

Stream of Contention

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

 **TU Delft**
Delft University of Technology
Faculty of Architecture
and the Built Environment
BK Bouwkunde



P5 Presentation

Planning Complex Cities Graduation Lab

Julia Sumarthinningrum Dahlan | 5219086

1st Mentor: **Roberto Rocco de Campos Pereira**

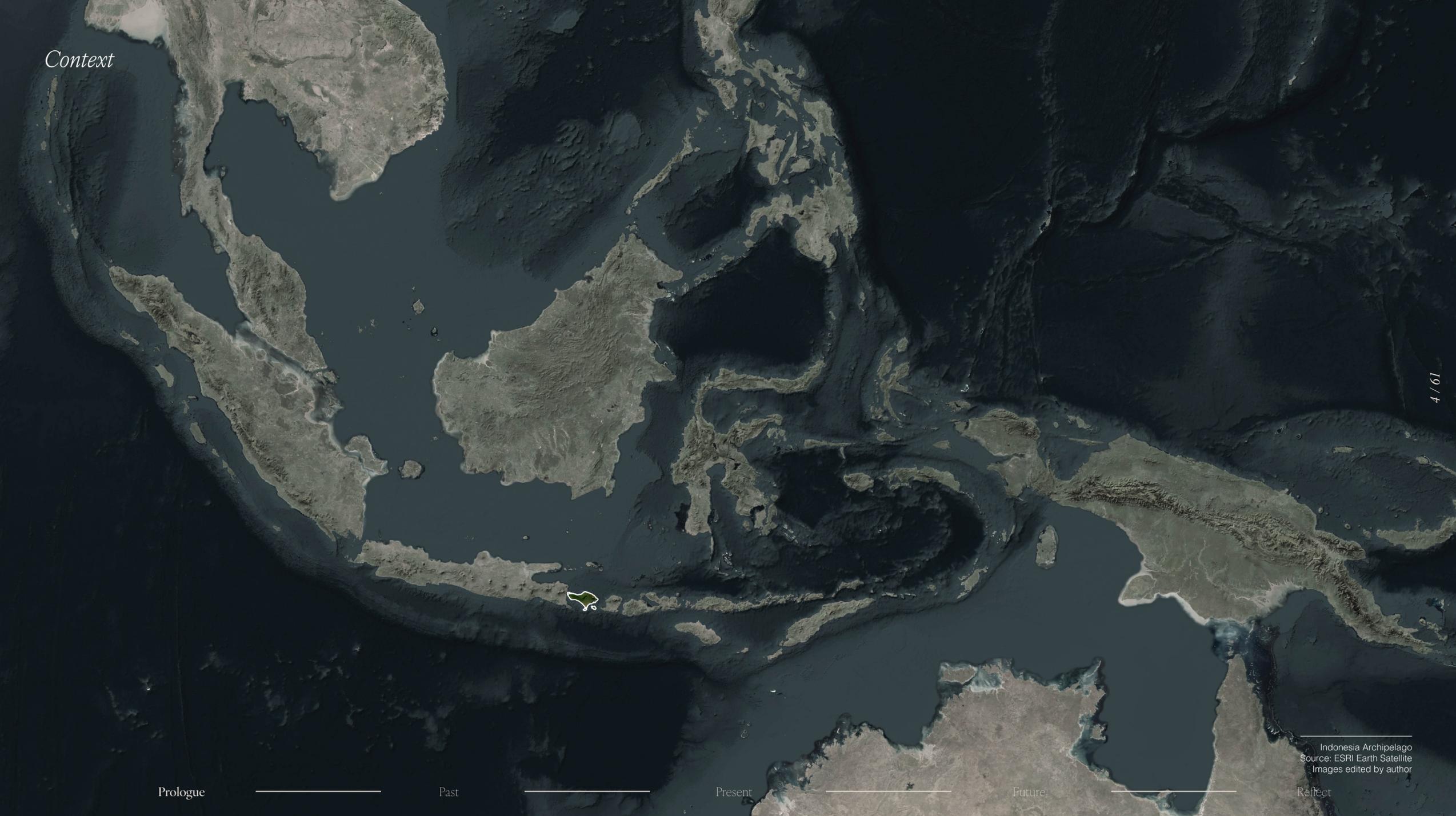
2nd Mentor: **Raquel Hädrich Silva**

Graduation Board: **Wido Quist**

Prologue

The Beginning

Context



4 / 61

Prologue

Past

Present

Future

Reflect

Indonesia Archipelago
Source: ESRI Earth Satellite
Images edited by author

Motivation



Prologue

Past

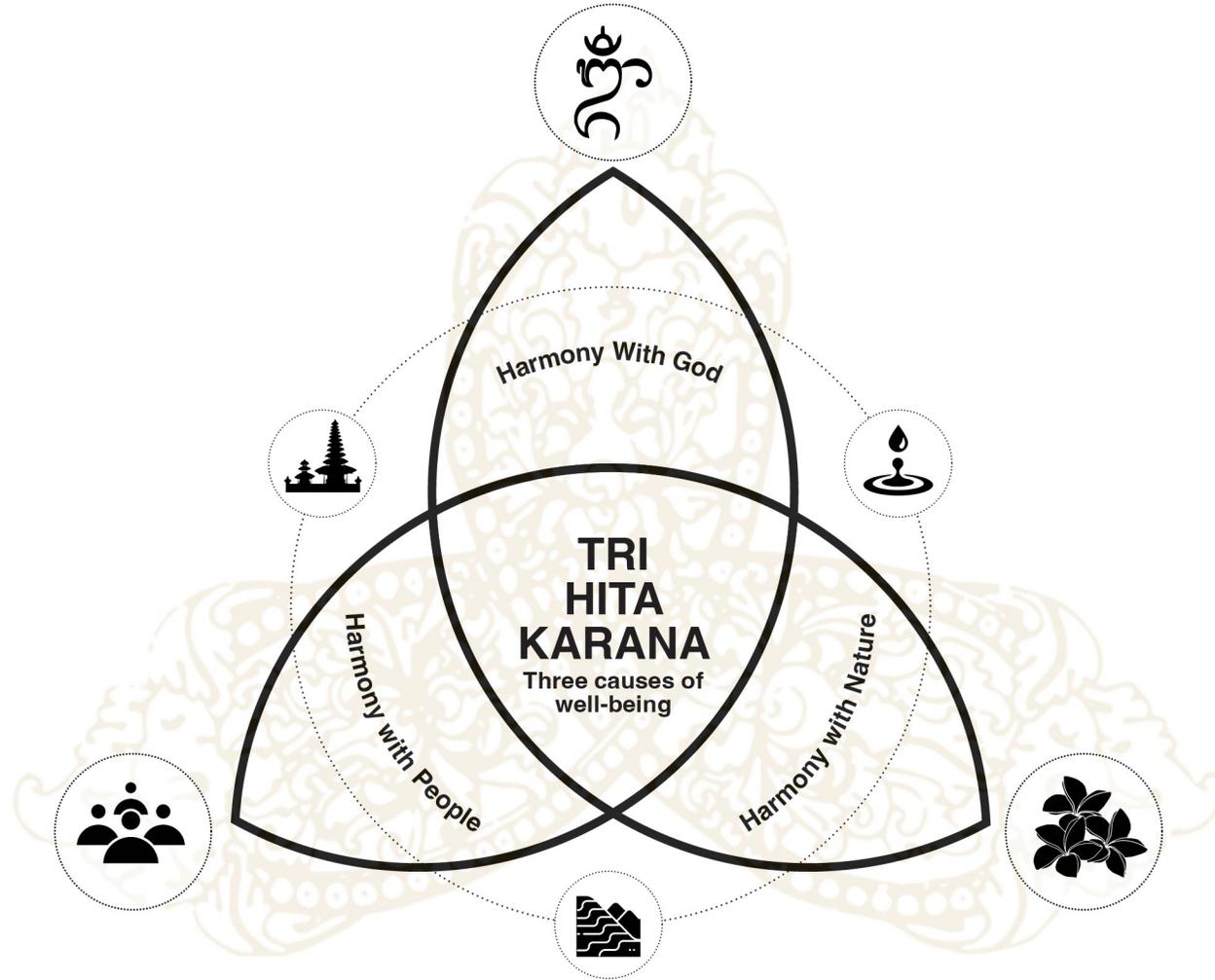
Present

Future

Reflect

Fascination

Tri Hita Karana Concept of Live



Fascination
Subak as
Cultural Landscape

Hydrological
System

Aggriculture
Production

Cultural-Ritual

Ecology
Balance

Community-based
Governance

Fascination
Subak as
Cultural Landscape

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)

Result of Tourism Driven Development

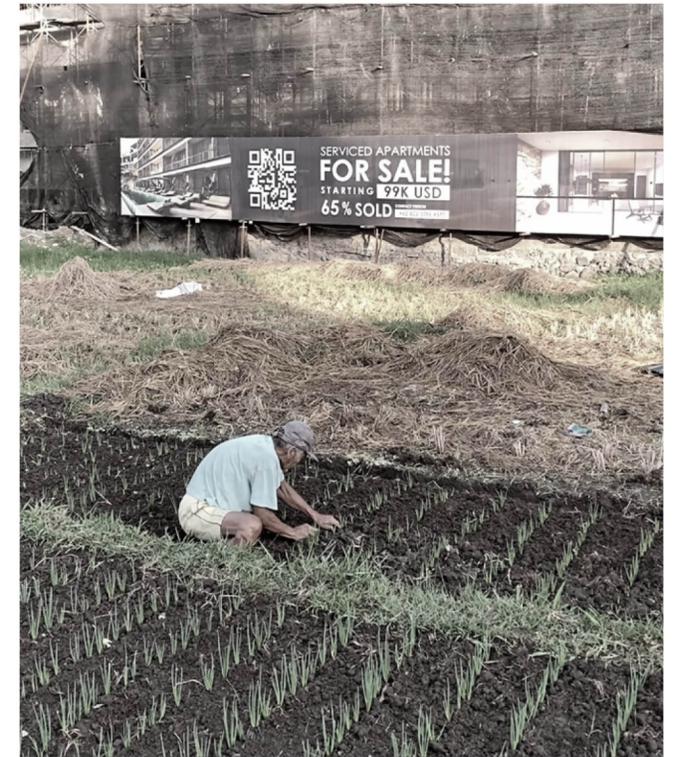
Rapid Acceleration of Land-Use Conversion



Water Scarcity

A screenshot of a news article from The Telegraph. The article title is "Bali's worsening drought is blamed on tourists using more than half its water". The article includes a sub-header "UK NEWS WEBSITE OF THE YEAR 2024" and navigation links for "Subscribe now" and "Log in". The article content shows a silhouette of a traditional Balinese pavilion (Paviliun) against a sunset sky, with people standing around it. The article is categorized under "Travel > Worldwide > Asia" and has a search bar with the text "Explore city breaks, activities...".

Local Marginalized



Problem Field

How Tourism Reshape Bali's Policies & Landscape?

1908



After the Puputan Klungkung war in 1908, Bali officially surrendered to Dutch rule. Hundreds of Balinese chose to end their lives rather than surrender to colonial forces, marking a tragic and symbolic resistance against Dutch colonization.

1920



The Dutch moral call was touched to maintain and preserve the conservatism of Balinese culture through "Balisiering Politics" or Balinization.

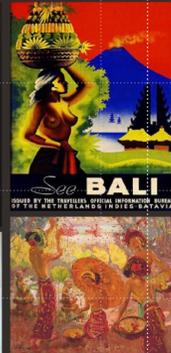
1935



The early introduction of tourism by the Dutch commodified Balinese culture for European visitors, romanticizing the island as an exotic paradise through arts and tourism poster.

Indonesia Independence Declaration

1945



1970



Grand Inna Bali Beach Hotel, is the oldest and tallest hotel and the only one in Bali that has 10 floors with an initial area of 42 hectares. It was decree by the first Indonesia's President to meet the need of Tourism industry.

1998

Under the New Order, Bali became a source of wealth for the elite, with relatives of the second president granted permits to operate with few restrictions. Consequently, the Balinese began to lose ownership and control of their lands.

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

2002

2010

2019 2020

2022



Bali endured the devastating Bali I and II bombings, which caused a downturn in tourism. In response, the government has frequently offered financial assistance to help sustain Bali's tourism industry.



Bali was heavily impacted by the COVID-19 pandemic, with its economy shrinking by about 9.3% in 2020 and tourism plummeting nearly 90% due to lockdowns and international travel restrictions.

After COVID-19 pandemic, 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.



Internet Era

The Internet era brought an influx of digital nomads, tourists seeking peaceful and quiet places to stay. This shift marked the rise in popularity of Canggu village.

Omnibus Law Introduced

The purpose of this law is to enhance the investment climate and simplify bureaucratic processes. Previously, investments had to undergo regional procedures, but they now go directly to the central government. This change has led to an increase in foreign investors engaging in the development of tourism areas

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

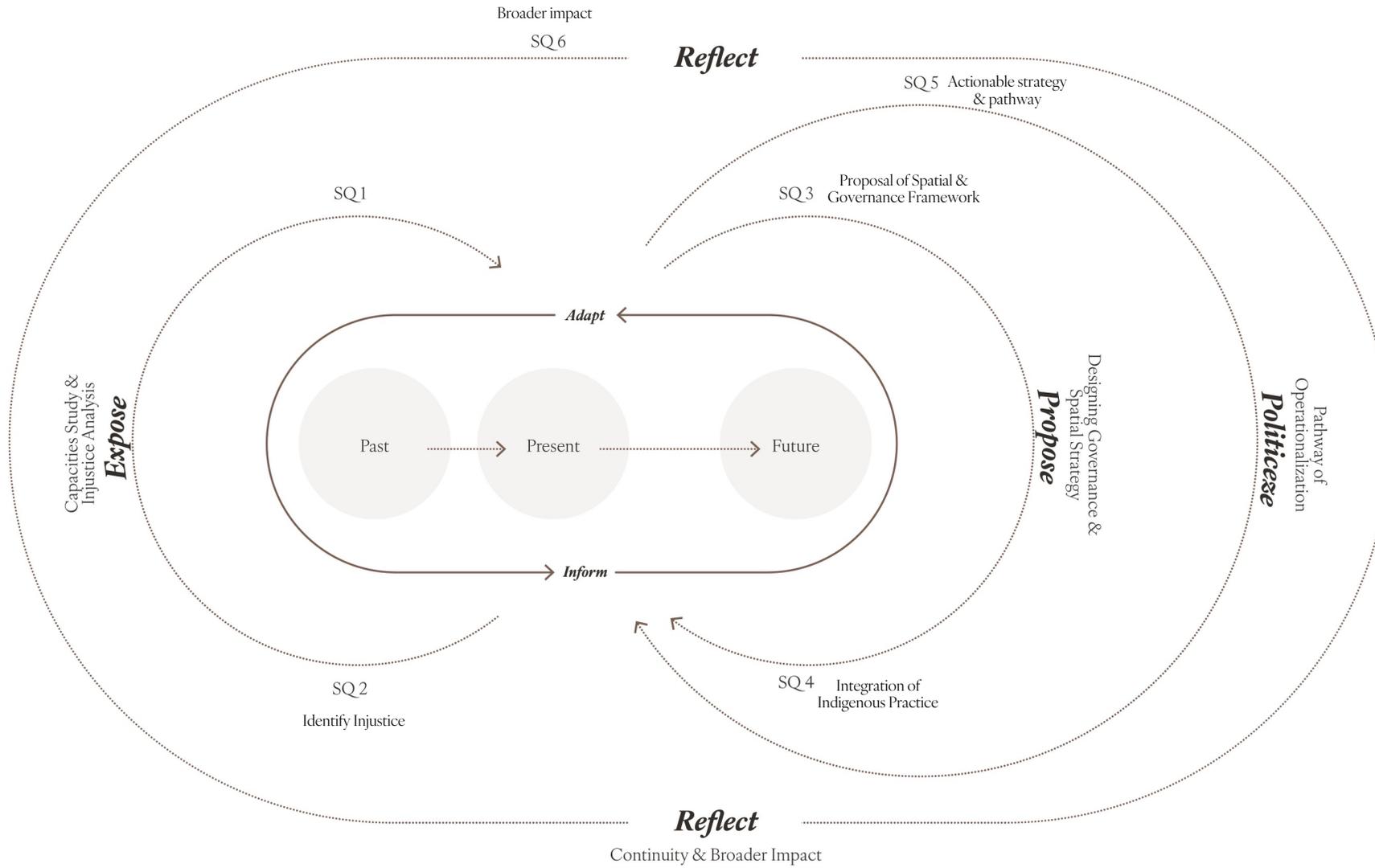
Problem Focus

Vulnerable Heritage Landscape

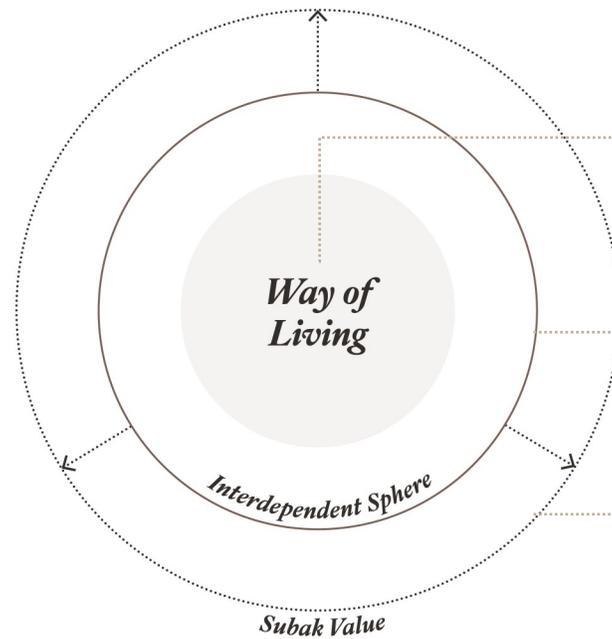
Tourism-driven development planning, policies, and historically has allowed injustice to persist. This unchecked development threatens Bali's cultural landscape and community, Subak.

12 / 61

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? ”



Three Layers of Inquiry



1. Ontological Layer

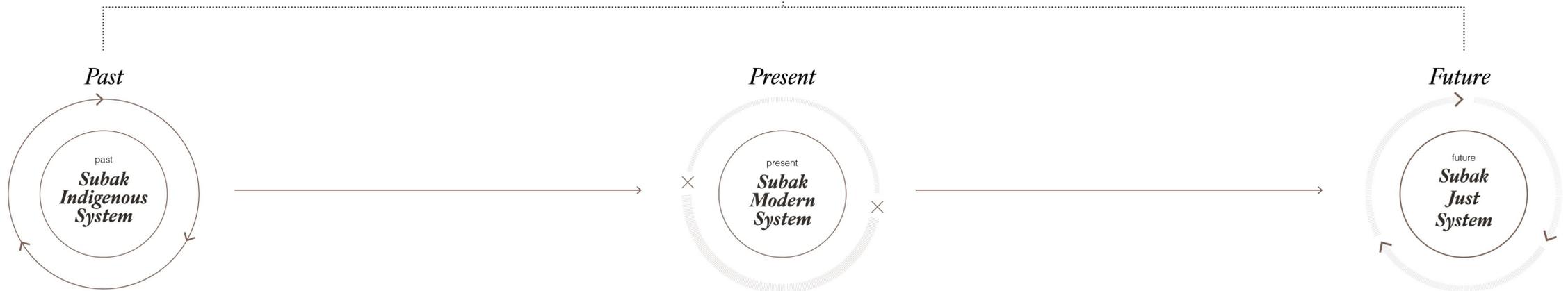
How people relate to nature, time, land, and life — their worldview and mode of existence.

2. Material Relations Layer

The relational field — where culture, prosperity, and ecology interact.

3. Values (Ethics, Cosmologies, Ways of Caring) Layer

Reflects what matters, how people care, and what guides action.

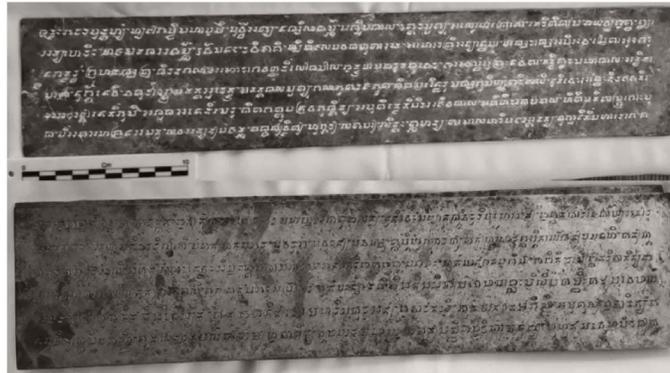


Past

Subak Indigenous Knowledge System

Subak as Indigenous Knowledge System
History of Subak

since 1071 AD

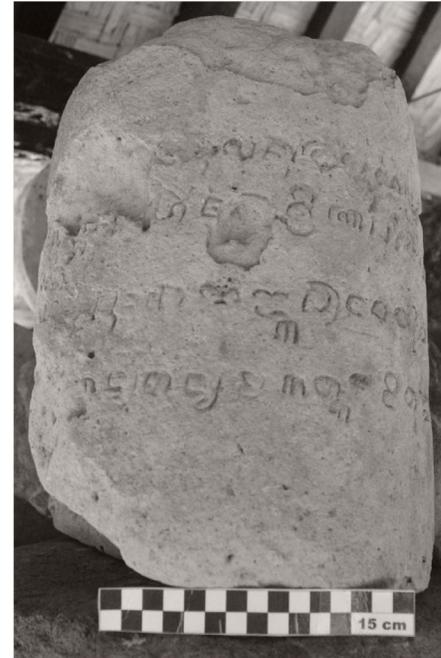


“sang mikukuhang sawah kewastanin subak, sang mikukuhang toya kewastanin pekaseh, ika marwenang mangepah toya punika,”

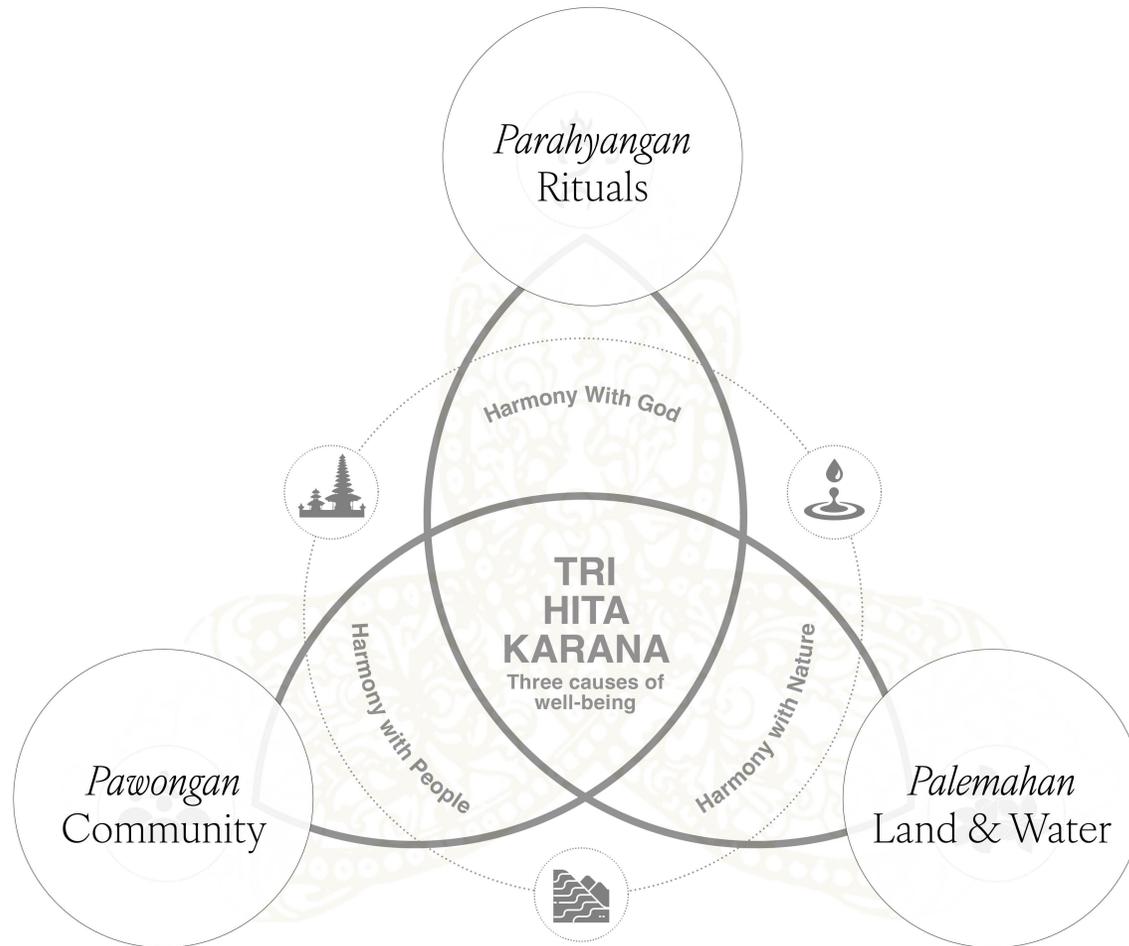
Klungkung Balinese lontar manuscripts

Pandak Badung inscription

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



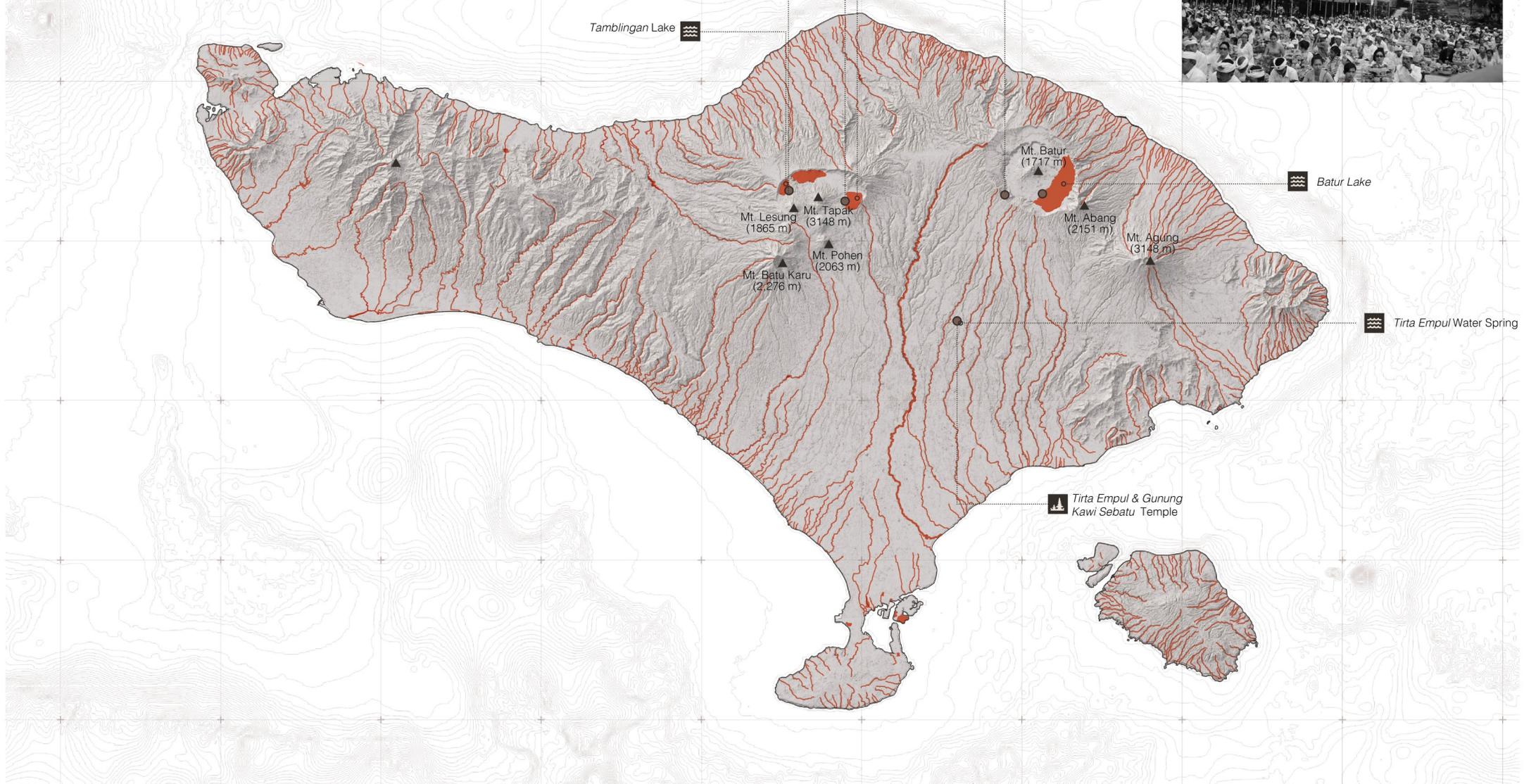
Embodied Wisdom in the Landscape



Subak as Indigenous Knowledge System

Practicing Subak Across Scales

On Island System Scale



Prologue

Past

Present

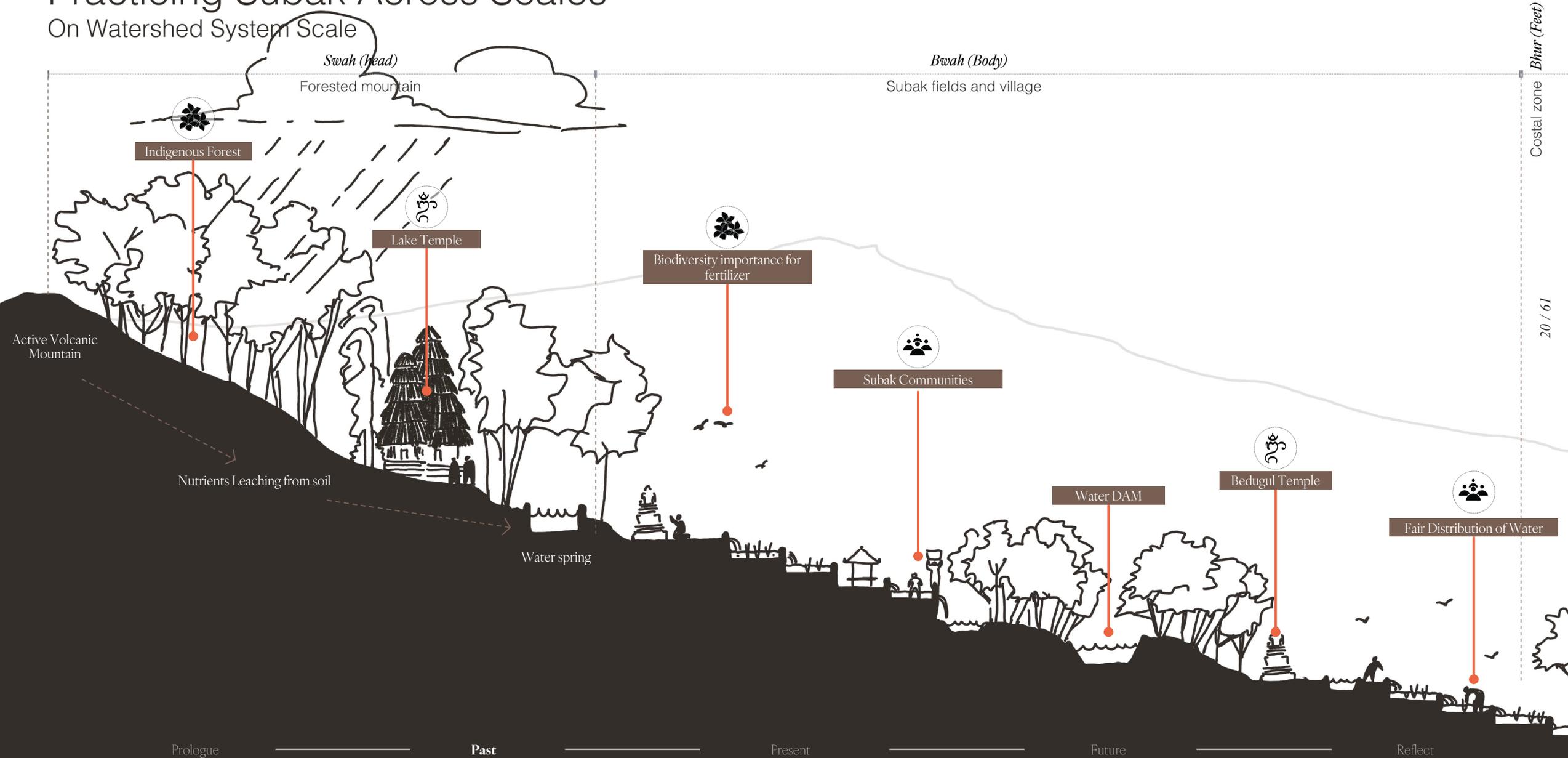
Future

Reflect

Subak as Indigenous Knowledge System

Practicing Subak Across Scales

On Watershed System Scale

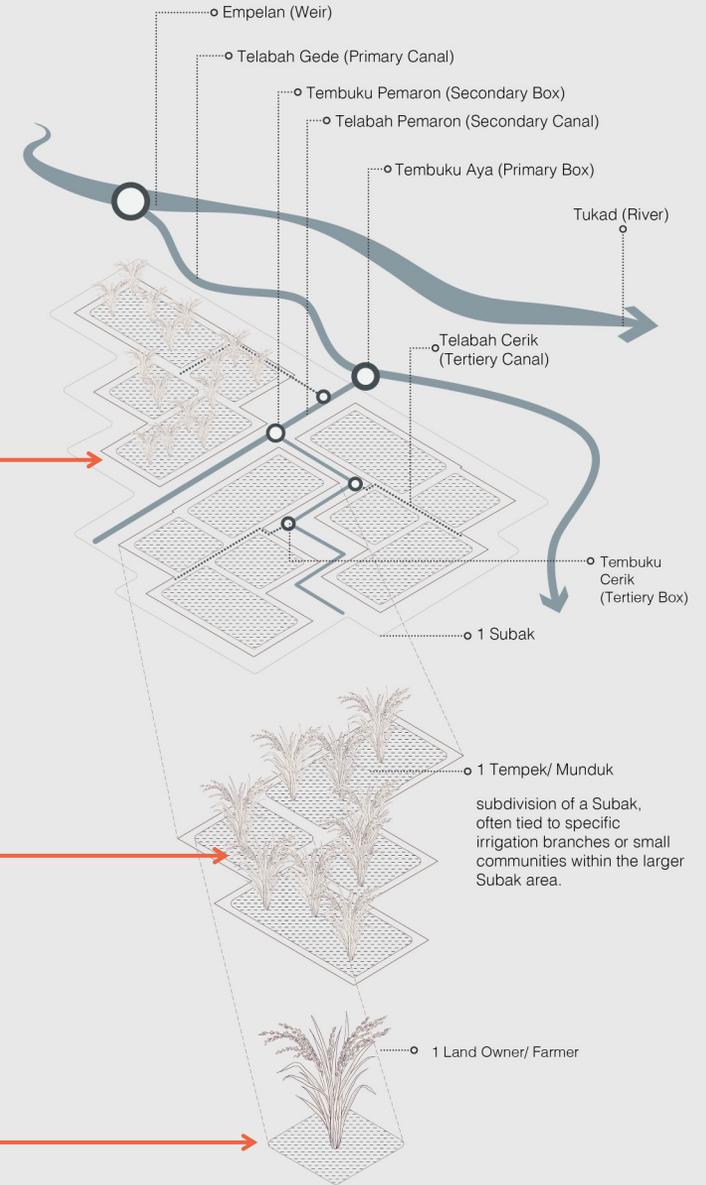


Subak as Indigenous Knowledge System

Practicing Subak Across Scales

On A Subak System Scale

One Subak
Area: +40-100 Ha
Members: + 20 – 150 farmers



Subak as Indigenous Knowledge System

Practicing Subak Across Scales

On A Subak System Scale

One Subak
Area: +40-100 Ha
Members: + 20 – 150 farmers

Tempek/ Munduk I

Farmers A

Farmers B
Past Present

Prologue

Highest Power

Paruman Krama Subak
(Meeting of Subak)

Prajuru /
Administrative

Pekaseh/Kelihan Subak
(Subak Head)

Pangliman/Petajuh
(Deputy Head)

Awig-Awig
Traditional regulation
written and unwritten regulations.
Normally, it consists of: water right,
establishment of organization and
obedience to policy, sense of
leadership and honesty, as well as the
operation and maintenance.

Managing Fair
Water Distribution

Mobilize
resources
& mutual
assistance

Managing the
schedule of rice
cultivation

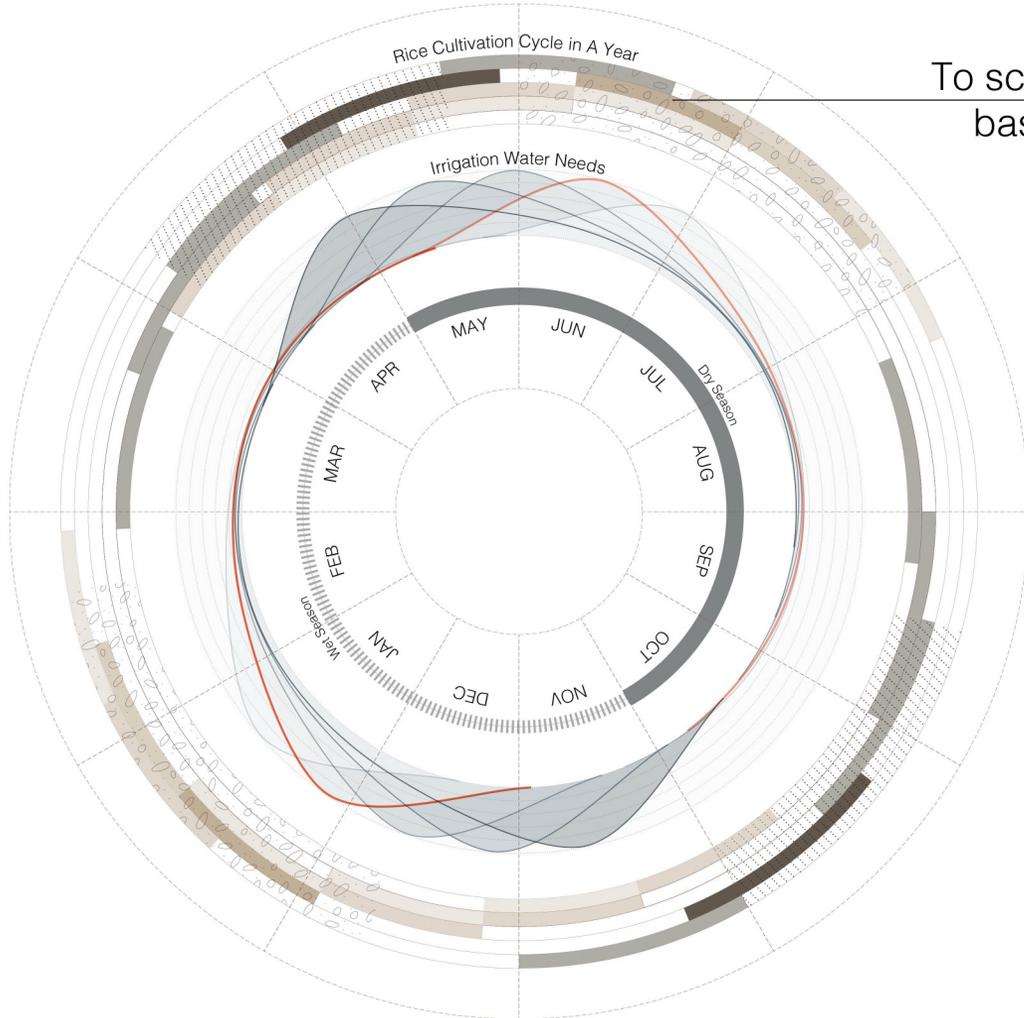
Resolve
conflicts

Scheduling &
organizing the
rituals to the
goddess

Subak as Indigenous Knowledge System

Subak Governance

On Rice Cultivation



To schedule which date is based on Hari Duasa

Hari Duasa / Auspicious Day

CAKA 1946

JANUARI 2025

WUKU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
MINGGU																															
Senin																															
Selasa																															
Rabu																															
Kamis																															
Jumat																															
Sabtu																															
INGKEL	WONG	SATO	MINA	MAHUK	TARU																										

PEMELASAN YANG TERGETAK DI BELAKANG DI BALIK KALENDER PIRU D PERHATIRAN

LOKERBALI.INFO

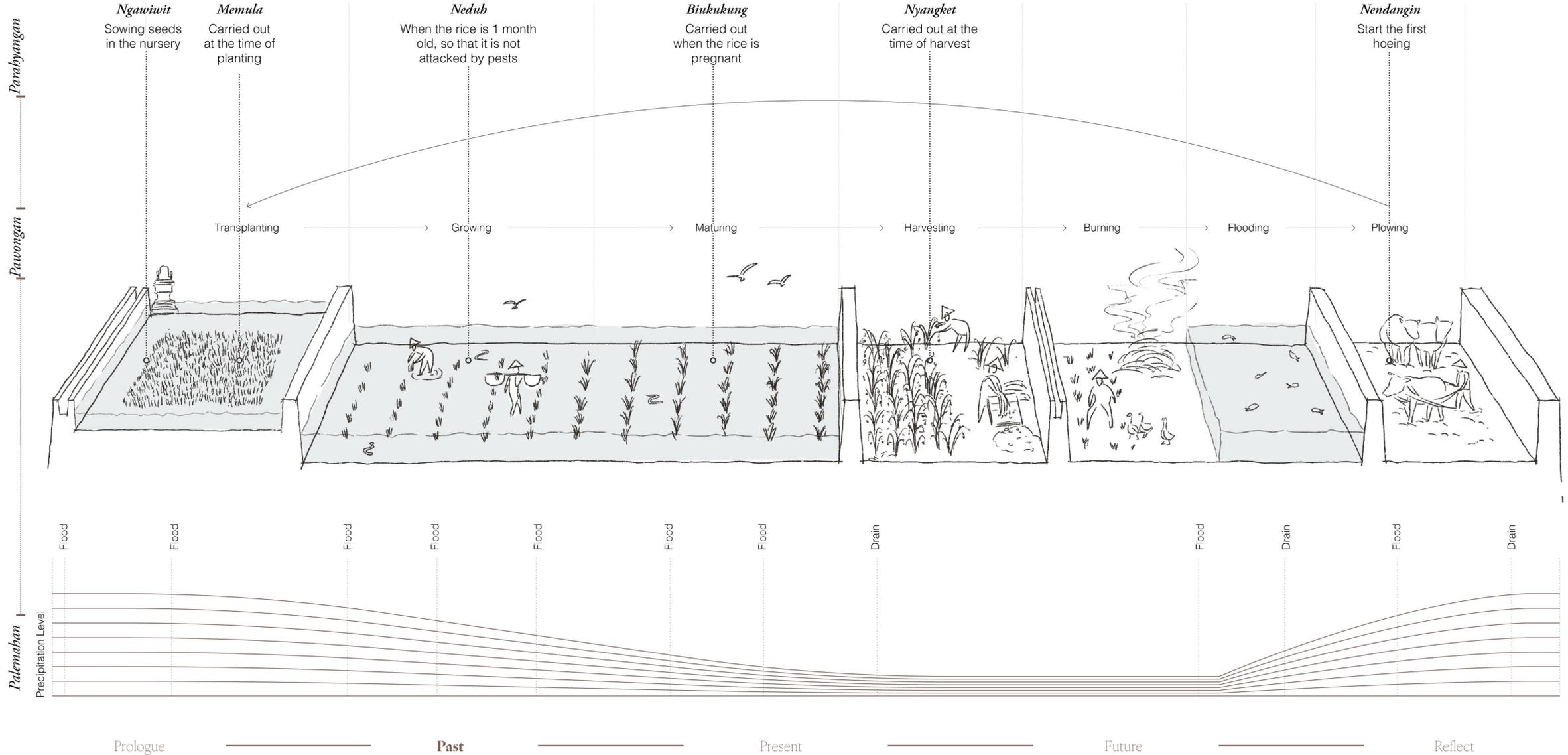
Google Play

App Store

Subak as Indigenous Knowledge System

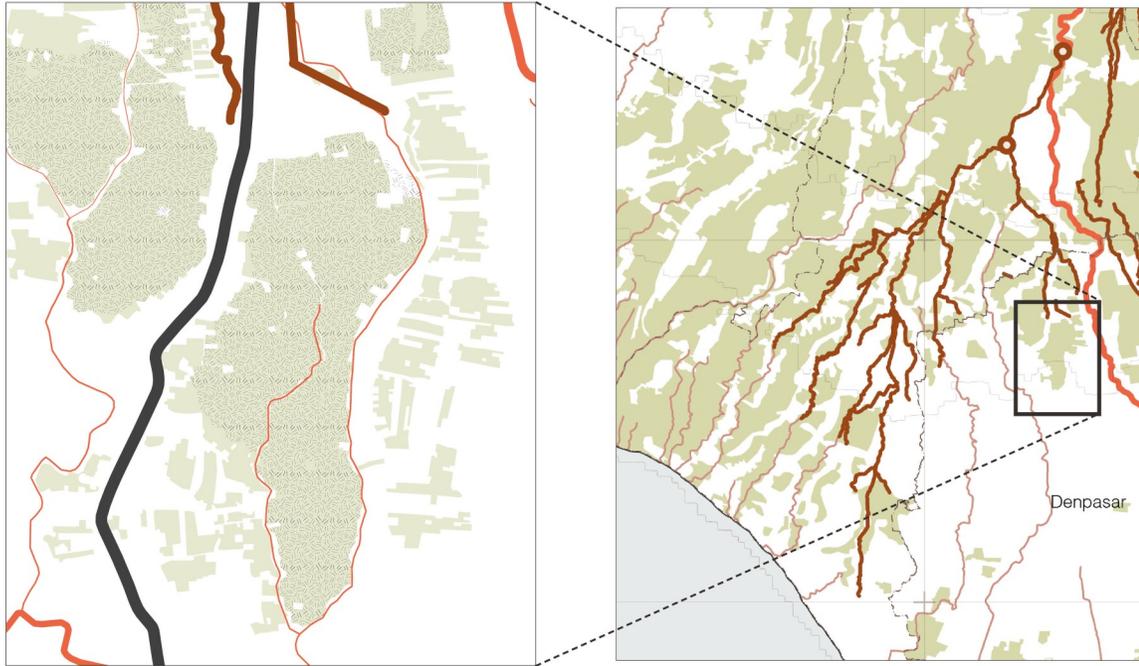
Subak Governance

On Rice Cultivation



Subak Governance

On A Subak System Scale



A Subak

Led by a Pekaseh

Subak Gede

Led by Pekaseh Gede

Indigenous Community

Sedahan Agung

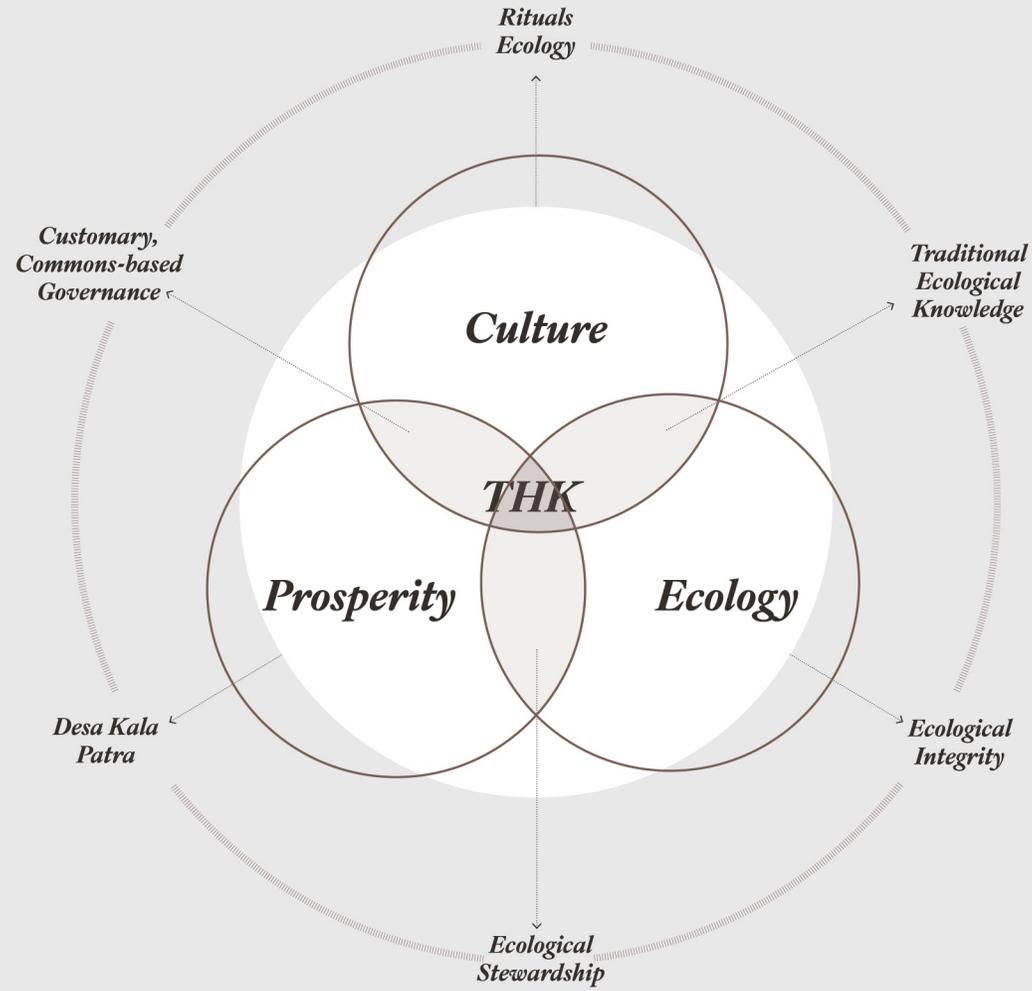
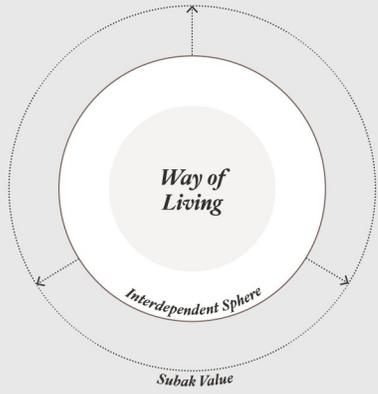
Formal Government

Provincial

Regional

Local

Subak as Indigenous Knowledge System



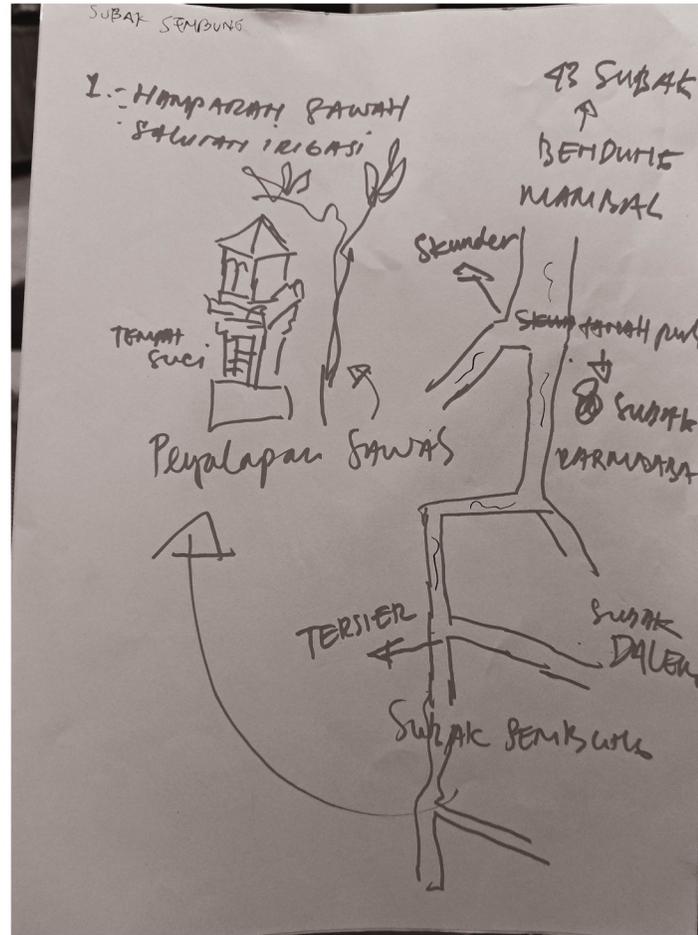
*Subak was **a subject, a living system** that balance the harmony of culture, ecology, & prosperity.*



Present

Forgotten Harmony

Sustaining the Values of Subak



Voice of Subak

Poisoned Paradise

A short documentary about Subak's struggle against land conversion in Bali.

Watch here:



Subak as Contested Territory
 The Struggle of
 Subak Practice



“I was given an envelope (containing money) as a bribe to sell the land (rice field).”

Memories

“I used to eat or sell the eel that i find in subak”

“Now the subak is highly dependent on government funding to operate.”

Memories

“Subak on a system of mutual cooperation. But now experiencing a decline.”

Memories

“The subak’s water used to be drinkable, but not anymore.”

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”

Subak dahulu dapat di minum dan banyak ikan yang hidup dan mudah cari makanan dan air lenau di kali itu kita bisa mandi
 lenau sekarang subak itu banyak di kali sempitnya; mudah mudahan kedepan yang mudq mau tukun jali petan

- Subak Dulu Sistem Gotong Royong mesid Bulek
 - Sekarang Sistem Gotong Royong sangat berkurang
 - Dulu jala di
 - Lahan sawah mulai berkurang
 - Air sudah tercemar
 - Subak di pertahankan

Dulu masih bisa minum dan air langsung di subak

Apakah sekarang atau masa depan, Petani masih ada dan generasi muda karena lebih cede perhasaban dan tukang sap

Pelan
 Harapan kami ke depan. Ma air kami bisa di pertahankan dan kedepan kami yg ke E. Negeri mau jikan Teknologi mudahan di bidang petan

Subak as Contested Territory

The Disruption of Subak's Rhythms

Green Revolution started late 60's.

A global initiative aimed at boosting agricultural land productivity using Western science-based technologies.

Green Revolution in Indonesia



New high yielding rice varieties (HYV) were introduced in Bali

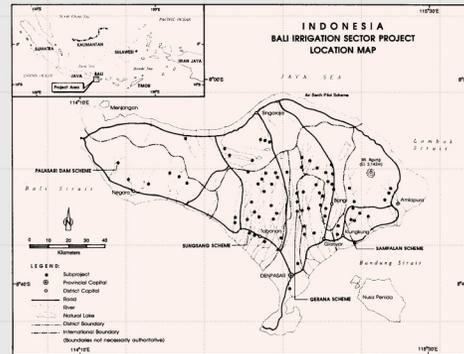
Farmers were urged to produce were urged to grow rice as rapidly as possible (almost 3x than usual in two years), disregarding traditional irrigation schedules and established crop rotation practices.



The initial increase in rice production was counterbalanced by water scarcity and unusually severe infestations of pests and diseases (Lansing, 1991; Sutawan, 2000; Pringle, 2004).

Bali Irrigation Project (BIP) was launched and financed by Asian Development Bank

It was only partly successful, as the new system clashed with centuries-old water distribution practices. Some subak even reverted to their traditional canals due to ongoing conflicts.



Bali Irrigation Sector Project, ADB 1979

Introduction of Subak Gede by the government

To improve irrigation water management and coordination for group of subak obtaining irrigation water from the same source (weir/dam, or water divider)

Farmers returned to their synchronized planting routines, traditional irrigation practices, and customary crop rotation methods.

However, the dependency on chemical fertilizers has persisted

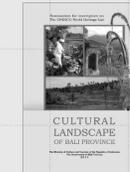
“Since the Reform era (1998), the authority of the Subak leader to prohibit land transactions has gradually disappeared. When ownership of rice field land is bought or sold, it no longer requires the permission or even the knowledge of the Pekaseh (Subak leader); the land title simply changes hands.”

on interview with Prof. Dr. Ir. I Ketut Suamba, M.P., Agribusiness department, Udayana University (2025)

Law No. 41 of 2009 concerning the Protection of Sustainable Food Agricultural Land (LP2B) was enacted to ensure the preservation and protection of agricultural land dedicated to food production.

UNESCO World Heritage Landscape recognition as an effort to preserve the landscape.

The recognition of the landscape as a UNESCO World Heritage Site was intended as an effort to preserve it. However, this designation has instead been used as a vehicle to open up tourism opportunities, particularly in the areas recognized as part of the World Heritage site (Wardana, 2019)



Omnibus Law Introduced

The purpose of this law is to enhance the investment climate and simplify bureaucratic processes. Previously, investments had to undergo regional procedures, but they now go directly to the central government. This change has led to an increase in foreign investors engaging in the development of tourism areas

1960

1968

1969

1970

Green Revolution effect

1979

1980

1981

1983

1990

1998

2000

2009

2010

2012

2019

2020

Prologue

Past

Present

Future

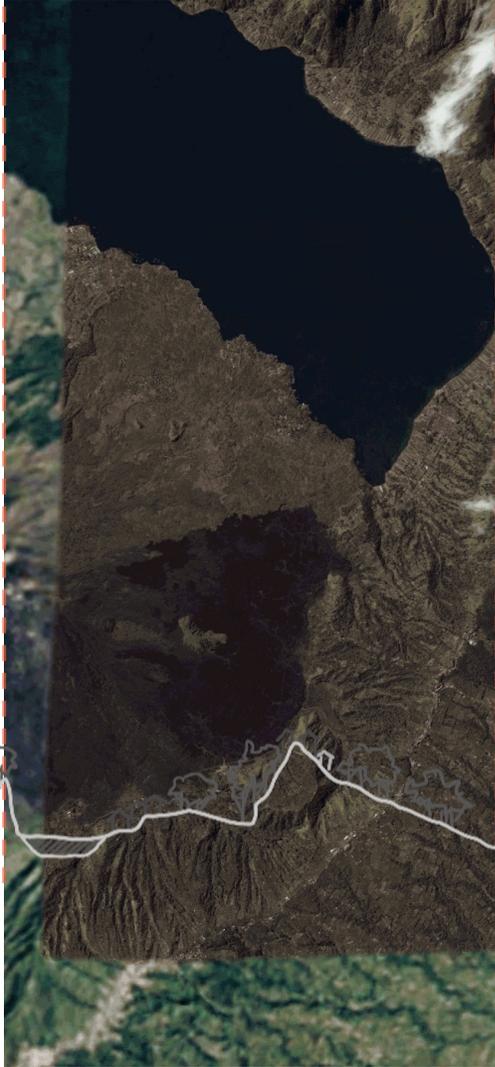
Reflect

Subak as Contested Territory

Landscape in Transition

Spatio Temporal
2005-2024

Upstream



Subak Hinterland



Subak in City



Subak Near Coastal Line



Prologue

Past

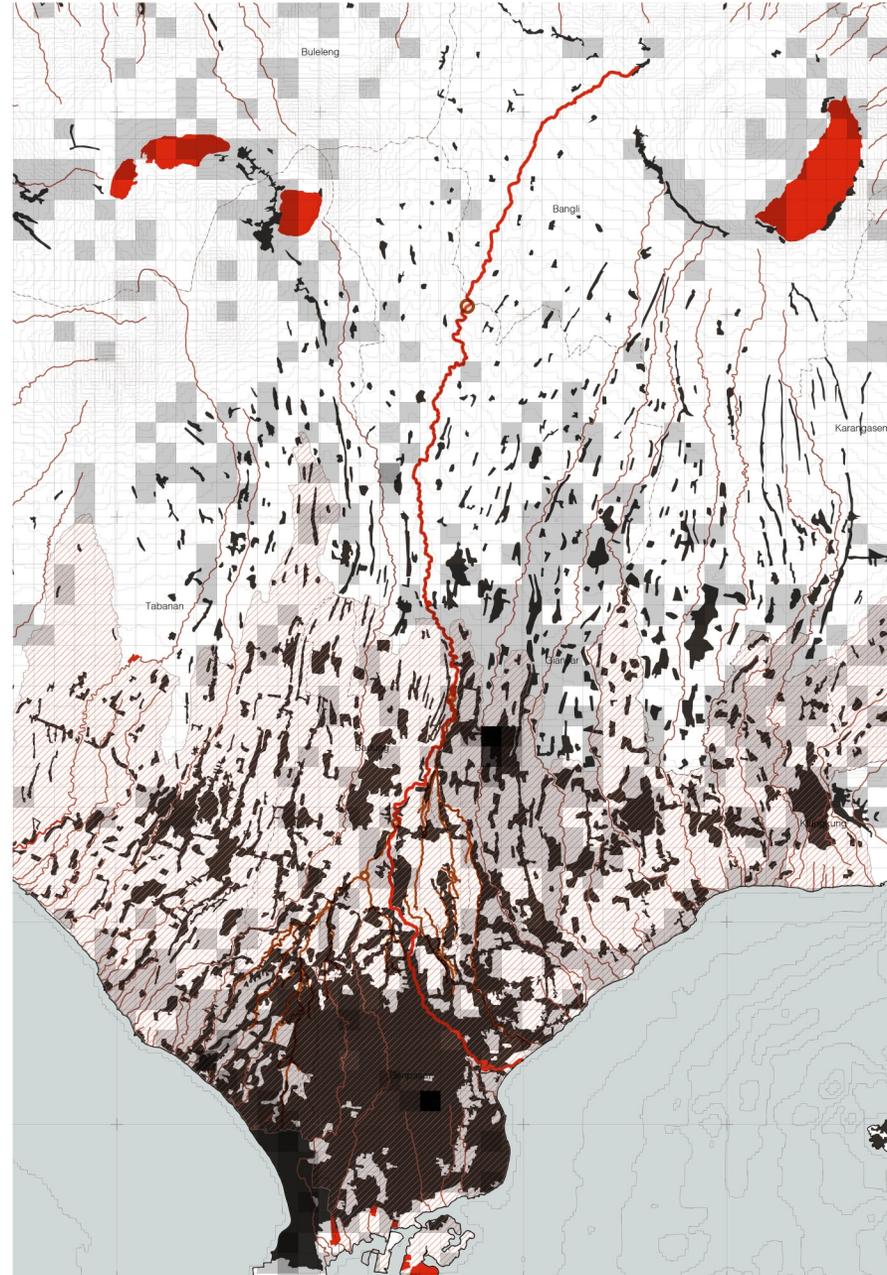
Present

Future

Reflect

Subak as Contested Territory
Landscape in Transition

Water Deficit



Prologue

Past

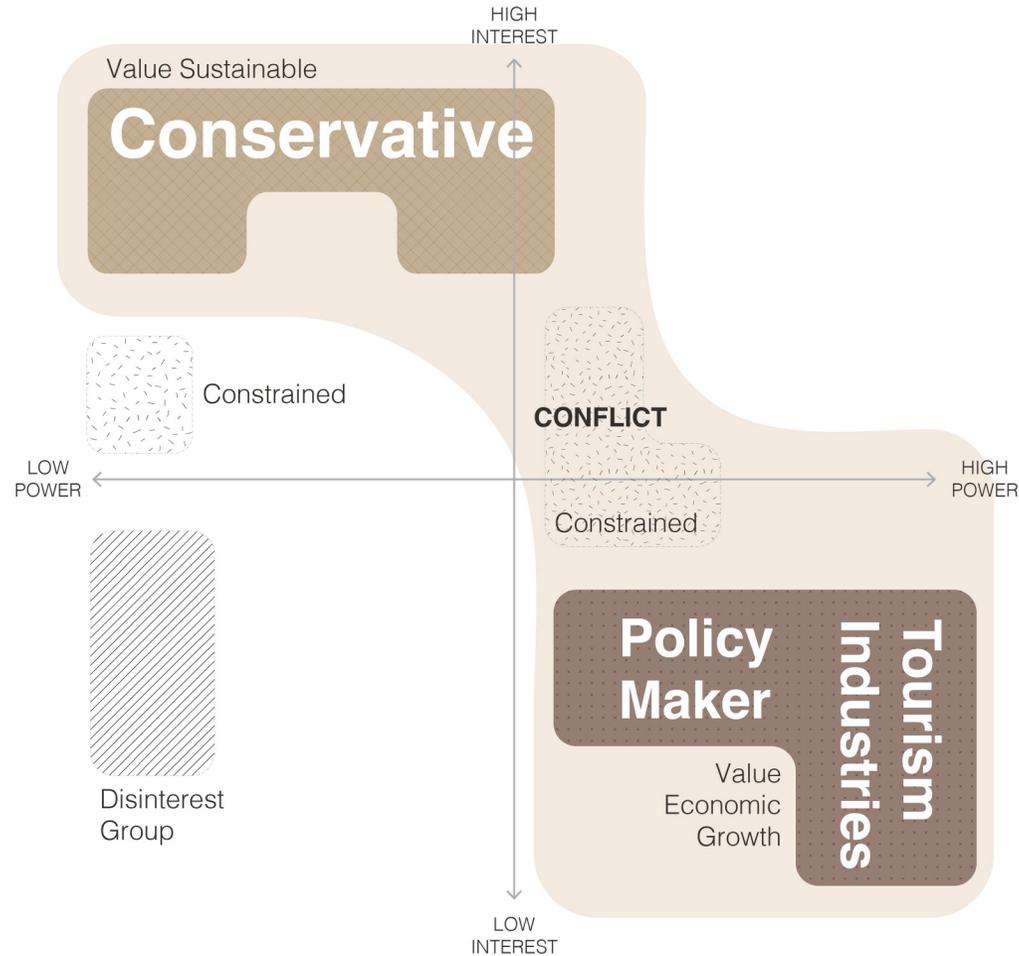
Present

Future

Reflect

Subak as Contested Territory

Displaced Prosperities and Power Struggle



LEGEND

- High Influence in Spatial Change
- Medium Influence in Spatial Change
- Low Influence in Spatial Change
- Crucial Stakeholders

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

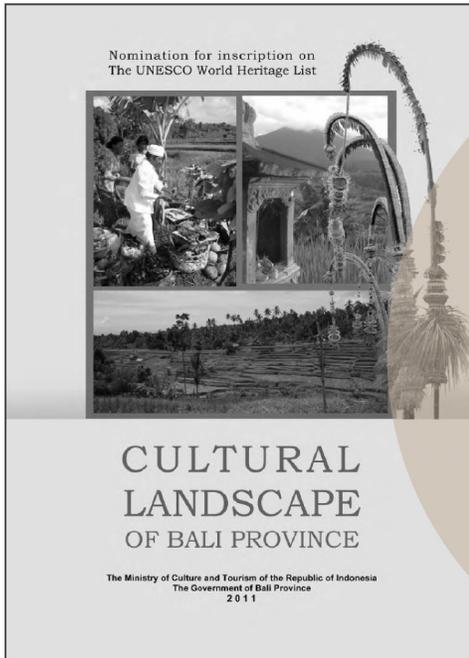
- I1 Tourism Industries
- I2 Developers
- I3 Land Owners
- I4 Spatial Planners
- I5 Environmental & Ecological Scientist

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

The Paradox of Preservation Nature-Culture & Development

UNESCO World Heritage



*Cultural
Presevation*

International

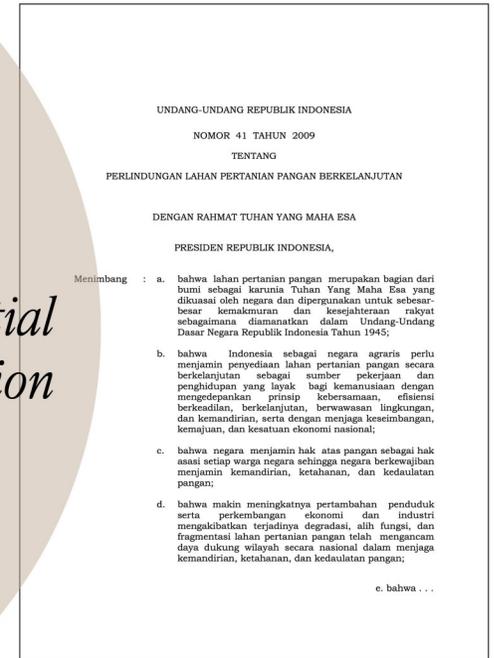
National

Provincial

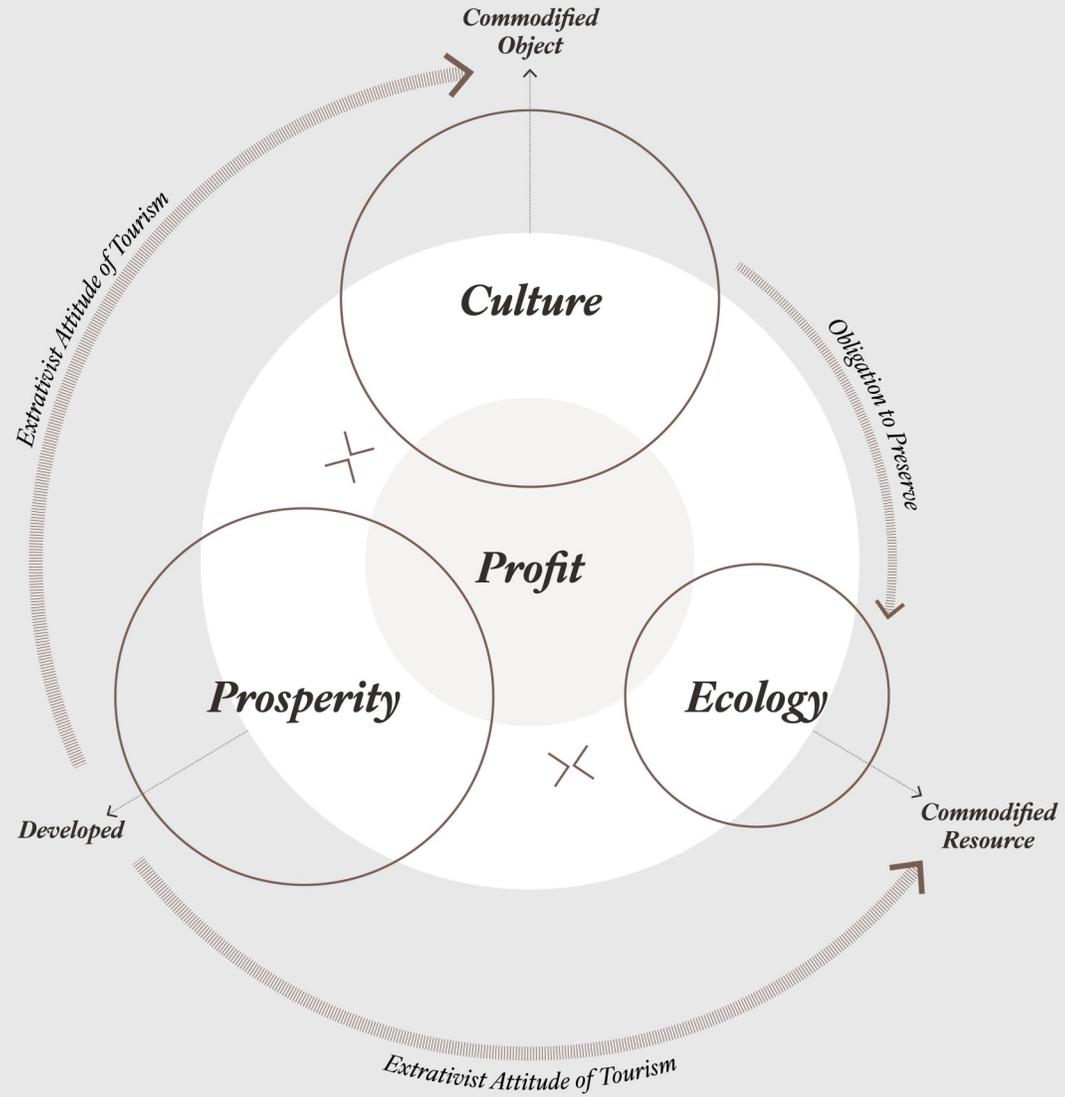
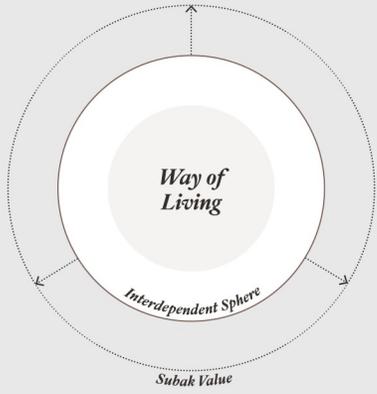
Regional

*Spatial
Presevation*

Bali Spatial Plan (RTRW)

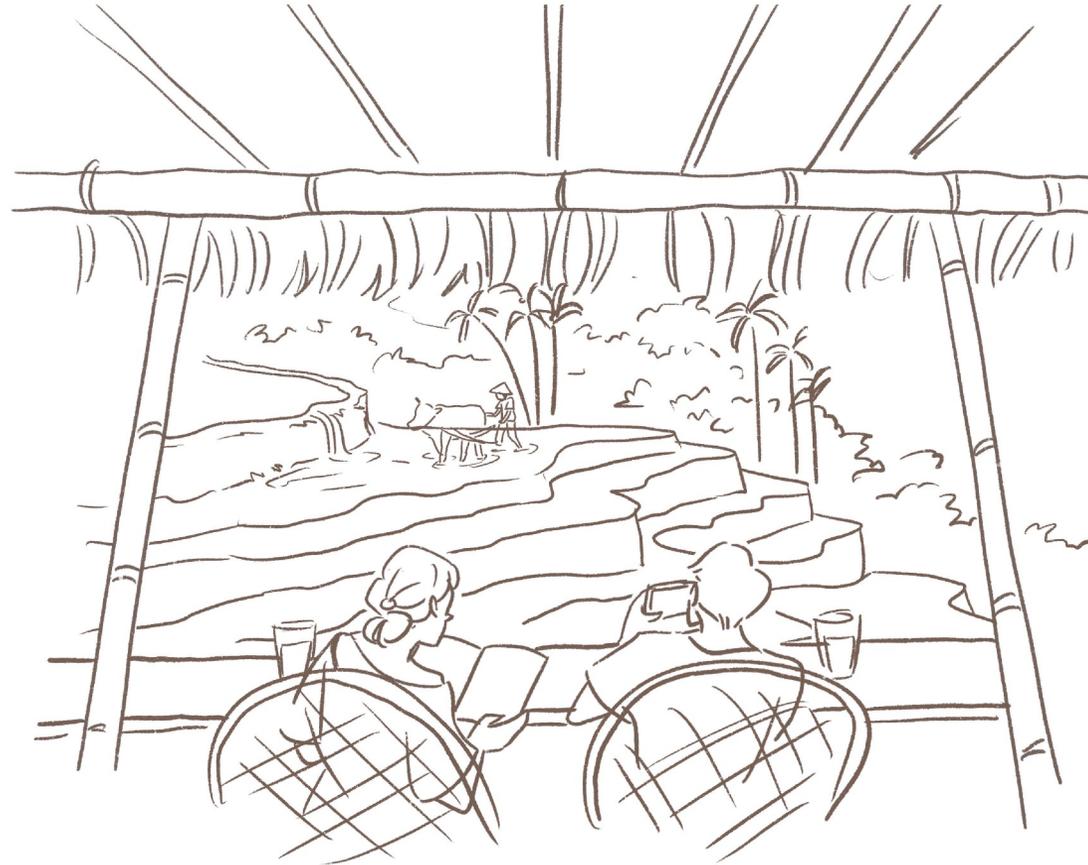


Subak as Contested Territory
 Degraded Value



Subak as Contested Territory
Degraded Value

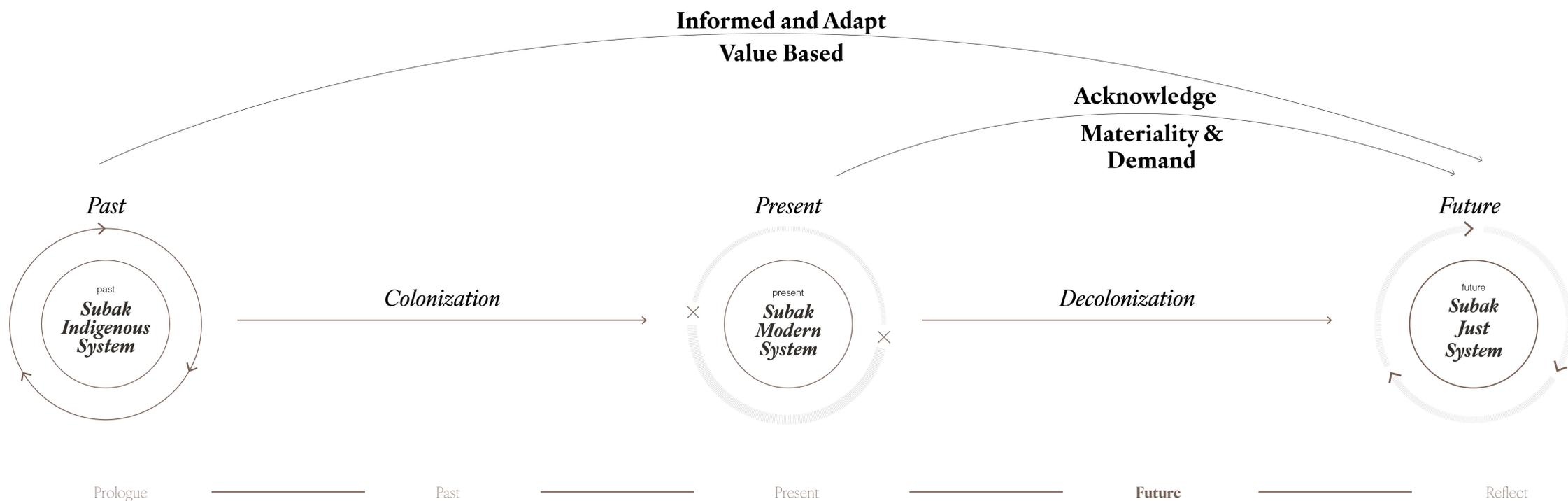
*“Subak, once a living soul of the land, now lies **objectified**—its grace quarried, its essence drained, a stage set only for the eyes of wandering strangers, **who see beauty but not the life beneath.**”*



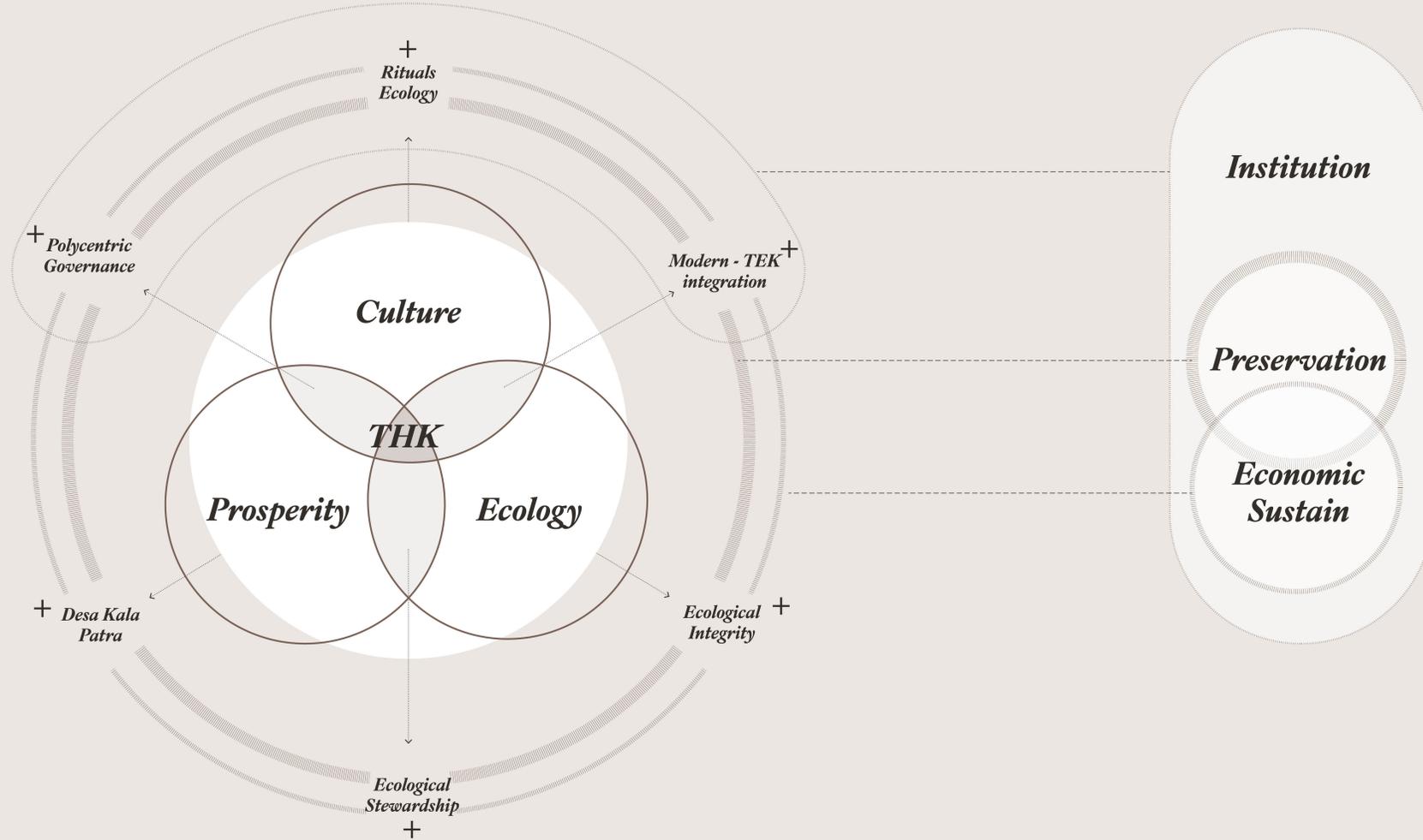
Future

Reclaiming The Balance

Value-Based Transformation



Towards Just Development
Vision



Towards Just Development
Strategy



1. Reactivation Sedahan Agung Role



Goals

To enhance Sedahan Agung's role in coordinating ecological governance and development oversight at the watershed scale.

Tools

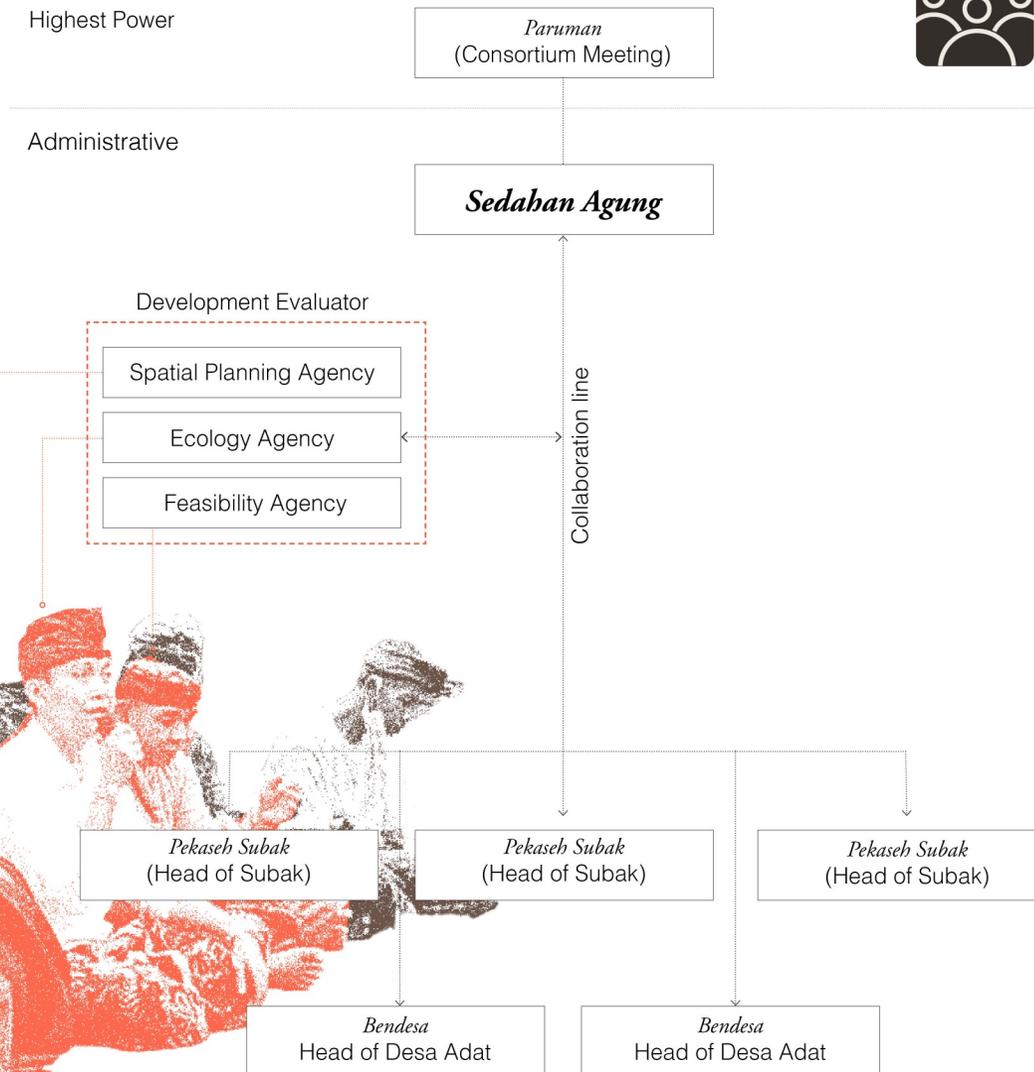
- Re-activate Sedahan Agung role with additional function
- Involvement into development approval process.

Who need to Participate

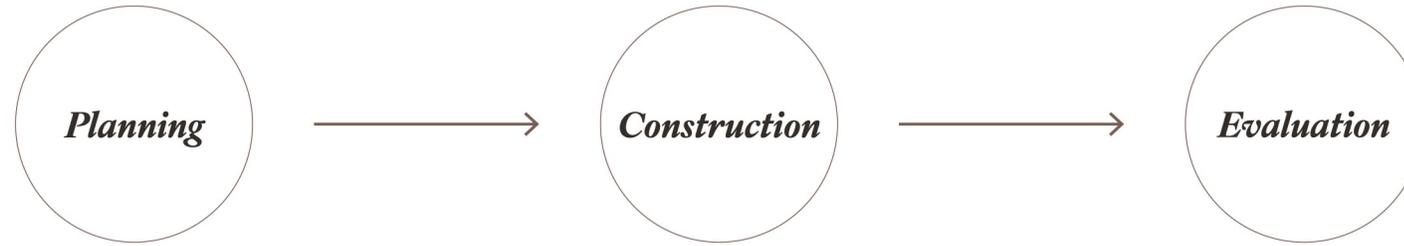
Sedahan Agung, Subak Gede, Subak, customary village (desa adat), spatial planners, environmental scientists, local government.

Who will Opposed

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



1. Reactivation Sedahan Agung Role



	Planning	Construction	Evaluation
Action	<p>Feasibility Study</p> <p>Reviewing and providing recommendations on proposed development projects</p> <p>Communicate with all Subak's Pekaseh in the same Watershed & Coordinate with Customary & Service Village</p>	<p>Construction Monitoring</p> <p>Assessing construction plans in relation to Subak's spatial and ecological values</p> <p>Monitoring implementation during the construction phase</p>	<p>Operational Assessment</p> <p>Evaluating environmental and social impacts during the operational stage of new developments</p>
Activity	<p>Territorial Assessment</p> <p>Follow the Territorial Zoning and Proximity Assessment</p>	<p>Periodic Soil & Water Quality Assessment</p> <p>Periodic Water Intake Assessment</p> <p>Periodic Social Impact Assessment</p>	<p>Periodic Soil & Water Quality Assessment</p> <p>Periodic Water Intake Assessment</p> <p>Periodic Social Impact Assessment</p>
Result	<p>Give Recommendation Letter for Developer</p> <p>as Part of Feasibility Study for Development</p>	<p>Compliance Recommendation</p> <p>Provide a recommendation for sanction or a recommendation for tax reduction</p>	<p>Compliance Recommendation</p> <p>Provide a recommendation for sanction or a recommendation for tax reduction</p>



2. Territories Zoning & Protection

Goals

To ensure that development within Subak territories is aligned with ecological thresholds and cultural values.

Tools

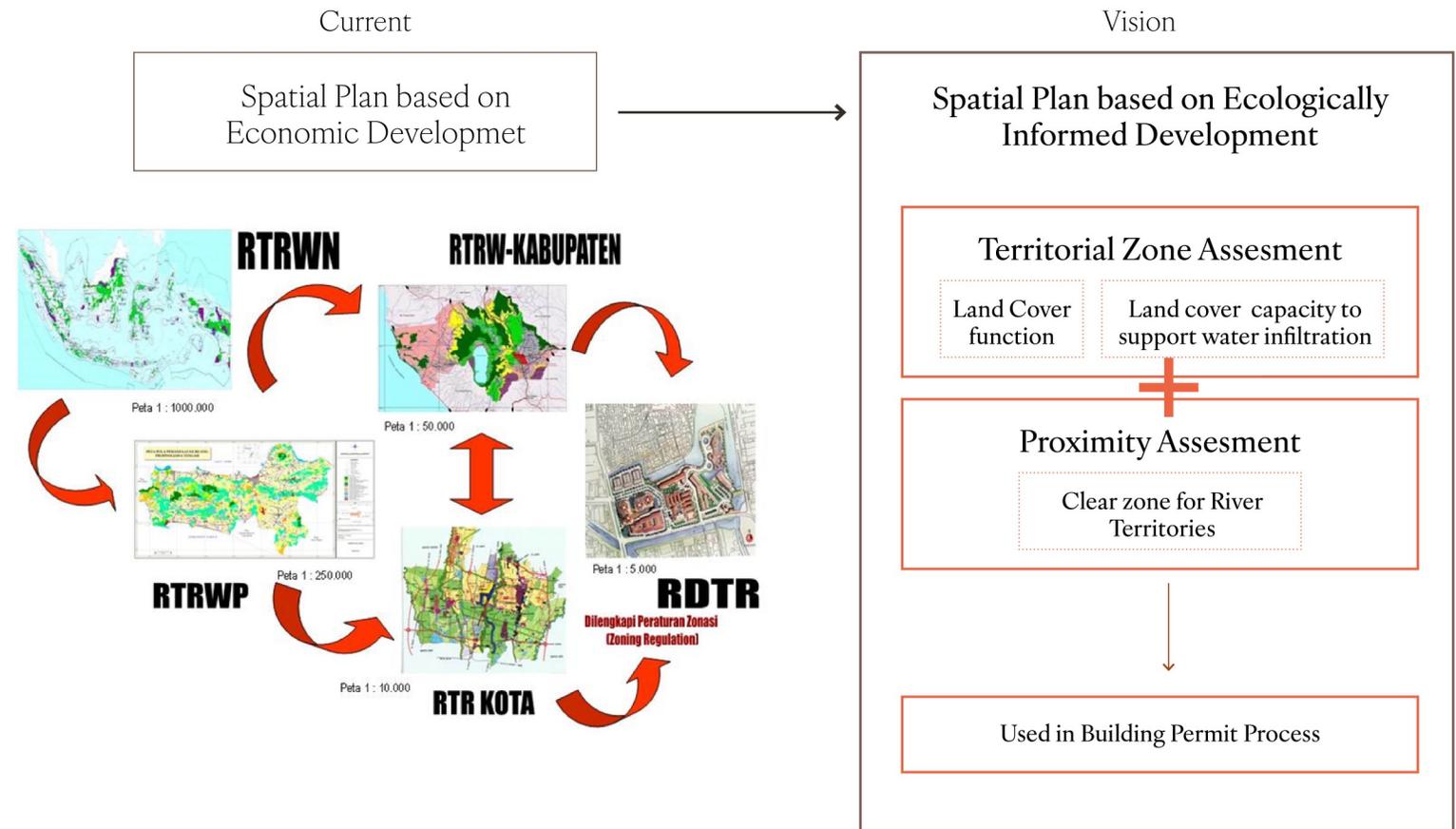
- Territorial Zoning Planning, classifies land based on ecological function, protection status, and allowable development intensity;
- Proximity Assessment, proximity of the proposed development site and critical hydrological features
- Reformed Building Permit Process, incorporates community-based authority into the process.

Who need to Participate

Subak Gede, customary village (desa adat), Subak Gede, Customary Village (Desa Adat), Local government agencies (Dinas PUPR, DLH, BPN), Developers, Spatial planners & environmental experts

Who will Opposed

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



Towards Just Development
Territorial Zoning



Territorial Zoning Assesment

Land Cover
function

Land cover capacity to
support water infiltration



Towards Just Development Territorial Zoning

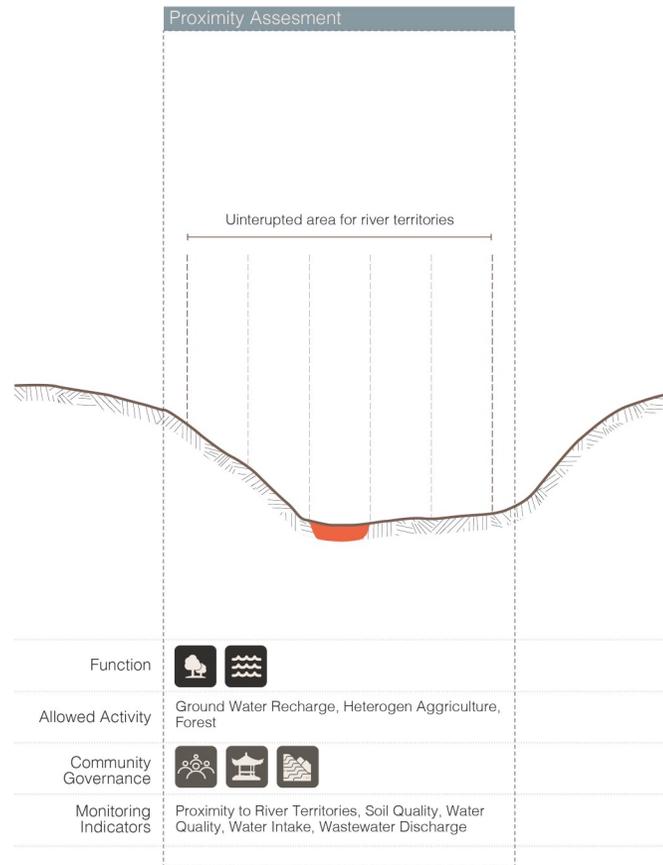


	Zone 1 - Protected Forest	Zone 2 - Agroecological Buffer	Zone 3 - Subak Core Zone	Zone 4 - Heritage Area
Cultural Value	Swah (head)	Bwah (Body)	Bwah (Body)	Bhur (Feet)
Function	Conservation, spiritual protection, ecological buffer	Agroforestry, buffer zone between forest and rice paddies	Rice farming & Heritage Landscape	
Allowed Activity				
Building Coverage Ratio (BCR)	0-2%	2-5%	2-8%	
Green Ratio	>97%	93-98%	90-98%	
Materials	Bamboo, palm leaves, reclaimed wood, natural stone, red brick	Bamboo, palm leaves, timber, natural stone, red brick, reuse materials	Bamboo, thatch, palm leaves, coconut fiber, timber, natural stone, red brick, reuse materials	
Hydrological Condition	High - Very High	High - Very High	Low - High	
Hydrological Consideration	Maintain high infiltration	Allow slow infiltration in certain function	Uninterrupted water flow	
Infrastructure Material	None, or minimal intervention (permeable materials) for Indigenous ceremonial use	Permeable path, natural stone, grass	Permeable path, natural stone, grass, raised walkways	
Community Governance				
Monitoring Indicators	Land cover, Signs of unauthorized access, Soil & Water Health	Soil and Water Health, BCR compliance	Soil and Water Health, BCR compliance, Crop Yields, Ceremony Access	

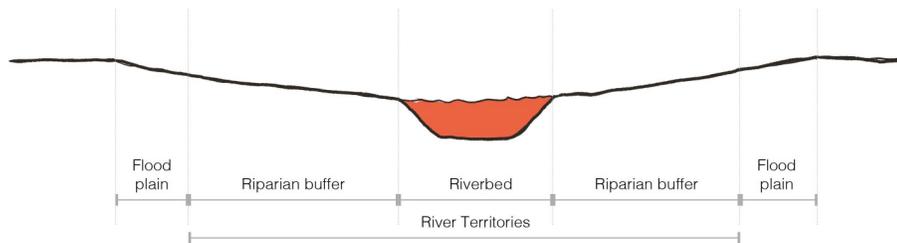
Towards Just Development
Proximity Assessment

Proximity Assessment
 Clear zone for River Territories

based on Regulation of the Minister of Public Works and Public Housing Number 28/PRT/M/2015 concerning the Determination of River Border Lines and Lake Border Lines.



River without embankment area



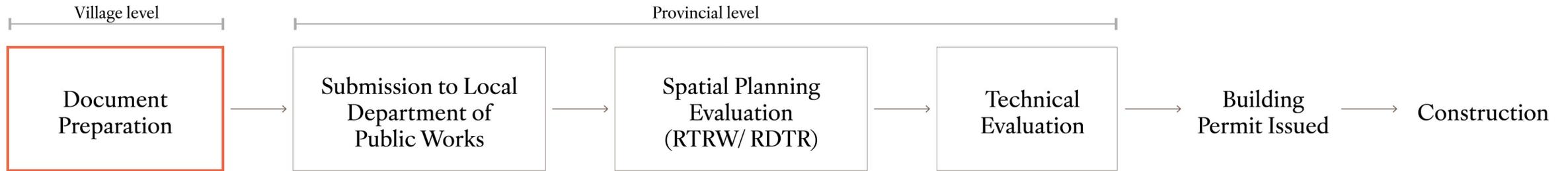
Clear zone for River Territories
 outside city setback min 50 - 100 m from river bed
 inside the city setback min 10 - 30 m from river bed



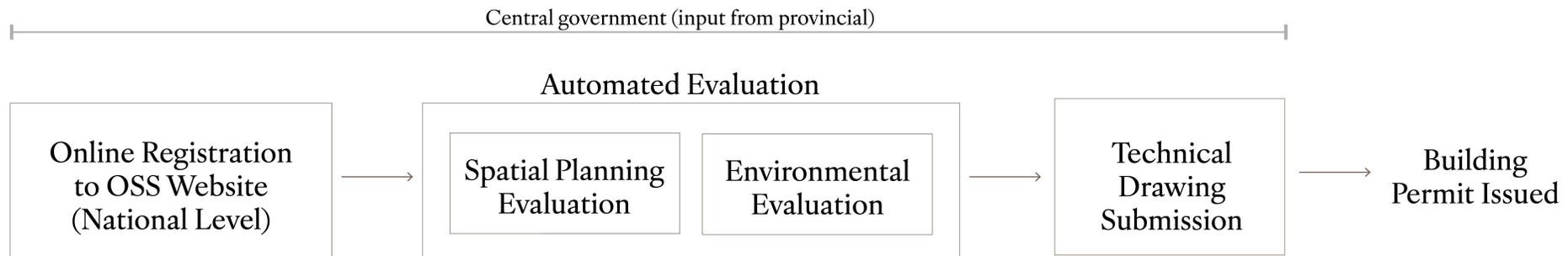
Reform of the Business/ Operating License Process



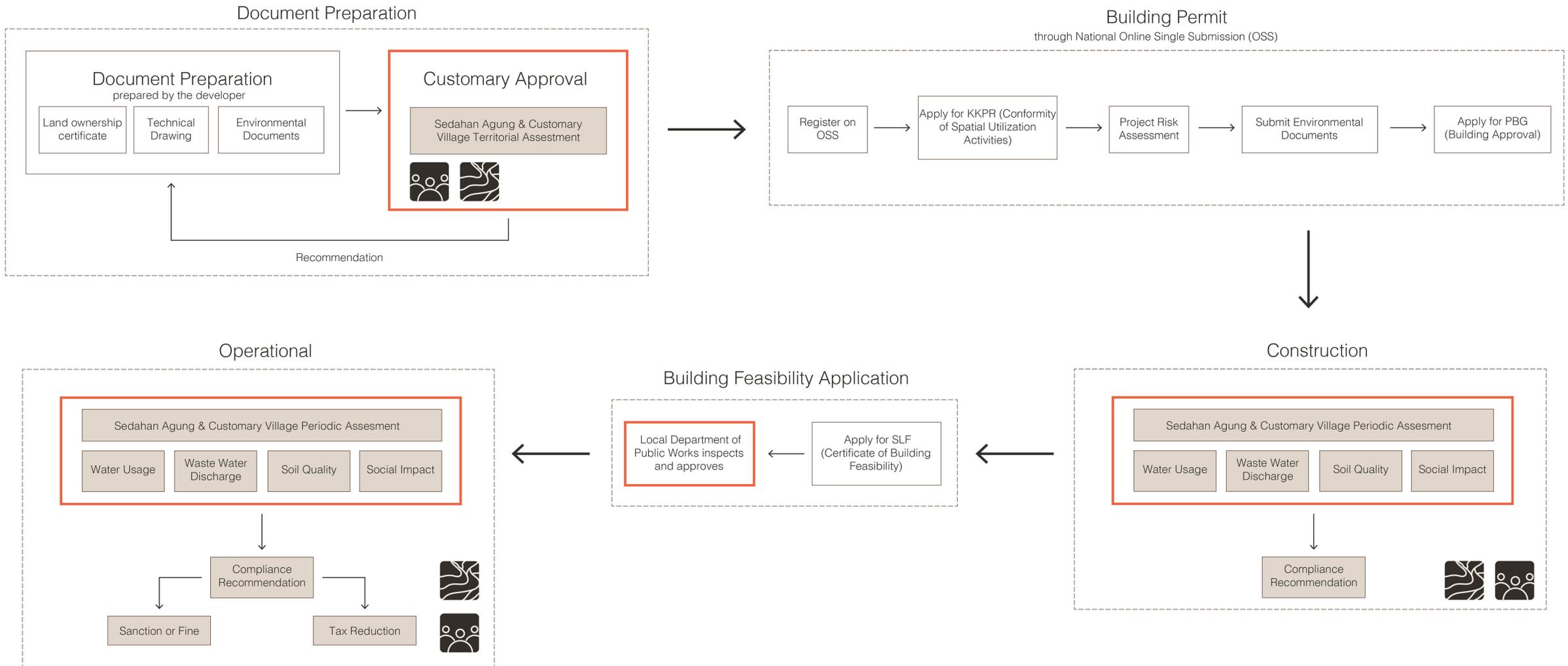
Before Omnibus Law



After Omnibus Law in 2020



 Indicate involvement of Customary Village or Indigenous communities



Indicate involvement of Customary Village or Indigenous communities

3. Co-Production of Knowledge

Goals

To raise awareness, provoke empathy, and educate the public on Subak's living cultural system.

Tools

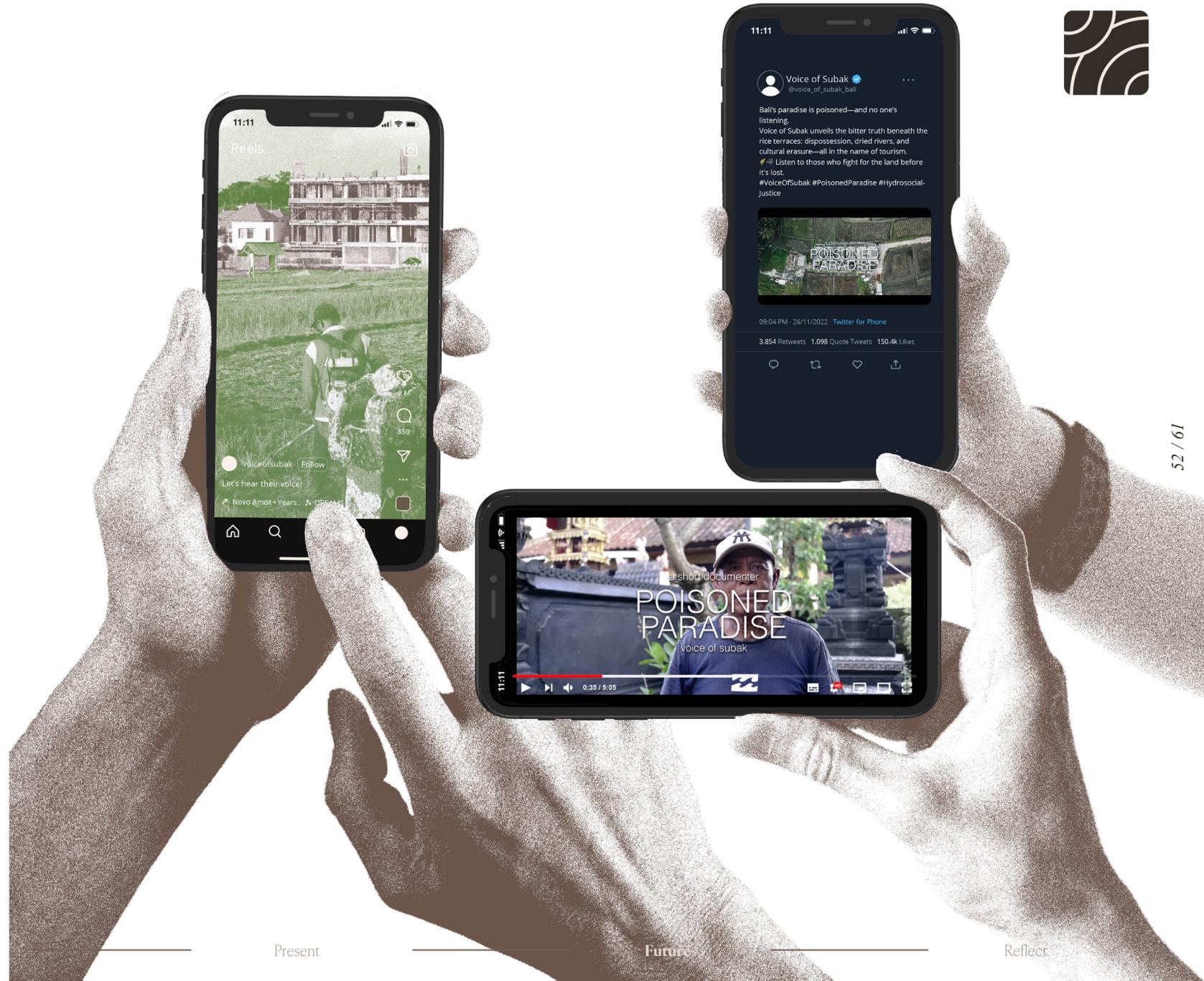
- Social media through arts, posters, photography, documentary films
- Communicative booklets for public, education, etc

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.



3. Co-Production of Knowledge

Goals

To raise awareness, provoke empathy, and educate the public on Subak's living cultural system.

Tools

- Social media through arts, posters, photography, documentary films
- Communicative booklets for public, education, etc

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.



4. Diversified Economic

Seasonal Activity



Goals

To create inclusive, territory-based economic opportunities and restore pride in farming.

Tools

- Seasonal Village Youth Engagement Programs
- Integrated Village Festival

Who need to Participate

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

Who will Opposed

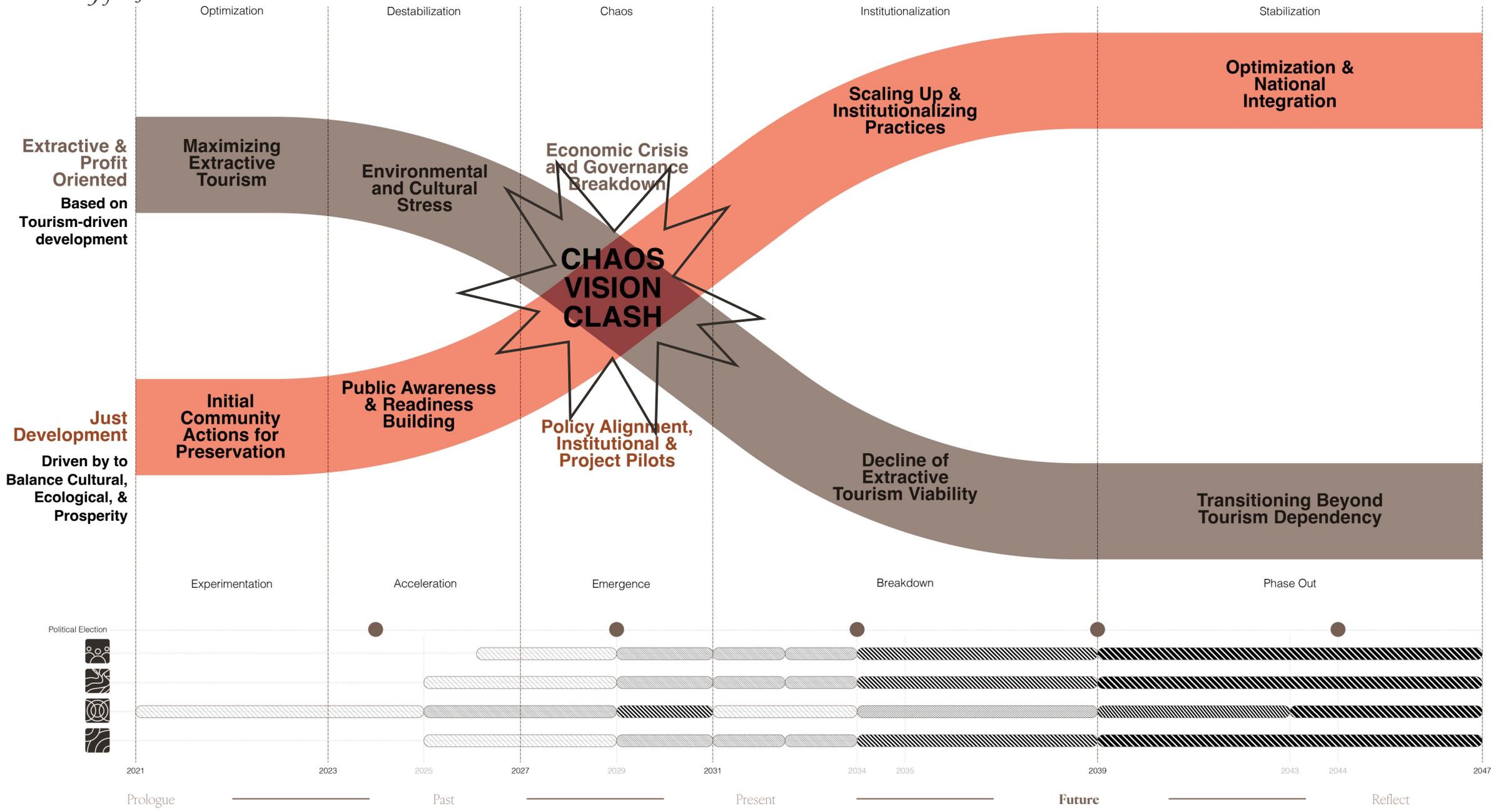
Business actors prioritizing monocultural tourism; stakeholders in land conversion.



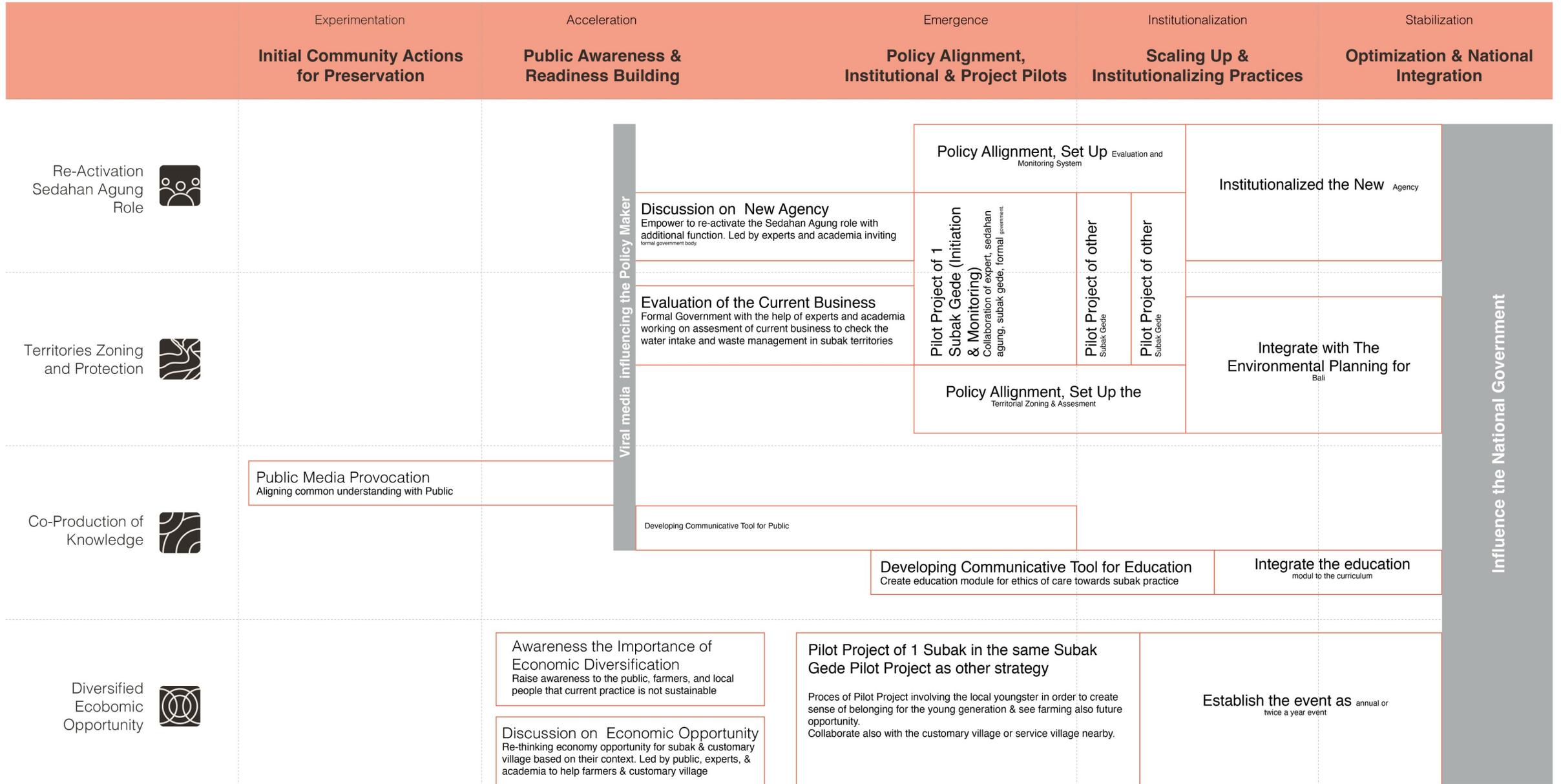
4. Diversified Economic Integrated Activity with Customary Village



A Pathway for Just Transition



A Pathway for Just Transition



Viral media influencing the Policy Maker

Influence the National Government

Reflection

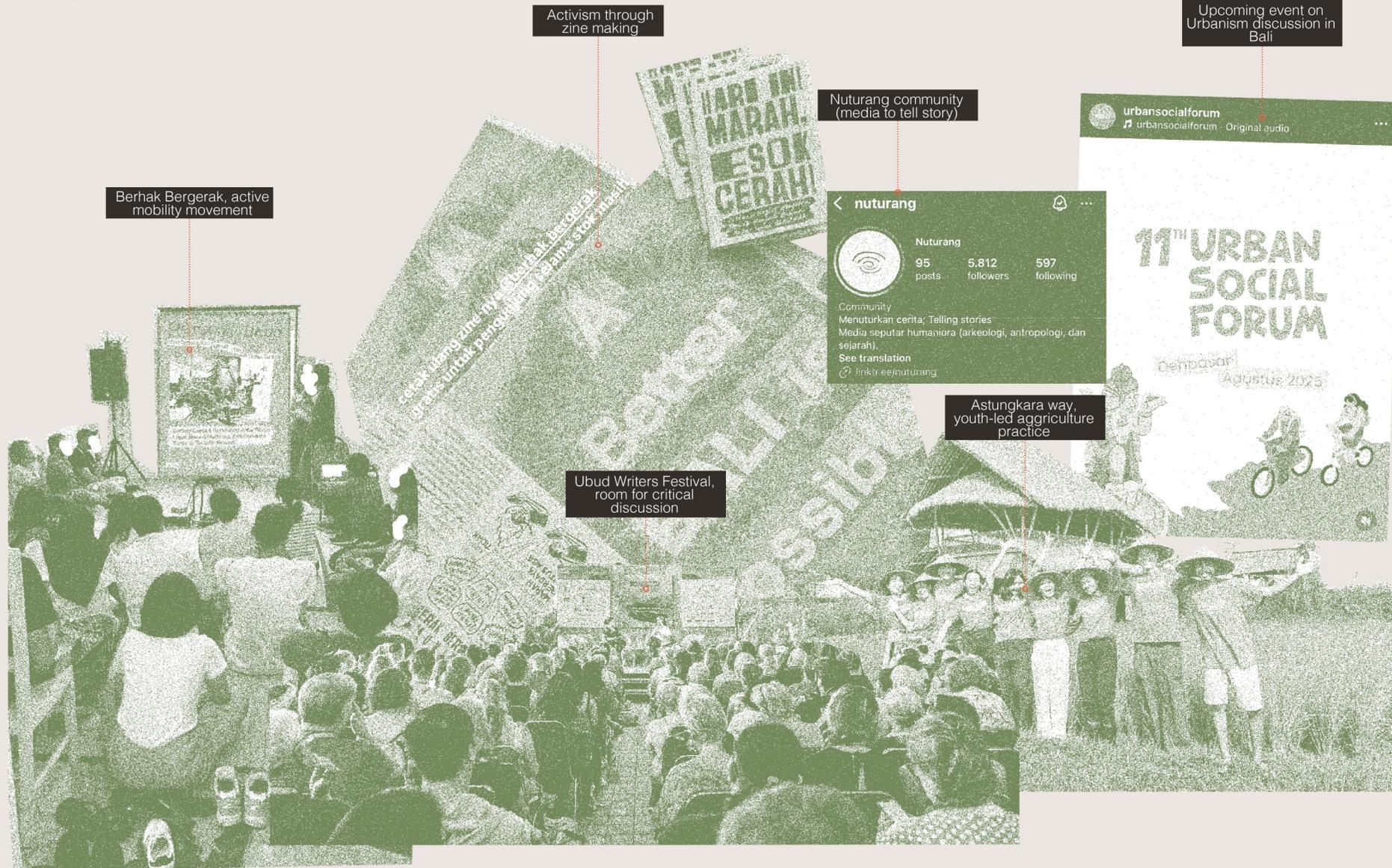
For Bali For Indonesia

Continuity
For Future of Bali

Painting by Gilang Propagalia
Source : instagram @gilangpropag Aug 2024



Continuity For Future of Bali

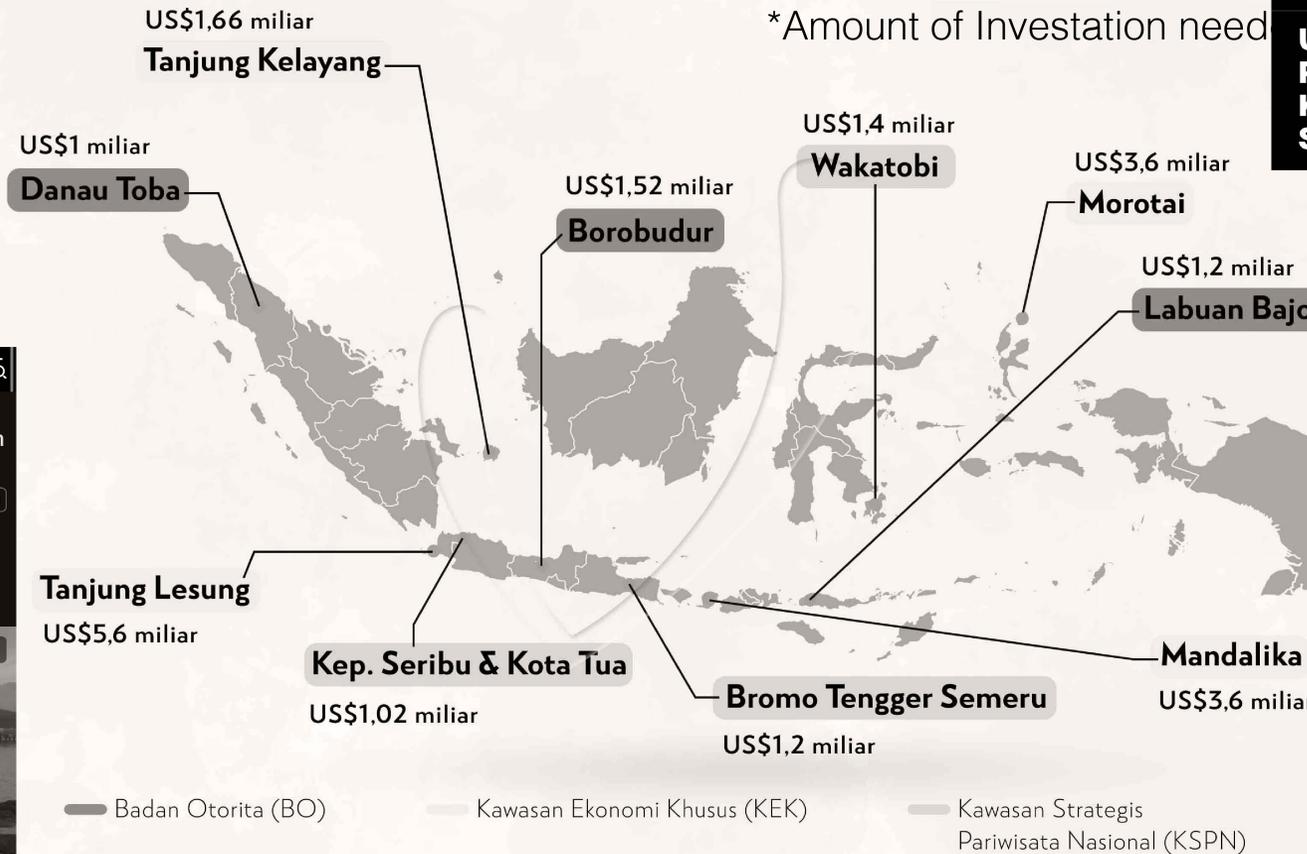


Continuity For Indonesia

Source : Ghiffari (Data from Ministry of Tourism 2018)

BETTING ON “NEW BALI”

*Amount of Investation need



UNESCO Asks for 'Jurassic Park' Tourism Project on Komodo Island to be Stopped

MONGABAY
 Stories from the Mandalika Circuit: Land Issues Not Yet Resolved, Residents Caught in Legal Traps
 FATHUL RAKHMAN (LOMBOK)
 19 JAN 2024 LOMBOK
 Comment Share article

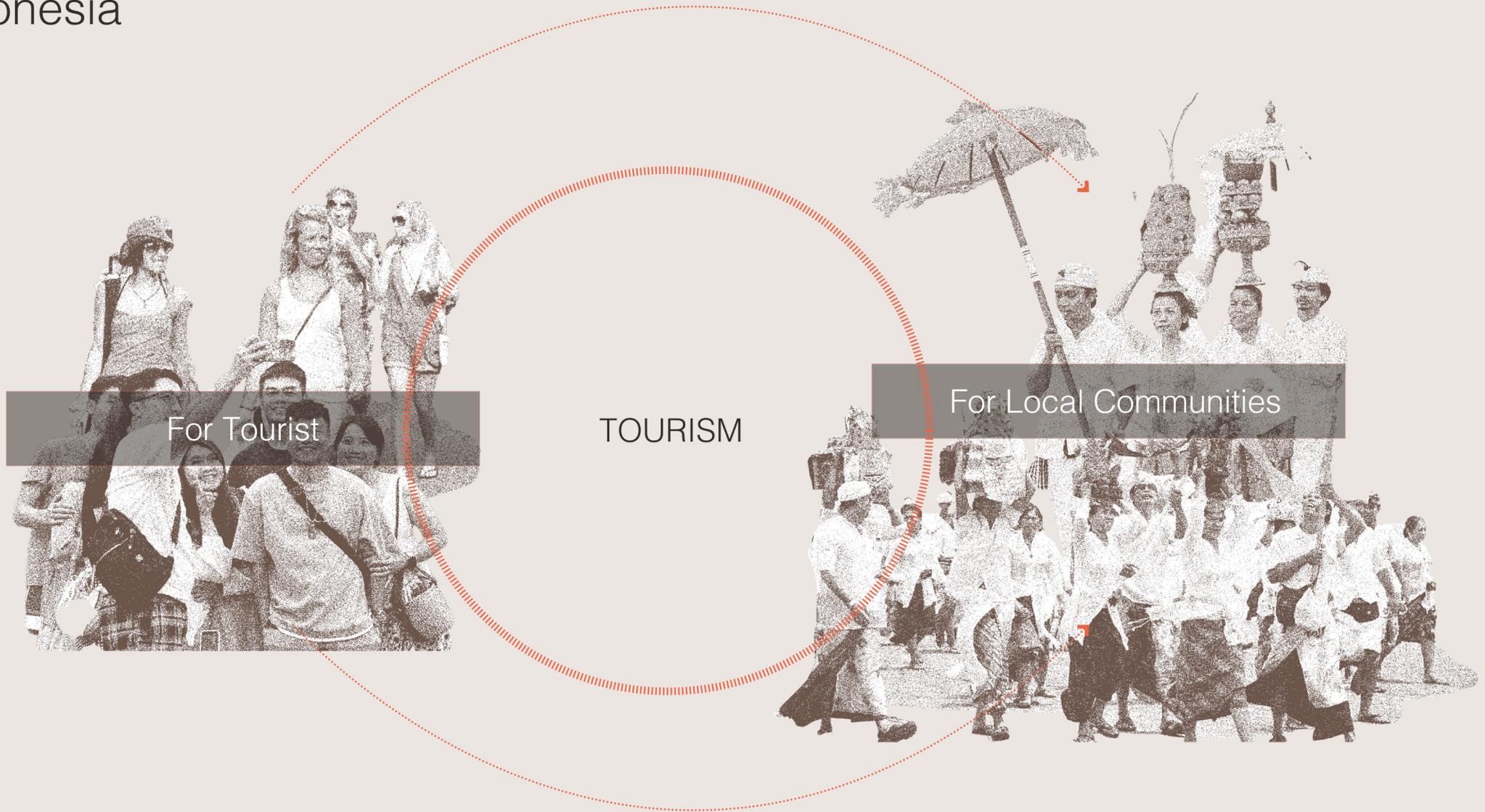
KOMPAS.com
 Labuan Bajo's Binongko Beach "Annexed", Residents Prohibited from Entering the Beach, DPRD Speaks
 Kompas.com, April 5, 2025, 11:34 WIB
 Nansianus Taris, Glory K. Wadrianto
 Editorial Team
 3 14
 View Photos

MotoGP at Mandalika Circuit and UN human rights violation allegations called 'attempt to bring down Indonesia'

BBC INDONESIA
 Progress on the construction of the Mandalika Circuit in April
 Valdy Baraputri
 BBC News Indonesia Journalist
 May 20, 2021

Sumber : Kementerian Pariwisata | Diolah : Visi Teliti Saksama | Infografis : Arizar Ghiffari | Desember 2018

Continuity
For Indonesia



ආර්ථික සහන

Thank you