

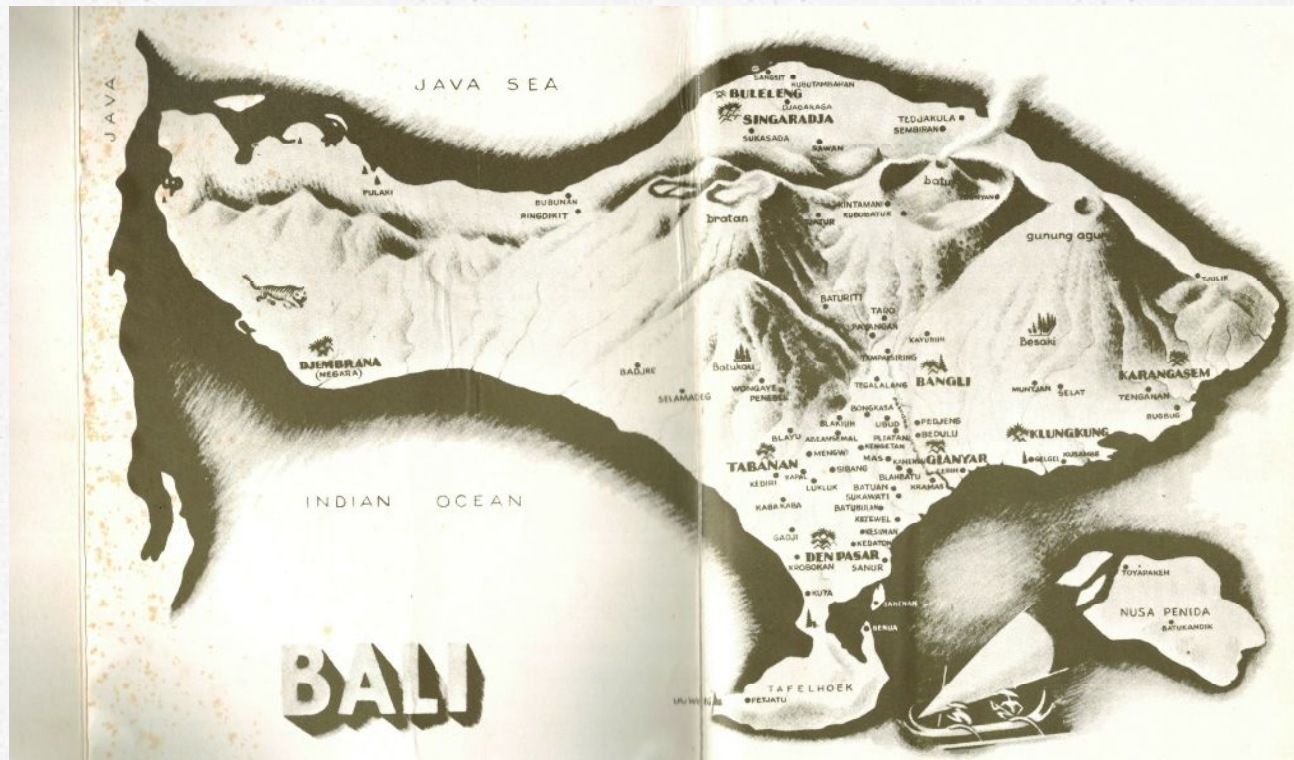
Toward an effective water  
managing system from hill to  
seashore: Bali, a tropical wet  
area case

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# Island of Bali, Indonesia



# Land use pattern of the island

- o Hilltop and hillside: scattered small villages  
dry field and garden:  
dry-land rice, corn, vegetables,  
coffee, clove, citrus tree, flowers
- o Midstream: dense populated villages/towns
- o Downstream: cities and tourist resorts  
wet rice field:  
paddy rice, vegetables, fruit trees

# Hilltop and hillside



## o Hilltop:

Coffee plantation since colonial time, then replaced by citrus trees in 1990s, and recently by flower gardens

## o Hillside:

Clove tree plantation since 1980s (northern side of the central mountains)

# Midstream



- o Irrigated wet rice field developed since around 10<sup>th</sup> century
- o Wet rice land was enlarged by the colonial modern technology and the area reached the peak in 1970s, then gradually was decreasing along with the development of tourism (replaced by roads, housing lots, and hotels)

# Downstream



- The development of cities and tourist resorts needs much more water than ever

# On-going water managing systems in Bali

The whole island level

provincial government's regulation on land use (2009)

Inter-*subak* level

provincial government's coordination  
lords' and colonial power's intervention  
rotatory supply based on ritual schedule

Intra-*subak* level

well-developed corporative and egalitarian  
management by irrigation association  
members

traditional



modern

# On-going water managing systems in Bali

The whole island level

Inter-*subak* level

Intra-*subak* level

- well-developed corporative and egalitarian management by irrigation association members (Lieftrinck 1886-87)
- the whole area of wet rice field in Bali (86,065 ha in 1999) is managed by *subak* associations (total  $\pm$  1,400 in 1990s)

traditional



modern

# On-going water managing systems in Bali

The whole island level

- rotatory supply based on ritual schedule, controlled by mountain lake temple's high priest (Lansing 1991)

Inter-*subak* level

- In pre-colonial period local lords constructed irrigation dams to increase followers (Schulte Nordholt 1996), and colonial government did so to increase tax income

Intra-*subak* level

- provincial government now coordinates the division of water between *subaks*

traditional



modern

# On-going water managing systems in Bali

The whole island level

Inter-*subak* level

Intra-*subak* level

- provincial government's regulation on land use (2009) tries to regulate the land use of the whole island for the first time in the history of Bali island, including the article (11 (2) c) to preserve more than 30 % of a river system area for forest and permanent vegetation field

traditional



modern

# Water problems in Bali now

- o Too much rain in the mountain area causes flood in downstream and destroy dams
- o Too much need of water by hotels and restaurants causes the decrease of groundwater supply
- o Large scale road and housing construction cause the difficulty in maintaining wet rice irrigation system

# What is needed?

hilltop dry fields

hill peasants

Wet rice fields

lowland peasants

hotels & restaurants

tourism industry

infrastructure

social needs

- o The provincial government's regulation alone is not enough to keep balance between the economic needs of these sections and the water management.
- o The **shared consciousness of water as common resources** is highly needed.

# To sum up

shared consciousness of  
water as common resources  
among the whole residents

The whole  
island level

provincial government's regulation on land  
use (2009)

Inter-*subak*  
level

provincial government's coordination  
rotatory supply based on ritual schedule

Intra-*subak*  
level

well-developed corporative and egalitarian  
management by irrigation association  
members

on-going

needed

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Thank you for your attention

