illustrations created by Subak members representing the existing physical components of the Subak irrigation and agricultural system. Source: Carlien Donkor (2024)

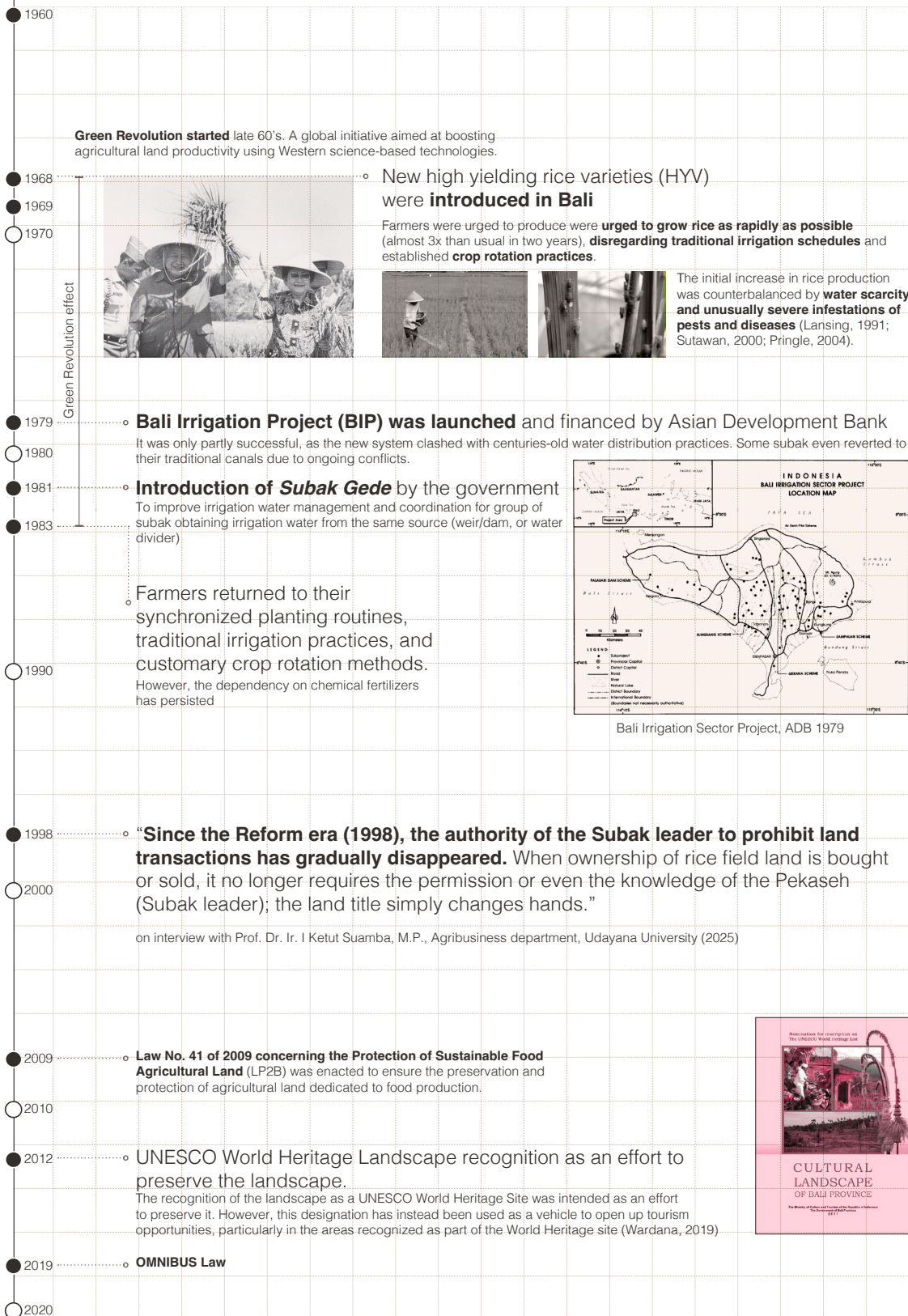
## ii. The Disruption of Subak's Rhythms

The disruption of the landscape balance traditionally maintained by Subak communities has been significantly influenced by interventions from the central government. Historically (see fig 5.4 for more detail), during the onset of the Green Revolution, which was promoted globally in the late 1960s, the Indonesian government actively encouraged Subak communities to increase agricultural output as part of a national development agenda. This policy emphasis prioritized productivity and modernization, often at the expense of local agro-ecological knowledge and religiously rooted land and water management practices. Although many farmers have since returned to traditional cultivation methods, the dependency on chemical fertilizers, introduced and heavily promoted during the Green Revolution, has persisted for over a decade. This shift has contributed to the erosion of synchronized cropping practices, which previously played a crucial role in minimizing the risk of pest outbreaks through coordinated planting and harvesting cycles.

Another significant intervention was the Bali Irrigation Project, initiated with the goal of modernizing irrigation infrastructure across the island. However, the project ultimately fell short of its intended objectives, as it failed to align with the needs and governance structures of Subak communities (Lorenzen, 2005). Over time, the role of Pekaseh, traditionally responsible for decision-making within the Subak, has diminished, contributing to a weakening of community-based governance. Land ownership changes no longer require community approval, accelerating the rate of land conversion. As a result, local participation in land and water governance has steadily declined, exacerbating the fragmentation of Subak territories and threatening the long-term sustainability of Bali's cultural landscapes.

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Fig 5.4 Historical analysis how the injustice evolve in Subak territories.



### iii. The Struggle of Subak Practice



In contemporary Bali, Subak continues to be practiced by farming communities who up-hold the indigenous knowledge systems passed down through generations. However, the sustainability of this practice faces increasing challenges due to intensifying competition over land and water resources. This transformation not only degrades the landscape and ecological systems that support Subak, but also contributes to a generational shift in values and aspirations. For many young Balinese, employment opportunities in the tourism sector are perceived as more economically rewarding and socially prestigious than farming. As a result, the practice of Subak becomes less appealing, and its intergenerational transmission is increasingly at risk, leading to what can be understood as a process of cultural erosion.

To better understand these dynamics, I conducted a series of in-depth interviews with a range of stakeholders involved in Subak practice. These included pekaseh (leaders of Subak), farmers and former farmers in Sembung and Uma Desa Canggu, and an eco-tourism manager engaged in promoting sustainable tourism in Subak Sembung. Also, I used the results from last year workshop from 10th World Water Forum in Subak Sembung as input from different stakeholders in Subak longevity. Their testimonies reveal the complex realities of maintaining Subak under changing socio-economic conditions. The following pages present these voices from the field, offering a grounded perspective on the current struggles and adaptations within Subak communities.

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Fig 5.5 Development encroaching behind a farmer focusing on his landscape.



*Pekaseh Subak Uma Desa Cangu*



*Pekaseh Subak Sembung*



*Subak Eco-Tourism Manager*



*Former Farmer*



*10th World Water Forum Workshop on Subak Longevity*

Fig 5.6 Subak members interviewed and engaged in a workshop conducted in May.

# The Voice in The Field

Interviews with the Stewards of the Cultural Landscape



Pekaseh Subak Uma Desa,  
Canggu, Badung

"The land area (Subak Uma Desa Canggu) used to be around 100 hectares. When I started serving as pekaseh (in 2019), it was about 74 hectares. Now, only 69.2 hectares remain."

"Our Subak members are around 140 people. All of them are over 50 years old, none are under 50. The younger ones, those under 50, usually don't want to work in the rice fields. Nowadays, it's the era where people are drawn to tourism in our area."

"Nowadays, everyone uses modern tools. I feel like farmers now want everything to be instant. It's not like it used to be."

"In the past, farmers were always in the rice fields, but now they're not. Maybe just a bit in the morning, a bit in the evening, that's it. No one works during the day. Usually, they have other jobs. That's why the rice fields are only used as a side job.... Some work in construction, some in other jobs."

"Someone came and asked me to move the irrigation channel (it is located to the land that a foreign party wants to buy and manage)."



Pekaseh Subak Sembung,  
Denpasar

"The funding from the Department of Culture is very different now... from originally 50 million, in 2020 it dropped to 10 million, and after taxes, only 8 million remained. That amount is used for the piodalan (ceremonial rituals) here (Subak Sembung)."

"In the past, there used to be groups of people harvesting, mostly women. Now, with so many household responsibilities, it's probably a burden. That's why it's hard to find labor for land cultivation here. There's a dependence on labor from outside the area, especially from Java. Nowadays, it's rare to see Balinese workers, it's mostly Javanese."

"Here, the President is now pushing for three planting cycles a year, but the water just isn't enough. And that's not even considering the shared use of tractors... That's really all the water we can get from the source."

"Upstream, more and more factories are appearing and they need water. The tofu industry take it (water) from the irrigation channel supply to wash their soybeans."



Head of Subak Sembung Eco-Tourism Management, Denpasar

Because the jogging track gets a lot of visitors and the parking lot is full, many vendors from outside want to sell here. But our rule is: if they don't own or work on rice fields here, they can't sell. Otherwise, this place would already be overrun.

"Tenant farmers usually just think about money, money. But for those of us who actually own the land, like my father back then, there was a rotation: intercropping secondary crops with rice to keep the soil fertile. Now they don't think like that anymore. People come here just to work, often from far away like Buleleng. People from Denpasar don't want to do it (working on field)".

"Nowadays, the pekaseh just follow the government's directions. The ones who hold authority now are the PPL, agricultural field advisors. They say, "Here's this type of seed," or "Here's this fertilizer," and people just follow. They no longer consider duasa"



Former Farmer in Subak Sembung, Denpasar

"I'm a farmer's child. Since I was little, I was taught to work in the rice fields, to plow, and to catch eels for daily living."

"There's no one left who wants to continue (farming); everyone (his successor) wants to go into tourism."

"Now a lot of (his) rice fields have become rentals, and I rent out my land to people from Flores. They're the ones managing it, and it's rented out for 5 years."

"There used to be so many eels, now there's not a single one left. It's because of that pesticide oil."

## *Memories, Wishes, and Fears*

*Workshop at World Water Forum 10, SE37 program*

*“Water for Shared Prosperity.” Capacity Building for Subak Longevity*



During a workshop held as part of the 10th World Water Forum on the longevity of Subak, participants engaged in a participatory mapping exercise aimed not only at documenting the physical aspects of Subak but also at exploring collective memory, aspirations, and concerns. The activity invited participants to reflect on their lived experiences, recalling what Subak meant to them in the past, what they hoped for its future, and what they feared may be lost. Several participants shared memories of when Subak water was clean enough to drink and when eels were abundant and could be sold as a local food source. These recollections contrasted sharply with present concerns, particularly the decline in youth interest in farming and the perception of agriculture as a low-status, low-income occupation.

Participants expressed deep anxiety about the future of their ancestral lands, fearing that younger generations would no longer be willing to inherit and manage them. This generational disconnect poses a significant threat to the continuity of Subak practices. Despite these concerns, many participants also voiced a strong desire for Subak to persist, hoping that its values, ecological wisdom, and communal spirit would continue to be sustained in the future.

Fig 5.7 Subak workshop at World Water Forum 10, SE37 program “Water for Shared Prosperity.” Capacity Building for Subak Longevity.

## Memories

*"Subak on a system of mutual cooperation. But now experiencing a decline."*

## Memories & Fears

Dulu kita mandi  
subak airnya dipan  
di rumah dan banyak  
ikan yang hidup dan  
mudah cari makanan  
dan air kalau di kali  
itu kita bisa mandi  
kalau sekarang subak  
nya banyak di kali  
sambungnya; mudah  
mudahan kedepan  
yang muda mau  
turu jadi petani

- Dulu Dulu Sistem  
Botong Royong masih  
Berkas.
- Sekarang Sistem Botong  
Royong sangat berkurang
- Dulu jaman di:
- Kalau sawah hasil  
berkurang.
- Air sudah tercemar.
- Subak di pertahankan

Dulu masih bisa minum  
dari air langsung  
di subak

Apakah sekarang atau  
masa depan, Petani  
masih ada dan generasi  
muda karena lebih cede  
perhasilan dari orang lain

## Memories

*"The subak's water used to be drinkable, but not anymore."*

Pelajar  
Harapan kami ke depan.  
dan kami bisa di pertahankan  
dan harapan kami yg ke I  
Masyarakat Masyarakat Petani  
modern di Subak petani

## Fears

*"Is there a future for farmers? Is there any young generation will continue to be farmers? Farmer income today is lower than a Janitor"*

Fig 5.8 Shared memories, fears, and wishes from the Subak community. Source: Port City Future WWF 10 team, 2024.

Insights from field interviews and the workshop reveal that tourism-driven development has significantly disrupted the value systems embedded within the Subak landscape. Where Subak once reflected an integrated balance of culture, ecology, and spiritual reciprocity, it is now increasingly fragmented. The pursuit of profit and economic prosperity, especially by actors outside of the traditional Subak community, has led to the commodification of both the natural environment and cultural practices. Ecological aspects are deprioritized, and human–nature relationships have shifted from reciprocal stewardship to transactional exploitation.

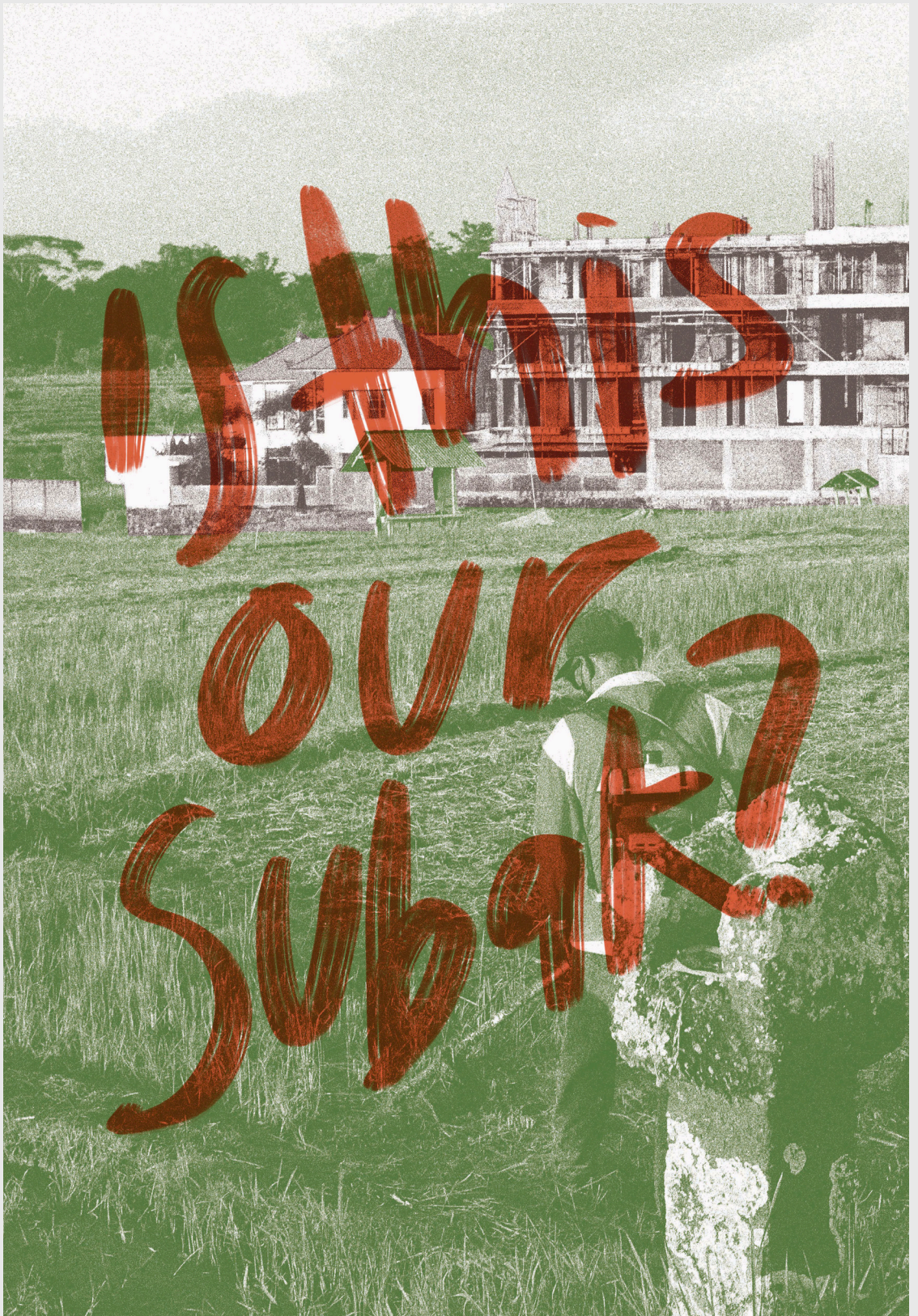
This shift is particularly visible in areas such as Subak Uma Desa Canggu, where tourism developers compete to acquire land adjacent to Subak areas for the visual appeal of rice terraces. As noted by Pak Suwarya, pekaseh of Subak Uma Desa Canggu, developers are not interested in Subak as a socio-ecological system but rather as a scenic backdrop to enhance commercial ventures. A similar dynamic is occurring in Subak Sembung, where, according to Pak Wayan Winartha, developers are targeting land that offers a view of nature, specifically Subak fields, for residential or tourism infrastructure. The landscape is increasingly viewed not as a living system of cultural and ecological interdependence, but as a commodity to be marketed.

Economic pressures also contribute to the abandonment of farming. Several interviewees reported that continuing agricultural work is no longer seen as viable or desirable, especially among the younger generation. The lack of financial returns from farming, combined with the availability of more lucrative tourism-related jobs, leads many families to sell their land. Those who remain often participate in Subak rituals as obligatory family traditions, rather than meaningful spiritual acts. As a result, a disconnect has emerged between ritual practice and its cosmological significance, eroding the intergenerational transmission of Subak values.

Environmental degradation further threatens the Subak system. Interviewees noted increasing water pollution, unpleasant odors, and declining water flow each year. These conditions weaken Subak's ecological base and reduce its functionality as an irrigation network. Additionally, Subak communities are increasingly dependent on government assistance, which comes through multiple bureaucratic channels, cultural, agricultural, irrigation, and spatial planning, creating procedural complexity and delays in resource management.

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Fig 5.9 Poster challenging perceptions of the contemporary state of the Subak heritage landscape.



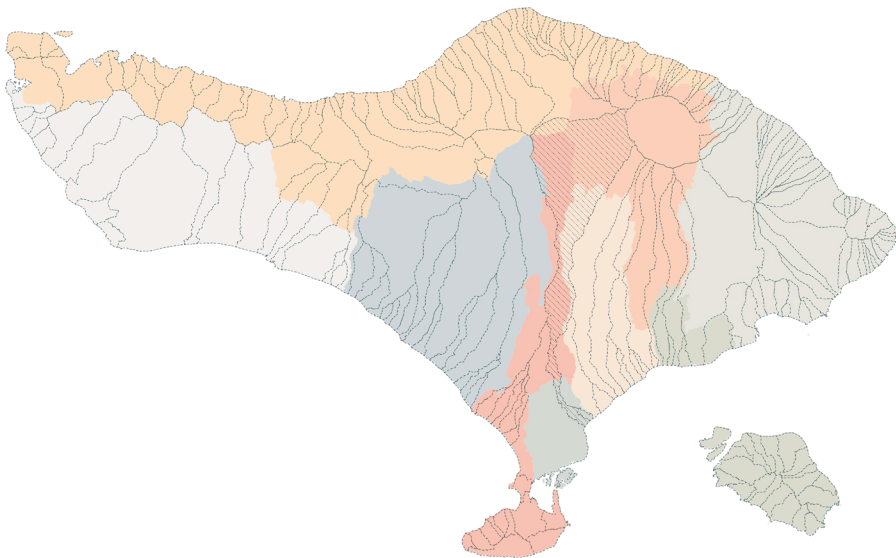
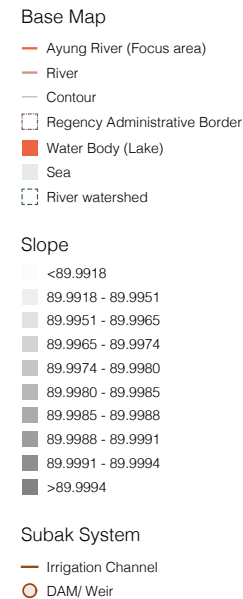
# Focus Analysis

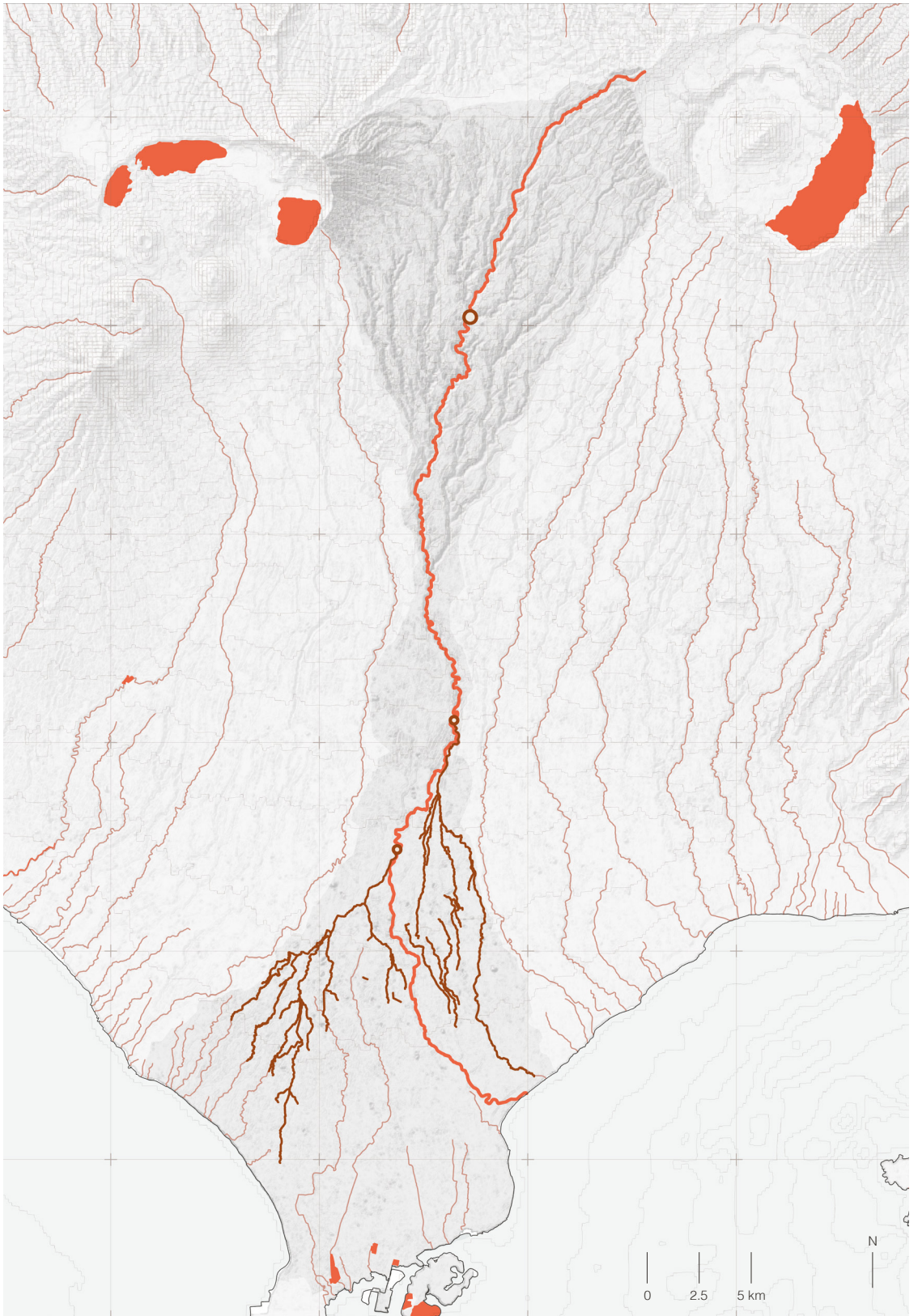
In the following discussion, I will analyze the transformation of the Subak landscape through the lens of three interdependent spheres: (1) ecological change, (2) power dynamics related to shifting notions of prosperity, and (3) the paradoxical tension between preserving culture–nature relationships and meeting the demands of tourism development. This analysis will be conducted spatially, tracing the Subak system from its upstream sources to downstream irrigated areas, and will be supported by stakeholder interviews and policy document analysis to contextualize socio-political dynamics within the physical landscape.

According to the *Profil Irigasi dan Rawa Balai Wilayah Sungai Bali–Penida Tahun 2023*, published by the Directorate General of Water Resources, Ministry of Public Works and Public Housing (PUPR), Bali comprises 391 river watersheds (see fig 5.10). Of these, nine are managed under the authority of the national government, while 14 irrigation areas fall under provincial jurisdiction (Kementerian PUPR, 2023). This thesis focuses specifically on the Ayung River watershed, as it supplies the primary irrigation source for both Subak Sembung and Subak Uma Desa Cangu (see fig 5.11). By centering this watershed, the analysis seeks to unpack the complex intersections of environmental degradation, socio-economic transformation, and cultural resilience within Subak’s hydrosocial territory.

Fig 5.10 Map of Bali showing regional divisions and 391 watershed boundaries.

Fig 5.11 Focused area highlighting the Ayung River watershed.





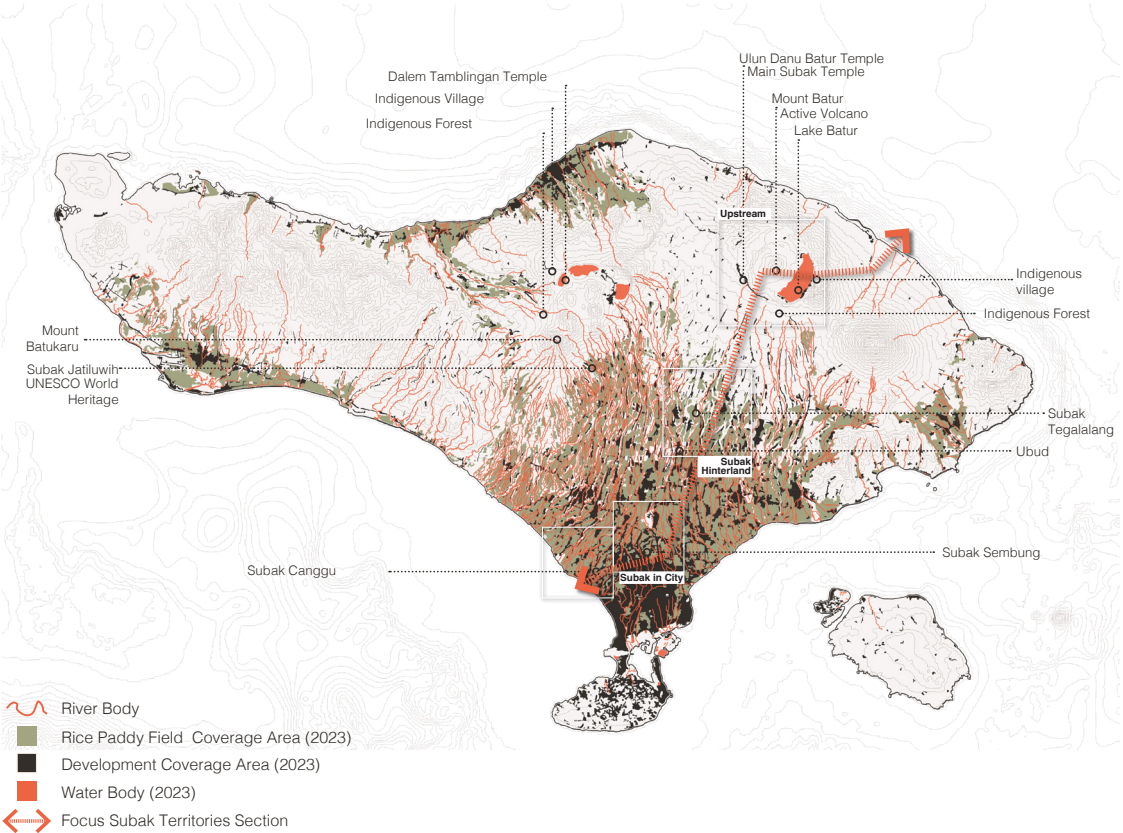
# iv. Landscape in Transition

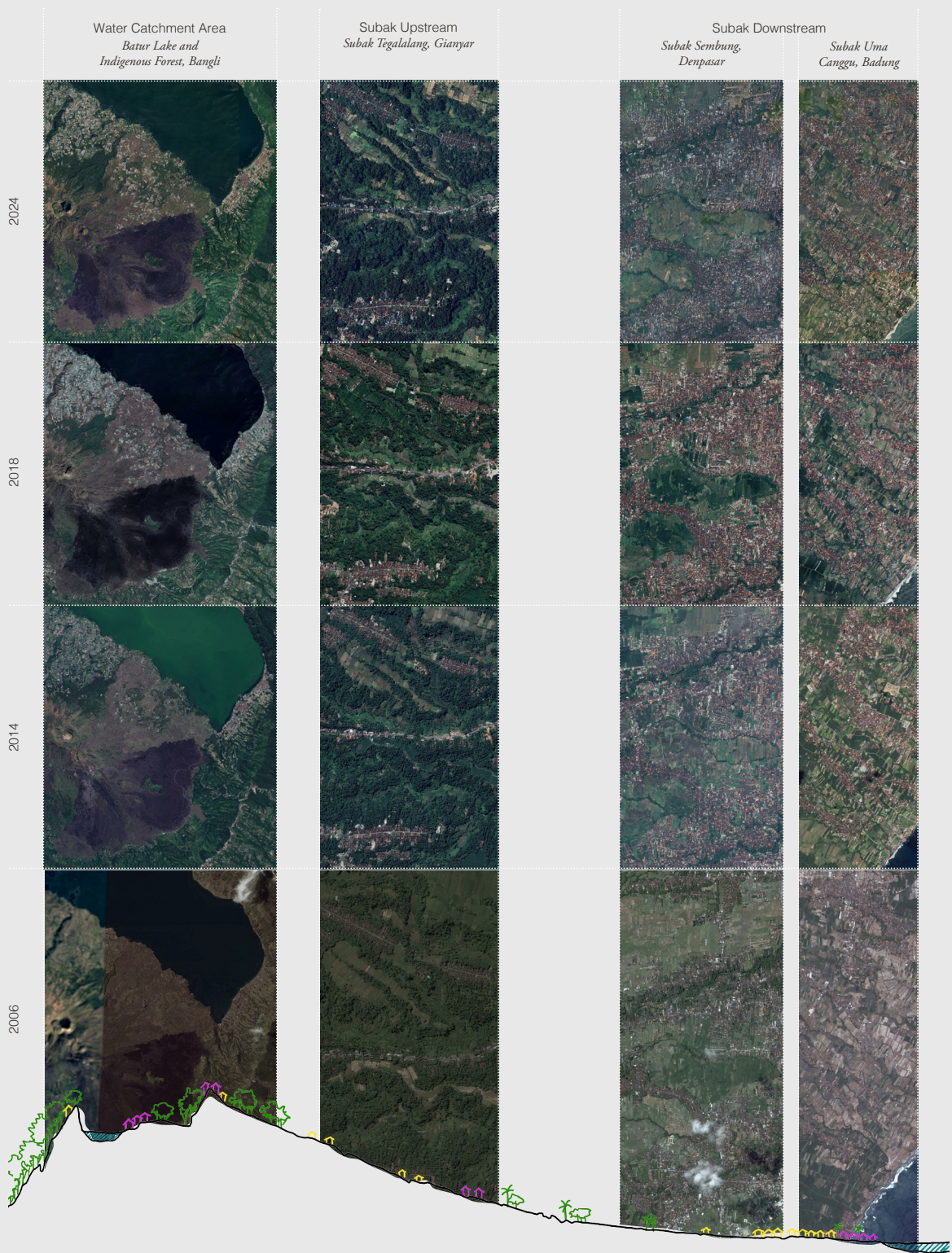
Over the past two decades, tourism-driven development has exerted increasing pressure on the Subak landscape, resulting in significant territorial transformations. From protected forest areas in the upstream regions to the downstream coastal zones, land use has shifted in response to tourism expansion (see Figure X.X). These shifts have occurred incrementally, yet cumulatively, altering both the ecological and socio-spatial fabric of Subak territories. The spatial changes associated with tourism, such as the construction of villas, resorts, and tourist facilities, have directly impacted the availability and quality of both land and water resources.

In the following chapter, this thesis will discuss more deeply spatial analysis of land cover change, tourism development intensity, and water sustainability. It also evaluates the current capacity of the landscape to retain and infiltrate water.

Fig 5.12 Fieldwork plan outlining activities conducted during the site visit prior to P2.

Fig 5.13 Spatio-temporal dynamics occurring within the Subak landscape in 2004 until 2024, from the upstream water source to the downstream areas.





# Land Cover Change

Land cover change over the past two decades has significantly altered the territorial and ecological integrity of Subak systems. Using spatial data provided by the Indonesian Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan, hereafter KLHK), this study mapped changes in land use across Subak territories between 2013 and 2023 (details see appendix table 1). The data reveal a reduction of approximately 12,600 hectares of forest cover and a decline of 15,900 hectares of rice paddy fields over the ten-year period. In contrast, built-up areas expanded by approximately 20,400 hectares, and new land use for mining activities accounted for an additional 1,600 hectares by 2023 (KLHK, 2023).

These transformations reflect the intensifying pressures of land commodification, particularly linked to tourism-driven development. As tourism infrastructure expands into previously agrarian or forested areas, land prices have surged, especially near culturally significant or scenic landscapes. This increase in land value also affects surrounding Subak communities, as land taxation rises in parallel. Interviews with local stakeholders indicate that Subak is increasingly viewed and utilized as an aesthetic asset, often marketed for its visual appeal rather than its ecological or cultural function. In this context, Subak is reduced to a form of visual capita, a commodity that supports tourism businesses at the cost of its original socio-ecological purpose.

### Base Map

- Ayung River (Focus area)
- River
- Contour
- Regency Administrative Border
- Water Body (Lake)
- Sea
- River watershed

### Subak System

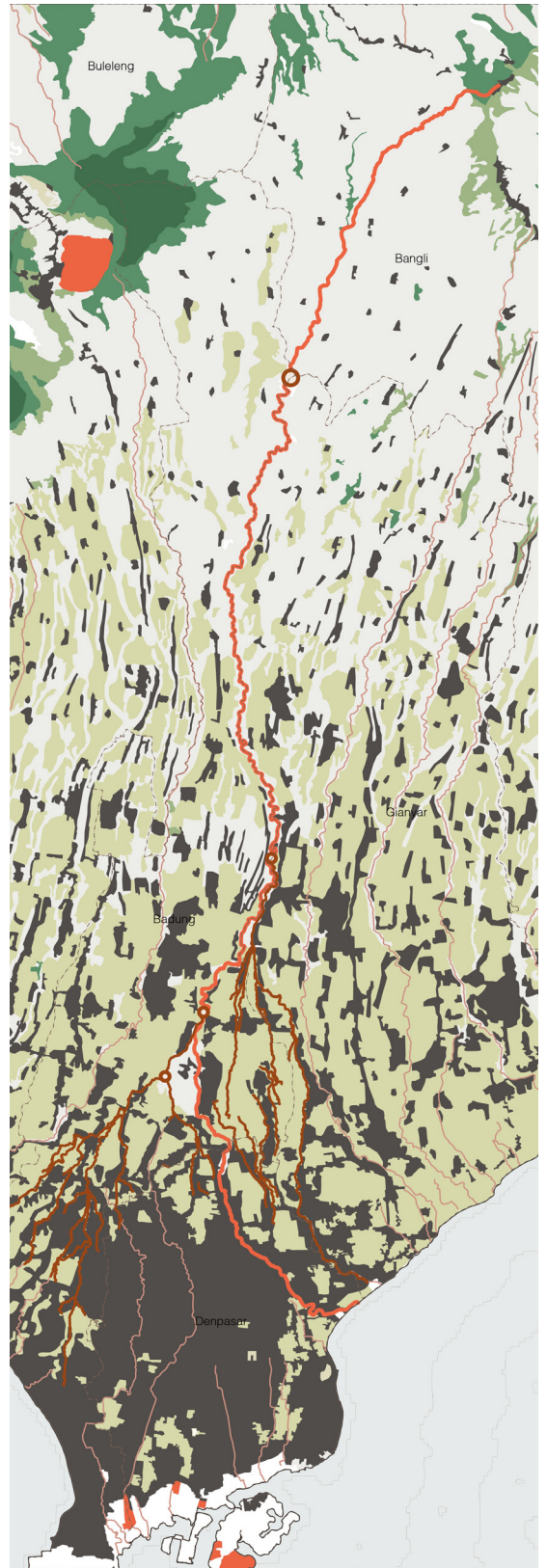
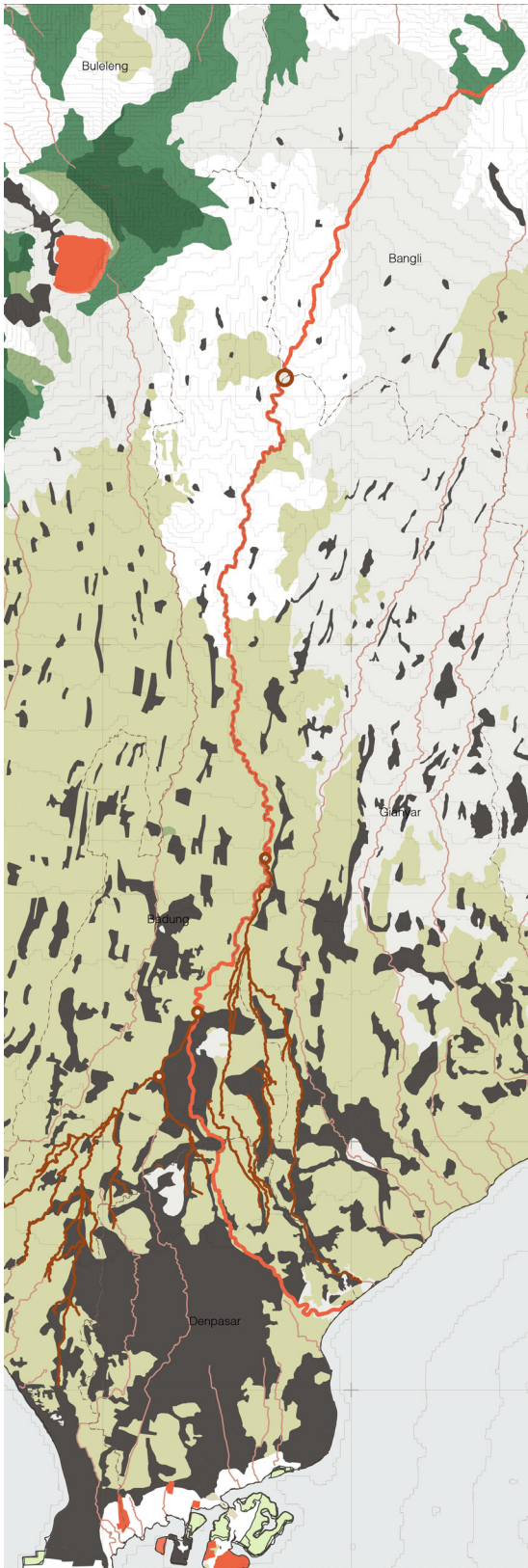
- Irrigation Channel
- DAM/ Weir

### Land Cover

- Dry Agriculture
- Wet Agriculture/ Rice Paddy Field
- Forest Plantation
- Secondary Dryland Forest / Logged-Over Forest
- Primary Dryland Forest
- Savana
- Development
- Water Body

Fig 5.14 Map illustrating land cover changes in the Ayung River watershed area from 2013 (left) to 2023 (right).





# Tourism Intensity

Insights from stakeholder interviews reveal several notable landscape transformations resulting from tourism-driven development. These transformations can be categorized into four primary tourism-related land uses:

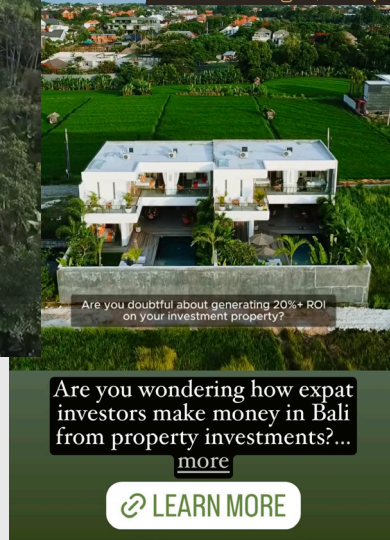
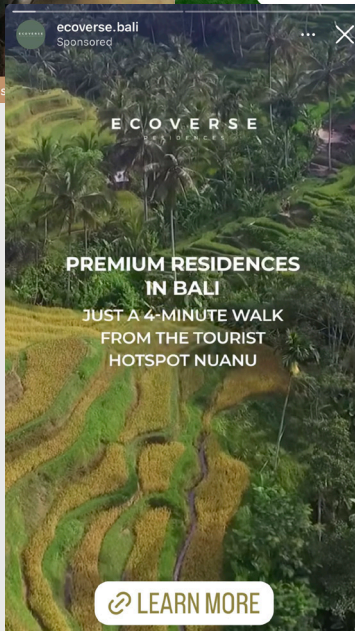
- Tourist attractions, including nature-based, cultural, and heritage sites;
- Tourism support facilities, such as cafés and restaurants;
- Tourist accommodations, including hotels, villas, and hostels; and
- Mass tourism infrastructure, including travel agencies, service industries, laundries, and worker housing.

This study focuses specifically on the first three categories, tourist attractions, tourism support services, and accommodations, as these are the most prevalent forms of development associated with the commercialization of the Subak landscape. These developments often leverage the visual and experiential appeal of Subak, marketing it as a backdrop for wellness, eco-tourism, and “living close to nature” experiences (Cole, 2012; Picard, 1996).

Such tourism intensification not only alters the physical structure of the landscape but also commodifies it, reshaping Subak from a working socio-ecological system into a consumable visual asset. These changes are often facilitated by developers and investors who promote the aesthetic and symbolic value of Subak, while contributing to land use conversion and ecological pressure in the area.

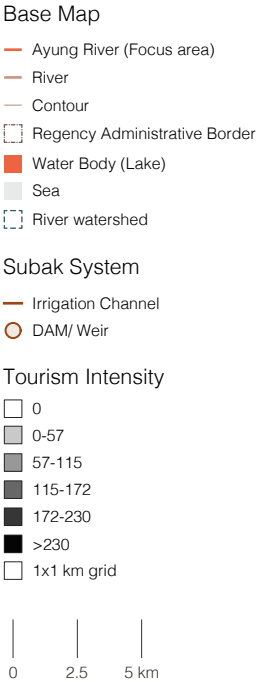
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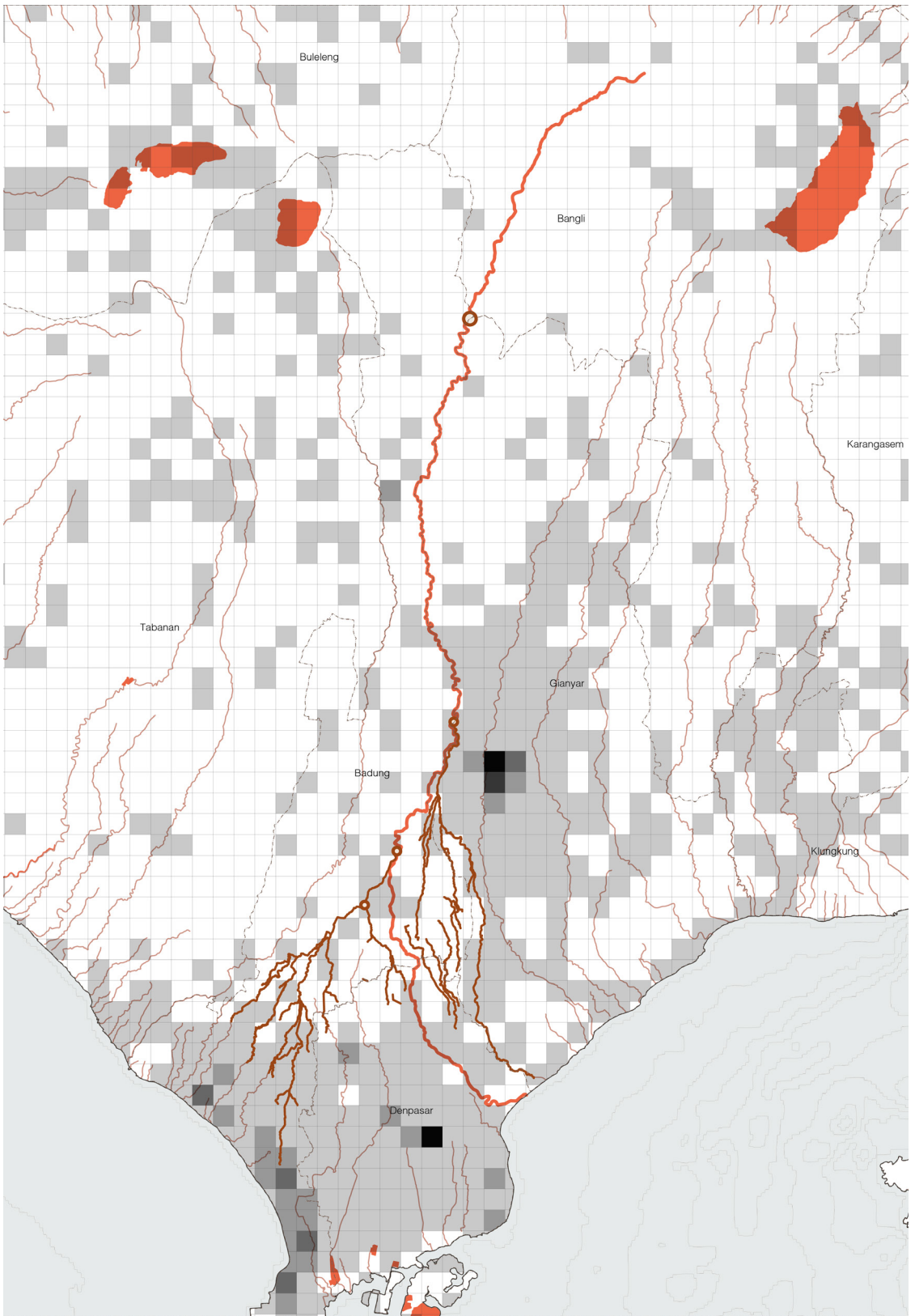
Fig 5.15 Social media promotional content for real estate projects located close to Subak or rice paddy fields, compiled and edited by the author from multiple electronic news sources.



Based on an analysis of available open data and spatial mapping of tourism-related activities, including accommodations, attractions, and supporting infrastructure, the resulting map illustrates a high concentration of tourism development in specific areas. The southern region of Bali emerges as the most intensively developed, while recent trends indicate that tourism activities are beginning to expand into the island's highland areas. This shift is particularly concerning, as these highlands serve as critical zones for Subak territories, functioning as vital water catchment areas. Encroachment into these ecologically sensitive regions poses a significant threat to the sustainability of traditional irrigation systems and the broader hydrological balance that supports agricultural livelihoods in Bali.

Fig 5.16 Spatial analysis of tourism intensity across the Ayung River watershed area.





Pattern of Tourism in Spatial



Tourism development in Bali has increasingly expanded beyond coastal zones and into inland and highland areas, raising concerns over its intersection with vital Subak territories. Spatial analysis reveals emerging patterns of tourism activity that intersect directly with water sources, cultural heritage sites, and critical irrigation infrastructure.

Highland Areas (Water Source Zones)

In the highland regions of Bali, particularly around Lake Batur, which serves as a key water source for Subak irrigation, tourism activities have begun to intensify. One notable area is the vicinity of Pura Ulun Danu Batur, a major water temple central to Subak cosmology and ritual life. Around this sacred site, tourism infrastructure such as cafés and restaurants has proliferated, particularly along the Batur crater. This area is also becoming well known for accommodations offering access to natural hot spring pools. While these developments contribute to the local economy, their proximity to sacred and hydrologically significant zones raises concerns about environmental degradation, cultural commodification, and the long-term sustainability of water resources.

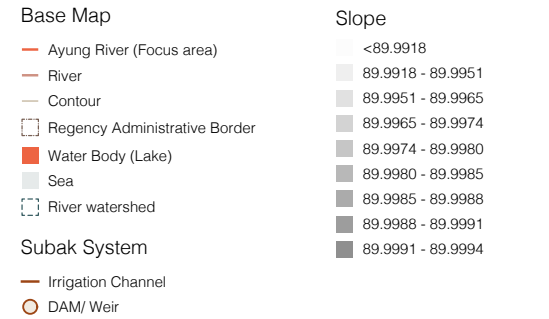
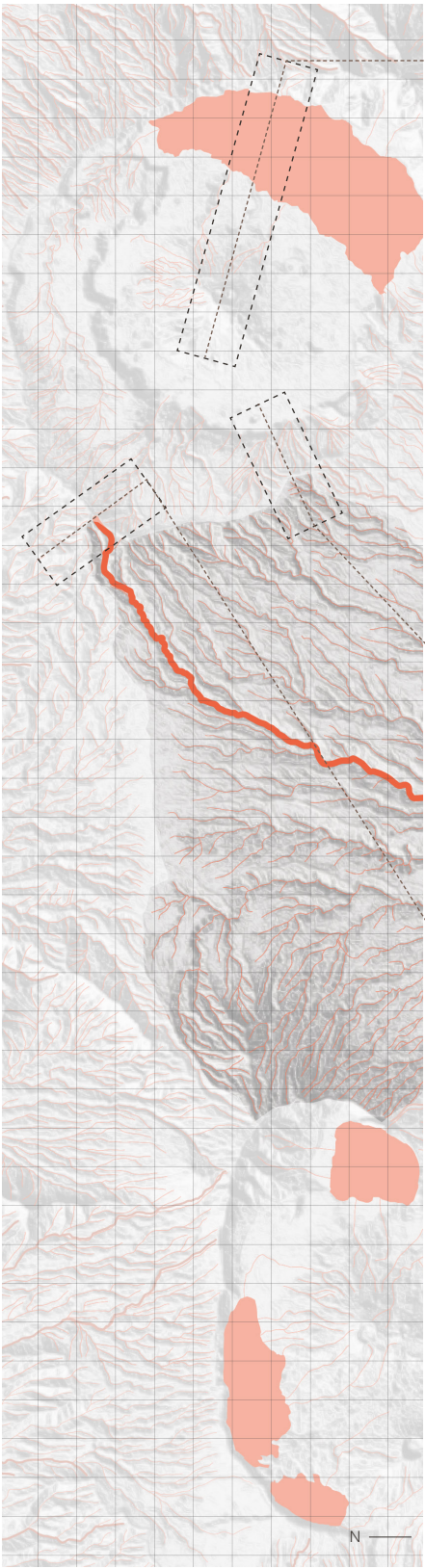
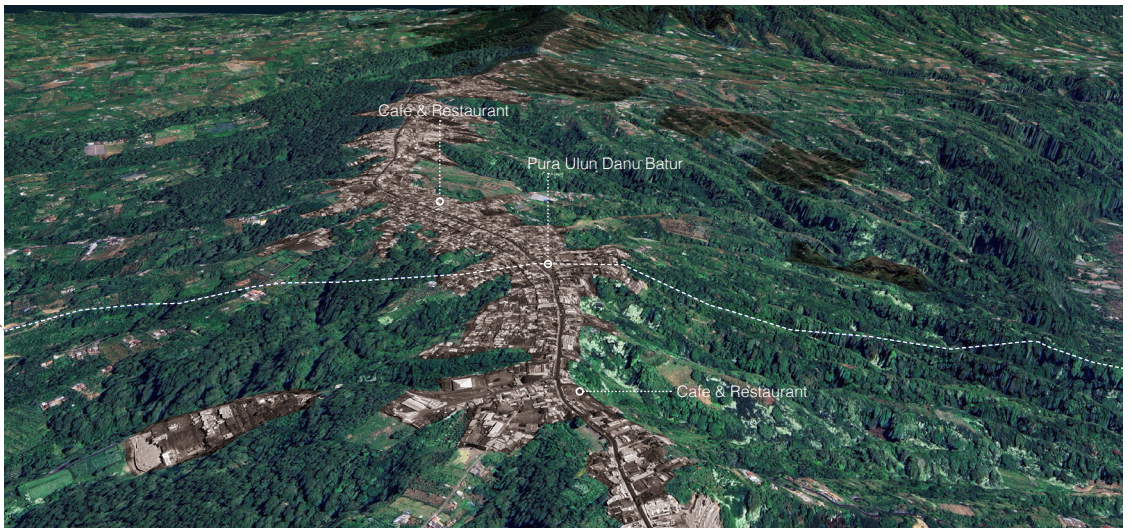
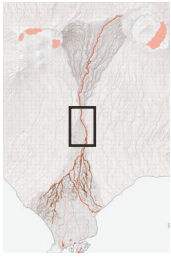


Fig 5.17 Spatial analysis of tourism activities along the Ayung River, illustrating their proximity to water body at upstream or water catchment areas.







# Midland Areas (Transition Zones)

In Bali's midland regions, traditionally dominated by rice terraces and active Subak networks, there is a growing trend of tourism accommodations being situated as close as possible to natural water sources. These developments are often high-end resorts or luxury villas (typically rated 4–5 stars) that market themselves as eco-friendly or wellness destinations. They promote tranquility, natural immersion, and the calming effect of flowing water as key selling points. Architecturally, these accommodations tend to adopt a villa-style layout, with dispersed units integrated into the landscape to create a sense of privacy and proximity to nature. However, such developments frequently encroach on irrigated agricultural land and water channels, potentially disrupting local hydrological flows and undermining communal water-sharing systems.

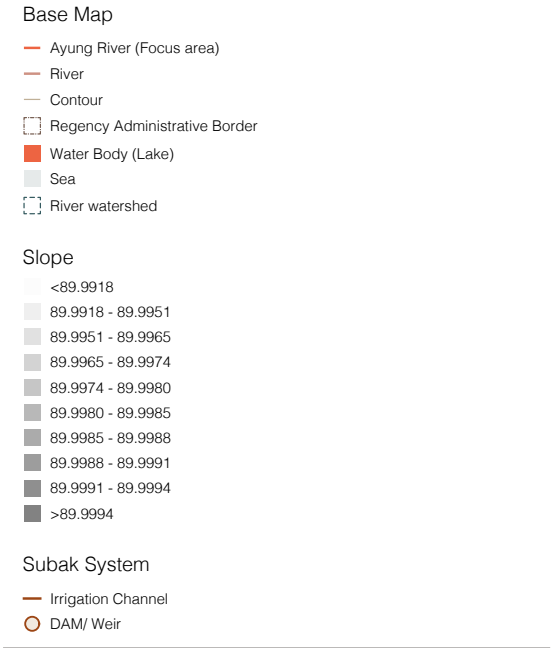
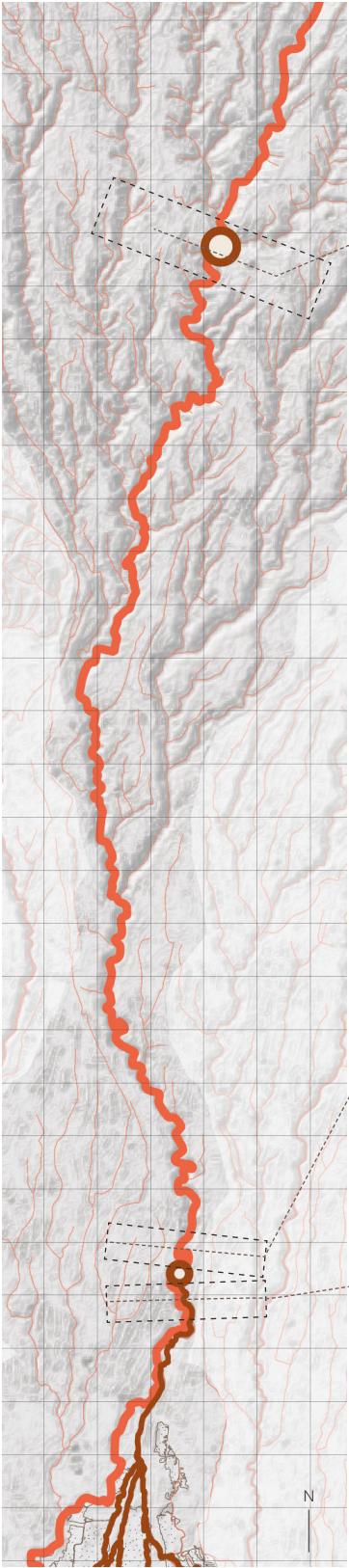
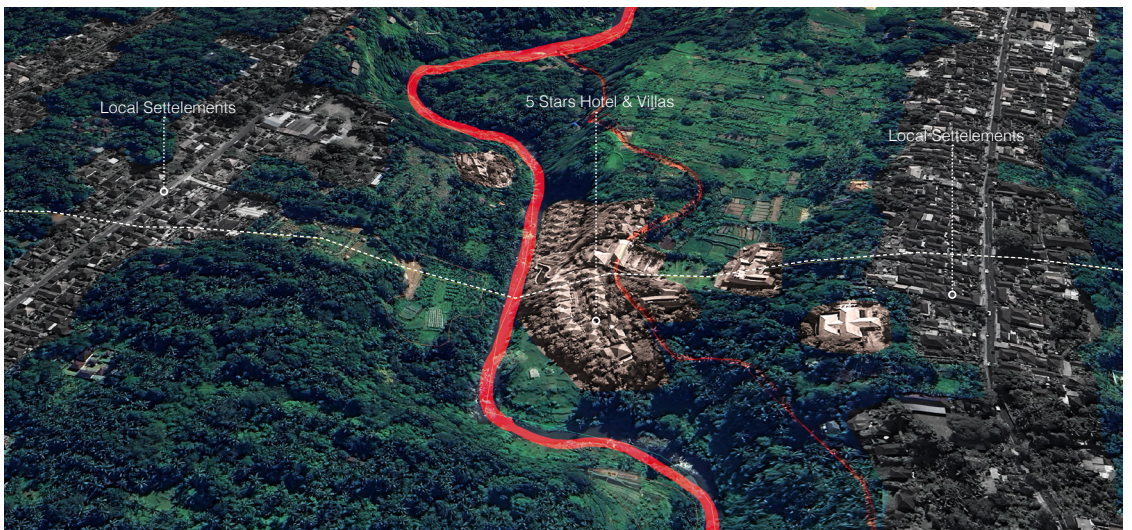
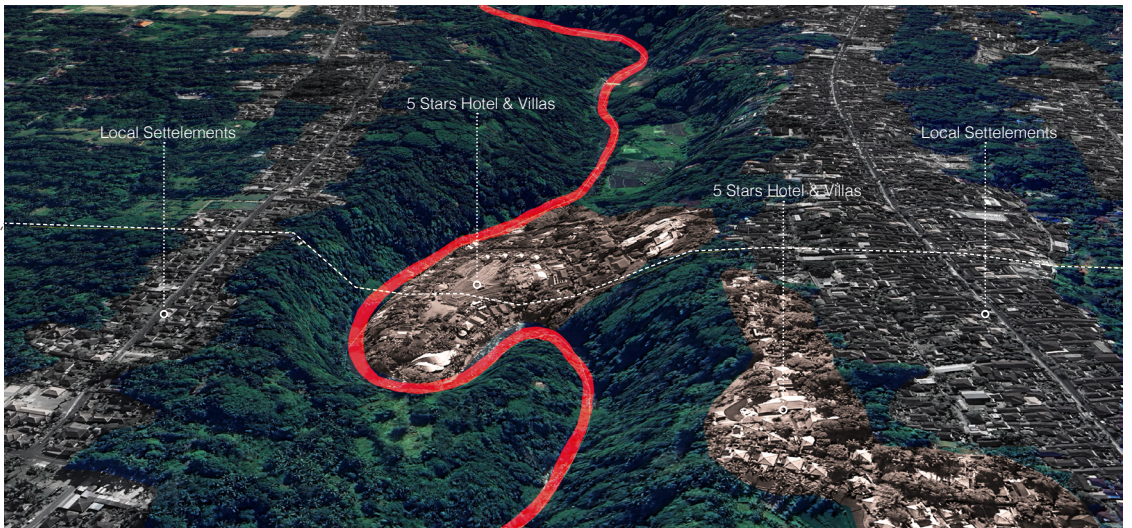
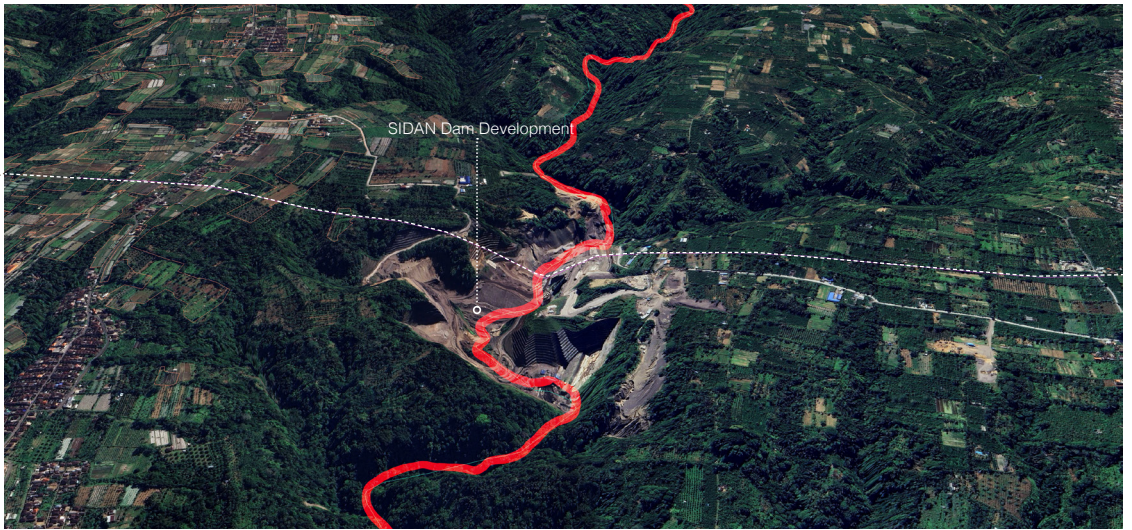
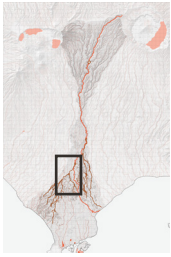


Fig 5.18 Spatial analysis of tourism activities along the Ayung River, illustrating their proximity to water body in midland areas.







# Downstream and Peri-urban Zones (Near Primary Diversion Weirs)

In areas located near the initial diversion weirs, where river water is first diverted into Subak systems, the land use patterns are less clearly defined. Some of these areas are occupied by unidentified industrial facilities, including bottled water production plants. The lack of transparent land-use classification and environmental regulation in these zones raises critical questions regarding water extraction, industrial pollution, and the weakening of community oversight. These downstream developments, while less visible than highland tourism, may pose equally significant threats to the integrity of Subak water governance and ecological function.

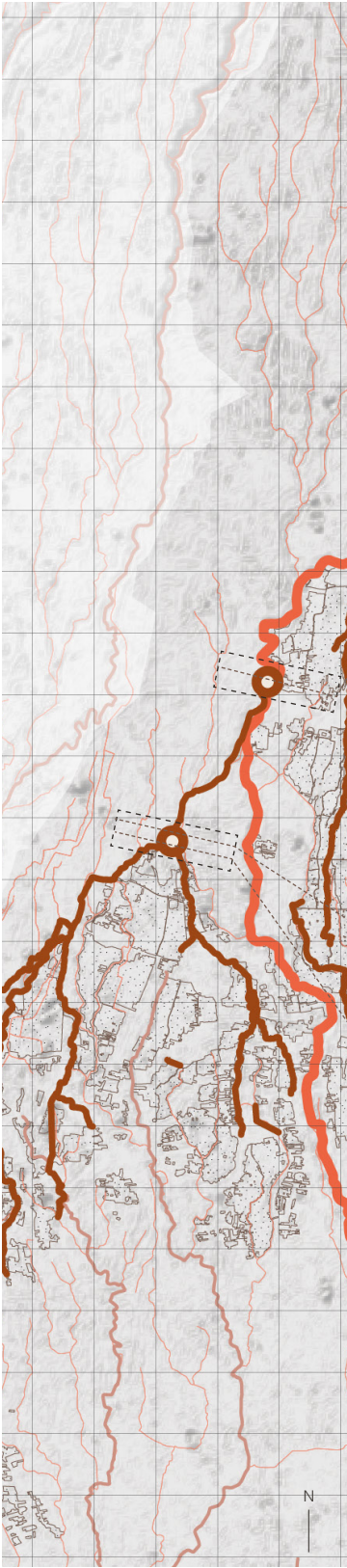
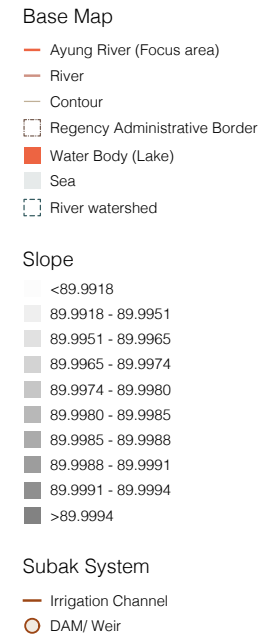
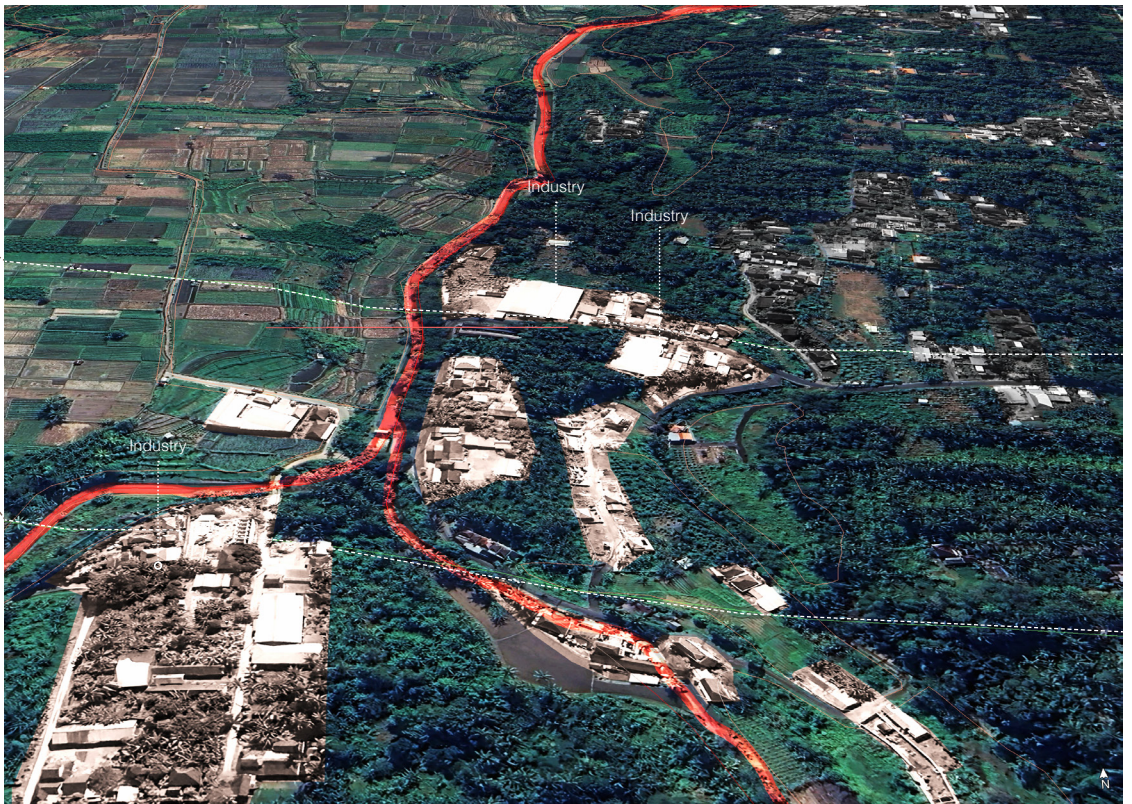
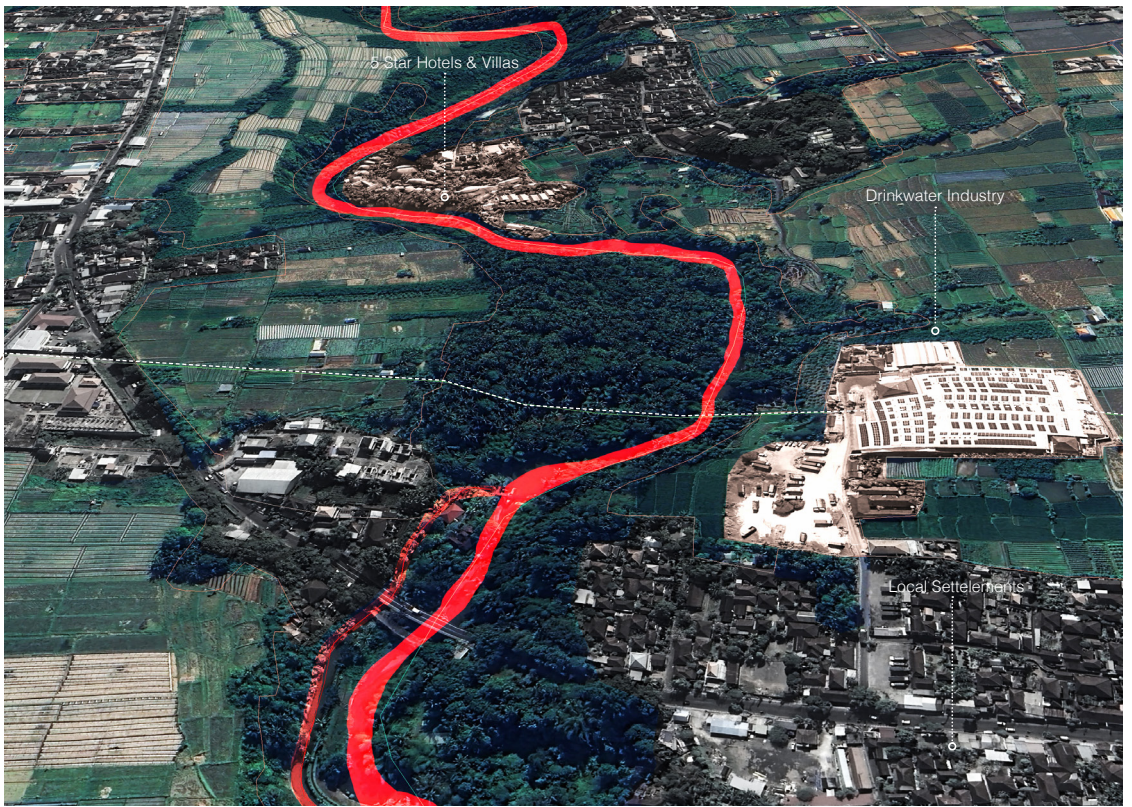


Fig 5.19 Spatial analysis of tourism activities along the Ayung River, illustrating their proximity near the irrigation channel.



Ideally, development within river buffer zones (sempadan sungai) should be strictly prohibited. According to Ministerial Regulation of Public Works and Public Housing No. 28/PRT/M/2015 concerning the Designation of River and Lake Borderlines, construction is restricted within a specific distance from riverbanks to preserve the ecological function of water bodies and prevent environmental degradation.

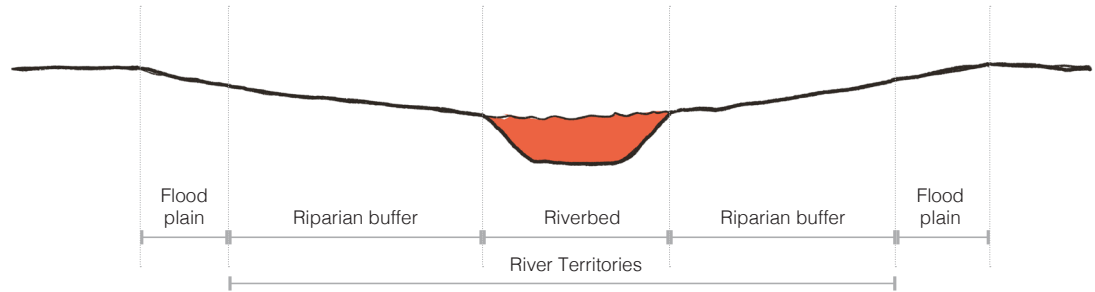
However, spatial analysis reveals that many tourism facilities in Bali have been developed in close proximity to river systems. This pattern is largely driven by the tourism industry's emphasis on proximity to nature, where water elements such as rivers and Subak irrigation channels are marketed for their scenic and auditory appeal. The sound of flowing water and the visual aesthetics of terraced landscapes have become key attractions, making these areas highly desirable for resort and hospitality development, often at the expense of ecological integrity and regulatory compliance.

This trend highlights the tension between spatial planning regulations and tourism-driven land use, underscoring the urgent need for stronger enforcement and alignment between environmental protection policies and tourism development practices.

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Fig 5.20 Diagram of river territory clear zones based on Ministerial Regulation of Public Works and Public Housing No. 28/PRT/M/2015.

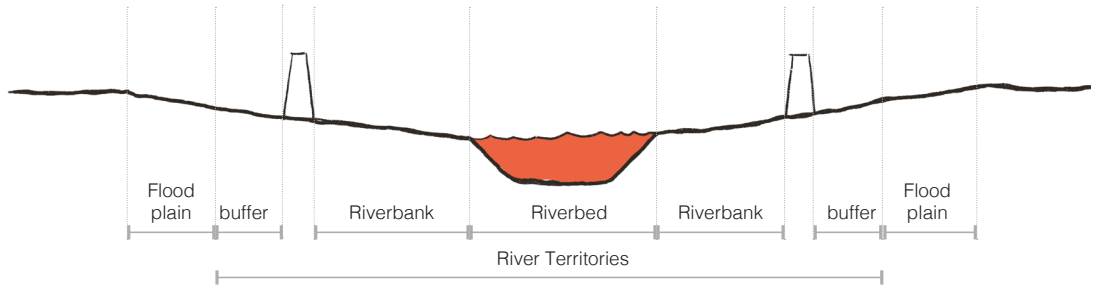
River without embankment area



Clear zone for River Territories

outside city setback min 50 - 100 m from river bed
inside the city setback min 10 - 30 m from river bed

River with embankment area



Clear zone for River Territories

outside city min 5 m from the embankment wall
inside city min 3 m from the embankment wall

# Water Availability

The southern region of Bali is currently experiencing a water deficit, with local water availability unable to meet the growing demands of its population and tourism infrastructure (see fig 5.21). Several districts in South Bali, particularly those with high concentrations of luxury resorts, hotels, and tourism services, have been forced to rely on water transfers from other regions of the island to supplement their supply. This inter-regional extraction reflects a spatial mismatch between resource availability and consumption patterns, driven largely by tourism-centered development.

The situation is further exacerbated by the disproportionately high water consumption associated with the tourism sector, which frequently exceeds that of local households and agricultural users. Tourism infrastructure, such as private villas, swimming pools, spas, and landscaped gardens, requires continuous and intensive water input, often sourced from the same catchments that support Subak irrigation systems. As Cole (2012) notes, this creates a direct competition between tourism and agriculture, placing increasing pressure on already strained hydrological systems. Without coordinated water governance that prioritizes ecological sustainability and equitable access, this imbalance risks undermining both the resilience of traditional farming systems and the long-term viability of the island’s water resources.

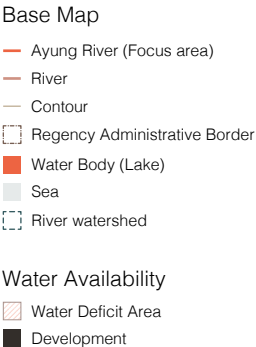
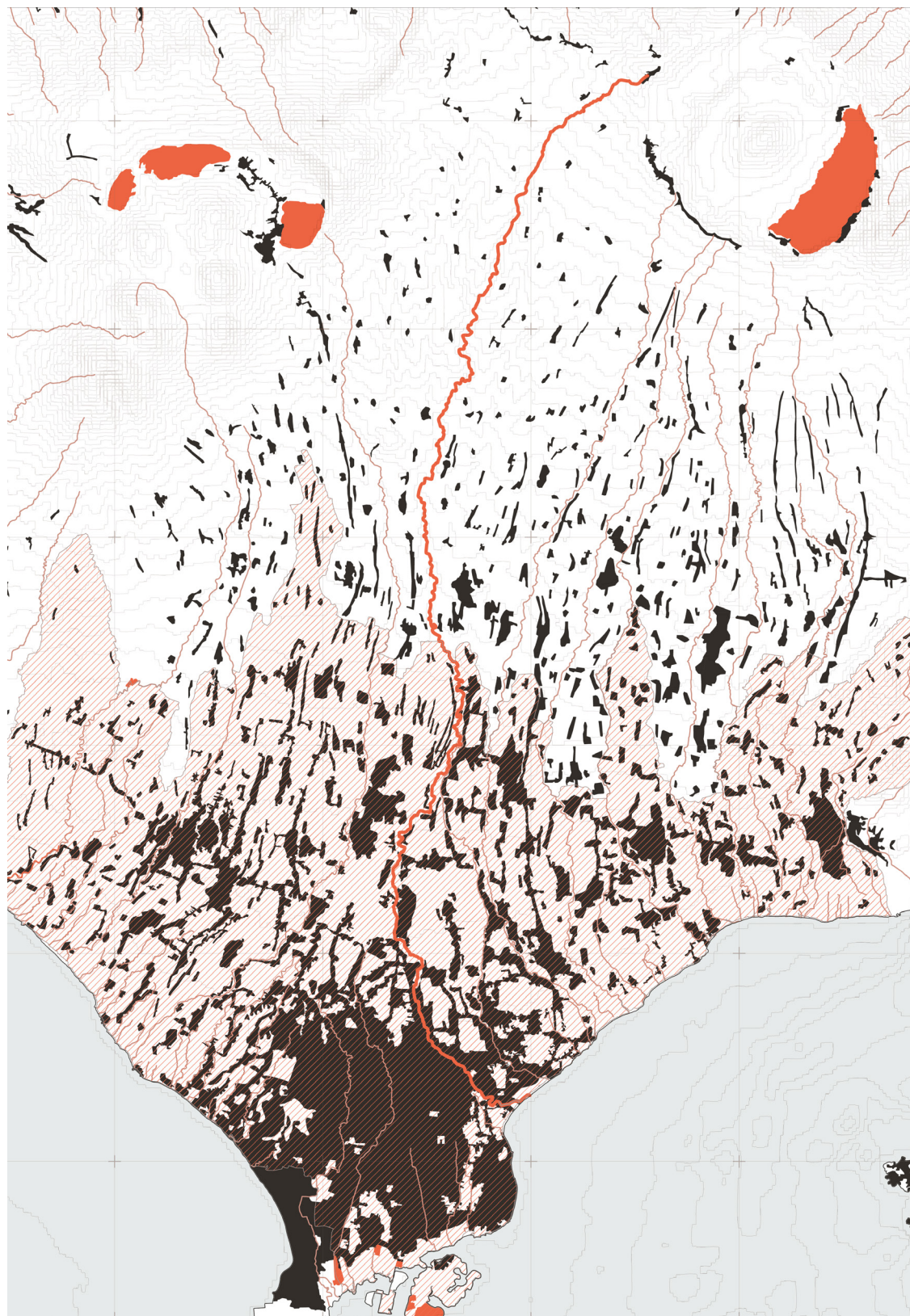


Fig 5.21 Spatial analysis of water availability in relation to land development along the Ayung River watershed.

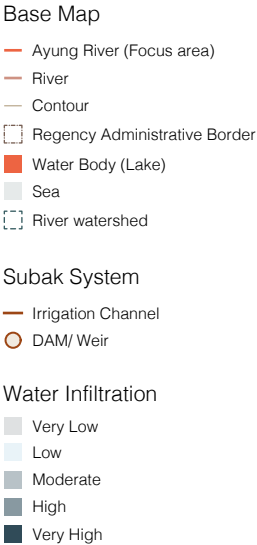


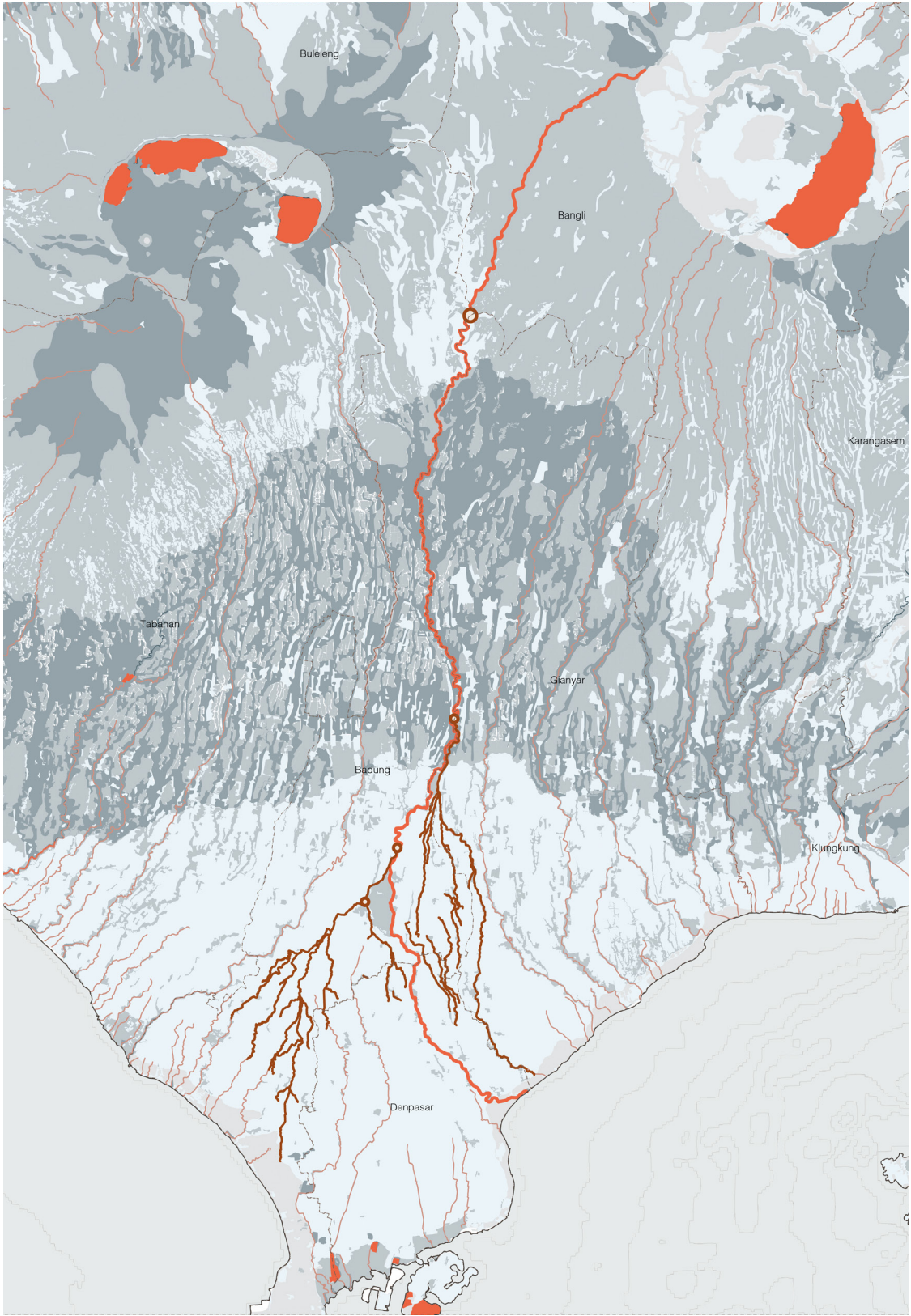
# Water Infiltration

The following map (fig 5.22) illustrates the spatial distribution of ecosystem service functions in Bali, based on data provided by the Center for Environmental and Forestry Planning (P3E) under the Indonesian Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan [KLHK], 2021). Specifically, the map highlights the ecosystem service of water regulation, which refers to the role of land cover and landscape configuration in supporting water infiltration and the gradual release of water into the hydrological system. In this context, the state indicators are determined by the land's capacity for water infiltration and retention, measured in cubic meters (m³). Meanwhile, performance indicators refer to the quantity of water infiltrated and retained, and the degree to which these functions support downstream hydrological systems, such as irrigation networks, including Subak.

The data show that the central region of Bali is still largely characterized by moderate to high levels of ecosystem service functionality. This indicates that the landscape in these areas retains substantial infiltration and retention capacity, making them crucial to the hydrological health of the island. Such regions are especially important in sustaining irrigation-dependent agricultural systems, such as Subak, and mitigating the impacts of land use change on water availability.

Fig 5.22 Spatial analysis of ecosystem services provided by land cover types in relation to their capacity to infiltrate surface runoff.



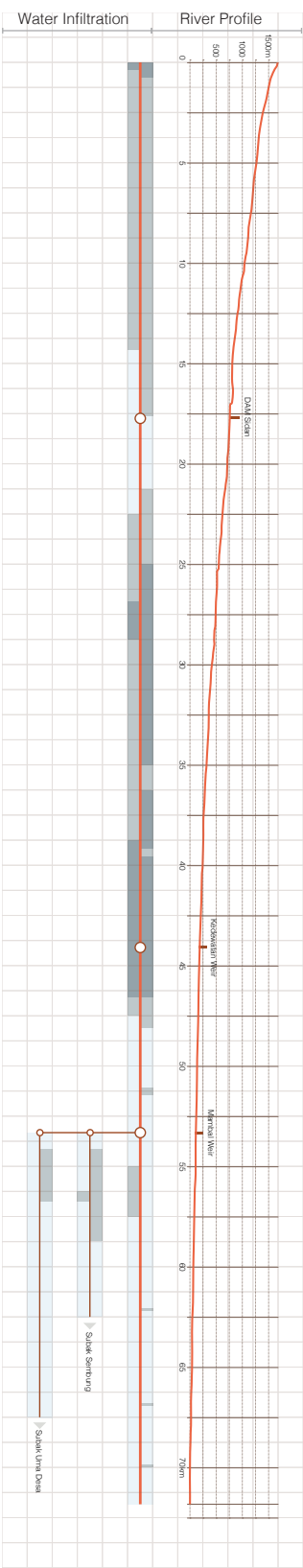


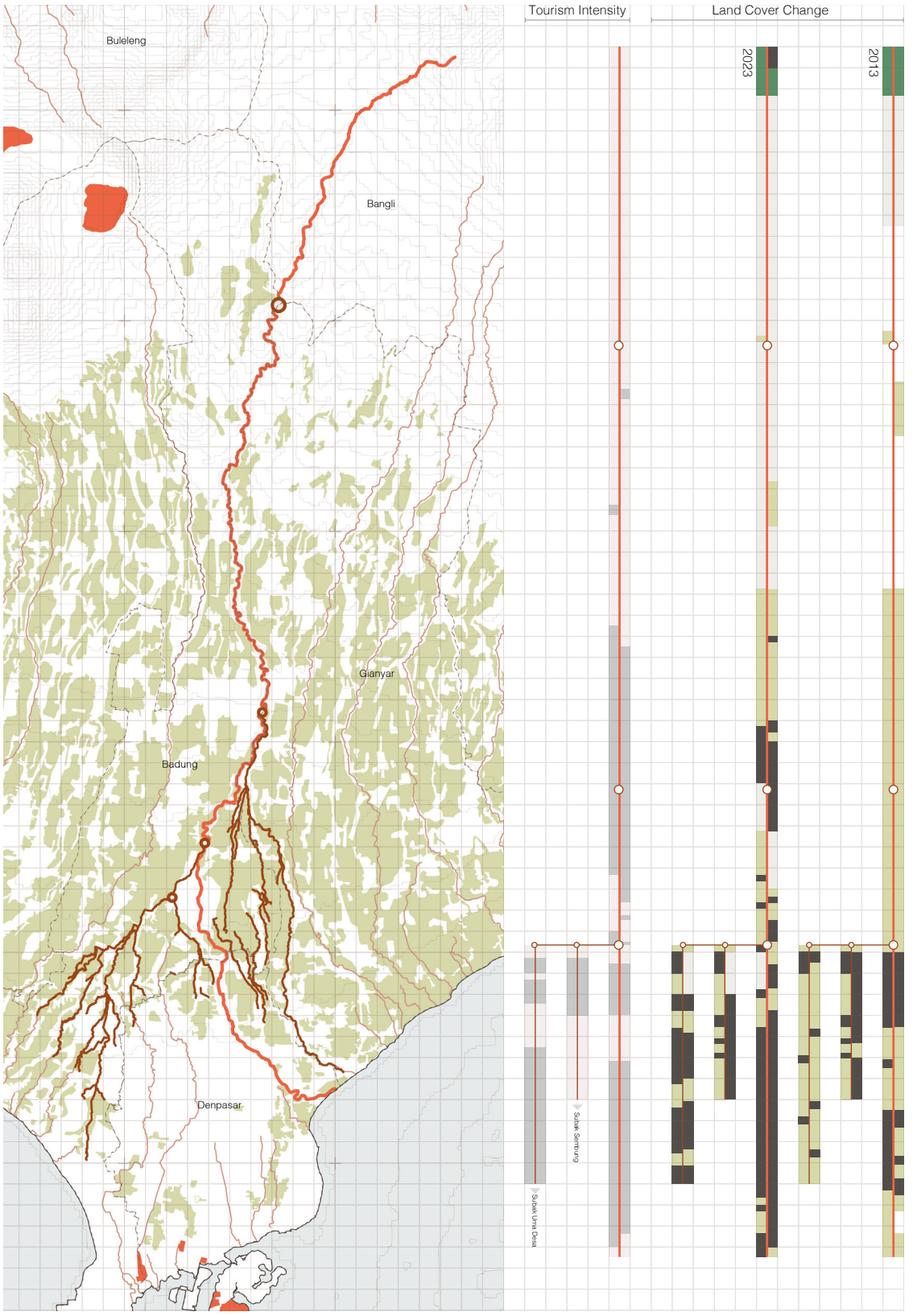
# Conclusion

Tourism-driven development in Bali has led to significant land cover changes that threaten the ecological and territorial integrity of Subak systems. Tourism infrastructure, including accommodations, attractions, and supporting services, has become increasingly concentrated in southern Bali and is now expanding into the highlands, where critical Subak water catchment areas are located. This spatial shift poses risks to both ecological sustainability and cultural heritage, particularly as Subak landscapes are commodified for aesthetic value rather than preserved for their socio-ecological function.

Complementary analyses of tourism intensity, land infiltration capacity, and water demand further reveal the growing strain on Bali's hydrological systems. Using open-source data and spatial mapping, the research identifies high tourism density in key Subak zones, with luxury accommodations often situated near water sources to enhance their appeal for wellness tourism. In highland areas such as Lake Batur, tourism activities, including cafés and hot spring resorts, have emerged near sacred Subak temples, further encroaching on vital water sources. Simultaneously, South Bali faces a water deficit, with some districts reliant on water transfers from other regions to meet tourism demands. These trends highlight a spatial and functional disconnection between consumption and supply, exacerbating competition with agriculture. Despite some central regions maintaining high water infiltration capacity, the long-term sustainability of Subak systems depends on integrated land and water governance that can reconcile tourism growth with ecological resilience and local rights.

Fig 5.23 Summary map presenting the conclusions of the spatial analysis.





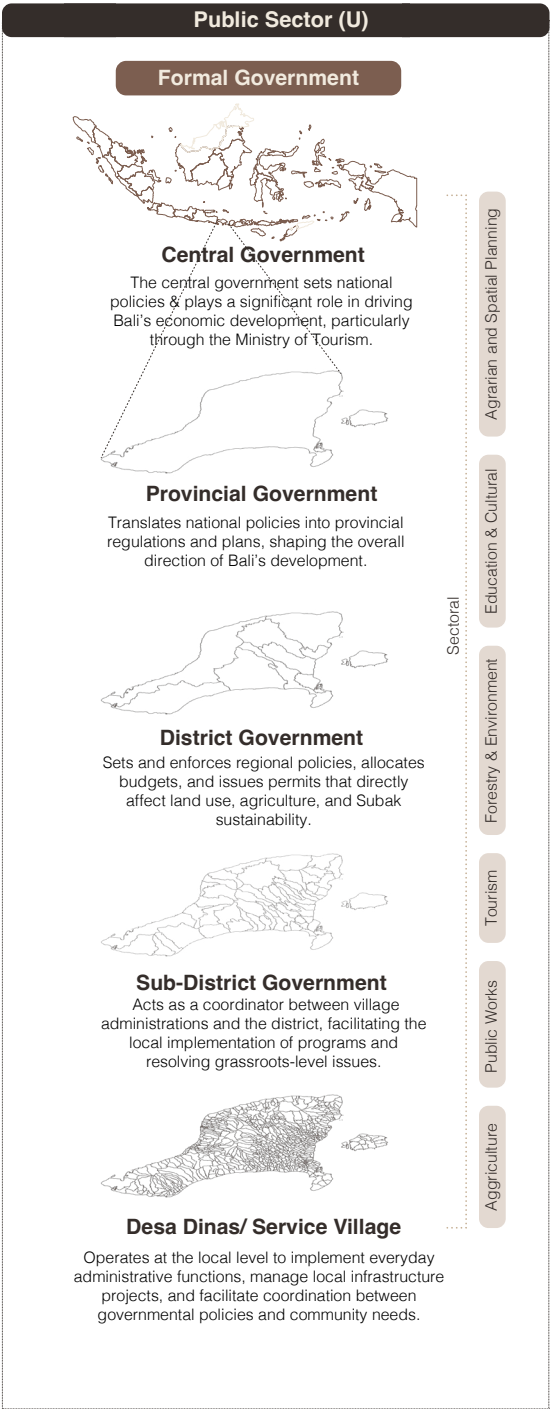
# v. Displaced Prosperities and Power Struggle

This research began by mapping the various stakeholders involved in the governance and transformation of Subak territories. These stakeholders were categorized into three main sectors: public, civic, and private (see fig 5.24). Within the public sector, both local and national government institutions play a significant role, particularly given Bali's strategic position within national development agendas. The influence of the central government is especially prominent due to the number of large-scale infrastructure projects implemented on the island.

The civic sector was further divided into three sub-groups based on their roles and institutional character: (1) public knowledge institutions such as academic and research bodies, including international organizations working on sustainability and development; (2) customary institutions that govern and represent traditional communities, such as desa adat and Subak leadership; and (3) diverse resident groups with varying degrees of involvement in land and water governance. In the private sector, two primary groups were identified: (1) capital owners, such as developers and investors who exert direct influence over spatial transformation; and (2) technical experts, including planners and consultants, who support the implementation of development visions.

This stakeholder mapping highlights the complex and multilayered nature of governance within Subak territories, where competing interests and capacities intersect.

Fig 5.24 Three categories of stakeholders influencing changes in Subak's hydrosocial territories.



## Civic Sector (C)

### Public Institution

#### C1 UNESCO

Provides international recognition, guidance, and financial support for protecting the Subak as a World Cultural Heritage landscape.

#### C2 NGO's

(NGO in development, social, environmental, cultural)

Support Subak, Customary Village, Local, & other Indigenous group through community empowerment, advocacy, conservation programs, and resistance to harmful development.

#### C3 Academic

Carry out studies and providing essential scientific and policy-oriented insights to support sustainable Subak governance.

### Customary Institution

#### C4 Customary Village

Desa Adat/ Customary Village upholds Balinese cultural, religious, and spatial values, including ritual responsibilities that intersect with Subak governance.

#### C5 Subak Organization

Manages traditional irrigation systems and collective farming practices based on Tri Hita Karana principles.

### Residents

#### C6 Local Residents

Live within or near Subak areas — regardless of ethnic background — and, having resided in Bali for an extended period, are directly affected by changes in land use, water access, and tourism-driven development.

#### C7 Indigenous People

Balinese who inherit cultural and ancestral responsibilities — including the stewardship of land, water, and forest ecosystems — through the continuation of traditional practices and rituals rooted in their territorial identity and community-based cosmology.

#### C8 Farmers

Individuals actively engaged in farming activities within the Subak system, responsible for day-to-day agricultural work, irrigation coordination, and upholding communal labor traditions (ayahan), regardless of whether they are landowners or sharecroppers.

#### C9 Local Young Generation

Represent the future of Subak, but often face detachment from farming due to urbanization and tourism-driven economic shifts.

#### C10 Temporary Residents

Such as tourists and digital nomads(domestic and international) —are short-term inhabitants who often view Bali as a place of escape and leisure, remaining largely detached from its cultural values and contributing to land-use pressures on Subak territories.

## Private Sector (I)

### Capital

#### I1 Tourism Industry

Drive land-use change and water demand around Subak areas through hotel, villa, and recreational developments.

#### I2 Developers

Invest in and reshape land formerly used for agriculture, often accelerating the conversion of Subak territories into private property.

The focus sector here are stakeholder who worked in :

Accommodation : Hotel, Villa, Bungalow

Recreational : Cultural Park

F&B sector : Restaurant, Cafe

#### I3 Land Owners

Individuals or entities who own Subak land but do not cultivate it, often selling, leasing, or holding it for profit-driven uses that accelerate land conversion and commodification.

### Technical Experts

#### I4 Spatial Planner

Influence land-use decisions and spatial policy implementation that affect Subak territory continuity or fragmentation.

#### I4 Environmental & Ecological Scientist

Analyze and advocate for ecological sustainability in water systems, biodiversity, and climate resilience within Subak landscapes.

I identified various stakeholders relevant to the discussion of spatial change and resource claims in Bali. These stakeholders are categorized into the public, private, and civic sectors. Stakeholder mapping entails identifying and classifying these groups based on their current positions or attitudes towards a project or issue, utilizing the three dimensions of sustainability: economic, social, and environmental. Additionally, there is a neutral category for stakeholders who remain impartial. This approach helps clarify their influence and informs the development of effective engagement strategies.

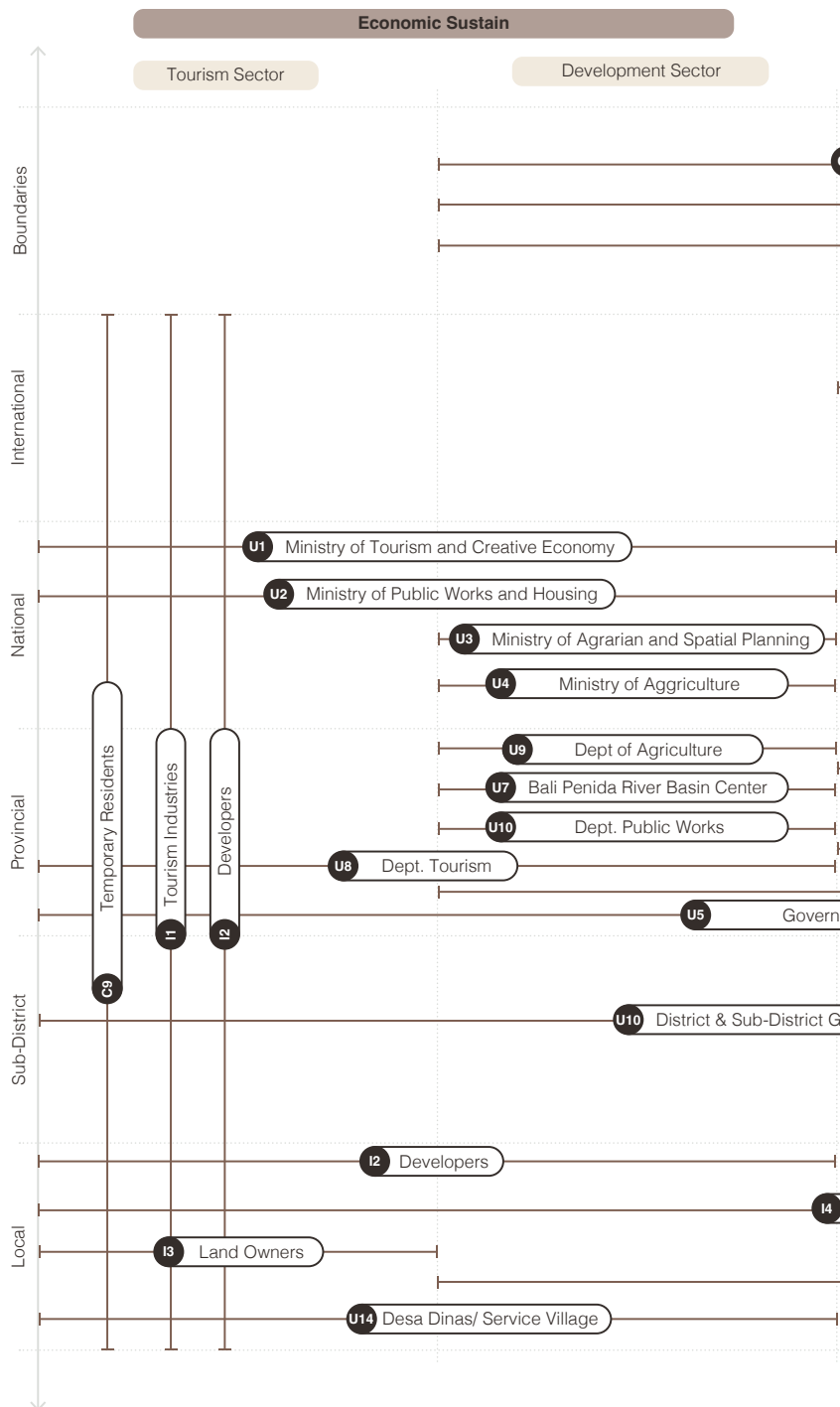
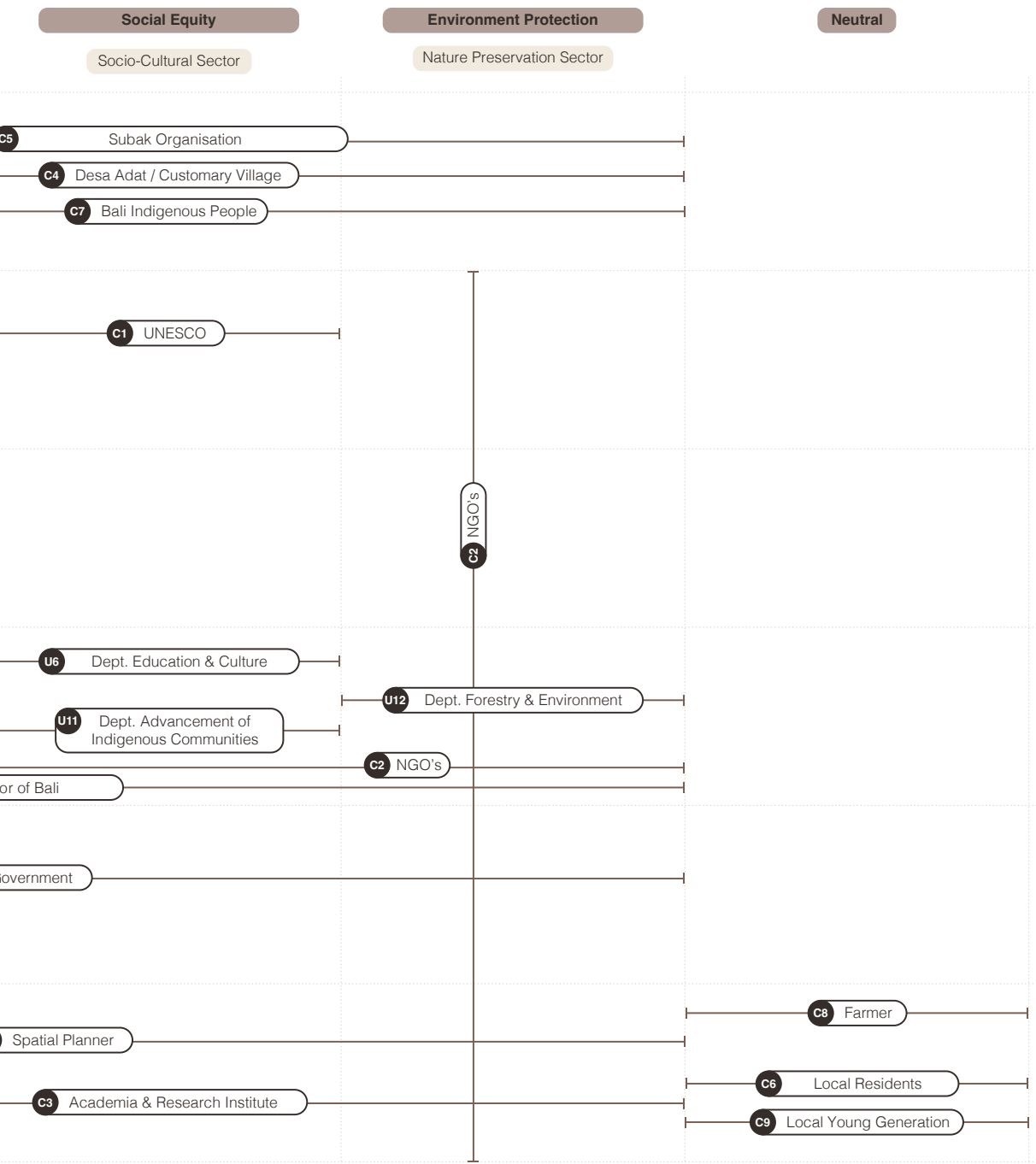


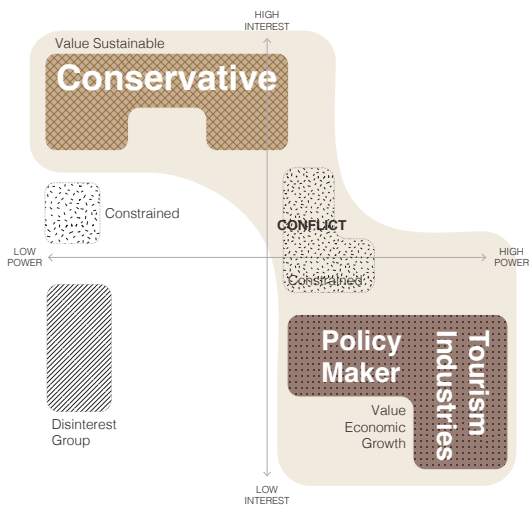
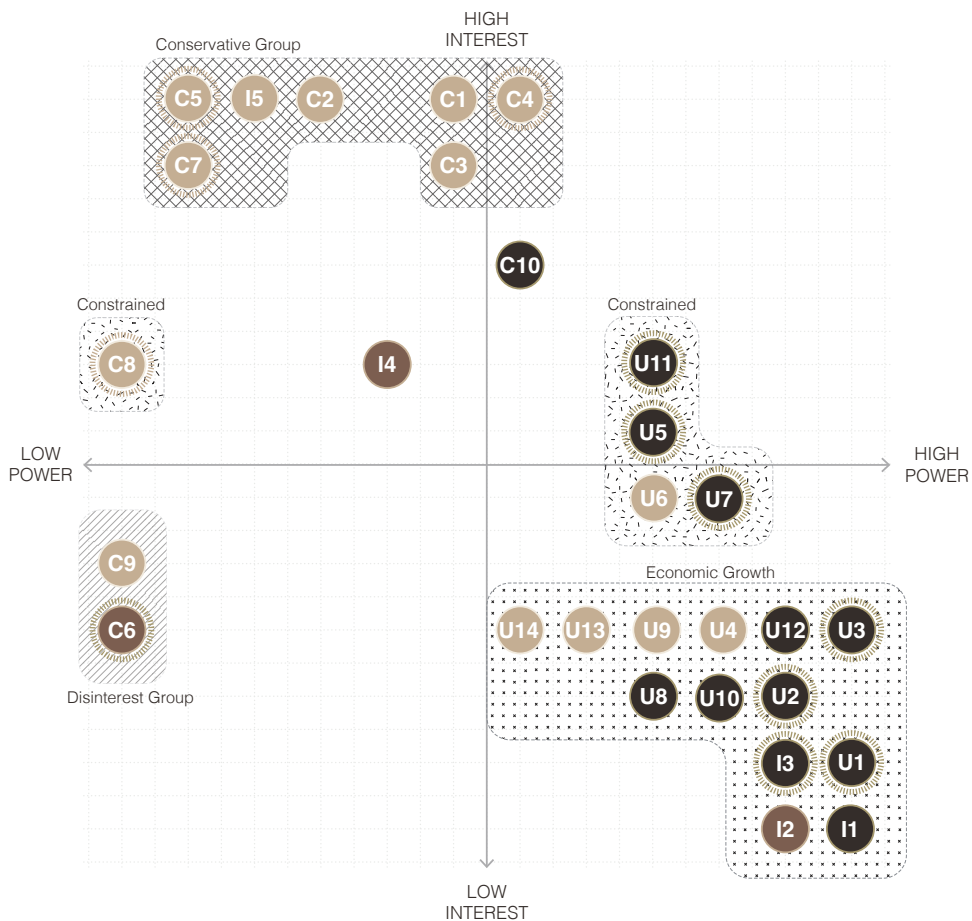
Fig 5.25 xxxxx



The stakeholder positioning involved mapping all relevant parties using a power-interest matrix. This methodology illuminated the current state of governance in the area. It was observed that a significant portion of the public sector, particularly national government entities, wielded considerable power but exhibited low interest in the issues at hand. Similarly, stakeholders in the tourism sector, especially large chain groups, displayed a comparable pattern. In contrast, the citizen population was divided into two distinct groups: one demonstrating high interest and the other showing complete disinterest. Consequently, the author aims to create a balance among all stakeholders and propose a new governance model that promotes spatial justice in Bali.





Fig 5.26 xxxxx



# Stakeholder Relation

Based on interviews conducted with various stakeholders, this study developed a relational mapping between customary organizations, specifically Subak and desa adat (customary villages), and other stakeholder groups. The analysis categorizes the nature of these relationships into three types: cooperation, dependency, and conflict. Each relationship was assessed and qualitatively graded by the researcher into three levels: none, low, or high, based on the frequency, intensity, and significance of interaction reported during the interviews. This relational mapping provides insight into the power dynamics, alignment of interests, and potential areas of tension or collaboration within Subak territories.

-  Appears in two aspects
-  Appears in all aspects

## PUBLIC SECTOR

- U1** Ministry of Tourism and Creative Economy
- U2** Ministry of Public Works and Housing
- U3** Ministry of Agrarian and Spatial Planning
- U4** Ministry of Agriculture
- U5** Governor of Bali
- U6** Bali Provincial Department of Education & Culture
- U7** BWS Bali-Penida River Basin Agency
- U8** Bali Provincial Department of Tourism
- U9** Bali Provincial Department of Agriculture
- U10** Department of Public Works and Spatial Planning
- U11** Bali Provincial Department for the Advancement of Indigenous Communities
- U12** Bali Provincial Department of Forestry & Environment
- U13** District & Sub-District Government
- U14** Service Village

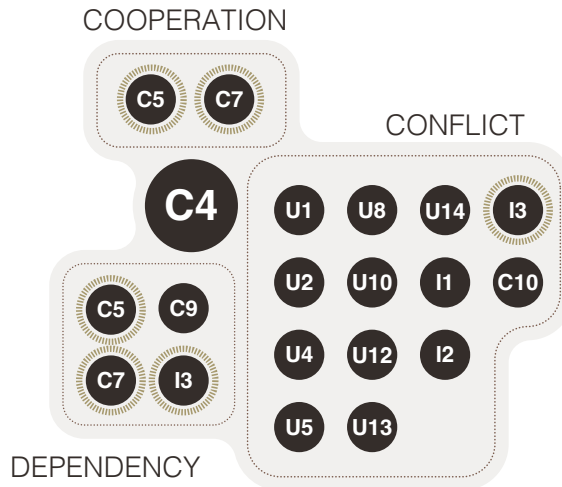
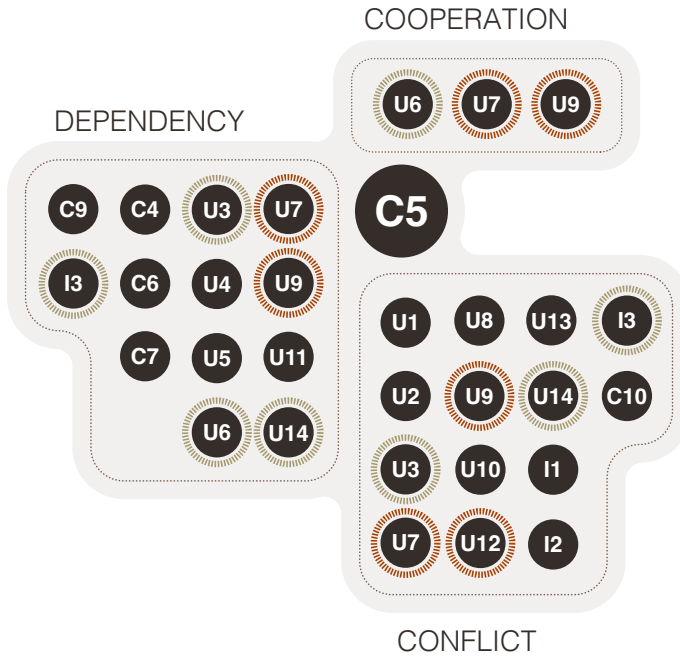
## PRIVATE SECTOR

- I1** Tourism Industries
- I2** Developers
- I3** Land Owners
- I4** Spatial Planners
- I5** Environmental & Ecological Scientist

## CIVIC SECTOR

- C1** UNESCO
- C2** NGO's
- C3** Academia
- C4** Customary Village
- C5** Subak Organization
- C6** Local Residents
- C7** Bali Indigenous People
- C8** Farmers
- C9** Local Young Generation
- C10** Temporary Residents

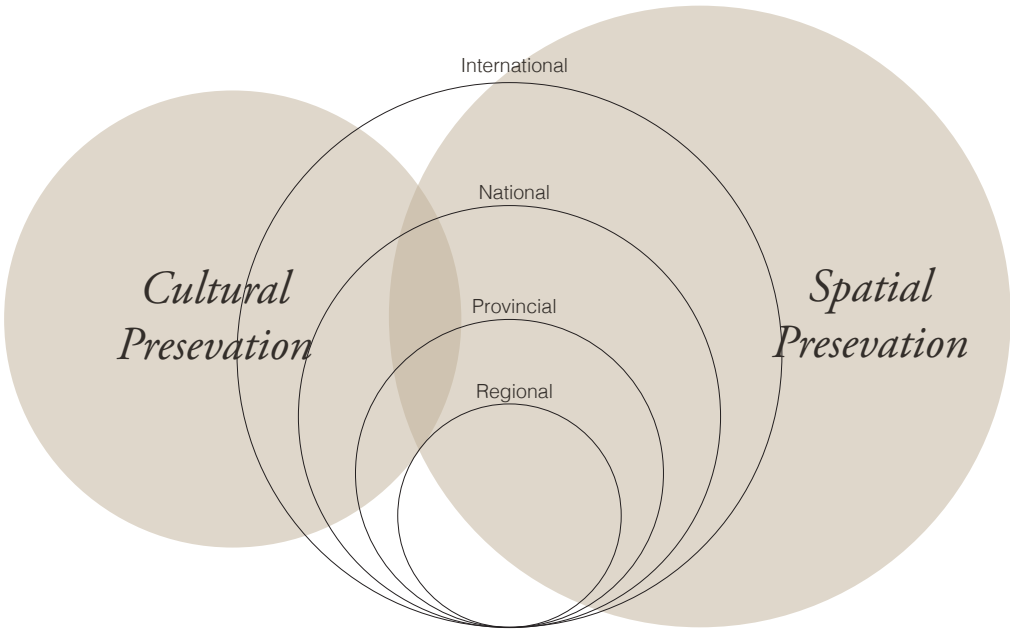
Fig 5.27 xxxxx



# vi. The Paradox of Preservation Nature-Culture & Development

Efforts to preserve the Subak landscape have been approached from two main directions: cultural recognition and spatial regulation. The first involves international recognition through UNESCO, which designated Subak as a Cultural Landscape World Heritage Site in 2012. This recognition was intended to protect the Subak system from increasing threats posed by rapid land use change and the expansion of tourism infrastructure (UNESCO, 2012). It elevated Subak from a local irrigation and governance system to a global heritage asset, emphasizing the need for conservation and international support.

Fig 5.28 Diagram illustrating the scale of preservation efforts from both cultural and spatial perspectives.



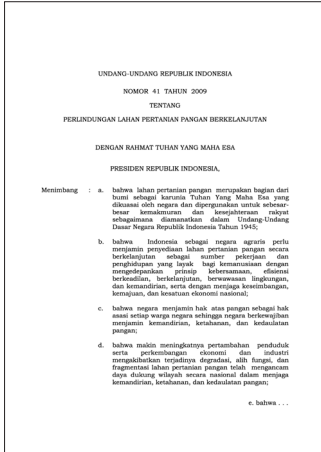


Fig 5.29 National regulations intended to protect agricultural landscapes from land conversion since 2009.

The second form of preservation emerges from national spatial and agricultural policy frameworks, particularly under the banner of food security. This is formalized through Law No. 41 of 2009 on the Protection of Sustainable Food Agricultural Land (Perlindungan Lahan Pertanian Pangan Berkelanjutan, or LP2B). The law was established to safeguard agricultural land to ensure long-term availability and productivity, addressing critical issues such as land degradation and the increasing rate of land conversion (Prasada & Priyanto, 2019).

To support the implementation of this law, the Indonesian government introduced a series of derivative regulations. These include technical guidelines, spatial information systems, and incentive mechanisms (Kementerian PUPR, 2023). At the regional level, the Provincial Government of Bali adopted Regional Regulation No. 2 of 2023 on the Bali Spatial Plan (RTRW) 2023–2043, explicitly aimed at protecting LP2B areas within the province.

Furthermore, institutional mechanisms meant to regulate land use have often had the opposite effect. Article 37 of Law No. 41/2009 provides that LP2B protection can be enforced through licensing mechanisms. In practice, however, the Online Single Submission (OSS) system, introduced to streamline spatial planning permits, has instead facilitated land conversion (Ramadhan & Murti, 2024; Indrajit et al., 2021). This is supported by Ministerial Regulation No. 13 of 2021 from the Ministry of Agrarian Affairs and Spatial Planning/ National Land Agency, which governs spatial conformity and program synchronization. While intended to ensure regulatory alignment, these policies have often been used to legitimize changes in land function, further weakening agricultural protections.

This regulatory paradox, where laws exist but fail to produce meaningful spatial outcomes, illustrates the deep tension between preservation and development. As one interviewee, a Balinese academic and urban scholar (Gede Mahaputra, 2025), explained, Subak today is caught in a struggle not only for land and water, but also for narrative control. Competing interests, from tourism developers to local landowners, contest what Subak should be, and for whom it is managed.

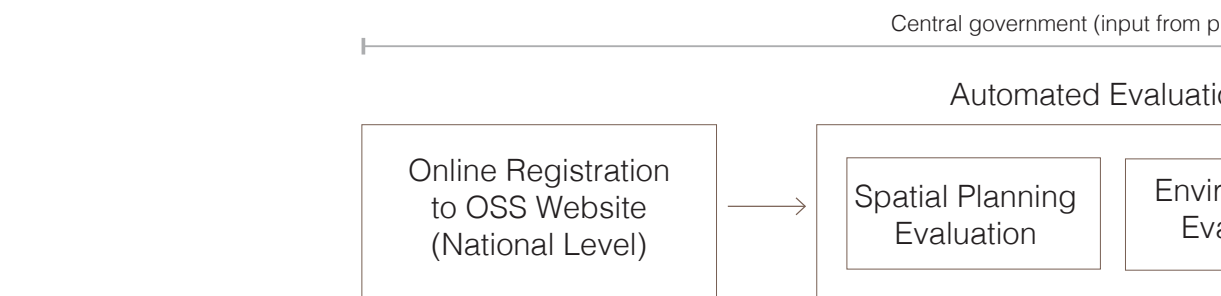
# Spatial Planning Permit Procedures for Business Operations

The current spatial planning permit system in Bali often marginalizes customary institutions and local communities, particularly Subak communities and customary villages (desa adat), by excluding them from formal development approval procedures. This exclusion has contributed to the erosion of traditional land stewardship practices and weakened environmental oversight in areas of high ecological and cultural value. Following the political reforms of 1998, the role of the Subak leader (Pekaseh) in overseeing land transactions has

## Before Omnibus Law in 2020 & Online Single Submission System



## After Omnibus Law in 2020 & Online Single Submission System

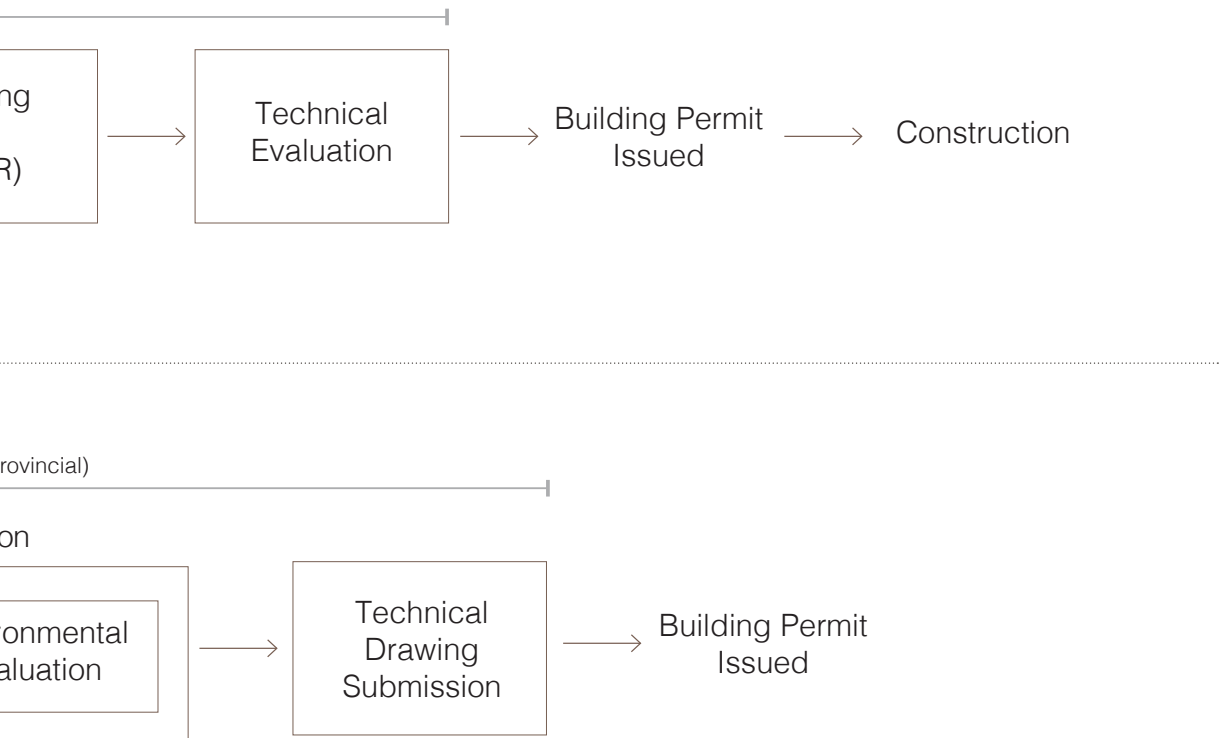


Indicate involvement of Customary Village or Indigenous communities

Fig 5.30 Scheme of spatial planning permit procedures for business operations before and after the enactment of the 2020 Omnibus Law and the implementation of the Online Single Submission (OSS) system.

steadily declined. After that, rice field ownership can be transferred without informing or seeking approval from the Pekaseh, as their formal authority in such matters has effectively been removed (Prof. Dr. Ir. I Ketut Suamba, M.P., interview, 2025).

The involvement of Indigenous communities has been further marginalized with the introduction of the Omnibus Law (Law No. 11 of 2020 on Job Creation) and the Government Regulation No. 5 of 2021 on the Implementation of Risk-Based Business Licensing. It established the Online Single Submission (OSS) system to streamline the process of obtaining spatial planning permits. This system centralizes decision-making authority in the hands of the national government and shifts all processes to an online format.



# vii. Degraded Value

The present context, from the interviews I identifies disruptions caused by tourism-driven development. The traditional integration has fragmented, as economic prosperity driven by profit increasingly dominates, separating and commodifying culture and ecology. Ecological aspects are deprioritized, and relationships to the natural environment become transactional rather than respectful and reciprocal. The following transformations are observable across three layers of inquiry:

## Ontological Layer

The original cosmological basis rooted in Tri Hita Karana is being replaced by a profit-oriented worldview, where land and water are valued primarily for their economic returns.

## Interdependent Spheres

The interconnected domains of ecology, culture, and prosperity are now increasingly separated. Cultural and ecological elements are commodified, and ecological reciprocity is replaced by extractive practices. Prosperity is measured in terms of economic competitiveness within a global tourism economy rather than communal well-being.

## Value Layer

Traditional Subak values such as stewardship, cooperation, and spiritual alignment are displaced by extractivist logics. The landscape is treated as a resource to be sold, viewed, and consumed, while ritual practices become symbolic rather than sacred.

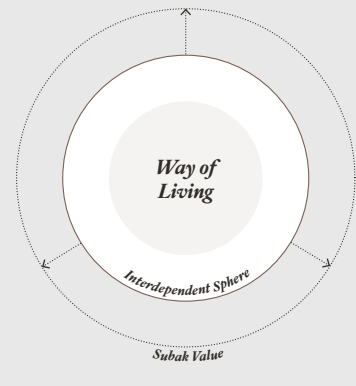


Fig 5.31 Three-layered analytical lens as an inquiry framework for understanding the Subak system across timelines (based on Conceptual and Analytical Framework on Chapter III).

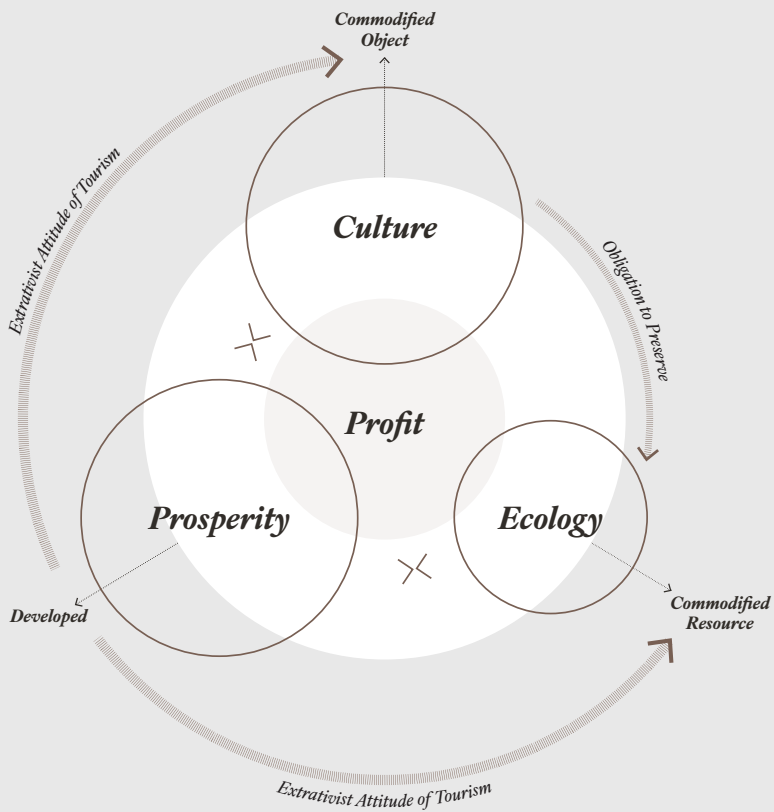


Fig 5.32 Synthesis of insights into the dynamics of injustice arising from tourism-driven development in Subak's hydrosocial territories, analyzed through three layers of analytical lenses.

*“Subak, once a living soul of the land, now lies **objectified**,  
its grace quarried, its essence drained,  
a stage set only for the eyes of wandering strangers,  
**who see beauty but not the life beneath.**”*

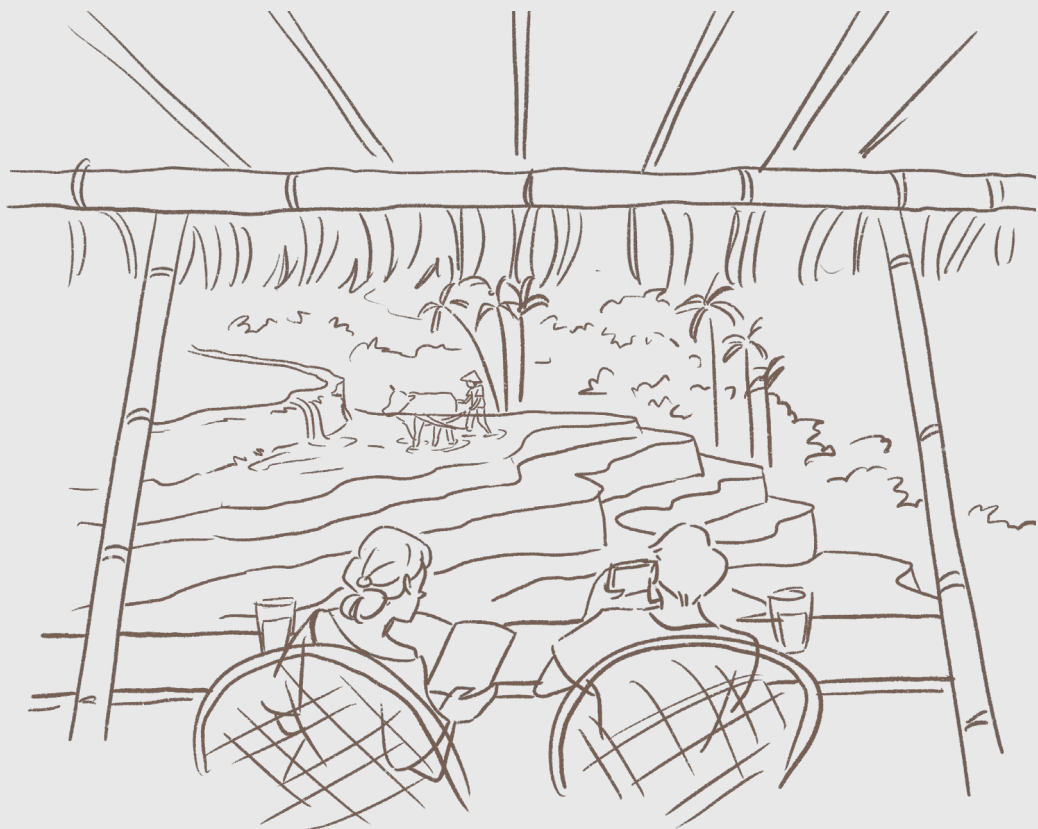


Fig 5.33 Illustration of the current condition of Subak, increasingly perceived and utilized primarily as a tourism object.





volume 3  
to propose &  
politicize

# Blueprint for Balance

Subak landscape near the Sangah  
sacred forest (2022)

# VI

## A Pathway Towards Just Development

- i. Value-Based Transformation
- ii. Vision & Strategy
- iii. Reactivation Sedahan Agung Role
- iv. Territories Zoning & Protection
- v. Ethics of Care
- vi. Diversified Economic
- vii. Pathway Towards Just  
Development

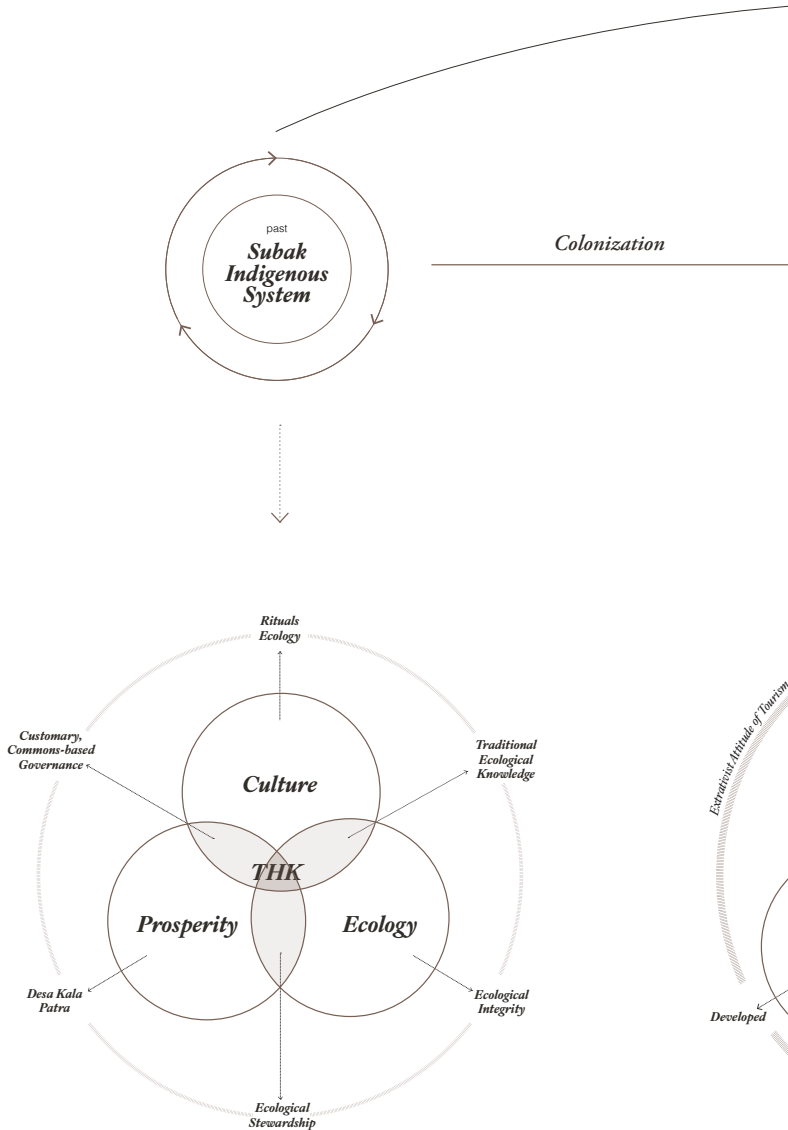


Fig 6.1 Collaborative actions between the younger and older generations to promote just and equitable development within the Subak system. Source: Astungkara way

# i. Value-Based Transformation

Grounded in the findings from historical analysis and field-based inquiry, the proposal emerges from a deep engagement with the values and wisdom embedded in Subak practices over time (see fig 6.2). These values, such as ecological stewardship, collective responsibility, and spiritual harmony, have historically shaped the Balinese relationship with land and water. However, these practices are now under threat due to intensifying landscape pressures, particularly since the colonial-era introduction of tourism as a dominant economic force in Bali (Picard, 1996; Cole, 2012).

To articulate a vision of Just Development rooted in Subak, I also use the layers of inquiry. The design approach proposed here does not seek to replicate the past, but rather to adapt and evolve indigenous principles in response to current and future pressures. By reinterpreting and applying traditional Subak values in a contemporary context, this strategy offers a pathway for development that is both culturally grounded and ecologically responsive, without ignoring the material and social realities of the present.



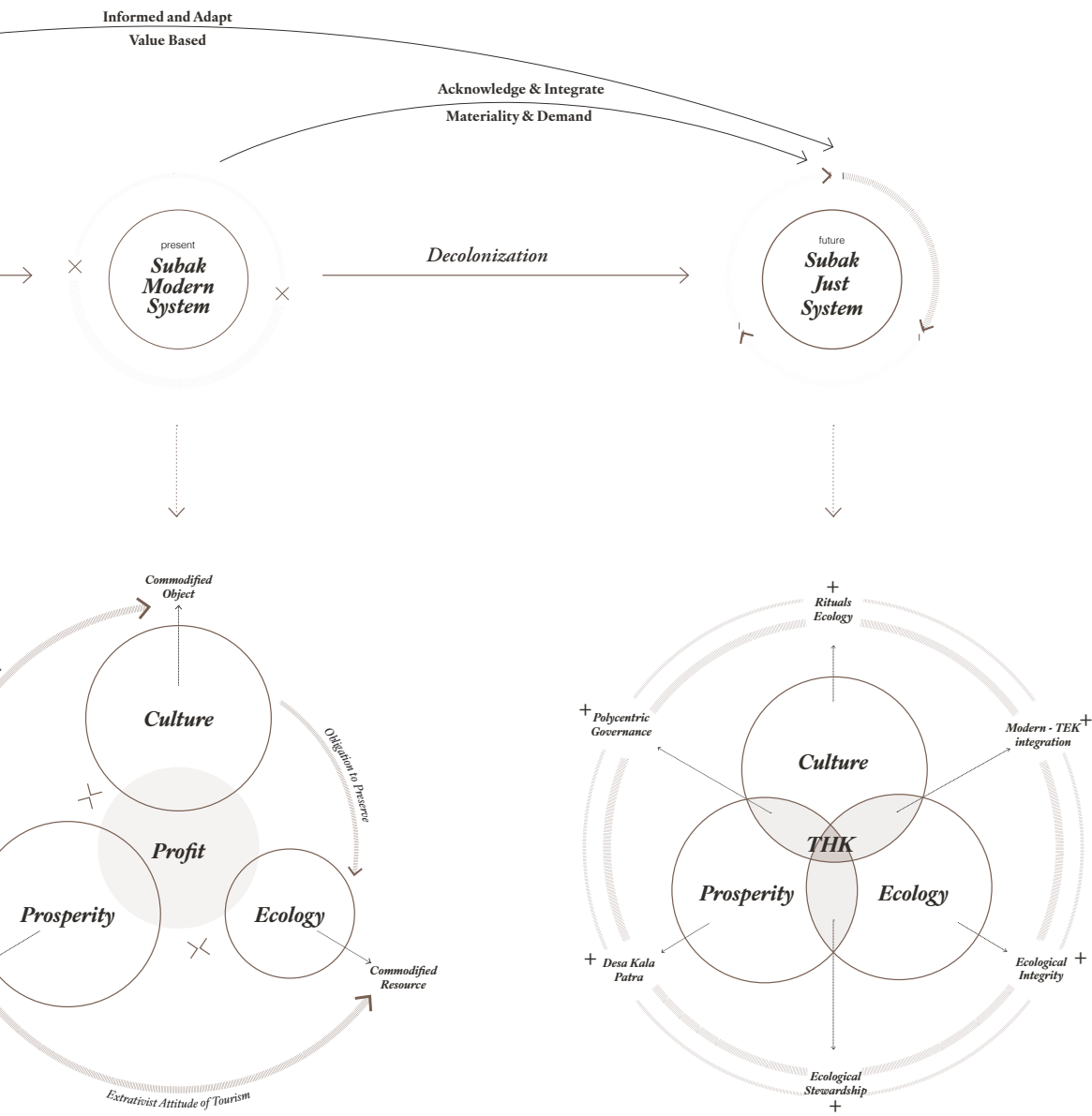


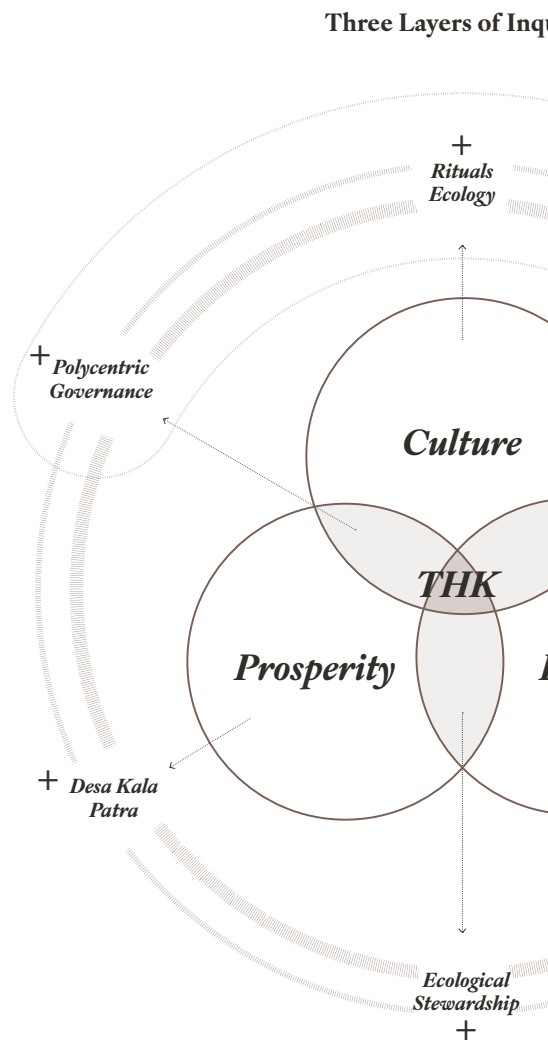
Fig 6.2 Synthesis of the three-layer analytical framework that informed the formation of the proposed vision.

# ii. Vision & Strategy

## Vision

My vision for future Subak practices involves a strategic reintegration and balance among cultural, ecological, and economic dimensions (see fig 6.3). Central to this vision is the restoration of traditional values and TEK, adapted thoughtfully to contemporary socioeconomic realities. Here, spatial planning and governance must return authority to Subak communities, supported by integrated practices of ecological preservation, stewardship, and polycentric governance.

Achieving this vision requires not only institutional reform but also a shift in epistemological recognition, acknowledging Subak as a dynamic, living system of knowledge and practice rather than a static heritage object. This entails creating enabling environments where intergenerational knowledge transmission is safeguarded, and where youth are actively involved in sustaining Subak’s relevance in contemporary life. Strengthening networks between Subak communities, local governments, and academic institutions can foster innovation rooted in tradition, enhancing resilience in the face of environmental uncertainty and socio-economic change. By embracing a pluralistic and adaptive planning model, Subak can serve as both a site of resistance to extractive development and a foundation for regenerative futures (see fig 6.4 for the vision).



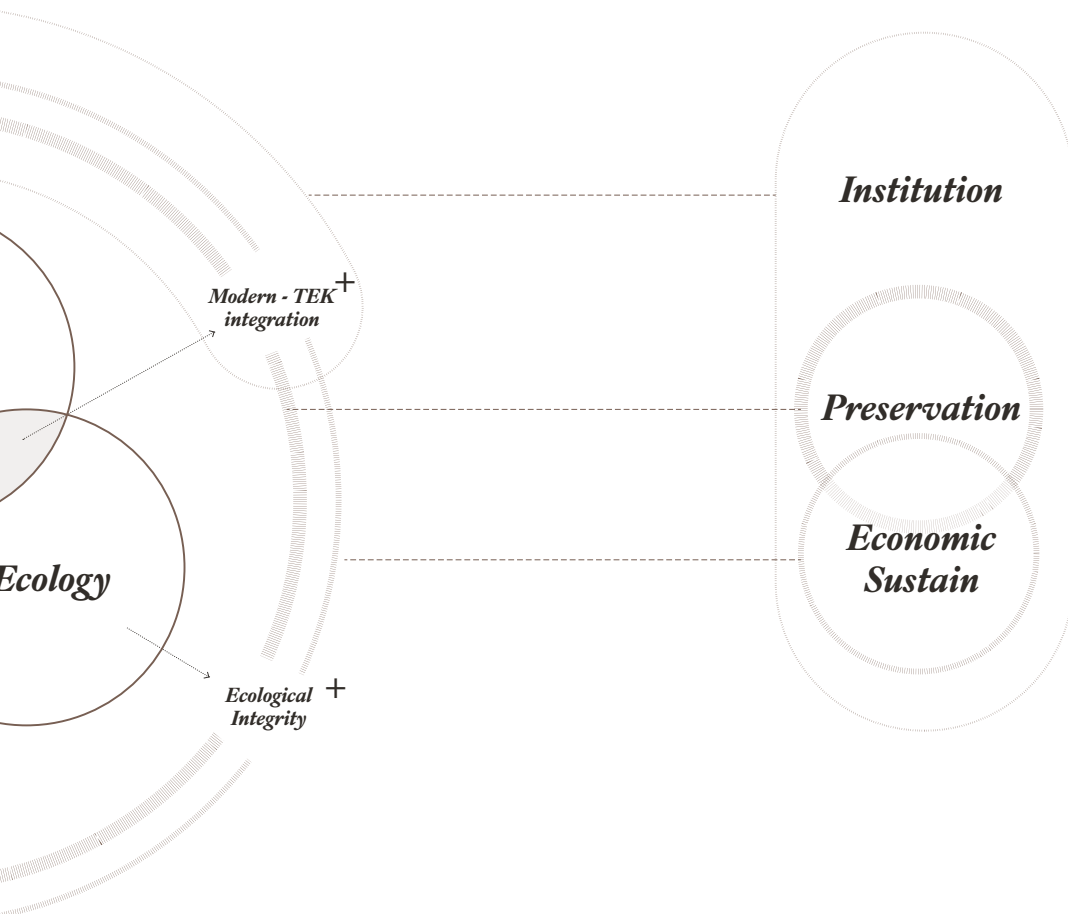


Fig 6.3 Vision proposal derived from the three-layer analytical framework, integrated with corresponding strategic layers.

# *Just Development for Indigenous & Local in Subak's Hydro*



# *Development Local Communities Hydrosocial Territories*



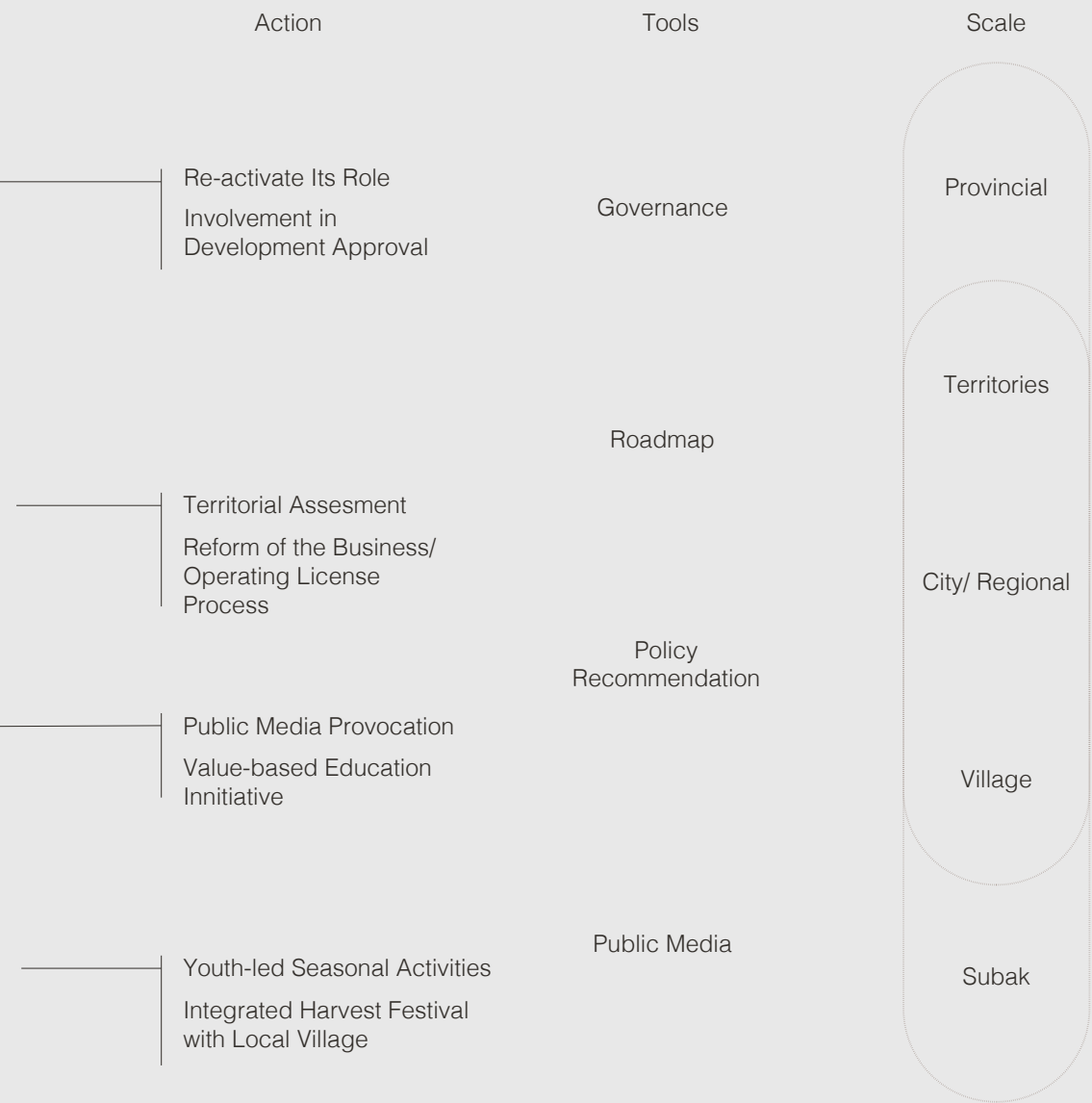
Fig 6.4 Vision for Subak's Hydrosocial Territories

# Strategy

Building on this vision, the proposed framework is further developed around three key systems: institutional governance, cultural-ecological preservation, and economic sustainability. Within these systems, this research outlines four core strategies aimed at guiding the transition toward just development in Subak’s hydrosocial territories. These strategies include concrete recommendations for policy integration, community empowerment, environmental stewardship, and inclusive economic models that align with Subak’s values and territorial logic.



Fig 6.5 Breakdown of system layers into corresponding strategies, followed by actionable responses, tools, and scales of implementation.



# iii. Reactivation

## Sedahan Agung Role

### Goals

To strengthen the protection and sustainable management of Subak territories, this proposal recommends reactivating and expanding the role of the Sedahan Agung, a traditional institution that historically served as a key intermediary between Subak communities and formal government structures. Beyond its established ecological and ritual functions, the Sedahan Agung should be formally integrated into spatial and development planning processes within its territorial scope. Importantly, however, this institution should remain independent from the formal state apparatus. Rather than being subordinated to government authority, the Sedahan Agung should be more closely aligned with Subak communities and indigenous groups, ensuring that planning processes are rooted in local knowledge systems and values.

### Action

- Re-activate Sedahan Agung role with additional function
- Involvement into development approval process.

### Who need to participate

Sedahan Agung, Sedahan Agung, Subak communities, customary village (desa adat), spatial planners, environmental scientists, local government.

### Who will opposed

Developers benefiting from unregulated construction; bureaucratic actors resisting power redistribution.



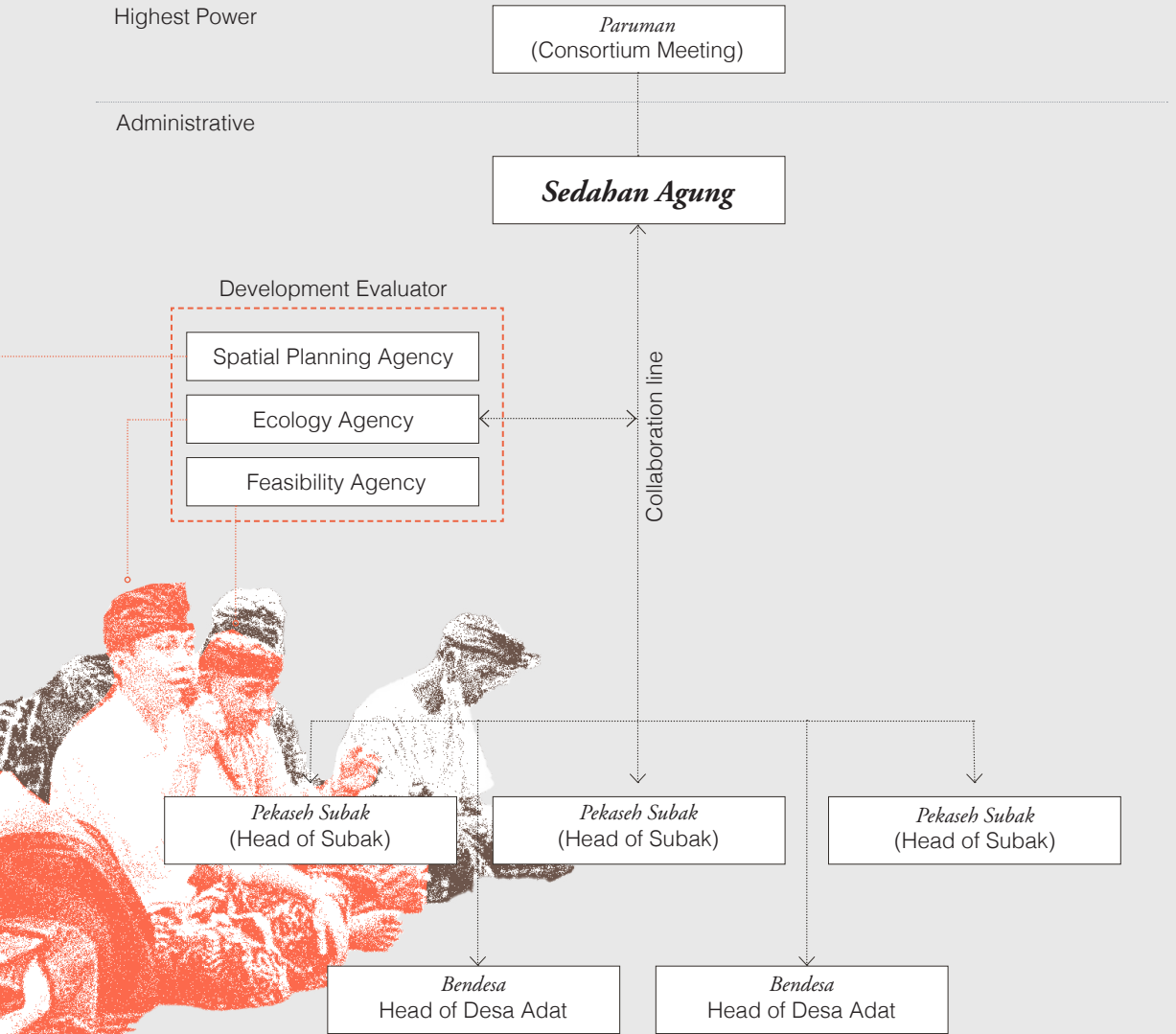


Fig 6.6 Organizational system to re-activate Sedahan Agung's role in the territories



Action

### Feasibility Study

Reviewing and providing  
recommendations on proposed  
development projects

Communicate with all Subak's Pekaseh in  
the same Watershed & Coordinate with  
Customary & Service Village

### Construction

Assessing constru  
to Subak's spatial

Monitoring imp  
the const

Activity

### Territorial Assesment

Follow the Territorial Zonning and  
Proximity Assesment

Periodic Soil  
Asses

Periodic V  
Asses

Periodic S  
Asses

Result

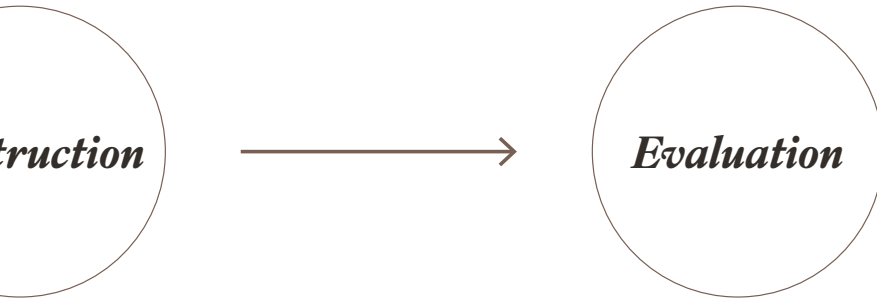
### Give Recommendation

### Letter for Developer

as Part of Feasibility Study for Development

### Com Recomm

Provide a recommen  
recommendation



## Construction Monitoring

Construction plans in relation to environmental and ecological values  
Implementation during construction phase

## Operational Assessment

Evaluating environmental and social impacts during the operational stage of new developments

### Soil & Water Quality Assessment

#### Water Intake Assessment

#### Social Impact Assessment

### Periodic Soil & Water Quality Assessment

#### Periodic Water Intake Assessment

#### Periodic Social Impact Assessment

## Compliance Recommendation

Recommendation for sanction or a recommendation for tax reduction

## Compliance Recommendation

Provide a recommendation for sanction or a recommendation for tax reduction

Fig 6.7 Scheme outlining the procedures and responsibilities that the Sedahan Agung must follow as part of their newly assigned task force.

# iv. Territories Zoning & Protection

## Goals

To establish a community-informed, ecologically responsive permitting system by integrating territorial assessment into the formal development approval process. This ensures that development within Subak territories is aligned with ecological thresholds and cultural values.

## Action

- **Territorial Zoning Planning**, which classifies land based on ecological function, protection status, and allowable development intensity;
- **Proximity Assessment**, which evaluates the spatial relationship between the proposed development site and critical hydrological features, such as rivers, springs, and irrigation channels
- **Reformed Business/ Operating License Process**, which is a revised permitting framework that formally incorporates community-based authority into the spatial planning and approval process.

## Who need to participate

- Sedahan Agung (as an expert council overseeing spatial and ecological review)
- Customary Village (Desa Adat) (ensuring cultural compatibility and community accountability)
- Local government agencies (Dinas PUPR, DLH, BPN)
- Developers (required to consult with customary bodies in early-stage planning)
- Spatial planners & environmental consultants (technical implementation)

## Who will opposed

- Developers and investors preferring fast-track permits without community involvement
- Centralized permitting authorities resistant to power-sharing with local/customary bodies
- Landowners in ecologically restricted zones looking to sell or convert their land for profit



This zoning framework challenges the dominant spatial logic of RTRW, which reflects technocratic and extractive tendencies rooted in economic utility and rigid administrative boundaries. Instead, it re-centers Indigenous ecological knowledge, hydrosocial relationships, and cultural justice within spatial planning processes (see fig 6.8).

Grounded in the spatial logic of the Subak system, the framework is structured along the upstream-to-downstream (hulu ke hilir) continuum, honoring both hydrological function and cultural cosmology. Zoning categories are based on current land cover data combined with site-specific assessments of water infiltration capacity. Similar to RTRW in format but divergent in intent, each zone defines permitted activities, building coverage ratios (BCR), green ratios, and suitable construction materials, emphasizing ecological permeability and cultural appropriateness over uniform regulation. Hydrological conditions are explicitly considered to inform infrastructure decisions that protect water flow and soil integrity.

The framework also outlines governance mechanisms for each zone, identifying responsible actors (e.g., krama subak, desa adat) and proposing monitoring indicators. A second layer of territorial analysis is applied by assessing the zones' proximity to river corridors, which are essential to both Subak irrigation and ritual life.

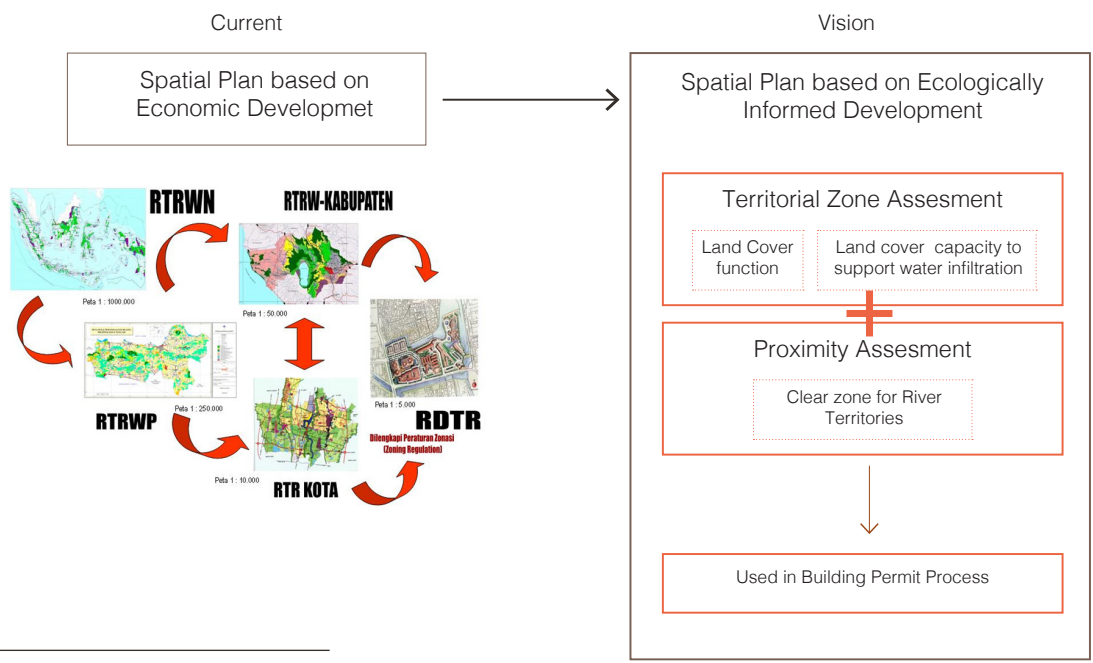



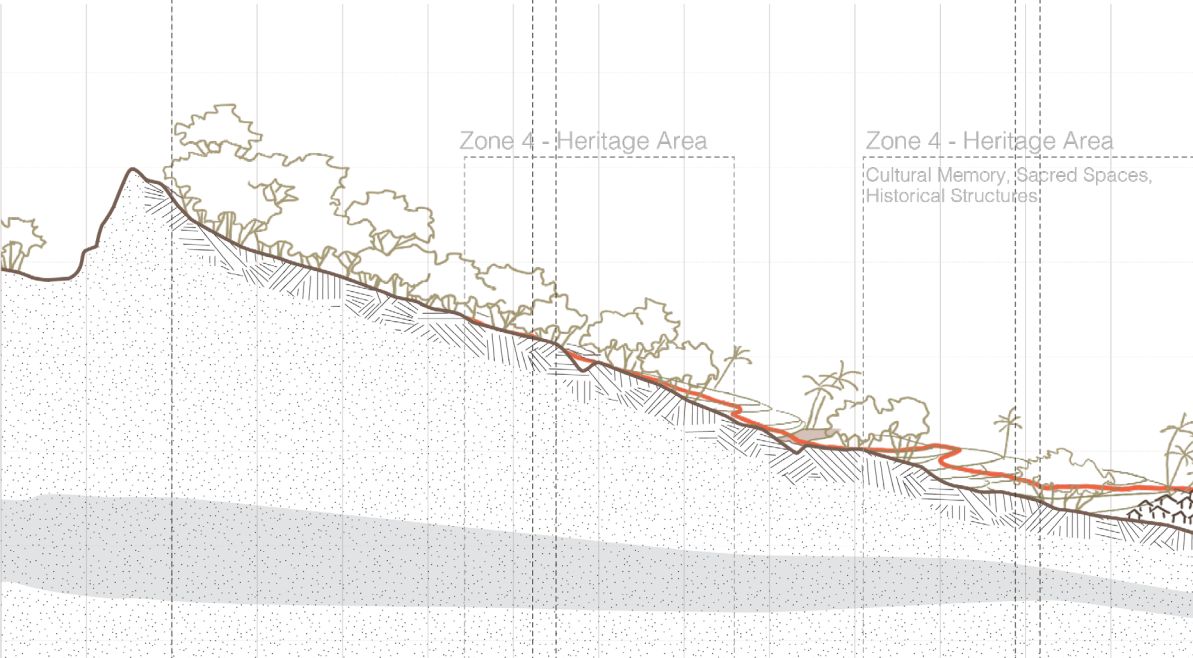





Fig 6.8 Comparison between the current spatial planning logic and the proposed vision that emphasizes ecological and social dimensions.





Fig 6.9 Spatial map illustrating the zoning layers of ecological territories.

	Zone 1 - Protected Forest	Zone 2 - Agroecological Buffer	Zone 3 - Suba
Cultural Value	Swah (head)	Bwah (Body)	
Function	Conservation, spiritual protection, ecological buffer	Agroforestry, buffer zone between forest and rice paddies	Rice farming & H
Allowed Activity			
Building Coverage Ratio (BCR)	<div><div></div></div> 0-2%	<div><div></div></div> 2-5%	<div><div></div></div> 2-8%
Green Ratio	<div><div></div></div> >97%	<div><div></div></div> 93-98%	<div><div></div></div> 90-98%
Materials	Bamboo, palm leaves, reclaimed wood, natural stone, red brick	Bamboo, palm leaves, timber, natural stone, red brick, reuse materials	Bamboo, thatch,
			
Hydrological Condition	High - Very High	High - Very High	Low - High
Hydrological Consideration	<div><div></div></div> Maintain high infiltration	<div><div></div></div> Allow slow infiltration in certain function	<div><div></div></div> Uninterrupted w
Infrastructure Material	None, or minimal intervention (permeable materials) for Indigenous ceremonial use	Permeable path, natural stone, grass	Permeable path,
Community Governance			
Monitoring Indicators	Land cover, Signs of unauthorized access, Soil & Water Health	Soil and Water Health, BCR compliance	Soil and Water H



ak Core Zone

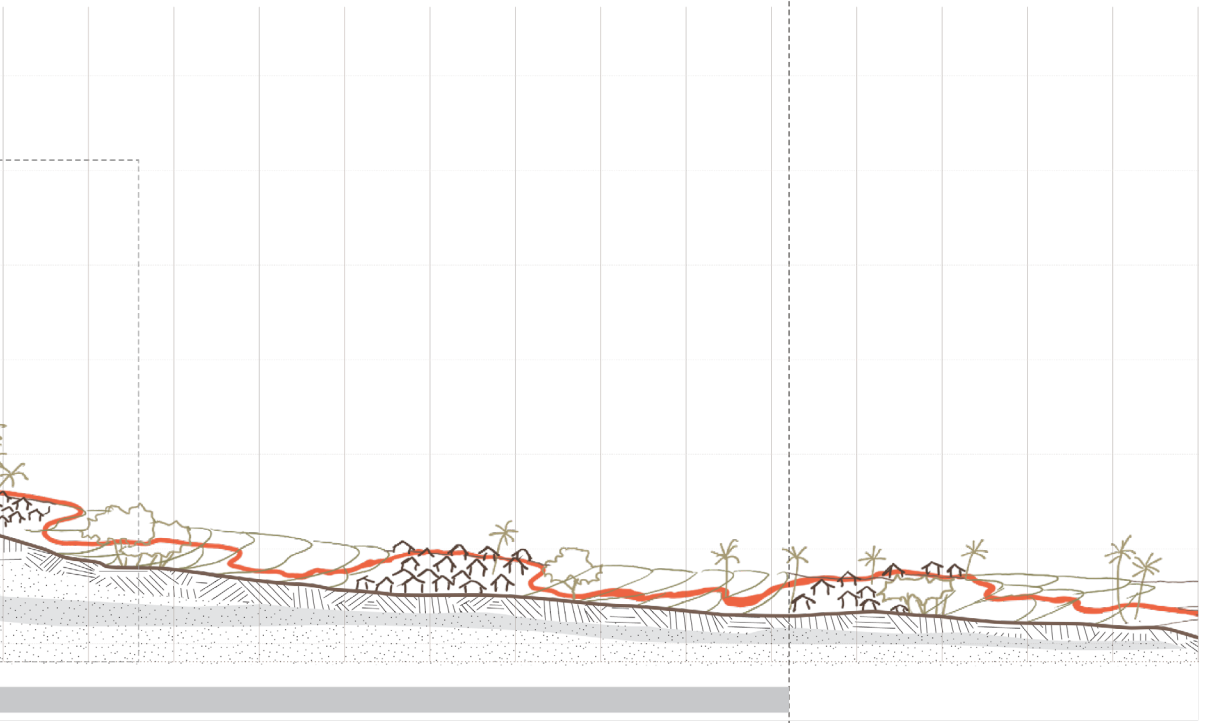
*Bwah (Body)*

*Bhur (Feet)*

Heritage Landscape



palm leaves, coconut fiber, timber, natural stone, red brick, reuse materials



water flow

natural stone, grass, raised walkways



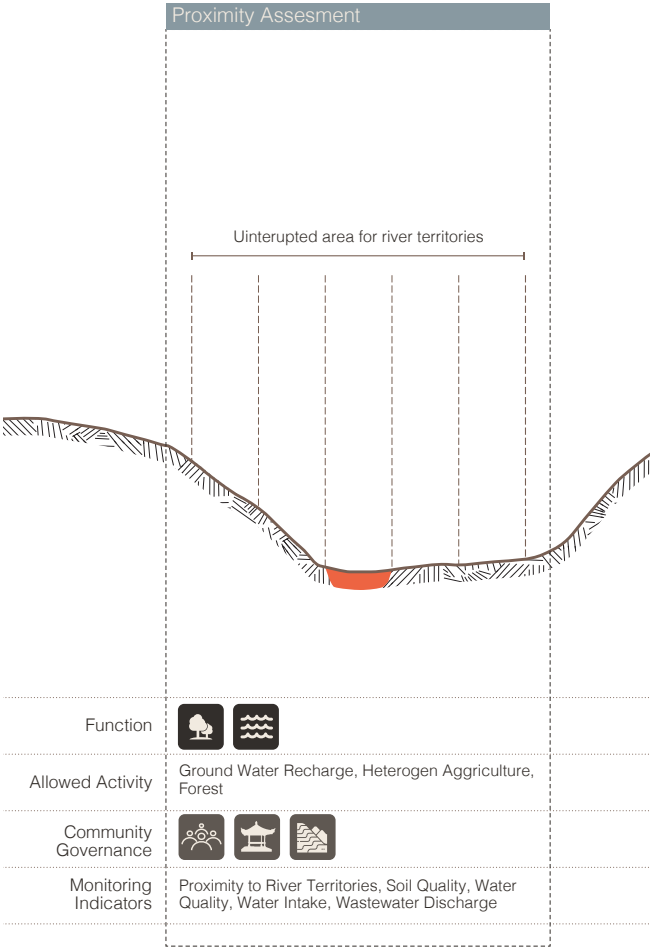
Health, BCR compliance, Crop Yields, Ceremony Access

Fig 6.10 Detailed strategies associated with each layer within the ecological territories zoning framework.

# Proximity Assessment

Following the territorial zoning framework, a secondary layer of assessment is applied to evaluate the proximity of built areas to water territories. This proximity analysis ensures that no development or activity occurs within the Clear Zone of river territories, in accordance with the Regulation of the Minister of Public Works and Public Housing No. 28/PRT/M/2015 on the Determination of River and Lake Border Lines.

For existing structures, such as tourism facilities or other built environments, that are located within or adjacent to the Clear Zone, a strict evaluation must be conducted. This includes regular assessments of their water intake and wastewater discharge practices, as well as soil and water quality monitoring in surrounding areas. The objective is to prevent contamination and maintain the ecological function of the river system, which is integral to both environmental sustainability and the integrity of the Subak hydrosocial system.



## River without embankment area

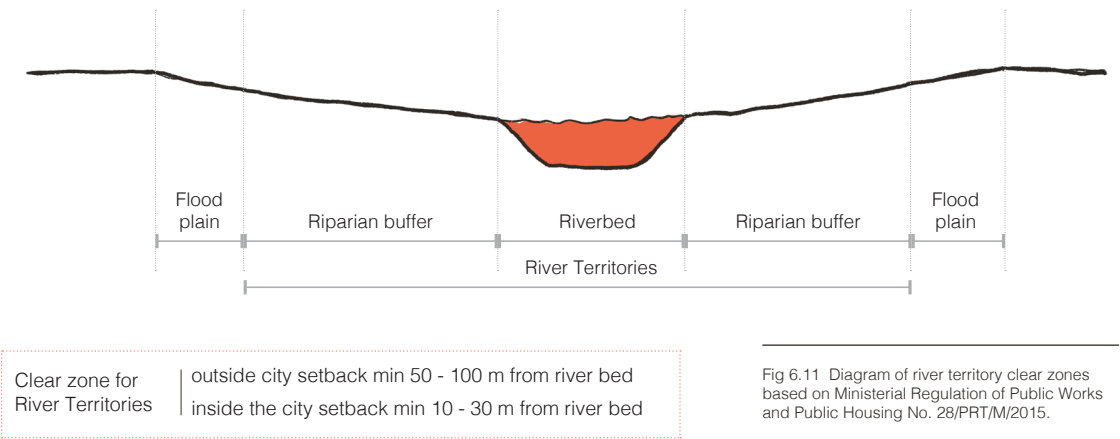


Fig 6.11 Diagram of river territory clear zones based on Ministerial Regulation of Public Works and Public Housing No. 28/PRT/M/2015.

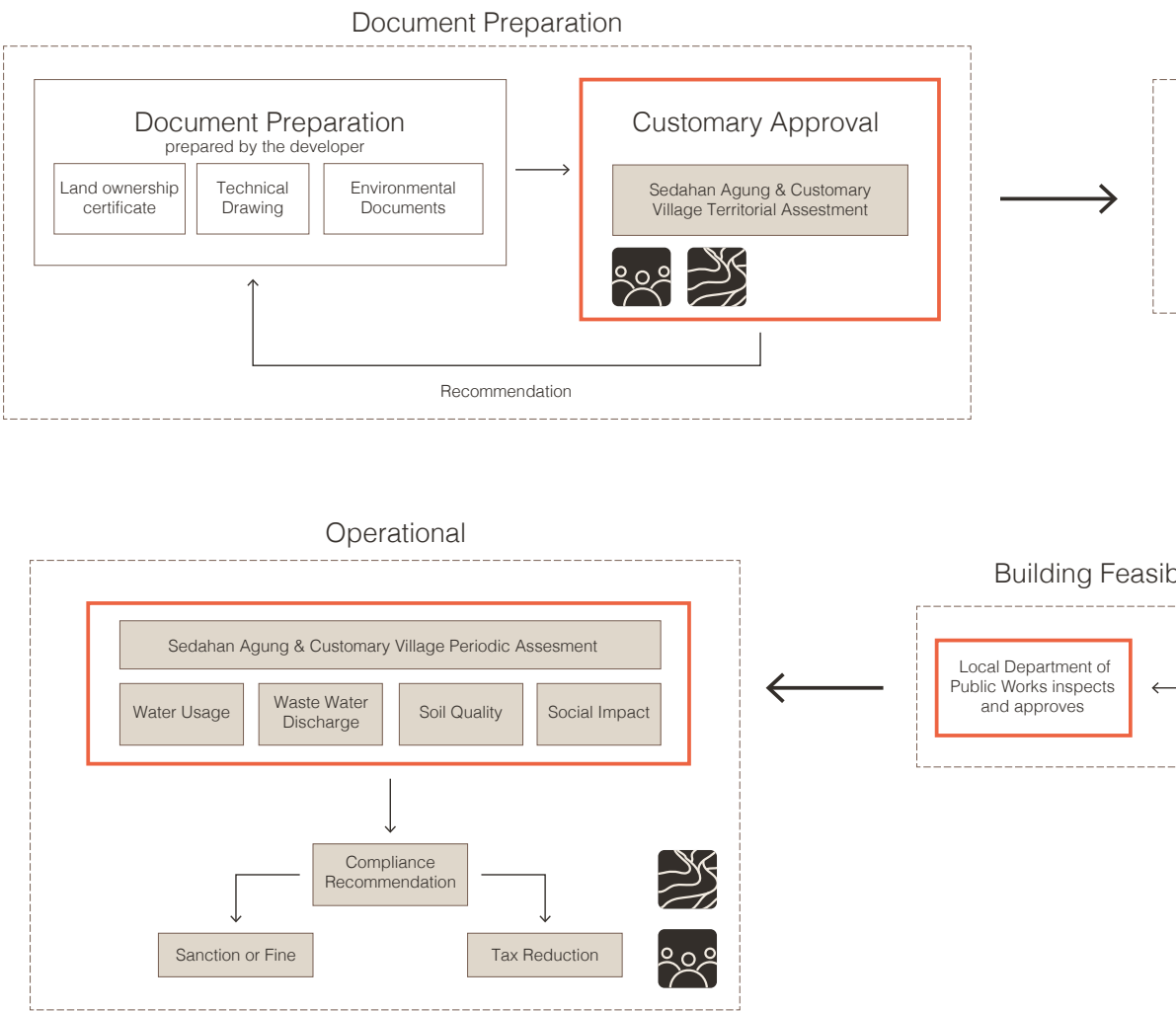


Fig 6.12 Proximity assessment diagram serving as the second analytical layer for evaluating development impacts.

# Reform of the Spatial Planning Permit Procedures for Business Operations

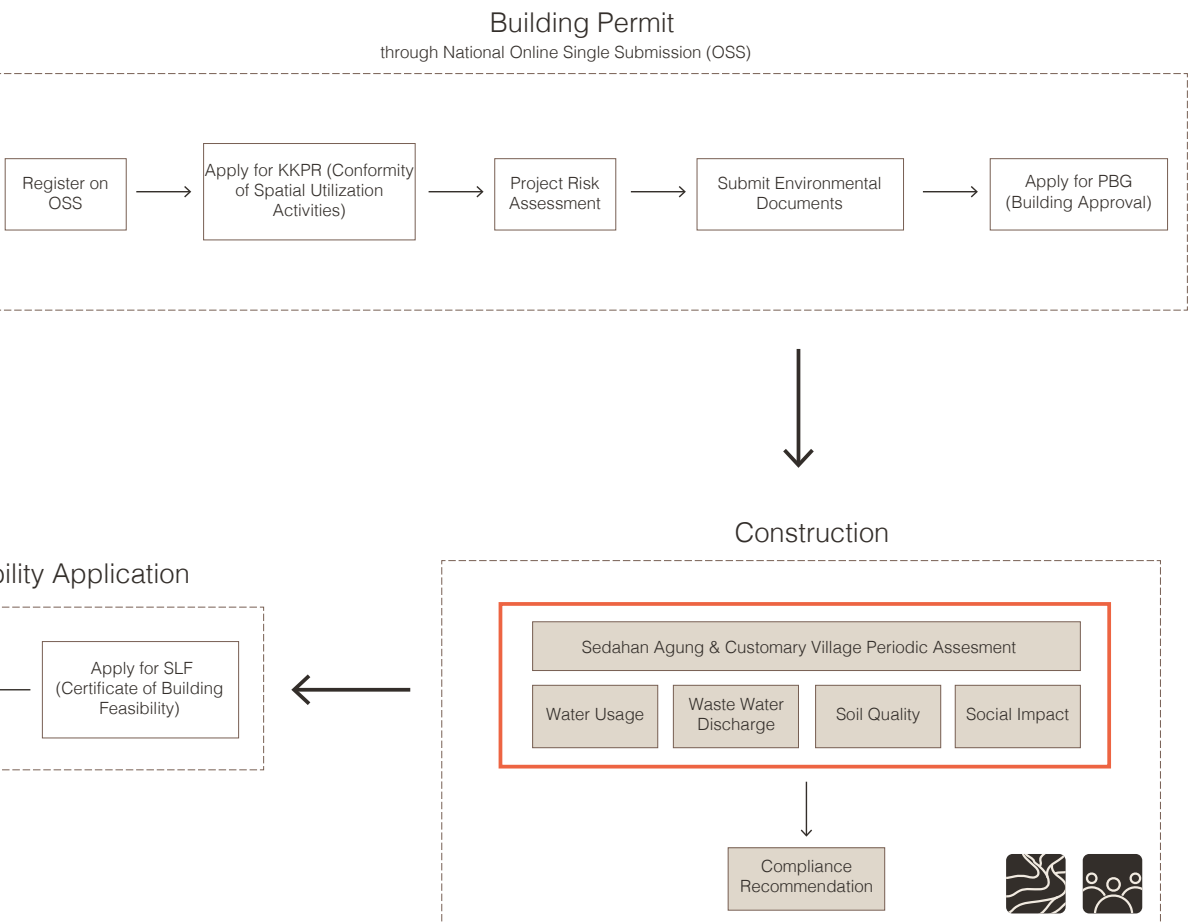
The current business/ operating permit process in Bali often excludes customary institutions and local communities, particularly Subak networks and customary village. This proposal (see fig 6.13) introduces a revised permitting framework that formally incorporates community-based authority into the spatial planning and approval process. Under this model, customary institutions, specifically Subak communities and desa adat, would be empowered to evaluate and issue recommendations on proposed developments based on a standardized territorial assessment of the site.

Fig 6.13 Proposed strategy for reforming spatial planning permit procedures for business operations.





A reactivated and restructured Sedahan Agung agency, equipped with expertise in spatial planning, hydrological systems, and environmental management, would act as the key representative body within this process. Together with the customary village, Sedahan Agung would conduct a preliminary feasibility assessment of proposed developments and issue a recommendation letter as a prerequisite for developers before proceeding to the national Online Single Submission (OSS) system. This step ensures that local socio-ecological priorities are considered from the outset of the planning process, aligning formal regulatory mechanisms with customary territorial governance.



# vi. Co-Production of Knowledge

## Goals

This strategy proposes a shift toward a new paradigm of care, an approach that reframes Subak not merely as a landscape of aesthetic value, but as a living cultural and ecological system that requires collective attention, advocacy, and intergenerational responsibility. It emphasizes two primary modes of engagement: public media provocation through film storytelling and value-based education.

## Action

- Public Media Provocation through arts, posters, photography, documentary films
- Value-based Communication Initiative booklets for public understanding and future education.

## Who need to participate

Artist, Filmmakers, educators, local youth, Subak elders, NGOs, schools, academia, media platforms, experts, tourist.

## Who will opposed

Stakeholders profiting from commodification of landscape; tourism marketers lacking ethical engagement.

## Public Media Provocation

The first mode involves the use of film as a medium of public engagement to raise awareness about the socio-ecological injustices occurring within Subak territories. By portraying the lived experiences of Subak communities, including their environmental struggles, traditional practices, and the pressures of tourism-driven development, documentary storytelling can generate empathetic understanding and public discourse. The goal is to create a viral, widely circulated narrative that captures public attention and ultimately pressures policymakers to act. This “viral-based advocacy” model aims to draw attention to current violations in Subak territories, particularly those involving unauthorized water intake and wastewater discharge, which threaten the integrity of the system.





*watch here*



Fig 6.14 Social media campaign materials—poster and film—designed to provoke public awareness and engagement.

# Value-based Communication Initiative

This trilogy book of subak tells three interconnected stories of Subak:

- Vol 1-The story of Indigenous knowledge systems that have shaped Subak for generations,
- Vol 2-The story of Subak's present-day struggles amid external pressures and land use change, and
- Vol 3-The story of hope, how Subak may evolve while staying rooted in its cultural values.

The booklet is designed as a communication tool, especially for the public and tourists, to help them understand that Subak is not merely a heritage object or a landscape to observe. It is a living, dynamic system, deeply embedded in the everyday life, cosmology, and agricultural practice of the Balinese people.

In the long term, care must also be cultivated through education that redefines preservation, moving beyond a static understanding of landscape beauty to one that recognizes Subak as a dynamic socio-cultural and ecological system. This booklet also serves as an educational resource for younger generations, helping them reconnect with and appreciate the legacy of Subak. Educational efforts should emphasize the institutional complexity, ritual practices, and community governance structures that sustain Subak. The primary target audience is the younger generation, with the aim of fostering deeper connections to land, water, and tradition.

This educational strategy may take the form of a series of illustrated booklets or digital media that document the past, present, and future of Subak. These materials would serve not only as learning tools but also as instruments of cultural continuity. By reframing farmers and Subak stewards as cultural guardians, rather than as occupying a lower socio-economic status compared to tourism workers, the initiative seeks to revalorize agricultural identities and encourage youth participation in the stewardship of Balinese landscapes.



Fig 6.15 The Subak Trilogy Book as a communicative medium, with potential development into an educational tool for younger generations.

# *How to Read The Book?*

*This booklet is part of a three-part journey through Subak the living water system that has shaped Bali's landscapes, livelihoods, and beliefs for centuries.*

*You can read each book on its own, or follow them in order to understand the full story: from its sacred roots, to its fragile present, and toward the futures we can imagine and create.*

*Each booklet invites you to reflect, observe, and listen — not only to the words, but to the voices of the land, the water, and the people who still live by it. At the end of each book, you'll find a path leading you to the next.*

*We invite you to follow the flow.*

## *Volume 1*

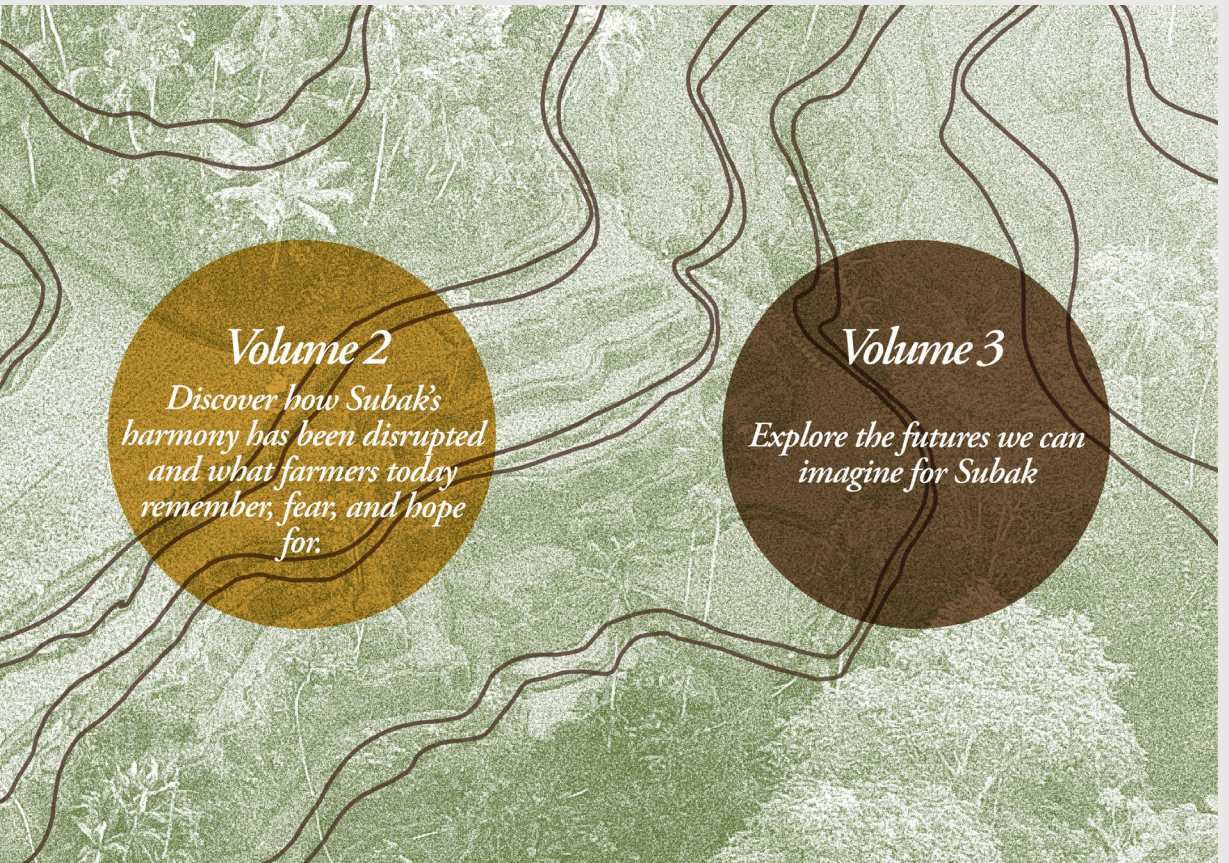
*Learn more about Subak  
Indigenous knowledge &  
Why its sacred logic  
continues to inspire awe*

Book of Subak

## *Indigenous Knowledge System*

volume 1

Fig 6.16 Guide to understanding and engaging with The Subak Trilogy Book.

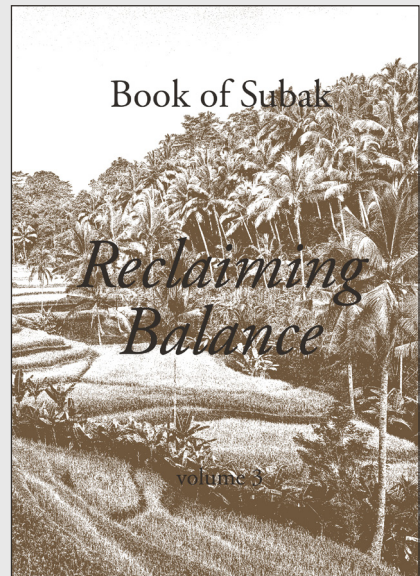
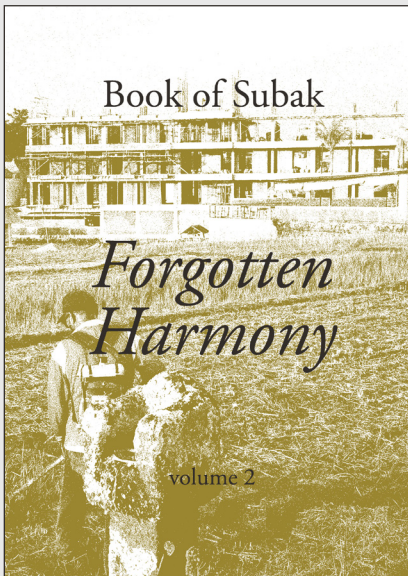


## *Volume 2*

*Discover how Subak's harmony has been disrupted and what farmers today remember, fear, and hope for.*

## *Volume 3*

*Explore the futures we can imagine for Subak*



# v. Diversivied Economic

## Goals

The objective of this strategy is to promote a wider range of economic opportunities that are rooted in the territorial context and cultural practices of Subak communities. This approach not only aims to strengthen local livelihoods but also seeks to restore a sense of pride in farming and environmental stewardship, particularly among younger generations.

## Action

- Youth-led Seasonal Activities
- Integrated Harvest Festival with Local Village

## Who need to participate

Farmers, youth, desa adat, local SMEs, tourism cooperatives.

## Who will opposed

Business actors prioritizing monocultural tourism; stakeholders in land conversion.





## Youth-led Seasonal Activities

Seasonal programming based on the rice cultivation calendar could be designed to engage children and youth in meaningful roles, from event planning to on-site coordination. This participatory model encourages intergenerational knowledge transfer and cultivates a sense of ownership and responsibility for the continuation of Subak-related cultural and economic practices. By embedding educational and entrepreneurial opportunities within Subak territories, this strategy supports both economic diversification and the long-term sustainability of the Subak system.



Fig 6.17 Illustrative activities supporting economic diversification as an alternative to reliance on tourism monoculture.

# Integrated Aggribusiness with Local Government & Business

One proposed initiative is the integration of agricultural festivals with activities organized by the customary village (desa adat). These festivals could be held annually or semi-annually, aligning with key moments in the agricultural cycle such as harvest season. They would serve as platforms for farmers to sell locally grown produce and value-added products, such as traditional food and beverages processed by the community. In doing so, the festival fosters economic activity while also reinforcing the cultural significance of Subak landscapes.





Farming  
Education



Plowing  
Experience



Gathering  
Place



Harvest  
Market



Seasonal  
Market

The Great Temple of  
Peguyangan

SDN 1 Peguyangan  
Elementary School

Housing area

# vii. Pathway Strategy

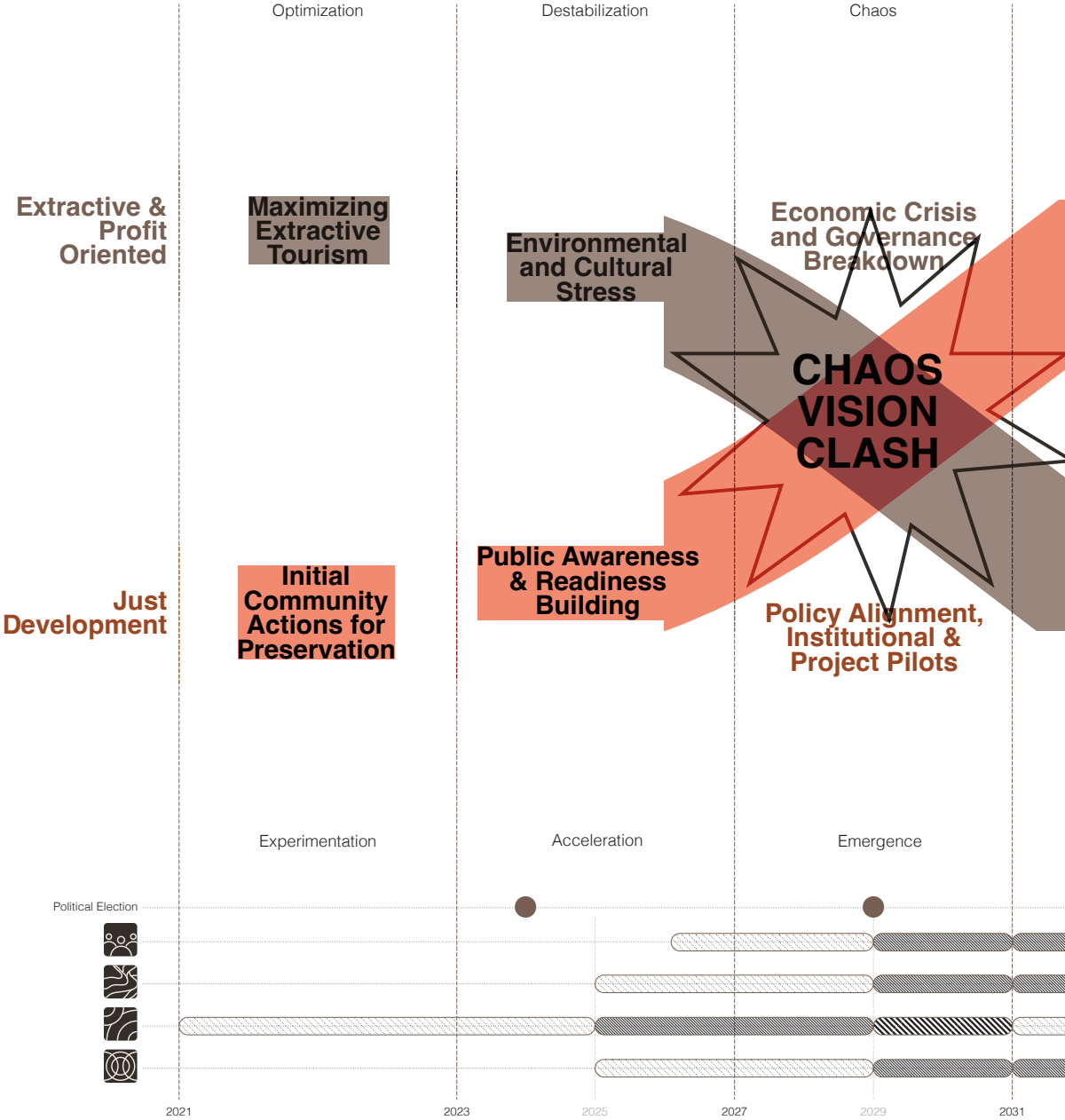


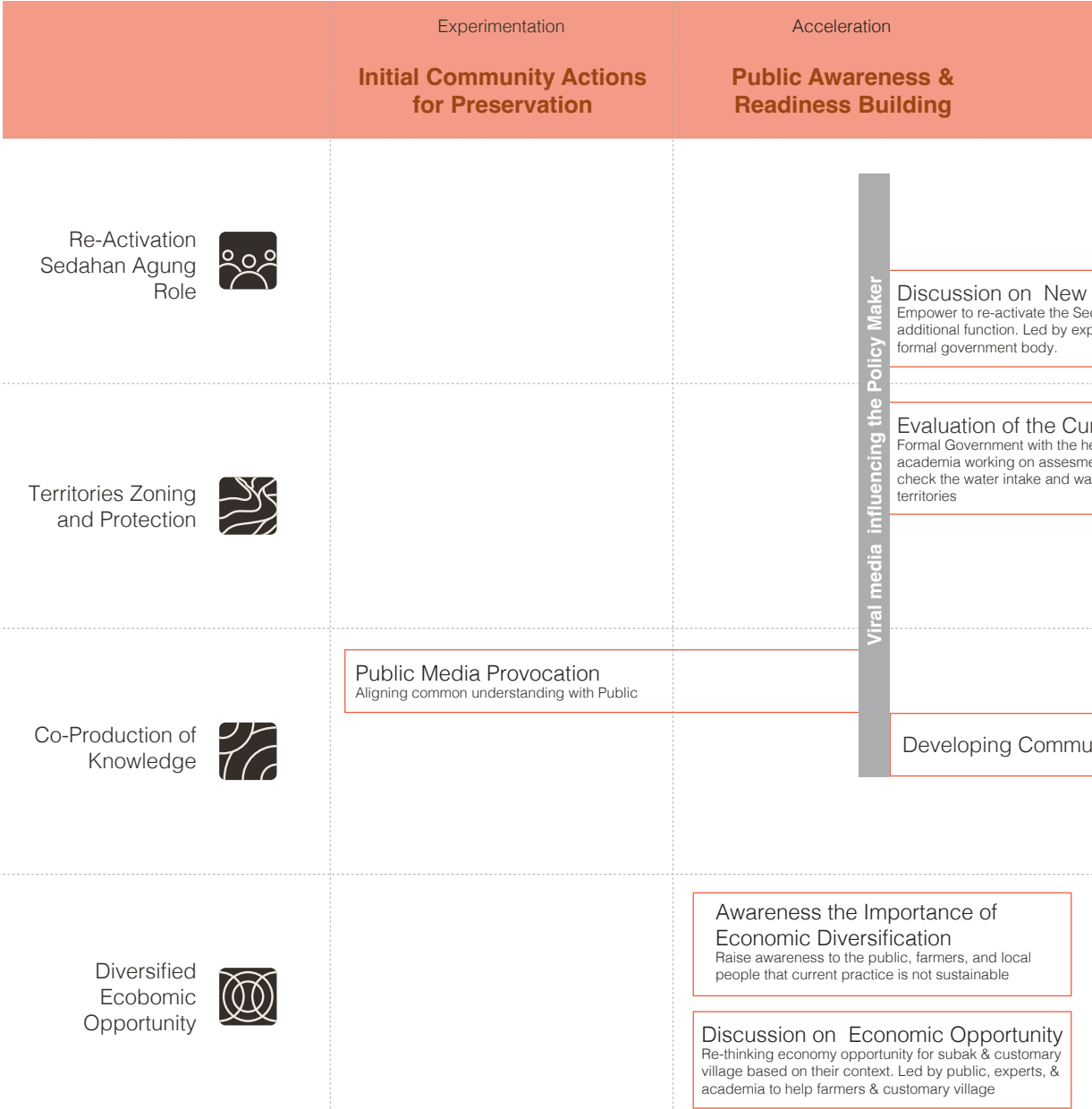
Fig 6.19 X-Curve diagram illustrating the transition pathway toward just development within Subak's hydrosocial territories.

To support a just development transition within Subak's hydrosocial territories, this research employs the X-Curve framework, a visual and strategic tool used to understand and navigate socio-technical transitions. By applying the X-Curve, the intention is to identify priority actions and align each step with clearly defined transition goals, ensuring that interventions are both strategic and contextually grounded.



The specific actions associated with each stage of the X-Curve transition framework are elaborated in the diagram presented below.

Fig 6.20 Detailed actions and activities aligned with the transition pathway toward just development within Subak's hydrosocial territories.



Emergence		Institutionalization		Stabilization	
Policy Alignment, Institutional & Project Pilots		Scaling Up & Institutionalizing Practices		Optimization & National Integration	
	Policy Alignment, Set Up Evaluation and Monitoring System		Institutionalized the New Agency		Influence the National Government
Agency Adhan Agung role with experts and academia inviting	Pilot Project of 1 Subak Gede (Initiation & Monitoring) Collaboration of expert, sedahan agung, subak gede, formal government.	Pilot Project of other Subak Gede			
Current Business Help of experts and ment of current business to ste management in subak				Integrate with The Environmental Planning for Bali	
	Policy Alignment, Set Up the Territorial Zoning & Assesment				
Communicative Tool for Public					
	Developing Communicative Tool for Education Create education module for ethics of care towards subak practice		Integrate the education modul to the curriculum		
Pilot Project of 1 Subak in the same Subak Gede Pilot Project as other strategy  Proces of Pilot Project involving the local youngster in order to create sense of belonging for the young generation & see farming also future opportunity. Collaborate also with the customary village or service village nearby.		Establish the event as annual or twice a year event			



An aerial photograph of a terraced rice field in a tropical landscape, with palm trees and dense vegetation surrounding the terraces. The image is in a dark, monochromatic style, likely sepia or dark brown, which serves as the background for the text.

volume 4  
to reflect

# Continuity & Conclusion

Subak Tegalalang Landscape  
Source: Silas Baisch on Unsplash (2023)

# VII

## Continuity

- i. Lesson for Future of Bali
- ii. Lesson for Future of Indonesia



Fig 7.1 Tourism promotion poster inviting visitors to Bali, Indonesia, by Garuda Indonesia's 1950 advertisement. Author edited from poster on NOW! Bali (2024)

# i. Lesson for Future of Bali

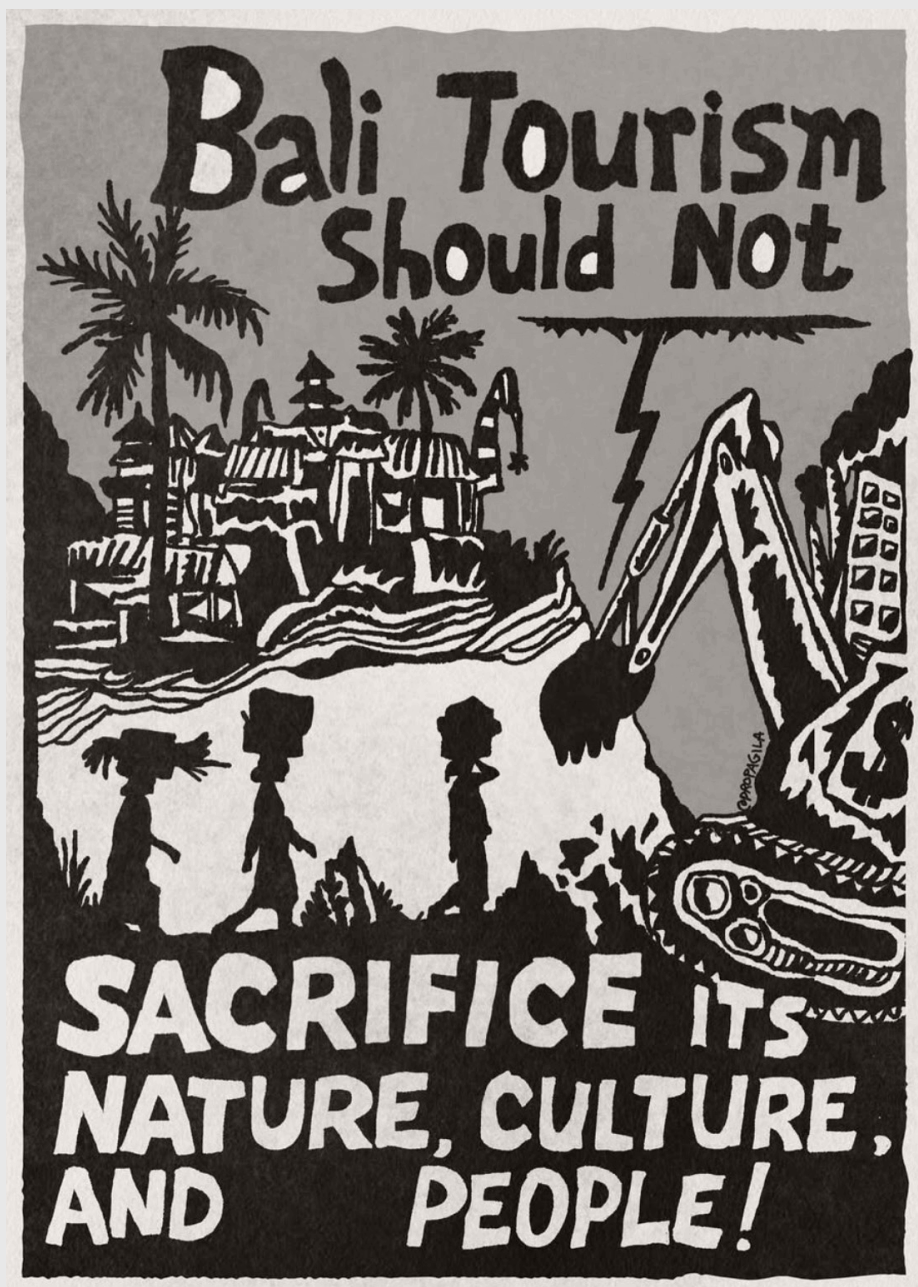
The strategies I propose to address spatial and social injustices in Subak territories are also applicable to Bali as a whole. Subak is not merely an irrigation system but a territorial and cosmological framework that upholds ecological balance through upstream-downstream interdependencies. Forests in the highlands, maintained by indigenous communities, serve as vital water catchment areas, running through soil that is mineral-rich due to volcanic activity, which feed essential to the terraced rice fields below. This interconnectedness reflects the integrated socio-ecological system that sustains Subak. Therefore, I proposed solutions through territorial assessments, protective zoning plans, and reformation of the building permit system. These solutions are essential not only to safeguard Subak but also to preserve Bali's indigenous forests, cultural landscapes, and its people.

There is also an urgency to shift Bali's economic paradigm, as its heavy reliance on tourism as its primary economic driver made local communities vulnerable. Alternative, community-driven economic activities should be promoted to give people options beyond tourism, particularly forms of tourism that commodify them and their culture without offering resilience or sustainability. This transformation requires collaboration across all sectors, government, academia, NGOs, and especially youth communities, to rethink development pathways rooted in local capacity and cultural and ecological values.

While tourism cannot be eliminated entirely from Bali, it is possible to reimagine its future. As illustrated in Figure 7.2, which states, "Bali's tourism should not sacrifice its nature, culture, and people," the current model must be reoriented to prioritize long-standing socio-cultural and environmental systems. Tourism must evolve beyond the "tourist-as-king" mindset and toward a model in which local communities are recognized as primary agents, subjects rather than objects, of development.

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Fig 7.2 Provocative Painting by Gilang Propagalia  
Authored edited from instagram @gilangpropag  
(2024)



Encouragingly, such awareness is already emerging within Bali's youth and art communities. They are increasingly vocal in critiquing extractive tourism practices through visual art, performances, and public discourse. Their activism reflects a growing movement to reframe development in ways that uphold environmental integrity, cultural dignity, and social justice. Several initiatives and actions have begun shifting public narratives, fostering more sustainable and community-centered tourism futures, such as through the Ubud Writers Festival, Nuturang communities, and social movement from Berhak Bergerak. Although they cover different topics, they all share the same goal of promoting social and environmental justice.



Berhak Bergerak, active mobility movement

Activism through zine making

Ubud Writers Festival, room for critical discussion



Fig 7.3 Youth-led movements and initiatives promoting sustainable and just development in Bali.

# ii. Lesson for Future of Indonesia

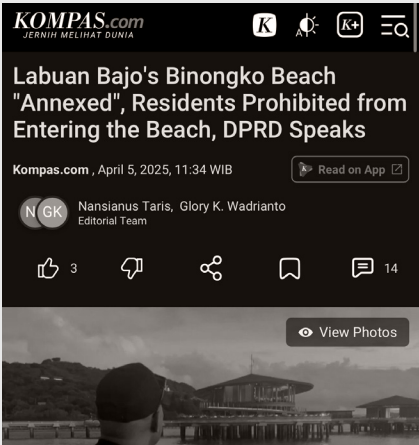
The extractive tourism model in Bali should serve as a lesson learned for the rest of Indonesia's tourism planning. Tourism remains a key economic sector, contributing significantly to the nation's GDP. In 2023, Indonesia's tourism revenue reached USD 14.63 billion, accounting for 4.1% of GDP, driven by a post-pandemic surge in foreign visitors (Indonesia's Tourism on the Rise, 2024). Since 2016, the government has pursued a "10 New Bali" strategy, prioritizing destinations such as Borobudur, Mandalika, Labuan Bajo, Lake Toba, and Wakatobi (see fig 6.6). These places, rich in natural and cultural heritage, have become focal points for rapid tourism development. However, many of the same issues seen in Bali are now recurring in these areas.

Fig 7.4 Indonesia's Ministry of Tourism plan (since 2018) to develop ten priority tourism destinations across the country, modeled after Bali.



Fig 7.5 News coverage highlighting the ecological and social negative impacts of business-as-usual tourism development in the ten priority destinations across Indonesia.

For example, investigative reports have documented land rights violations in Mandalika (BBC Indonesia, 2021; Mongabay, 2024), restricted public access to beaches in Labuan Bajo (Kompas, 2025), and ecological threats to Komodo National Park (VICE, 2021). These were a few cases that were recognized by the media. It reflects a pattern of tourism that exploits local resources and marginalizes local communities while selling their cultural identity and natural beauty to the world for the benefit of the tourism industry.



There is an urgent need to shift the tourism paradigm. Rather than positioning local communities as passive objects of tourism, they must become active subjects with agency in shaping the direction of tourism (see fig 6.6). A just and sustainable tourism model must prioritize local communities, learn their cultural practices, and respect environmental integrity, allowing communities to define their development without sacrificing their daily lives or ecosystems.

Subak teaches us that development can be grounded in care rather than extraction. Its governance system, deeply cultural, ecological, and community-led, offers a compelling model for how other regions in Indonesia might re-center indigenous wisdom and ecological justice in the design of tourism futures. What makes Subak unique is not merely its irrigation infrastructure, but its enduring capacity to sustain ecology, culture, and collective responsibility amidst rapid transformation. This research positions Subak not as a nostalgic relic, but as a strategic reference point for imagining just, resilient, and post-extractive development pathways across the archipelago, particularly in regions increasingly targeted by state-led tourism expansion. In this context, the development of the “10 New Balis” initiative, launched in 2018, calls for serious reconsideration. Rather than replicating extractive tourism models, future tourism planning should be grounded in local value systems, place-based governance, and cultural-ecological integration, as exemplified by Subak. By learning from Subak, Indonesia has the opportunity to craft a more sustainable and inclusive vision for its tourism economy.

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Fig 7.6 Diagram illustrating the paradigm shift in tourism development.



# VIII

## Conclusion

- i. Summary
- ii. Further Research

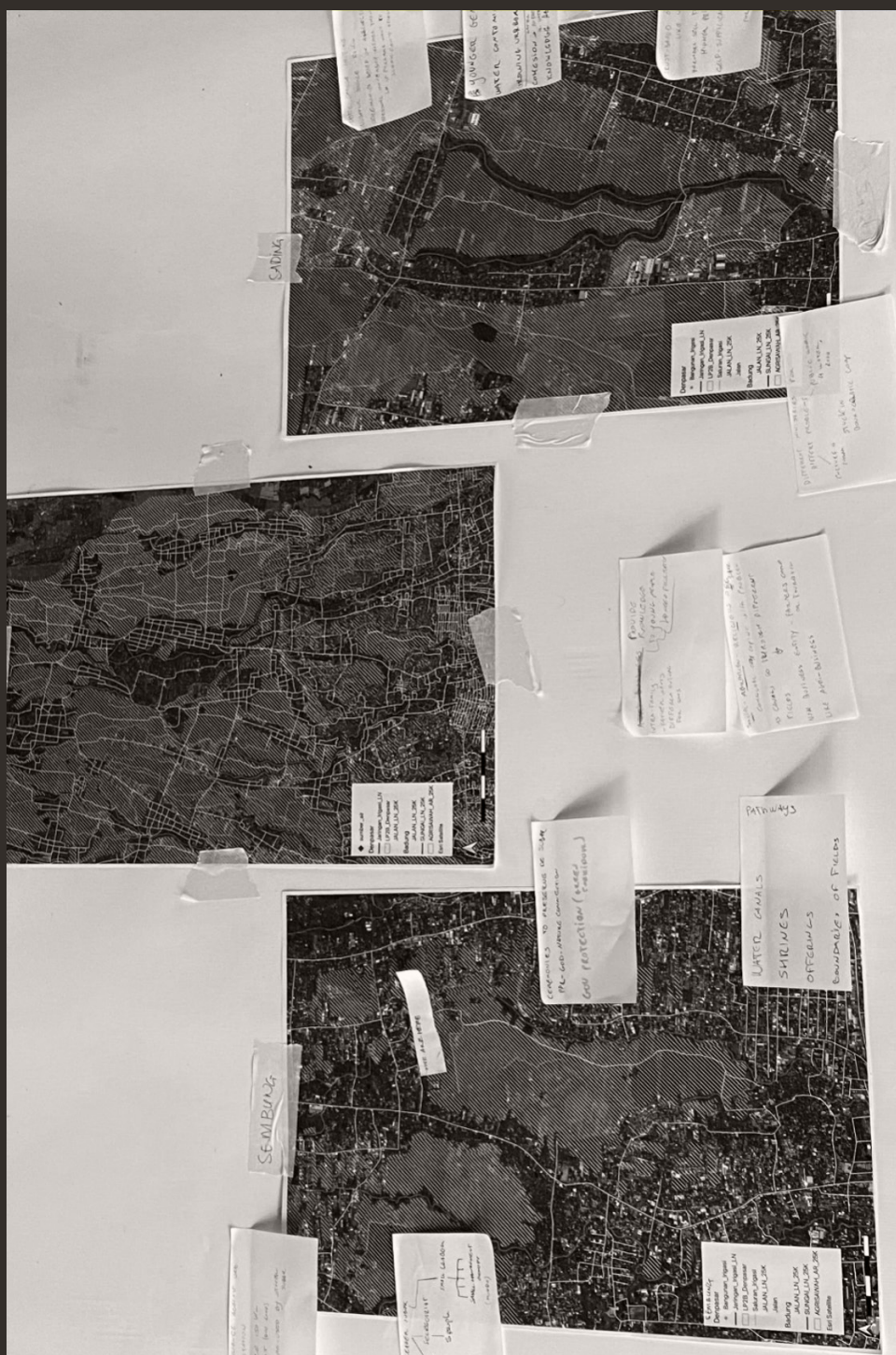


Fig 8.1 Results from a workshop with Subak communities focused on sustaining Subak values.  
Source: Carlien Donkor (2024)

# i. Summary

This research aims to uncover the injustices affecting Subak's hydrosocial territories due to tourism-driven development and propose spatial planning strategies and governance reforms that prioritize ecological sustainability, cultural preservation, and equitable development. It also seeks to foster public awareness and intergenerational engagement, particularly among youth, through acts of care that support just and sustainable futures for Subak communities.

The research was conducted through an ethnographic approach, analyzing how Subak is traditionally practiced and how power dynamics have shifted due to the increasing commodification of land and water. Although tourism is often justified as a driver of local economic growth, in practice, it has reinforced structural injustices and marginalized traditional governance systems. Volume II of this study presents a detailed account of Subak's Indigenous practices and how they have been undermined by historical processes of colonization and modern governance structures, leading to both procedural and distributive injustices. Despite longstanding recognition of Subak as cultural heritage, this recognition is often superficial, leveraged primarily to maintain scenic landscapes for tourism rather than to uphold the ecological and cultural systems that Subak sustains.

To address these challenges, this research proposes a set of alternatives based on lessons learned from both historical practices and contemporary community struggles. These alternatives are presented in Volume III and include institutional reforms, spatial planning tools, epistemological interventions rooted in an ethics of care, and economic diversification strategies. Recommendations include reactivating traditional institutions such as Sedahan Agung with expanded authority, implementing territorial zoning assessments, reforming business licensing processes, and reducing dependency on tourism by creating integrative livelihood options for local youth. Furthermore, the proposal includes a knowledge production strategy, beginning with public awareness campaigns and the development of communication tools as educational resources to cultivate intergenerational ethics of care and responsibility.

Volume IV reflects on the broader implications of this work for Bali and Indonesia's development trajectory. The proposed strategies can serve as critical tools to challenge dominant models of spatial planning that prioritize economic growth and tourism over the needs of local communities, cultural heritage, and environmental sustainability.

In conclusion, this research advocates for a balanced approach, one that integrates environmental and cultural preservation with inclusive economic opportunities while reasserting the central role of customary institutions in shaping future development.

## ii. Further Research

This research is not without limitations and presents multiple opportunities for further development, particularly in its theoretical, methodological, analytical, and strategic dimensions. While this study aimed to understand the complexity of Subak's hydrosocial territories through reflections on historical practices and current dynamics, the methodological approach was constrained by time. A more extended period of fieldwork would have allowed for a deeper, more nuanced understanding of the lived experiences of Subak communities, indigenous groups, tourism actors, and local government representatives.

Future research would benefit from longitudinal ethnographic methods, including extended observation and in-depth interviews, to capture the evolving dynamics of governance, resistance, and adaptation in Subak territories. In addition, organizing focus group discussions or participatory co-design workshops with community members and relevant stakeholders could foster collaborative knowledge production and generate more grounded and context-sensitive strategies.

The strategic proposals put forward in this thesis could also be refined through sustained dialogue with both indigenous knowledge holders and domain experts. Such engagement is essential for ensuring that proposed interventions are not only technically sound but also culturally resonant and socially legitimate.

Ultimately, the political landscape in Bali, characterized by contestation, decentralization, and competing development agendas, deserves a more in-depth study. A deeper examination of political ecology and institutional dynamics could enrich future policy and governance recommendations aimed at securing just and sustainable outcomes for Subak systems.

# IX

## Reflection

- i. On Relation to Urbanism
- ii. On Ethics & Positionality
- iii. On Research & Methodology
- iv. On Academic & Societal  
Relevance
- v. On Transferability



Fig 9.1 A regulatory sign prohibiting construction within the Subak area, ironically placed atop a pile of leftover building materials from a housing project in one of Denpasar's Subak zones.

# i. On Relation to Urbanism

Throughout the thesis process, a question kept rising in my head: What does it mean to practice urbanism? This question and the thesis process have led me to reconsider the role of urban practitioners. They are not merely designers, planners, or policymakers but mediators who navigate between competing interests, knowledge systems, and spatial imaginaries. My previous professional experience as an urban designer, spanning nearly five years, exposed me to the persistent dichotomy between technical expertise and socially and environmentally grounded practice. In architectural and planning education, this divide is often reinforced: technical knowledge is viewed as objective and neutral, while social engagement and environmental value are perceived as subjective and external.

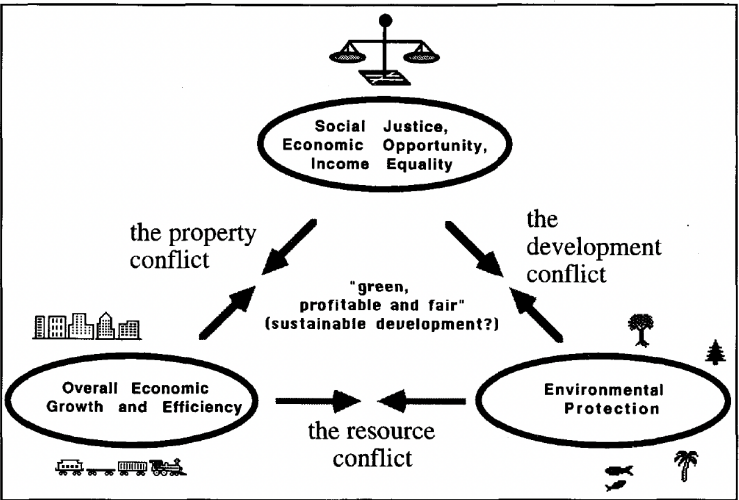
This research has led me to reject that binary. As someone trained in both technical and socio-cultural approaches, I now view the role of the urbanist as a translator across disciplines and stakeholders, capable of integrating engineering logic with community values, policy with lived experience, and spatial strategy with cultural sensitivity. Urbanism, in this sense, becomes an act of mediation, of weaving together diverse voices to collectively envision and enact more just and context-sensitive urban futures (Miraftab, 2009).

Practicing urbanism in this context demands cultural literacy, ecological sensitivity, and communicative competence. As practitioners, we must position ourselves as mediators between communities, systems, and knowledge regimes, not to impose solutions but to co-produce meaning and direction that are situated and relational to their specific contexts. This idea resonates with Mignolo's (2009) notion of epistemological delinking and the recentering of marginalized knowledge systems.

The dichotomy between "technical" and "social" roles in urbanism is unhelpful; instead, what is required is the ability to move across these domains with humility and care. My engagement with Subak has shown that spatial interventions must begin with deep listening and ethics of situated practice, particularly when working in culturally and spiritually rich environments.

At the same time, this journey of defining what it means to practice urbanism has brought me into dialogue with debates on the goals of planning. Campbell's (1996) "planner's triangle" illustrates the inherent tensions among competing objectives, economic development, environmental protection, and social equity. In light of current challenges, I believe it is no longer viable to pursue only one or two of these objectives in isolation. Instead, we must strive for a balance among all three. The responsibility of planners, therefore, involves addressing the contemporary challenge of sustainable development through a twofold, interconnected approach: (1) effectively managing and resolving conflicts and (2) fostering

innovative technical, architectural, and institutional strategies. In doing so, planners must actively facilitate conflict-resolution processes while simultaneously advocating a clear and meaningful vision for sustainable development (Campbell, 1996).



Thus, I challenged the conventional planning in Indonesia, influenced by Western planning, which was tied to economic growth metrics and administrative boundaries, often neglecting socio-cultural territoriality and ecological interdependence. Therefore, I proposed a radical planning system based on traditional knowledge, territorial, trans-administrative, and ecologically rooted rather than technocratically bounded by one axis of economic growth.

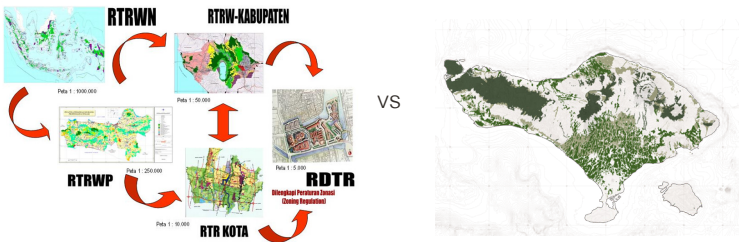


Fig 9.2 Campbell's Planner's Triangle illustrating the conflict and balance among equity, economy, and environment in planning practice.

Fig 9.3 Comparison between normative planning and territorial planning approaches, highlighting differences in goals, methods, and spatial logic.

## ii. On Ethics & Positionality

This research is rooted in a personal motivation to contribute meaningfully to the land that shaped my personal development. Bali has provided me with a worldview grounded in reciprocity and abundance, from the sacredness of its water to the nourishment of its land. Undertaking this research required a continuous negotiation of my positionality, as a Balinese-born Muslim engaging deeply with a Hindu practice that is both religious and cosmological. While I share cultural roots with the communities I worked with, I also acknowledge the partiality of my perspective. Rather than claiming insider status, I approached the research as a learner and listener, seeking understanding through dialogue and respectful collaboration. To bridge this gap, I consulted with Hindu friends and collaborators to ensure cultural accuracy and avoid misrepresentation. I enacted epistemic modesty, ensuring ethical knowledge creation that respects local epistemologies. More importantly, I sought to learn directly from Subak practitioners, treating interviews not as data extraction but as shared conversations. My positionality also influenced how I approached the community: informal interactions, speaking in Balinese, and conducting interviews in ways that respected local rhythms and hierarchies helped build trust and invite more open dialogue.



Fig 9.4 Workshop activities with Subak community during 10th World Water Forum side event at Subak Sembung, Denpasar, Bali

As Subak farmers are often marginalized in planning and policy discussions, I was careful to avoid positioning myself as a problem solver for their problems. My aim was not to offer solutions but to listen, document, and amplify the knowledge that already exists within the community. In presenting their stories through written narratives, voice recordings, and documentary videos, I obtained informed consent and committed to using their testimonies ethically and with care.

This reflexivity was not only ethical but also methodological in nature. It enabled me to gain a deeper understanding of how power, culture, and knowledge are circulated throughout the research process. It reminded me that we, as researchers, always speak from somewhere and that the legitimacy of our work depends not only on analytical rigor but on relational accountability. This methodological process was used because research is inherently situated and relational (Mignolo, 2009).

### iii. On Research & Methodology

This research involved an iterative and reflexive methodological process. Early fieldwork and revisiting the results of the previous workshop with the Subak communities provided valuable insights, prompting a revision of my conceptual and analytical frameworks. As the thesis progressed, I refined the methodology to address the research questions better and respond to the complexity of the field. This included rethinking my positional lens, redesigning my conceptual framework, and deepening my understanding of Subak through both ethnographic fieldwork and literature on indigenous systems. This thesis is highly dependent on fieldwork interviews, observation, and literature study.

Because several participants that I interviewed had limited connection to ancestral knowledge, I also relied heavily on secondary sources, historical texts, legal documents, and academic literature, to reconstruct the ecological and cosmological foundations of Subak. This triangulation of field interviews, literature review, and stakeholder mapping helped shape my analytical model, particularly the three-layered framework based on value systems. It also clarified the various forms of spatial injustice embedded within the landscape territories.

Crucially, I learned that methodology is not neutral. The tools we choose must be in dialogue with the context we are studying. In Bali, a rigid, metrics-based method from a Western framework would have missed the symbolic, spiritual, and relational dimensions that are essential to understanding the complexity of Subak. This is part of a decolonial methodological research posture that requires not only different content but a fundamentally different orientation to knowledge-making.

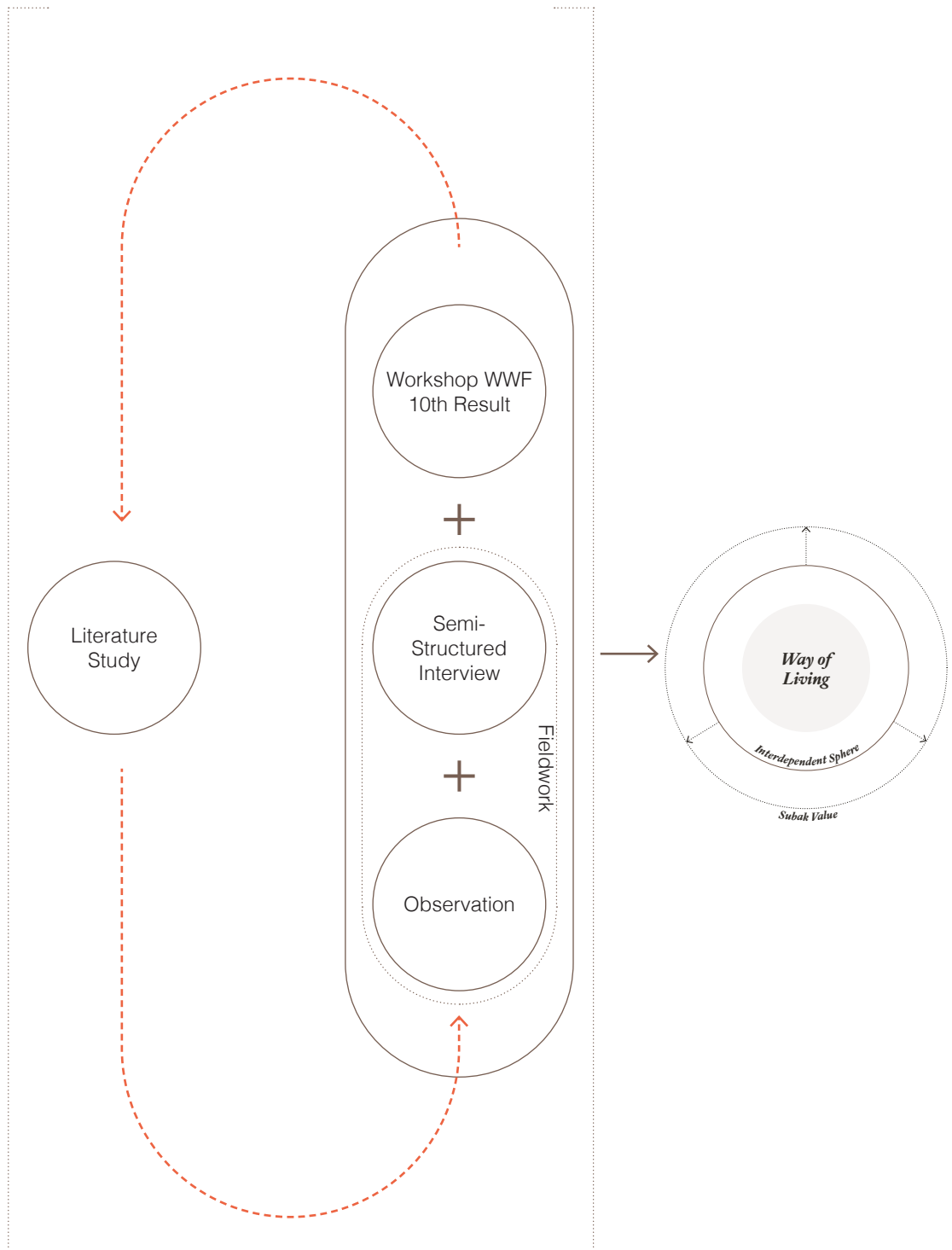


Fig 9.5 Looping process of the research methodology, illustrating iterative stages of analysis, reflection, and refinement.

## iv. On Academic & Societal Relevance

This thesis contributes to academic discourse by challenging normative approaches to planning through a decolonial lens. Mainstream urbanism, particularly as taught and practiced in postcolonial contexts, is often heavily influenced by Western models, epistemologies, and development paradigms. In Indonesia and many parts of the Global South, Western-centric urban ideals continue to overshadow local traditions and indigenous knowledge systems. This thesis does not seek to romanticize the past, but to recover and re-engage local wisdom, such as the Tri Hita Karana philosophy embedded in Subak, as a legitimate foundation for planning in the present. It does so by foregrounding indigenous epistemologies, specifically Tri Hita Karana, as a foundation for spatial thinking and governance.

Applying a decolonial perspective allows for a rethinking of whose knowledge counts, and for whom planning is done (Escobar, 2018). The decolonial approach used in this thesis reorients planning away from extractive models toward a relational ethic that acknowledges colonial legacies, local agency, and hybrid realities. This is especially relevant in postcolonial societies like Indonesia, where development often mimics Western ideals at the expense of indigenous practices. By situating Subak as a model of socio-ecological planning, the thesis calls for academic and policy spaces to revalue indigenous systems not as folklore but as futures. This is especially urgent in Bali, where tourism-driven development has repeatedly shown its fragility, in the wake of the 2002 bombing and more recently, during the COVID-19 pandemic. The dependency on a single economic sector has highlighted the unsustainability of the current development model, and underscores the need for more inclusive and resilient economic alternatives.

The disintegration of Subak is not just an environmental loss; it is a loss of cultural infrastructure, of alternative economies, and of rooted ecological knowledge. This research thus serves as a provocation to rethink development pathways, calling on the public to engage not as passive observers but as active participants in shaping just and resilient futures.

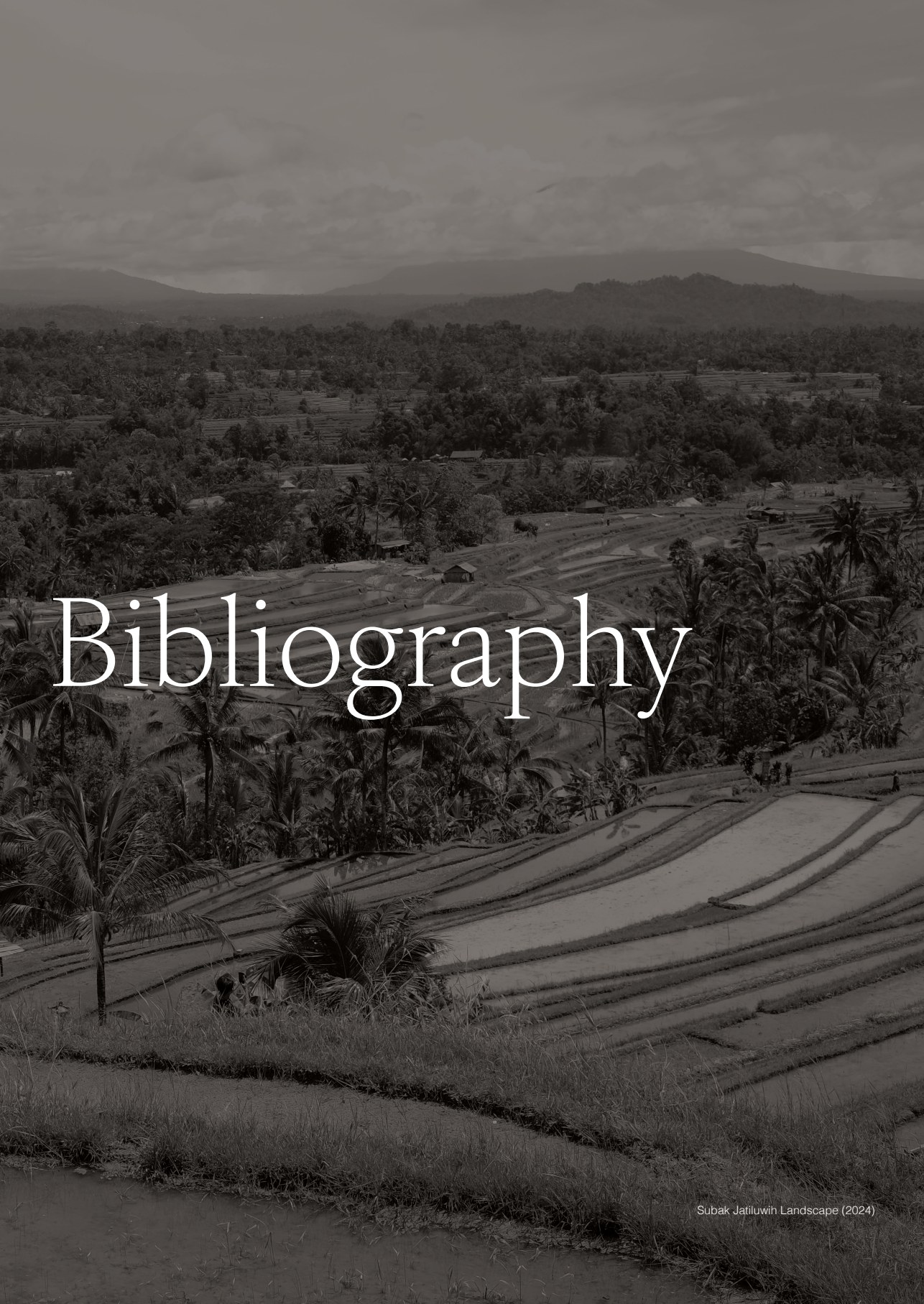
## v. On Transferability

The framework and findings of this thesis offer lessons that extend beyond Bali. Many communities across the Global South face similar challenges: development pressures that commodify culture, extract from nature, and erode indigenous governance systems as a result of colonization legacies. The layered lens developed in this research, using value-based critique, can be applied in other contexts to diagnose and address the complexity and dynamics of the socio-cultural context. This application is especially relevant in post-colonial contexts, where modern planning systems often remain entangled with extractive and hierarchical logic.

The thesis argues that spatial justice cannot be achieved without epistemic justice, recognizing and restoring ways of relating to land, water, and community that have been silenced or dismissed. By positioning Subak not as a relic but as a living system of resistance and possibility, this research contributes to a broader project: envisioning futures that are ecologically viable, culturally grounded, and socially just. This thesis adopts an alternative approach, rather than the technocratic planning process, by learning from local practices and epistemologies. It highlights the significance of grounding spatial and governance strategies in the lived experience and wisdom of local communities. The hope is that planners, scholars, and communities elsewhere draw from this approach, not to replicate it, but to learn from its principles and adapt them to their contexts.

This thesis serves as both a case study and a methodological blueprint for other regions facing similar situations, offering practical tools for identifying and addressing epistemic injustice and an invitation to rethink planning as a relational practice.





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# Appendix

# Research Outcomes

Based on the research framework previously, there are three stages main outcomes that I want to make based on my sub research question:

## 1. To Expose Outcome: Spatial Injustice Analysis on Distributive, Procedural, and Recognition Justice and Capacities Study

To unpack the spatial injustice present within Subak Hydrosocial territories and also to study the the capacities and potential of local communities to foster spatial justice

## 2. To Propose and Politicize Outcome: Spatial Planning and Governance Framework + Actionable Strategies to Operationalize it

To design a spatial planning and governance solution that reflect indigenous practice and prioritize spatial justice principle. The framework will be accompanied by actionable implementation strategies to operationalize these solutions, aiming to reduce the tourism dependency.

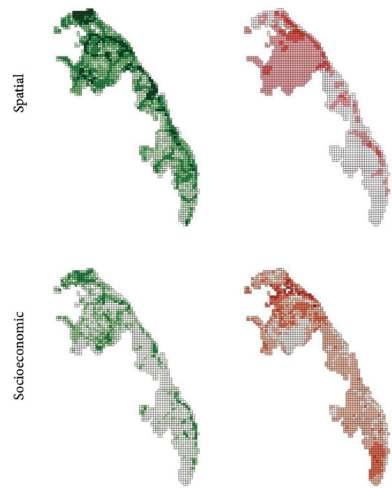
## 3. To Reflect Outcome: Short Documentary on Subak Communities

To create a compelling short documentary that reflect the lived experiences of Subak communities. The documentary will serve as a medium to provoke discussion on the dynamics of Subak, the challenges it face, and the valuable lesson these experiences offer for advancing broader spatial justice agenda.



### Injustice Analysis and Capacities Study Unpack Spatial Injustice and Capacities of Subak Communities

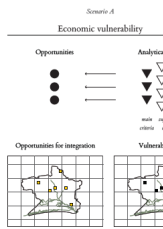
To unpack the spatial injustices present within Subak's hydrosocial territories through an in-depth analysis of spatial, historical, policy, and institutional dimensions. This analysis will be conducted using a spatial justice perspective, which provides a critical lens to examine how inequities are produced and sustained within these territories. Furthermore, the study seeks to explore the capacities and potential of Subak and indigenous communities to actively contribute to fostering spatial justice, emphasizing their role in shaping equitable and sustainable spatial practice



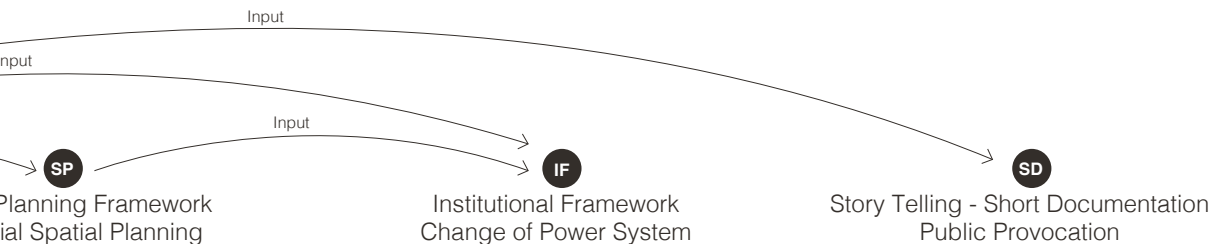
Source: Subendran J. (2021)

### Spatial R Territory

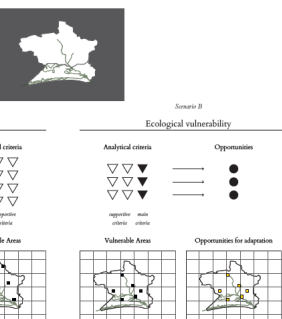
This frame spatial planning incorporate In are firmly rooted justice. It aims to preservation, ec equitable land us framework seeks not only respect values, rights, an communities, fos just future for the



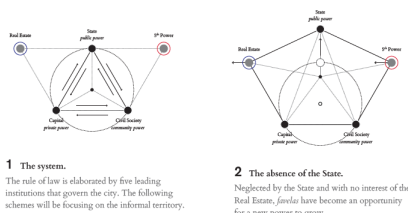
Source: Gonzalez F. (2021)



The framework will propose innovative solutions that deeply integrate indigenous knowledge and are grounded in the principles of spatial justice to holistically integrate cultural, ecological sustainability, and social practices. By doing so, the framework ensures that development initiatives but actively promotes the needs and needs of Bali's indigenous communities, fostering a more sustainable and resilient region.



The institutional frameworks will be designed to identify the most effective methods for integrating subak and indigenous communities within the current governance system. This approach seeks to empower these communities by granting them rights and stewardship over their lands, enabling them to make decisions about land management and resource utilization. Through this framework, indigenous communities will have a recognized role and authority in preserving and sustaining their cultural and environmental heritage, fostering a governance model that is inclusive, respectful, and responsive to their unique knowledge and needs.



Source: Gonzalez F. (2019)

This documentary is designed to be a compelling medium that highlights the cultural and environmental implications of Bali's transformation to the Subak communities. Its goal is to stimulate public discourse of who are the most vulnerable in this tourism-driven development. By raising awareness and encouraging dialogue, the documentary seeks to inspire formal institutions to take more active measures in addressing these pressing issues.



## Implementation Strategy Actionable Strategies to Operationalize

The roadmap will outline strategic steps, essential resources, and coordinated actions necessary to drive long-term, sustainable change. It will serve as a comprehensive guide, ensuring that each phase of the journey toward spatial justice is meticulously planned and actionable.



Source: Subendran J. (2021)

# Land Coverage Change Calculation

No	PL17_ID	ID	Land Coverage
1	2001	Hp	Hutan Lahan Kering Primer
2	2002	Hs	Hutan Lahan Kering Sekunder/Bekas Tebangan
3	2004	Hmp	Hutan Mangrove Primer
4	2005	Hrp	Hutan Rawa Primer
5	2006	Ht	Hutan Tanaman
6	2007	B	Semak Belukar
7	2010	Pk	Perkebunan/Kebun
8	2012	Pm	Pemukiman/Lahan terbangun
9	2014	T	Lahan Terbuka
10	2500	Aw	Awan
11	3000	S	Savana/Padang Rumput
12	5001	A	Tubuh Air
13	20041	Hms	Hutan Mangrove Sekunder/ Bekas Tebangan
14	20051	Hrs	Hutan Rawa Sekunder/Bekas Tebangan
15	20071	Br	Semak Belukar Rawa
16	20091	Pt	Pertanian Lahan Kering
17	20092	Pc	Pertanian Lahan Kering Campur Semak/Kebun Campur
18	20093	Sw	Sawah
19	20094	Tm	Tambak
20	20121	Bdr/Plb	Bandara/Pelabuhan
21	20122	Tr	Transmigrasi
22	20141	Tb	Pertambangan
23	50011	Rw	Rawa

2003	2006	2013	2023	land change 2003-2023	land change 2006-2023	land change 2013-2023
49740.96	46580.01	43910.56	38647.57	-11093.39	-7932.45	-5262.99
50847.74	53967.16	53954.58	46637.95	-4209.78	-7329.20	-7316.63
463.96	463.96	421.15	11.02	-452.95	-452.95	-410.13
0.00			0.00	0.00	0.00	0.00
1857.41	1889.94	1760.67	9821.11	7963.69	7931.16	8060.43
75939.54	76991.06	92885.73	16703.48	-59236.06	-60287.58	-76182.25
46055.65	45926.70	1099.51	906.04	-45149.61	-45020.65	-193.46
31924.80	31964.01	34650.46	55030.10	23105.30	23066.09	20379.64
8372.56	7330.03	6597.74	2408.17	-5964.38	-4921.85	-4189.57
				0.00	0.00	0.00
2845.91	2845.91	321.48	6767.64	3921.73	3921.73	6446.16
2937.37	2937.37	3083.52	3388.87	451.50	451.50	305.36
1708.72	1708.72	1809.97	2278.94	570.22	570.22	468.97
				0.00	0.00	0.00
17.09	17.09	24.69	0.00	-17.09	-17.09	-24.69
93215.68	102815.63	59341.11	45024.94	-48190.74	-57790.69	-14316.17
116481.21	106971.00	147618.98	243308.01	126826.79	136337.00	95689.03
89801.91	89801.91	112813.07	96934.49	7132.58	7132.58	-15878.58
424.32	424.32	475.12	1191.56	767.25	767.25	716.45
169.28	169.28	225.58	427.85	258.57	258.57	202.28
				0.00	0.00	0.00
		5.36	1590.34	1590.34	1590.34	1584.98
48.25	48.25	47.14	0	-48.25	-48.25	-47.14

## Cooperation

Stakeholder											
		U1	U2	U3	U4	U5	U6	U7	U8	U9	U10
Customary Village	C1	no	no	no	low	no	no	no	no	low	low
Pekaseh Subak/ Head of Subak	C2	low	no	no	low	high	high	low	low	low	low
Subak Organisation	C3	low	no	no	low	high	low	low	low	low	low

## Dependency

Stakeholder											
		U1	U2	U3	U4	U5	U6	U7	U8	U9	U10
Customary Village	C1	no	no	no	no	no	no	no	no	low	no
Pekaseh Subak/ Head of Subak	C2	high	low	low	high	high	high	high	high	high	high
Subak Organisation	C3	high	low	low	high	high	high	high	high	high	high

## Conflict

Stakeholder											
		U1	U2	U3	U4	U5	U6	U7	U8	U9	U10
Customary Village	C1	low	high	high	high	no	no	high	low	low	high
Pekaseh Subak/ Head of Subak	C2	high	high	high	high	low	no	high	low	low	high
Subak Organisation	C3	high	high	high	high	low	no	high	low	low	high

U11	U12	U13	U14	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	I1	I2
no	low	low	low		low	low	no	low	no	no	no	low	high	no	no
low	no	low	low	low		high	no	no	no	low	no	no	high	no	no
low	no	low	low	low	high		no	no	no	low	no	no	high	no	no

U11	U12	U13	U14	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	I1	I2
low	low	no	no		high	high	no	no	no	no	low	high	high	no	no
low	no	low	high	high		high	low	no	no	low	high	high	high	no	no
low	no	low	high	high	high		low	no	no	low	high	high	high	no	no

U11	U12	U13	U14	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	I1	I2
high	high	high	high		no	no	no	no	no	high	no	no	no	high	high
high	low	high	high	low		no	low	no	no	high	no	no	no	high	high
high	low	high	high	no	no		low	no	no	high	no	no	no	high	high

# *How to Read The Book?*

*This booklet is part of a three-part journey through Subak the living water system that has shaped Bali's landscapes, livelihoods, and beliefs for centuries.*

*You can read each book on its own, or follow them in order to understand the full story: from its sacred roots, to its fragile present, and toward the futures we can imagine and create.*

*Each booklet invites you to reflect, observe, and listen — not only to the words, but to the voices of the land, the water, and the people who still live by it. At the end of each book, you'll find a path leading you to the next.*

*We invite you to follow the flow.*

## *Volume 1*

*Learn more about Subak  
Indigenous knowledge &  
Why its sacred logic  
continues to inspire awe*



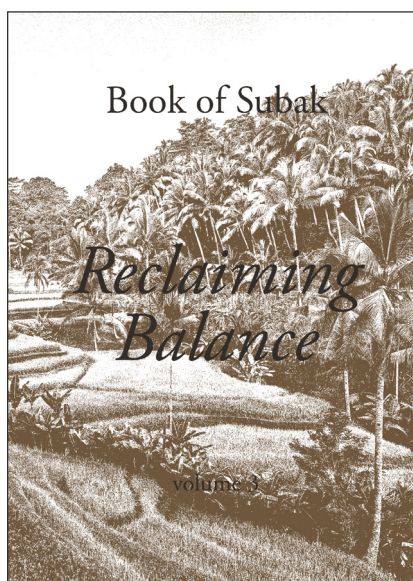
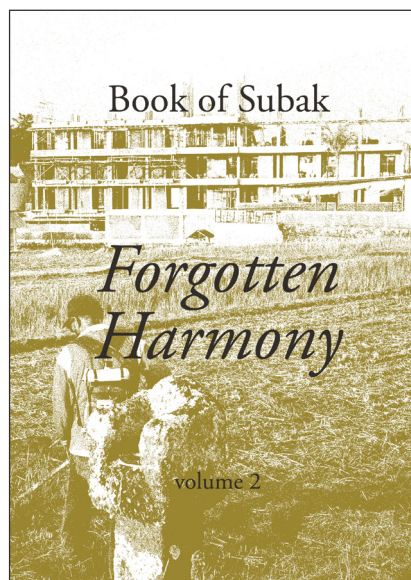
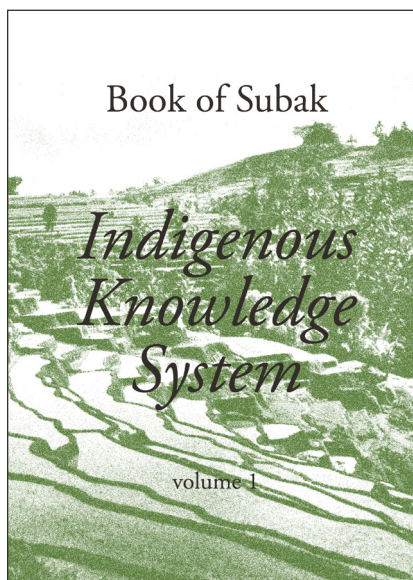
## *Volume 2*

*Discover how Subak's  
harmony has been disrupted  
and what farmers today  
remember, fear, and hope  
for.*

## *Volume 3*

*Explore the futures we can  
imagine for Subak*





For further reading, please refer to the additional documents attached.



# ආරාධනා

Balinese rituals Karya Ngusaba.  
Source: Arnan on Suratan Bali News (2024)

