

APPENDIX

A

RESPONDING TO:
DOMAIN

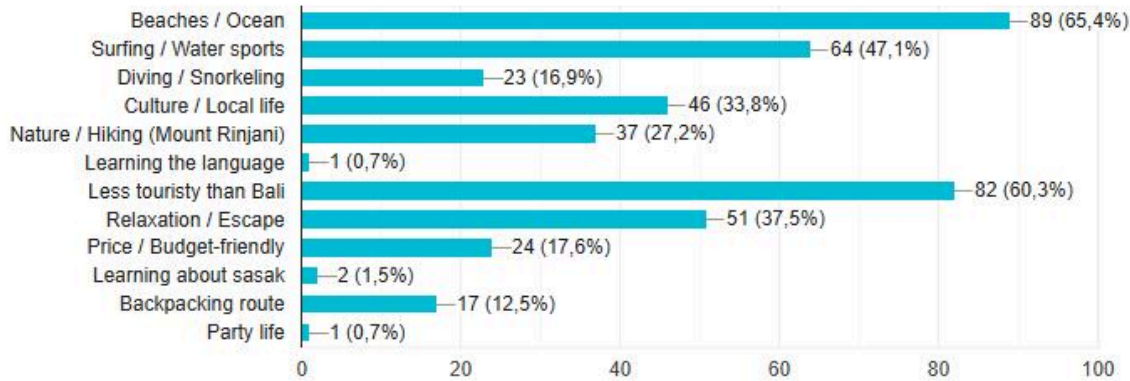
2

Appendix A.2: Survey findings

Why Lombok?

Select your **top 3 reasons** for visiting Lombok.

136 antwoorden



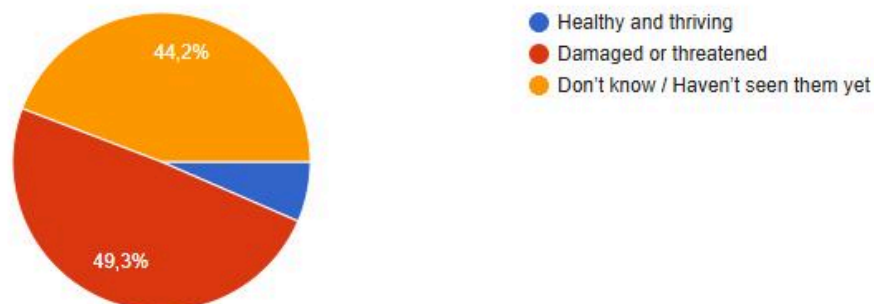
Before coming to Lombok, did you know it has coral reefs?

138 antwoorden



Based on what you've seen or heard, do you think the coral reefs here are:

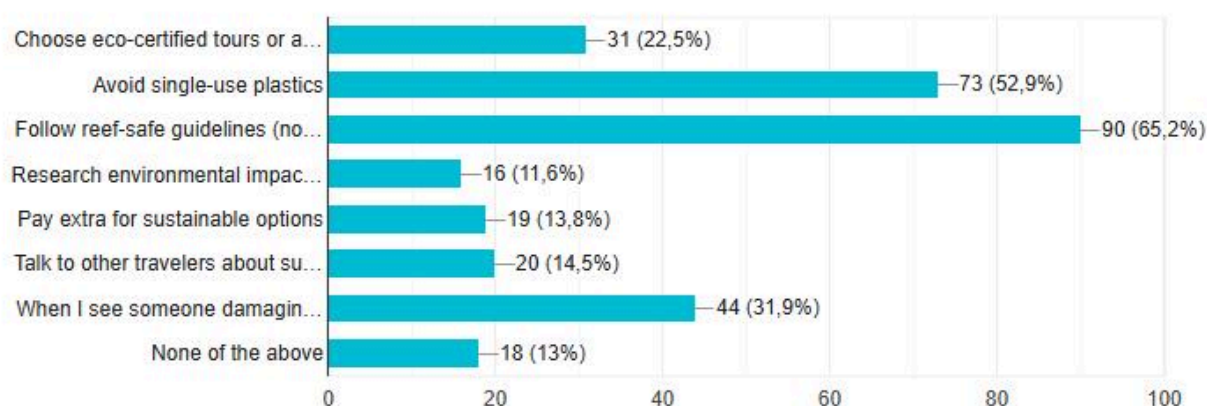
138 antwoorden



Which of the following sustainable travel actions do you usually take?

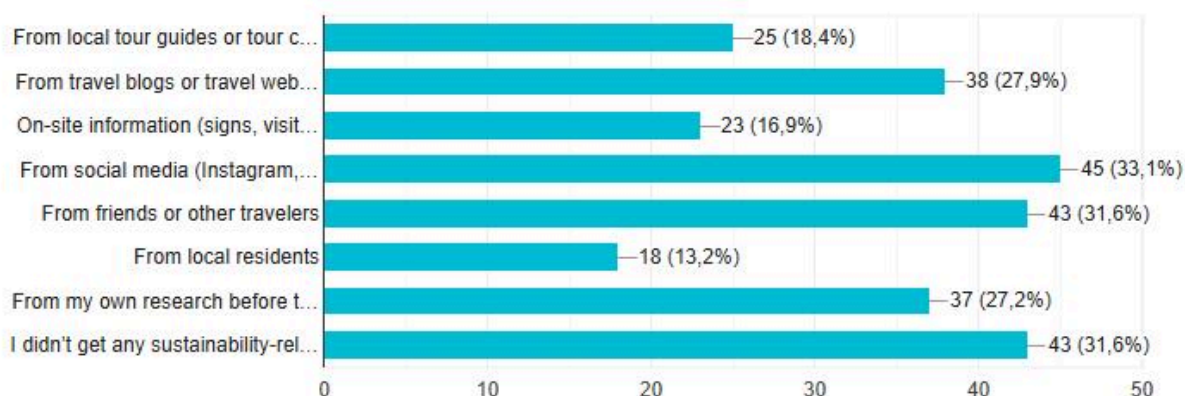
(Select all that apply)

138 antwoorden



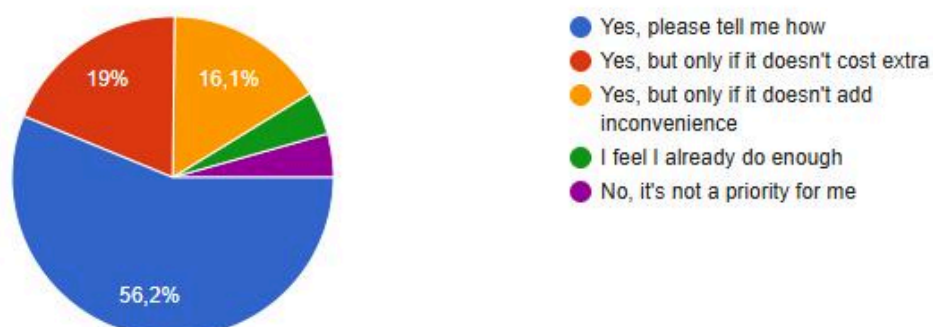
Where did you get most of your information about sustainability or environmental impact while traveling in Lombok?

136 antwoorden



Would you be willing to do more for environmental protection while traveling if it were made easier?

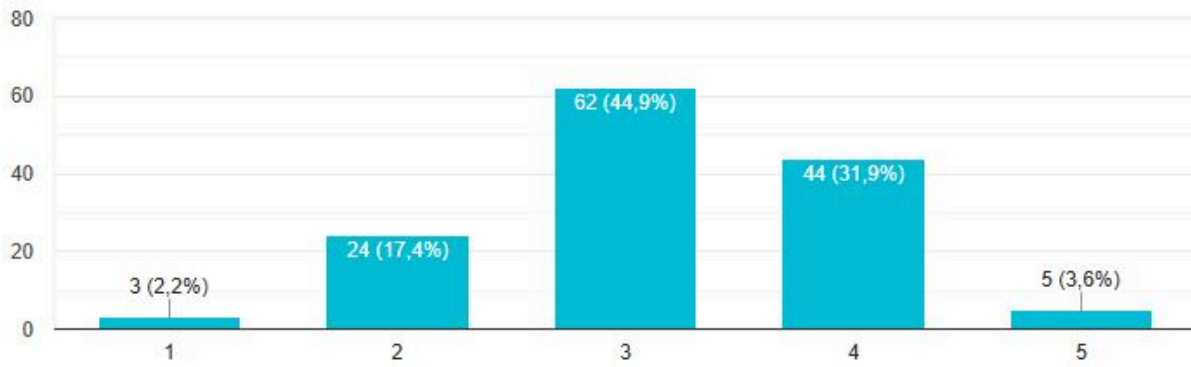
137 antwoorden



On a scale from 1 to 5, how sustainable would you say your travel behavior is?

 Diagram kopiëren

138 antwoorden



Comments:

- Keep the good work up. We need strong sustainability travel initiatives to make it the norm not niche here in Lombok, and globally.
- Indonesia is unfortunately so polluted and it is likely I wouldn't come back for this reason. It seems the government has zero initiatives towards locals respecting the environment and it is beyond disgusting what I've seen so far. There are microplastics in tofu, fish and so many other ingredients that it is extremely concerning. Most corals are not even in the sea anymore, they are washed up on the beach. Shame, shame, shame! Most tourists are no saints unfortunately, but I've seen nothing like the behaviour of locals. Unbelievable.
- When taking a tour did you get information about sustainability, climate change or natural impact
- Great job!!
- More information should be shared about it
- This is my second time in Lombok
- Sadly there is a lot of rubbish on the floor in a lot of places throughout Indonesia and especially on Kerandangan Beach in Senggigi and in the sea which is really awful to see
- Thank you for doing this efforts!
- We have been pleased to see that Senggigi beach has less litter than our recent visit to Flores.
- Appreciate your initiative
- It break my heart to see kids being on their own in the streets until late at night, selling bracelets and being exposed to alcohol, drugs and dangerous behaviours. Also, the garbage being thrown away and left everywhere is a massive issue and it is the main reason why I won't come back to Lombok. Tanjung Ann beach is supposed to be beautiful, what I saw what just a huge landfill putting protected species like turtles at risk
- It's great that people are doing something to protect the environment here!
- We feel we could do more as long as feel not be approached like a child, you are doing good work!
- Succes met je onderzoek en veel plezier hè topmensen half jaar!

Observations:

- I spoke to several retired international people. What struck me was that they spoke very negatively about tourism; they didn't consider themselves tourists and never filled out the survey for that reason.
- The older people I spoke to were more often negative about the situation here (mainly waste here), while younger people had a more positive attitude and often complemented us about the work we were doing.
- In Senggigi we tried really hard finding tourists, where as in Kuta in went really easy.
- Many complaints about litter on beaches.
- Suggestions for more information about reefs and sustainable practices during tours.
- Some called for more local initiatives or cleanups.

APPENDIX

B

RESPONDING TO:
EXPLORING
FUTURE
CONTEXT

3

Appendix B.1: Contextfactors

Biological

1. Growth rate of shallow water corals

Shallow water corals can grow 10-20 cm per year; deep-sea species grow much more slowly (≈ 10 mm/year in some species).

(Global Foundation for Ocean Exploration, n.d.)

BIOLOGICAL

PRINCIPLE

2. Deep-sea corals age slowly and are long lived

Deep-sea coral species have very slow growth rates and can survive for millennia, with very low growth increment per year.

(Global Foundation for Ocean Exploration, n.d.)

BIOLOGICAL

PRINCIPLE

3. Algae dominance fosters harmful bacterial growth

On reefs overtaken by algae, coral organisms contribute to dissolved organic matter changes that favor opportunistic harmful bacteria.

(Thobor et al., 2024)

BIOLOGICAL

TREND

4. Food chain collapse from coral loss

With the degradation or loss of coral reefs, entire marine food chains collapse, as many species depend on reef structure for shelter, feeding, breeding and predation.

(NOAA Fisheries, 2022)

BIOLOGICAL

PRINCIPLE

5. Lifespan of corals

Some coral genotypes (e.g. *Acropora palmata*) have been found to live for over 5,000 years in ideal conditions; deep-sea coral colonies may even be thousands of years old.

(Penn State University, 2016)

BIOLOGICAL

STATE

6. Ocean acidification weakens cold-water coral skeletons

Acidified seawater reduces the strength and stability of cold-water coral skeletons, increasing the risk of reef degradation.

(Wolfram et al., 2022)

BIOLOGICAL

DEVELOPMENT

7. Symbiont network structure affects coral survival

Coral-symbiont network connectivity and thermal tolerance influence coral growth after recurrent warming; generalist symbiont species perform better under stress.

(Basílio & Figueiredo, 2025)

BIOLOGICAL

PRINCIPLE

8. Overfishing disrupts reef balance

Overfishing of herbivores removes key control of algae growth, allowing algae to overgrow corals.

BIOLOGICAL

PRINCIPLE

9. High coral diversity in extreme temperature environments

Some marine lakes with sustained high temperatures ($>31-32^{\circ}\text{C}$) show unexpectedly high coral species richness, suggesting potential thermal tolerance or adaptation.

(Wageningen University, 2024)

BIOLOGICAL

TREND

10. Coral recovery variability

In Jakarta Bay and the Thousand Islands, among bleached corals, $\sim 36\%$ fully recovered, $\sim 26\%$ partially, $\sim 38\%$ died, showing taxonomic and depth-dependent resilience.

(Razak et al., 2025)

BIOLOGICAL

PRINCIPLE

11. Symbiosis dependency: corals & zooxanthellae

Corals rely on a delicate mutualistic relationship with zooxanthellae algae; zooxanthellae provide up to ~90 % of corals' energy needs through photosynthesis, while corals offer nutrients, CO₂, shelter.
(Team, 2025)

**BIOLOGICAL
PRINCIPLE**

Cultural

12. Cultural expectation of stable careers

There is a cultural expectation of pursuing a stable career, especially after receiving a good education, which results in few Indonesians choosing risky work in nature conservation.
(Andre Saputra, personal communication, 15 September 2025)

**CULTURAL
PRINCIPLE**

13. Tanjung Aan luxury resort development

Tanjung Aan Beach was transformed (in July 2025) into a luxury tourism destination, displacing local warungs and sparking concern over job loss and cultural impacts.
(Tanjung Aan Vendors Evicted For Lombok Resort Development, 2025)

**CULTURAL
DEVELOPMENT**

14. Tourist boom in the 20s

Indonesia's tourism industry is entered a booming phase in the 20s, welcoming 8.5 million international arrivals in the first seven months of 2025, up 10% year-on-year.
(VietnamPlus, 2025)

**CULTURAL
DEVELOPMENT**

15. Growing tourism due to MotoGP race

MotoGP race would bring at least 64,000 visitors to the island as seen from the number of tickets that have been sold. The Southeast Asian country expects the event to help boost its economic recovery.

(Xinhua, 2022)

**CULTURAL
DEVELOPMENT**

16. The urgency of Sasak wisdom in education

Research emphasizes the importance of character education based on Sasak local wisdom in elementary schools in East Lombok to support cultural preservation and the transfer of values.

(Tohri et al., 2022)

**CULTURAL
PRINCIPLE**

17. Conflict between law and culture

Although Indonesian and international laws recognize the principle of equality between men and women, customary law and culture often dominate state law and Islamic law regarding marriage in practice, placing a heavy burden on women.

(Nuriskandar, 2021)

**CULTURAL
PRINCIPLE**

18. Men vs woman freedom to marry

Noble men have the freedom to marry women who don't hold a noble title. Women don't have this freedom, which is a very striking difference and a form of discrimination between men and women.

(Nuriskandar, 2021)

**CULTURAL
STATE**

19. Cultural Restrictions results is later marriage

Due to these strict cultural and ancestral rules, many women, even over 30, are still unmarried.
(Nuriskandar, 2021)

**CULTURAL
DEVELOPMENT**

20. Tradition and religion boundaries blurred (Wetu Telu)

In Lombok the Wetu Telu tradition and other syncretic practices show that local custom and Islam are interwoven; customary (pre-Islamic/animist) elements remain embedded in ritual life, producing a blurred boundary between "tradition" and "religion."

(Budiwanti & Eidhamar, 2024)

CULTURAL

DEVELOPMENT

21. Architectural modification in resort design

Modern resort developments in Lombok (e.g., Novotel Lombok) are incorporating vernacular architecture elements from the Sasak tribe, but also modifying or losing some traditional aspects due to maintenance and modernization demands.

(Tjandra & Indrarani, 2024)

CULTURAL

TREND

22. Limited swimming skills

Many local residents in Indonesia (including Lombok) have low swimming proficiency; social enterprises and local initiatives (e.g., Buffalo Pond) have recently started offering affordable swim and water-safety lessons to reduce drowning risk and increase employability in marine jobs.

(Tulk, 2024)

CULTURAL

PRINCIPLE

23. Brain drain of skilled young Indonesians

Indonesia is facing a rising brain drain as many young, skilled workers (especially ages 25-35) are moving abroad for better career opportunities and citizenship, which risks loss of valuable human resources and innovation potential at home.

(Salma, 2025)

CULTURAL

STATE

24. Gentrification Pressures from mass tourism

What is gentrification: areas once inhabited by lower-income locals are transformed by tourism-driven investment, rising land prices, and displacement of indigenous communities. (Yudiantika et al., 2025)

CULTURAL

PRINCIPLE

25. Privatization of public beaches

A beach that was once open to all becomes branded, gated, and securitized. The public becomes private.

(Ayudya., 2025)

CULTURAL

TREND

26. Tourism-driven gentrification in hotspots

In tourist-heavy areas, gentrification is widespread, reshaping local spaces and economies.

(Intern, personal communication, 2025)

CULTURAL

DEVELOPMENT

27. Social media presence in public spaces

Social media platforms such as TikTok are highly popular, and videos or music are often played out loud in public spaces.

(Intern, personal communication, 2025)

CULTURAL

STATE

28. OCB of female and male teachers is the same

no difference in Organizational Citizenship Behavior (OCB) between male and female public high school teachers

(Wilian et al., 2021)

CULTURAL

STATE

Cultural

29. Tradition as an educational tool

The Perang Topat ritual in Lombok, a joyful "rice cake war" where Muslims and Hindus gather at the Lingsar Temple, embodies historical and cultural values of gratitude, community cohesion, and interfaith tolerance, which are passed on and preserved for the younger generation through Islamic religious education. (Muliadi et al., 2024)

CULTURAL
PRINCIPLE

30. Homogeneous i.c.w. multigenic model for citizen literature

Successful implementation of Citizenship Literature based on local wisdom requires two models: the homogeneous model as a primary option for strengthening local identity, and the multigenic model as a strategic option for promoting the culture of nationalism within diversity.

(Hamid et al., 2021)

CULTURAL
PRINCIPLE

31. Sacred natural sites (coasts and springs) and local veneration

Local Sasak traditions in Lombok maintain veneration of certain natural sites (e.g., springs and ritual places) that are treated as sacred and shared between religious communities.

(Budiwanti & Eidhamar, 2024)

CULTURAL
PRINCIPLE

32. Social media in a collectivistic culture

Students with a high interdependent construal engage in self-comparison on social media to evaluate themselves against society's norms or expectations so they can adapt to the group and maintain harmony, which is typical of collectivistic cultures such as in Indonesia.

(Tedjawidjaja & Christanti, 2024)

CULTURAL
DEVELOPMENT

33. Local traditions sustain altruism and social solidarity, but face modern pressures

Sasak cultural practices function as mechanisms for instilling altruism, mutual help and social solidarity. These practices persist but face pressures from modernization and tourism; communities actively adapt (e.g., using social media) to keep traditions alive.

(Saimun, 2025)

CULTURAL
TREND

34. Traditional jobs change due to climate change

On Lombok, rising sea levels force fishers into different jobs. People are abandoning their family trade of fishing to instead grow seaweed or leave the island for stable employment.

(Jacobson, 2023)

CULTURAL
TREND

35. Airport LOM as Bali's second airport

Because of shortage in flight capacity in Bali, Lombok becomes the second airport for Bali only one ferry away.

(Harbour City Lombok, n.d.)

CULTURAL
TREND

160. Village mobilization to build a new mosque

A larger mosque is under construction with slow progress due to budget constraints; nonetheless, the entire village contributes labor and local resources to the project. This collective effort reflects strong communal practices and local investment in shared infrastructure.

Interview with Bruce, street vendor (personal communication, October 2025).

CULTURAL
STATE

161. All religions live symbiotically

The mosque is next to a Buddhist temple, which in turn is next to a Hindu temple. Elements of religion are also mixed, as Muslims worship their ancestors. Everyone knows each other and helps each other, regardless of religion.

Bruce, street vendor (personal communication, October 2025).

CULTURAL
PRINCIPLE

165. Norm of shared responsibility for ocean conservation

Local respondents generally express the belief that responsibility for ocean conservation rests with everyone, not solely the government. This shared-responsibility principle is a cultural stance that could support community-led conservation initiatives.

Street interviews and observations (personal communications/field notes, October 2025).

CULTURAL
PRINCIPLE

166. Gendered division of labour in local fishing households.

Observations indicate a common household division where men fish and women sell the catch at markets. Across market stalls, fish vendors are predominantly women, while fishers are predominantly men; this division shapes income flows and social roles in coastal communities.

Market observations and interviews with fish vendors (personal communications/field notes, October 2025).

CULTURAL
STATE

171. Many tourists are unaware of coral degradation

Tourist survey results show that roughly half of respondents (49.3% of 138) are aware that corals are damaged; the remainder are either unaware or believe coral health is good. This knowledge gap among visitors constrains the potential for voluntary protective behaviour unless awareness is raised.

Tourism survey (n = 138) (personal communication/data, October 2025).

CULTURAL
STATE

172. Primary reasons tourists visit Lombok

Survey responses indicate that tourists primarily visit Lombok because it is perceived as less touristy than Bali and for beaches and marine experiences. Other common motivations include surfing and watersports, relaxation/escape, and interest in local culture and everyday life.

Tourism survey (n = 138) (personal communication/data, October 2025)

CULTURAL
STATE

Demographic**36. Mortality risk from natural disasters**

Mortality Risk in Indonesia, a significant proportion of the population lives in areas with a relative risk of death due to natural disaster from three or more hazards (40,1%) and two or more hazards (59.3%).

(Dilley et al., 2005)

DEMOGRAPHIC
STATE

37. School dropout due to lack of accessibility

The high school dropout rate in east Lombok is caused by the lack of accessibility of quality education, especially in rural areas far from education centers.

(Fatri Saleh et al., 2024)

DEMOGRAPHIC

STATE

38. People depending on fish for food

About 3 billion people worldwide rely on fish as a major source of nutrition, especially in developing coastal communities.

(Budkowski, 2022)

DEMOGRAPHIC

STATE

39. Birth rate close to replacement level

Indonesia's total fertility rate fell to 2.14 children per woman in 2022, down from 5.6 in 1971.

(Katriona, 2023)

DEMOGRAPHIC

DEVELOPMENT

40. High proportion with no schooling or incomplete schooling

In both East and Central Lombok, a large share of the population has either never attended school or not completed elementary school. (ca. >30–35%)

(Fadhlurrahman, 2025)

DEMOGRAPHIC

STATE

41. Age structure of East Lombok

In 2024, 63.66% of East Lombok's population was of working age (15–59), 27.02% were children, and 9.32% were elderly.

(Darmawan, 2024)

DEMOGRAPHIC

STATE

42. Equal Gender Distribution

Men and woman are evenly distributed in Lombok (Thomas Brinkhoff: City Population, n.d.)

DEMOGRAPHIC

STATE

43. People depending on fish for income

Approximately 600 million people globally depend directly on fisheries and aquaculture for their livelihoods.

(WorldFish Annual Report, 2022)

DEMOGRAPHIC

STATE

44. Low higher-education rate in Lombok

In Central Lombok Regency, only about 4.53% of residents had completed higher education by mid-2024.

(Fadhlurrahman, 2025)

DEMOGRAPHIC

STATE

45. Marriage Decline Over the Past Decade

In one decade, the number of marriages in Indonesia has decreased by approximately 30 percent, while divorces have increased by more than 9 percent.

(Wahyudi, 2025)

DEMOGRAPHIC

TREND

46. Urbanization in Indonesia

Approximately 58.57% of Indonesia's population lived in urban areas in 2023, indicating a rapid ongoing process of urbanization.

(Statista, 2025)

DEMOGRAPHIC

DEVELOPMENT

Demographic

47. 1/3 complete basic schooling

Only a third of Indonesian students, in a country where 57 million attend school, complete basic schooling.

(A Liquid Future, 2022)

DEMOGRAPHIC

STATE

48. Voter participation rates is 80%

In NTB province, which includes Lombok, about 3.97 million were listed on the provisional voter rolls for Indonesia's 2024 general elections.

Voter turnout across Indonesia was ~81.8%, while the gubernatorial election in NTB saw turnout of ~74.23%.

(Adji, 2024)

DEMOGRAPHIC

STATE

156. High and persistent child stunting in Lombok (West Nusa Tenggara)

Lombok exhibits persistently high rates of child stunting (local surveys report ~35–40% of children under five). Multiple interacting causes are implicated, including chronic food insecurity, inadequate sanitation, limited maternal education, and early marriage. Addressing stunting will require integrated interventions across nutrition, water/sanitation, maternal health, and education sectors.

(Andre Saputra, personal communication, October 2025); Picauly et al. (2024).

DEMOGRAPHIC

STATE

157. Mercury exposure from artisanal gold mining (ASGM) in Lombok

Artisanal and small-scale gold mining practices using mercury are introducing mercury contamination into local air, water, and soils. Mercury bioaccumulates in fish and shellfish consumed by nearby communities, producing concentrations that frequently exceeds safety thresholds and causing health effects (e.g., neurological symptoms, kidney dysfunction) among miners and residents..

(Andre Saputra, personal communication, October 2025); Junaidi et al. (2019).

DEMOGRAPHIC

STATE

Ecological

49. CO₂ emissions: Tourist flight vs. Indonesian resident

The Dutch tourist emits more CO₂ with the flight alone (~ 3.3 tonnes) than the average resident of Indonesia in an entire year (~ 2.40 tonnes).

(TheGlobalEconomy, 2023)

(Calculate Your Travel Carbon Footprint, n.d.)

ECOLOGICAL

STATE

50. Disaster Assistance

The main threats for which Indonesia received assistance in recent years were drought, earthquakes and floods.

(Dilley et al., 2005)

ECOLOGICAL

STATE

51. Future without coral under 1.5°C warming

Scientists expect that by the end of this century, hardly any living coral will remain if global warming exceeds 1.5°C.

(KNMI, 2024)

ECOLOGICAL

DEVELOPMENT

52. Climate change drives frequent coral bleaching

Climate change is causing increasingly frequent and intense coral bleaching events in Lombok.

(Ghafari et al., 2021)

ECOLOGICAL

TREND

53. Reef loss reduces fish diversity and biomass in Sekotong Bay

Reef loss in Sekotong Bay leads to a clear decline in diversity, density, and biomass of reef fish.

(Karnan, 2022).

ECOLOGICAL

STATE

54. Sedimentation reduces light, smothers coral

Sediment runoff from land clears reduces sunlight penetration, inhibits photosynthesis of corals' zooxanthellae, and buries coral structures.

(Burke & Wood, 2021)

ECOLOGICAL

STATE

55. Marine heat waves are increasing

The Southwest Pacific, including Indonesia, is experiencing unprecedented marine heat waves affecting coral reef mortality and stressing ecosystems.

(Reuters, 2025)

ECOLOGICAL

DEVELOPMENT

56. Local pollution amplifies bleaching

Urban reefs chronically exposed to land-based pollution show higher susceptibility to bleaching; pollutants and nutrients worsen stress.

(Razak et al., 2025)

ECOLOGICAL

STATE

57. CO₂ emissions per capita in 2045

The average CO₂ emissions per capita in 2045 will be around 5 tonnes CO₂eq per year.

(TheGlobalEconomy, 2023)

ECOLOGICAL

STATE

58. High Landslide Risk

The natural hazards risk of landslide is high.

(CityFacts, 2018)

ECOLOGICAL

STATE

59. Tourism growth and environmental damage

Tourism is growing rapidly but often contributes to damage (e.g., irresponsible diving, resort construction too close to reefs).

(Andre Saputra, personal communication, 15 September 2025)

ECOLOGICAL

DEVELOPMENT

60. Nickel mining linked to deforestation

Nickel mining on land goes hand in hand with deforestation.

(IUCN NL, 2022)

ECOLOGICAL

DEVELOPMENT

61. Marine heat stress & bleaching frequency

Increasing sea surface temperatures cause more frequent and intense coral bleaching events in Indonesia, especially in areas like Gili Matra, which may face annual severe bleaching by 2030.

(De Clippele, 2023)

ECOLOGICAL

DEVELOPMENT

Ecological

62. Destructive fishing physically damages reef structure

Practices such as blast fishing and anchoring destroy coral frameworks, reducing structural complexity and resilience.

(Putra et al., 2018)

ECOLOGICAL

STATE

63. Global warming + acidification shifts reefs toward algal dominance

Under future ocean conditions (+2°C warming, -0.2 pH), reef communities shift from calcifier-dominated to algal dominated, losing biodiversity.

(Jury et al., 2024)

ECOLOGICAL

DEVELOPMENT

64. No fish zones show high potential

Documentary 'Ocean' highlights that well-protected marine areas have shown recovery, reefs and sea life bouncing back.

(Nowlan, Scholey, & Butfield, 2025).

ECOLOGICAL

DEVELOPMENT

153. COVID-19 period gave a temporary boost in marine biodiversity

During the COVID-19 pandemic, reduced tourist presence in Gili Air corresponded with observed improvements in coral condition and increases in fish abundance; some local divers also reported sightings of dolphins not seen in recent years. This represents a temporary ecological response to lowered human pressure.

Interview with dive instructor, Gili Air (personal communication, October 2025).

ECOLOGICAL

STATE

158. Climate tipping points threatening coral reefs

Global warming approaching 1.5°C elevates the risk of crossing thermal tipping points for warm-water coral reefs, increasing coral bleaching and mass die-offs. Broader climate tipping risks (e.g., changes to ocean circulation) further threaten coastal ecological stability and human communities dependent on reef services.

Immediate, deep decarbonization and interventions that trigger positive tipping dynamics are required to reduce long-term risk.

(Lenton et al., 2025)

ECOLOGICAL

DEVELOPMENT

162. Coastal land erosion reduces landing space for fishers

Shoreline erosion has reduced the available space for fishers to land boats and unload catches; even at low tide, landing space is limited. Reduced intertidal area increases operational difficulty for small-scale fishers. *Interview with fisherman, Ampenan Tengah Beach (personal communication, October 2025).*

ECOLOGICAL

STATE

164. Waste and plastic pollution is a major community concern

Tourists, locals, and fishers consistently identify waste, especially plastic accumulating on beaches and inland, as a pressing environmental problem. Visible pollution affects aesthetics, marine life, and the local economy and appears as a recurring topic across interviews and observations.

Interviews with fishers and tourists; direct observation (personal communications/field notes, October 2025).

ECOLOGICAL

STATE

Economical

65. Economic exposure to natural disasters

Indonesia is at high risk of economic losses due to natural disasters, with 34.2% of GDP at relatively high economic risk from three or more perils, and 62.3% of GDP at high risk from two or more perils.

(Dilley et al., 2005)

ECONOMICAL

STATE

66. Coral bleaching impacts on economy

Economic damage: bleaching has direct negative effects on fisheries yield and tourist appeal.

(Karnan, 2022)

ECONOMICAL

STATE

67. Indonesia's global nickel leadership

Indonesia is the world's leading nickel producer, accounting for over half of the global supply and holding the largest nickel reserves.

(IUCN NL, n.d.)

ECONOMICAL

STATE

68. Blue economy in "golden era" Indonesia 2045

The Blue Economy is a core component of Indonesia's economic transformation in 2045, with oceans and marine resources at the center.

(Indonesia 2045, n.d.)

ECONOMICAL

DEVELOPMENT

69. Coral reef and manta ray tourism in Indonesia

Indonesia has a thriving coral reef tourism industry and also the second largest manta ray tourism industry in the world, with an annual value of over \$15 million.

(Curzon, 2018)

ECONOMICAL

STATE

70. Macroalgae production

Indonesia is the second largest producer of macroalgae worldwide, after China.

(Farobie et al., 2022)

ECONOMICAL

STATE

71. Biomass-to-energy technologies as sustainable option

Biomass-to-energy technologies (such as biogas from macroalgae) are internationally regarded as promising options for sustainable energy development in developing countries.

(Farobie et al., 2022)

ECONOMICAL

DEVELOPMENT

72. Rural underemployment and low agricultural investment

Underemployment is particularly prevalent in rural areas. The situation is exacerbated by the fact that the agricultural sector, which has been affected by this, has attracted less than 5 percent of total investment since 1980.

(World Bank, 2019)

ECONOMICAL

STATE

Economical

73. Dynamite fishing yields private income but net societal loss

While dynamite fishing generates high private income for fishermen, it results in a net loss for society due to the loss of tourism, coastal protection, and sustainable fishing.

(Pet-Soede et al., 1999)

ECONOMICAL

PRINCIPLE

74. Evaluating support program for investments and policies

Accurately defining, measuring, and allocating the impact of support programs is crucial for evaluating the impact of investments through these programs and adapting policies.

(Bridging People And Nature, n.d.)

ECONOMICAL

PRINCIPLE

75. Lack of investment leads to short-term income reliance

A lack of investment for communities leads to reliance on short-term income from fisheries or tourism.

(Andre Saputra, personal communication, 15 September 2025)

ECONOMICAL

PRINCIPLE

76. Tourism boosts Tetebatu's local economy

Qualitative findings show that tourism development in Tetebatu Village, Lombok, has had a positive impact on the local economy, particularly through increased income, employment opportunities, and greater community control.

(Kurniawan et al., 2022)

ECONOMICAL

STATE

77. Broad community participation in Kebon Ayu tourism

In Kebon Ayu, nearly all villagers participate in tourism activities; village tourism development has led to more economic activity, additional jobs, and higher value of agricultural products.

(Jannah, S. et al., 2023)

ECONOMICAL

STATE

78. Foreign investors due to growing tourism in Lombok.

More and more foreigners are investing in Lombok. They moved from their investments in Bali to Lombok due to growing tourism rates.

(Marlissa, 2025)

ECONOMICAL

DEVELOPMENT

79. Tourism widens inequality between rich and poor

Tourism widens the gap between rich and poor, as wealthy investors build resorts and increase their capital while local communities see little benefit.

(Intern, personal communication, 2025)

ECONOMICAL

PRINCIPLE

80. Corruption in education budget

Indonesian Corruption Watch claims there are very few schools in the country that are clean of graft, bribery or embezzlement, with 40 percent of their budget siphoned off before it reaches the classroom.

(A Liquid Future, 2022)

ECONOMICAL

STATE

132. Poverty of coastal communities

Coastal communities are among the poorest groups in Indonesia.

(Andre Saputra, personal communication, 15 September 2025)

ECONOMICAL
STATE

154. Some ecological rescue centres prioritize tourism over ecology

Local turtle rescue and display centres that aim to help hatchlings and attract visitors may unintentionally disrupt natural behaviours (for example, impairing swimming or imprinting) and thereby reduce animals' ability to survive or reproduce in the wild. Economic incentives from tourism can bias centre practices away from best ecological outcomes.

Interview with dive instructor, Gili Air (personal communication, October 2025)

ECONOMICAL
PRINCIPLE

155. Shark fishing for markets in China

Local fishers report targeted fishing of sharks, often involving finning (removal of fins and discarding the body), which contributes to shark mortality and population declines. The shark fin trade, driven in part by demand in China as a status symbol, is implicated in unsustainable pressure on shark and ray populations.

Conversation with IBF member about sharks and rays project (personal communication, October 2025).

ECONOMICAL
STATE

163. Decline in nearshore fish stocks pushes fishers to deeper waters

Coastal fish decline, linked to coral reef degradation and overfishing, is driving local fishers to conduct deep-sea fishing to meet catch needs. This shift increases fuel costs, trip duration, and risk exposure while altering local fishing patterns and livelihoods.

All interviews with fishermen (personal communications, October 2025).

ECONOMICAL
DEVELOPMENT

Philosophical**81. Living artifacts as tools for ecological awareness**

Living artifacts have the inherent capacity to cultivate awareness and facilitate knowledge building (among individuals and society at large) about ecological principles and phenomena. This is achieved by tapping into the fundamental operating mechanisms of living systems.

(Karana et al., 2023)

PHILOSOPHICAL
PRINCIPLE

82. Embracing open systems

Closed systems hinder creative interactions, co-evolution and biodiversity by emphasizing control and predictability

(Karana et al., 2023)

PHILOSOPHICAL
PRINCIPLE

83. Anthropocentrism: humans above nature

The worldview that places humans above nature emphasizes exploitation and control rather than coexistence.

(Boslaugh, 2013)

PHILOSOPHICAL
PRINCIPLE

Philosophical

84. The planet as victim confirmed anthropocentrism

The planet as victim becomes abstract and confirms the image that humanity is outside of nature.

(Grunberg, 2025)

PHILOSOPHICAL
PRINCIPLE

85. Its a human problem not a nature problem

Nature will eventually return, that's what immerses the infinite. It's more that humanity is being responded to.

(Grunberg, 2025; Nowlan, Scholey, & Butfield, 2025).

PHILOSOPHICAL
PRINCIPLE

86. Day-to-day survival limits long-term conservation

For coastal communities, life is day-to-day survival through fishing, leaving little room for long-term conservation.

(Andre Saputra, personal communication, 15 September 2025)

PHILOSOPHICAL
STATE

87. Living artifacts transcend human-centred perspectives

Living artefacts offer the opportunity to transcend human-centred perspectives and challenge conventional notions of time, scale, aesthetics and use in design.

(Karana et al., 2023)

PHILOSOPHICAL
PRINCIPLE

88. Situatedness of climate responsibility

Climate change does not affect all people in the same way, nor are all people equally responsible for its causes. Situatedness highlights that individuals, communities, and nations are embedded in specific social, cultural, economic, and geographical contexts. These contexts shape both their contribution to climate change and their vulnerability to its consequences.

(Haraway, 1988)

PHILOSOPHICAL
PRINCIPLE

89. Environmental philosophy and eco-justice

Growing scholarly work in Indonesia arguing that environmental crises stem from philosophical worldviews (anthropocentric, dualist) and that eco-philosophy (deep ecology, environmental ethics) should inform law, education, and values.

(Nurmardiansyah, 2014)

PHILOSOPHICAL
DEVELOPMENT

90. Philosophical roots of feudalism influencing modern democracy

There is a philosophical and cultural basis of feudalism still present in Indonesian democratic practices, where hierarchical and patron-client values shape citizens' expectations of government rather than egalitarian democratic norms.

(Fauzan & Adela, 2019).

PHILOSOPHICAL
STATE

91. Populism and democratic distortion through ethical lens

Populism in Indonesian elections is critiqued philosophically (e.g., via Nietzschean existentialism) for distorting democratic ideals like merit, responsibility, and integrity.

(Wihardjo, 2025)

PHILOSOPHICAL
TREND

109. Syncretic Wetu Telu

The Wetu Telu in Lombok is a syncretic religious belief that emerged from the merging of indigenous animistic beliefs, Hinduism, Buddhism, and Islam. (Wirata, 2018)

PHILOSOPHICAL

PRINCIPLE

110. Ancient Lombok Belief Systems

The belief of the ancestors of ancient Lombok people initially had a flow of beliefs namely animism, dynamism, and totemism. This animistic belief can not be separated from the ancient history of the Indonesian nation in worshipping spirit which is considered had magical and supernatural powers. (Wirata, 2018)

PHILOSOPHICAL

PRINCIPLE

111. Contemporary expression of animism in Wetu Telu

Animism is still expressed today in the Wetu Telu tradition in Lombok through the worship of ancestral spirits and other spiritual entities, often via offerings at graves, which is considered an integral part of their religious tradition. (Wirata, 2018)

PHILOSOPHICAL

STATE

Political

92. Corruption among low-paid officials

Corruption is a major problem at the lower levels, usually caused by the very low salaries for government officials working in the field. (Pet-Soede et al., 1999)

POLITICAL

STATE

93. MPA implementation challenges

In Indonesia, none of the officially recognized Marine Protected Areas (MPAs) have yet been fully incorporated, often due to limited technical or financial capacity. (Pet-Soede, 2003)

POLITICAL

STATE

94. Lack means to patrol at sea

Local law enforcers often lack the means and will to patrol and make ar-rests at sea. (Pet-Soede et al., 1999)

POLITICAL

STATE

95. Komodo National Park integrated management strategy

The KNP approach is a fully integrated management strategy that combines the rigorous management of no-take zones and strict enforcement against destructive fishing with the implementation of alternative income-generating programs (AIGs) such as mariculture, education, and awareness-raising to protect marine biodiversity and safeguard exploited fish stocks to enhance fisheries in the surrounding traditional use zone. (Pet-Soede, 2003)

POLITICAL

DEVELOPMENT

Political

96. Rio+20 call for transformative marine cooperation

Rio+20 Summit and calls for a transformative approach that mobilizes the private sector, governments and communities to work together to conserve the marine environment and ensure social and economic equity.

(Thomas J. et al., 2013)

POLITICAL

DEVELOPMENT

97. Risk of blue economy hijacking

There is a risk that the term “Blue Economy” will be hijacked by forces focused on pure exploitation and maximizing income, leading to greater overexploitation.

(Thomas J. et al., 2013)

POLITICAL

TREND

98. The state's and the constitution's attitude to minorities

Despite the 1945 Constitution guaranteeing religious freedom, the state is often perceived as powerless or appears to condone violence against minorities (“condonement politics”). If the state fails to protect minorities, democracy can suffer a fatal decline.

(Qodir & Hefner, 2024)

POLITICAL

PRINCIPLE

99. Decline in Indonesia's democracy

Indonesia's Democracy Index has been declining; civil liberties and political culture scores are particularly low, sustaining the characterization of “flawed democracy.”

(Anugrahanto, 2025)

POLITICAL

DEVELOPMENT

100. Pandemic accelerated democratic erosion

The COVID-19 period increased risks to civil liberties, intensified majority conservatism, and weakened democratic institutions in Indonesia.

(Schäfer & Syam, 2025)

POLITICAL

DEVELOPMENT

101. Policy lacks implementation and enforcement

Policies (e.g., Marine Protected Areas) exist on paper, but implementation and enforcement are lacking.

(Andre Saputra, personal communication, 15 September 2025)

POLITICAL

STATE

102. Archipel structure complicates coordination and enforcement

Indonesia is an archipelagic country with 17,000 islands, making coordination and enforcement complex.

(Andre Saputra, personal communication, 15 September 2025)

POLITICAL

PRINCIPLE

103. Law 59/2024 anchors long-term ocean governance

Law 59/2024 anchors long-term development planning (RPJPN 2025–2045) into policy, giving ocean management and sustainability a legal framework.

(Indonesia 2025, n.d.)

POLITICAL

DEVELOPMENT

Political

104. Waste management gaps in Lombok

Lombok lacks a developed waste management system. There is only one disposal site, and residents must bring their own waste there, mostly managed by volunteer initiatives. (Intern, personal communication, 2025)

POLITICAL
STATE

105. Private dominance in vocational education

The provision of vocational education and training in Indonesia is dominated by private institutions, while the government plays a smaller role. (World Bank, 2019)

POLITICAL
STATE

106. Shortage of primary school teachers in Central Lombok

A regional analysis of public primary school teacher needs in Central Lombok highlights structural staff shortages and shifts in civil servant (PNS) status. (Wati et al., 2024)

POLITICAL
STATE

107. Undocumented births & citizenship ambiguity Many births in East Lombok are not officially documented, creating ambiguity around legal identity, citizenship rights, and access to public services. (Butt, 2018)

POLITICAL
STATE

108. Declining public trust and erosion of democratic values

Democratic values in Indonesia are under strain: low public trust, disillusionment, and perceptions that electoral and governance processes are corrupt or unfair are increasing. (Wahyudin et al., 2019)

POLITICAL
STATE

133. Protests and criticism of government inequality

There are many protests and criticism about the functioning of the government, particularly the income of politicians compared to the general population. (Marghadi, 2025)

POLITICAL
TREND

168. Tourist diving fee enforcement and transparency concerns

Authorities require international divers to pay a fee for diving at the Gili Islands; diving schools report strict enforcement but express scepticism about the transparency and allocation of collected funds.

Interview with diving school representative (personal communication, October 2025).

POLITICAL
STATE

169. Government investment in tourism: "Is Lombok going to be the next Bali?"

Regional government investment aims to expand tourism infrastructure and visitor numbers, with ambitions to develop Lombok as a major tourism hub similar to Bali. (Ewe, 2025)

POLITICAL
DEVELOPMENT

176. Selective enforcement of marine regulations

In the tourist Gili islands, enforcement is effective when linked to tourism revenue (such as entry or conservation fees), but enforcement against illegal fishing practices is weak, revealing unequal regulatory priorities.

Field conversations with multiple dive instructors from multiple diving schools (personal communication, October and November 2025).

POLITICAL
STATE

177. School meal programs struggle with large-scale implementation

Indonesia's ambitious school meal program, a key policy priority under President Prabowo, has encountered major difficulties including food poisoning incidents, hospitalizations, and hygiene failures, highlighting the complexity of scaling public health interventions.

Field observations and conversations with local (personal communications, November 2025) (Teresia, 2025)

POLITICAL
DEVELOPMENT

Psychological

112. Holistic experience drives visitor satisfaction

Holistic experience en experience quality hebben positieve invloed op bezoekers-tevredenheid en de intentie om terug te keren. (Juliana et al., 2023)

PSYCHOLOGICAL
PRINCIPLE

113. Stopping destructive fishing due to self-realized consequences

Fishermen have stopped destructive methods such as dynamite fishing after realizing it led to fewer fish catches when corals were destroyed. (Andre Saputra, personal communication, 15 September 2025)

PSYCHOLOGICAL
TREND

114. Empathy through relatability

Humans feel more sympathy when an issue is presented through relatable human stories rather than abstract data.

(Bullock et al., 2021)

PSYCHOLOGICAL
PRINCIPLE

115. Show don't tell

Behavioral change occurs more effectively when people see and experience it, rather than when it is only explained.

(Intern, personal communication, 2025)

PSYCHOLOGICAL
PRINCIPLE

116. Positive effect of power and motivation in Teacher Organizational Citizenship Behavior (OCB)

Teachers in Central Lombok show higher Organizational Citizenship Behavior (voluntary extra-role behavior) when they receive more power and motivation from leadership.

(Ridlo et al., 2020)

PSYCHOLOGICAL

PRINCIPLE

117. Early learning shapes lifelong behavior

Habits and knowledge learned at a young age strongly shape future attitudes and behaviors.

(Hanushek et al., 2025)

PSYCHOLOGICAL

PRINCIPLE

118. Out of sight, Out of mind

What is not visible is often not considered relevant; people tend to ignore issues they cannot directly see.

(Underwood, 2022)

PSYCHOLOGICAL

PRINCIPLE

119. Poverty shortens people's time horizons

Empirical studies show poverty tends to shorten individuals' planning horizons and reduce cognitive bandwidth for future-oriented decision-making; poverty can therefore limit how far people practically think ahead.

(Laajaj, 2017)

PSYCHOLOGICAL

PRINCIPLE

151. Hiking hype causes dangerous situations

Social-media-driven interest in hiking volcanoes has increased the number of inexperienced hikers attempting routes without suitable equipment or preparation. Locals report riskier behaviour at volcano hiking sites and an observable rise in hazardous situations, even as formal accident statistics at some sites appear to have declined.

Conversation with IBF member (personal communication, October 2025).

PSYCHOLOGICAL

TREND

170. High willingness among tourists to engage in environmental protection

Survey responses indicate strong tourist willingness to participate in pro-environmental actions if made accessible, 91% of 138 tourist respondents expressed interest in doing more to protect the environment when offered practical options.

Tourism survey (n = 138) (personal communication/data, October 2025).

PSYCHOLOGICAL

TREND

175. People don't confront harmful behavior

Within local culture, directly confronting others, such as fishermen fishing in illegal areas, is socially avoided. Even professionals like dive instructors refrain from addressing violations, this is not normal to do in this culture.

Field conversations with local dive instructors (personal communication, November 2025).

PSYCHOLOGICAL

PRINCIPLE

Social

120. Fisheries misconception about MPA

A major misconception is the role of MPAs in fisheries management. There is a misconception that MPAs negatively impact fish productivity, while in fact they are essential for protecting fisheries from collapse.

(Pet-Soede, 2003)

SOCIAL

PRINCIPLE

121. Impact of consumer demand

Consumer demand for sustainability and transparency puts pressure on the chain and creates the need for certification and traceability.

(Wageningen University & Research, 2022)

SOCIAL

TREND

122. Certification requirements hinder local fishers. Because data systems and literacy are lacking, they are often left behind. This makes distributed tools and inclusive systems crucial.

(Wageningen University & Research, 2022)

SOCIAL

DEVELOPMENT

123. International vs. local engagement in marine conservation

The Indonesian Biru Foundation has many international people and students coming to help with marine life, while local involvement remains limited.

(Andre Saputra, personal communication, 15 September 2025)

SOCIAL

STATE

124. Coral reefs as coastal protection

Corals play a crucial role as coastal protection against waves and land loss; without them, people are forced to move inland.

(Andre Saputra, personal communication, 15 September 2025)

SOCIAL

PRINCIPLE

125. Skepticism about Indonesia's 2045 Golden Era plan

There is skepticism among the population about the ambitious plan that Indonesia will reach its "golden era" in 2045.

(Andre Saputra, personal communication, 15 September 2025)

SOCIAL

TREND

126. The gains of the rich come at the expense of the poor

What the rich gain is almost always something the poor have to lose.

(Ayudya., 2025)

SOCIAL

PRINCIPLE

127. Skills gap between vocational training and Mandalika's tourism industry

There is a clear gap between current vocational education and the skill needs of the Mandalika tourism and SEZ industry; curricula and partnerships must be strengthened.

(Putri et al., 2024)

SOCIAL

DEVELOPMENT

Social

128. Self-comparison due to social media

Longer duration of social media use and a greater number of social media applications both correlate with higher levels of self-comparison on social media to Indonesian students.

(Tedjawidjaja & Christanti, 2024)

SOCIAL

DEVELOPMENT

129. Rural communities are unaware of the underwater world

Communities are not aware of the reefs and ocean because of lack in education and there not a lot of people that can swim and see for themselves.

(Andre Saputra, personal communication, 15 September 2025)

SOCIAL

STATE

130. Gender Inequality improving

Indonesia's Gender Inequality Index has improved (declined) to ~0.421 in 2024, but gaps remain in labour force participation, parliamentary seats, leadership, and in reproductive health.

(BPS-Statistics Indonesia, 2025)

SOCIAL

DEVELOPMENT

131. Increasing difficulties in fishing

Fishing is becoming increasingly difficult: fishermen must go farther out, use more fuel, face more danger, and spend less time with their families.

(Andre Saputra, personal communication, 15 September 2025)

SOCIAL

DEVELOPMENT

134. Community readiness in Tetebatu for tourism

The readiness of the local community in Tetebatu Village in terms of education, knowledge, and level of involvement shows that people are sufficiently prepared to deal with potential impacts of tourism development.

(Kurniawan et al., 2022)

SOCIAL

STATE

135. Tourism in Kuta Mandalika: benefits and trade-offs

Tourism in Kuta Mandalika Beach heeft positieve effecten op het inkomen voor horeca en reisdiensten, maar een negatieve impact op traditionele ambachtelijke en straatverkopers.ele ambachtelijke en straatverkopers.

(Haris, A. et al., 2020)

SOCIAL

STATE

136. Protests against resorts and gentrification

There have been many protests against the rise of resorts, gentrification, and the shrinking of public beaches, processes largely driven by the wealthy elite.

(Intern, personal communication, 2025)

SOCIAL

TREND

137. Birth Registration and Local Resistance in Sasak Communities

Sasak responses to Indonesia's push for universal birth registration show that official documents often hold little meaning in daily life, being seen mainly as tools of state control and surveillance.

(Butt, 2018)

SOCIAL

STATE

138. Discrimination against minorities

Minority groups living in Indonesia, such as Ahmadiyya, Sunda Wiwitan and Shia, are often subjected to discriminatory, intimidating and violent treatment.

(Qodir & Hefner, 2024)

SOCIAL

PRINCIPLE

139. Social media to spread extremist ideologies

Intolerant and anti-pluralist groups, often supported by paramilitary groups, are using social media to spread extremist ideologies, hampering the efforts of moderate Islamic groups (Muhammadiyah) to promote tolerance.

(Qodir & Hefner, 2024)

SOCIAL

TREND

140. People are becoming increasingly alienated from nature

"And every time we have workshops, public talks, events, we try to basically sound it and then tell it to the world. And it's also amazing how so few people know how to plant a tree. How do you plant a tree? Like people are so disconnected with the nature."

(Andre Saputra, personal communication, 15 September 2025)

SOCIAL

DEVELOPMENT

152. Diving hype is causing dangerous situations

Dive operators report that tourists who cannot swim increasingly book and participate in diving trips, often motivated by social media, creating safety concerns for instructors and other divers. This trend increases reliance on instructors and raises the risk of incidents during dives.

Interview with dive instructor, Gili Air (personal communication, October 2025).

SOCIAL

TREND

159. Digitalization disadvantages people who never attended school (illiterate populations)

Rapid digitalization of tourism services, booking taxis, tours and payments online, makes verbal-only communication less viable. People who cannot read or write (including guides, drivers, and vendors) face job losses or decreased income opportunities as tourists increasingly transact digitally rather than in-person.

Bruce, street vendor (personal communication, October 2025).

SOCIAL

DEVELOPMENT

167. Growing community awareness of coral reef importance

Street interviews indicate increasing public awareness of coral reef value and the role of human activities (destructive fishing, waste pollution) in reef degradation. This rising awareness may enable more effective community engagement in reef protection.

Street interviews and observations (personal communications/field notes, October 2025)

SOCIAL

DEVELOPMENT

Social

173. Child labour visible in tourist areas

Observations in highly touristed locations (notably Kuta) reveal many children selling goods or asking for money in streets and nightlife areas, including approaches to tourists near bars, supermarkets, and party exits.

Field observations in tourist areas (personal communications/field notes, October 2025)

SOCIAL

STATE

179. Informal food security through neighborhood solidarity

When income is insufficient, street vendors and residents can rely on borrowing rice or food from neighbors, friends, or family, demonstrating strong informal support systems.

Field conversations with street vendors (personal communication, October 2025).

SOCIAL

DEVELOPMENT

174. Community-led waste and safety management

Siskamling operates as a citizen-led system for safety, waste control, and neighborhood cohesion.

Field observations and conversations with locals (personal communications/field notes, November 2025)

SOCIAL

STATE

178. Economic necessity drives rapid return to work after disaster-induced trauma.

Following the 2018 Lombok earthquake, widespread trauma was reported, yet businesses reopened almost immediately once physical danger subsided, as maintaining income took priority over psychological recovery.

Field observations and conversations with locals (personal communications/field notes, November 2025)

SOCIAL

PRINCIPLE

Technological

141. Significant investments in solar energy parks

Lombok has its first 7 MW solar PV park, operational since July 2019. By 2030, it will have three solar parks with a combined capacity of 21 MW.

(Petrova, 2017)

TECHNOLOGICAL

DEVELOPMENT

142. Selaparang as Potential Hub for Digital Nomads

The Indonesian Ministry is considering developing the Selaparang Transmigration Area in East Lombok into a technology hub for digital nomads, leveraging remote work and digital connectivity.

(Primayanti, 2025)

TECHNOLOGICAL

TREND

143. Eco-solutions in construction at tourist destinations

In villas, resorts, etc., we increasingly see the integration of sustainable technology: rainwater harvesting, greywater reuse, solar water heaters, use of local materials, smart irrigation techniques, lighting automation, etc.

(Sudrajat, 2023)

TECHNOLOGICAL

TREND

144. Machine learning & AI in coral reef monitoring

Novel methods using drones, underwater imagery, and AI/Deep Learning are enabling multi-scale coral reef monitoring, allowing faster and more precise assessments of reef health.

(Contini et al., 2025)

TECHNOLOGICAL

DEVELOPMENT

Technological

145. Autonomous robots for reef restoration

Emerging technologies like reconfigurable autonomous surface vehicles are being developed to scale up reef restoration (larval reseeding etc.), reducing cost and scaling area coverage compared to manual methods.

(Mou, 2022)

TECHNOLOGICAL

TREND

146 . LOM Airport expansion

LOM Airport has undergone a significant expansion to accommodate larger numbers of tourists.

(Meidyana et al., 2017)

TECHNOLOGICAL

DEVELOPMENT

147. Seaweed cultivation and downstream processing

There is a project in East Lombok for sustainable seaweed cultivation (100 ha) with a downstream factory for products such as biofuel.

MTCRC (2024)

TECHNOLOGICAL

DEVELOPMENT

148. Adoption of food-delivery apps by traditional restaurants in Lombok

Traditional food restaurant owners in Lombok adopted GoFood (a food delivery app) during the COVID-19 pandemic, with Technology Acceptance Model analyses showing pandemic effects increased willingness to use technology.

(Bimantari et al., 2024)

TECHNOLOGICAL

STATE

149. Rising internet penetration in Indonesia

By 2024 internet penetration in Indonesia had reached ~79.5%, showing steady growth in connectivity among all age groups.

(Adji, 2024)

TECHNOLOGICAL

DEVELOPMENT

150. Monitoring improvements via multi-scale remote sensing & AI

Combining underwater and aerial imagery, and AI models, to classify coral morphotypes and habitats, supports broader reef monitoring and detection of early stress.

(Contini et al., 2025)

TECHNOLOGICAL

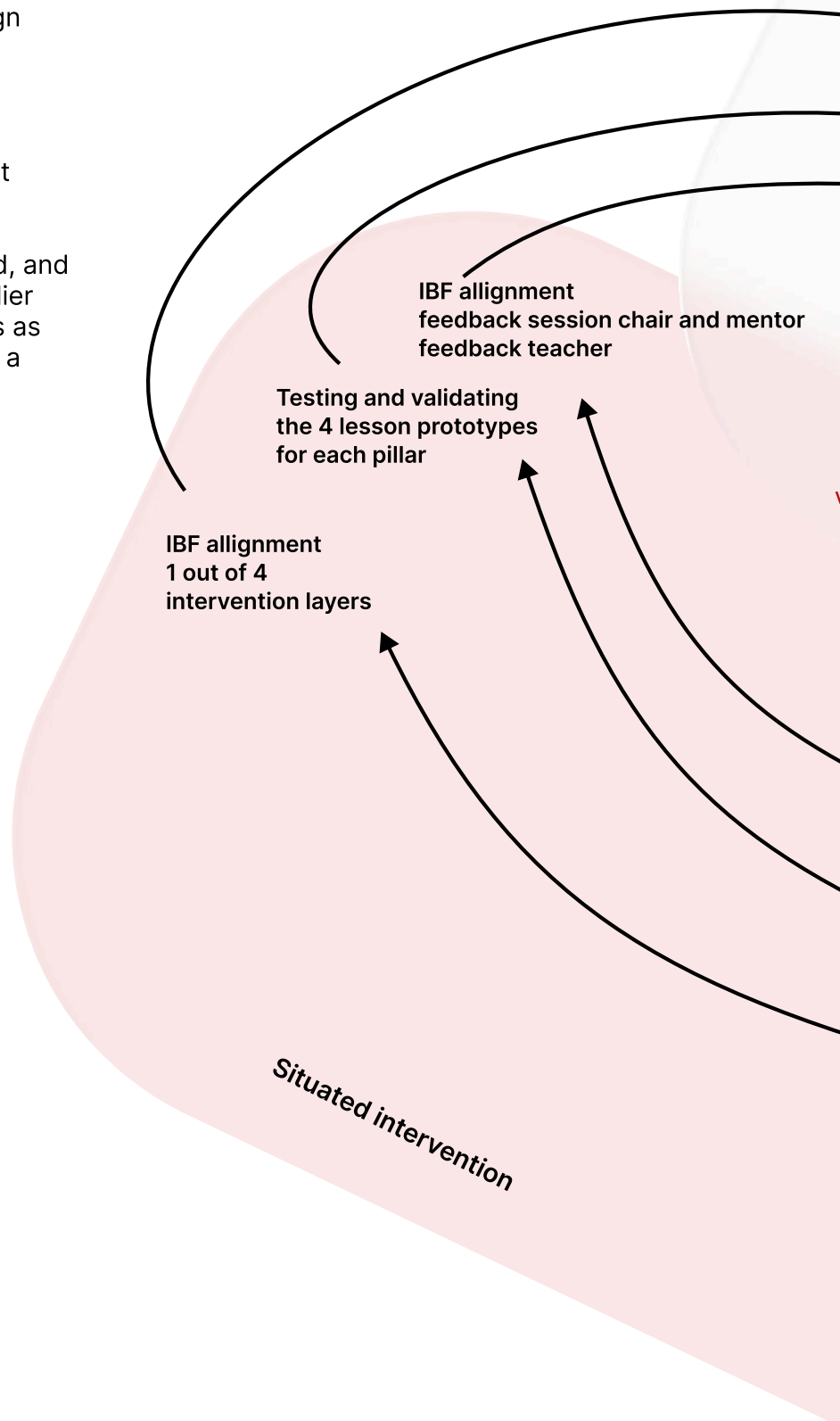
DEVELOPMENT

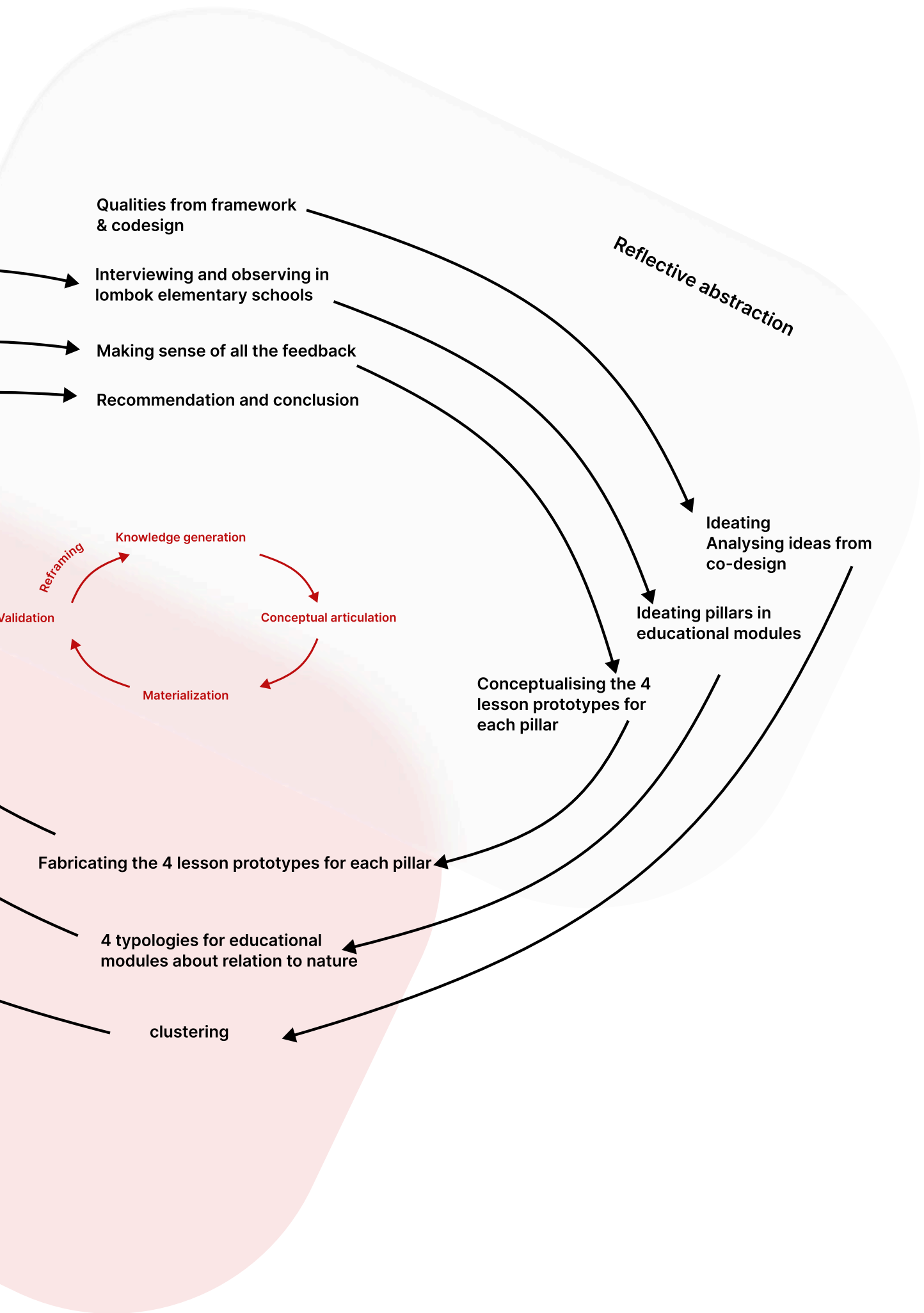
Appendix D.1: Visualization of design process

The diagram visualizes the iterative progression between the four stages, knowledge generation, conceptual articulation, materialization, and validation, within the broader movement between reflective abstraction and situated intervention.

With the design rationale around it that symbolises the steps taken in this design process.

It should be noted that, although the diagram is presented as a structured sequence of stages, the process did not unfold in a strictly linear or systematic manner. In practice, stages often overlapped, certain steps were revisited, and insights from later phases informed earlier ones. The visualization therefore serves as an analytical reconstruction rather than a precise chronological account.





Appendix D.2: Lesson 1

pillar: nature as sacred

Teacher briefing - English version

Teacher briefing – lesson 1

Pillar: Nature as sacred

Theme: The sea, tides, and meaning

Format: Storytelling, observation, and reflection (outdoor lesson)

Goal of the lesson

The goal of this lesson is to help children explore a natural place through scientific explanation, cultural storytelling, and personal reflection.

About this pillar

Nature as sacred explores the idea that nature can hold meaning beyond practical use or scientific explanation.

This pillar invites children to see that:

- nature can be understood through science
- nature can be understood through stories and culture
- nature can also be experienced personally, through feeling and reflection

Lesson Context

This lesson takes place at the beach. If the beach is not accessible, another nearby natural place can be used, such as a grassy field, or open natural space close to the school.

Nature itself functions as the classroom.

Children are invited to slow down, observe, listen, and reflect on the same place from different perspectives.

Pedagogical approach

- Place-based learning: the environment is part of the lesson
- Story-based learning: knowledge is shared through narrative
- Reflective practice: quiet moments support inner awareness
- Dialogical learning: multiple perspectives exist side by side
- Experiential learning: observing, sitting, listening

Teacher tips

- Use a calm voice and slow pacing.
- Encourage listening; to the story, to nature, and to each other.
- Sharing is always voluntary.
- Present the story as “a story people tell”, not as fact.
- Emphasize that science explains how, while stories help us think about meaning.

Key message

This lesson helps children explore nature with both their mind and their inner awareness.

Lesson structure

1. Arrival & observation (±5 minutes)

Children sit in a circle at the beach and share what they see, hear, and notice.

"What do you see here?"

"What do you hear?"

"What do you notice about the sea?"

** optional: Ask for one minute of silence before answering the questions**

2. Introduction to the lesson (±5 minutes)

Today's lesson will be a little different. We will learn through two stories about this place. One story comes from science, and one comes from a princess who lived here long ago

3. Reading through two stories (±15 minutes)

Using illustrated cards, the teacher explains:

- **How tides work (scientific perspective)**
Read the explanation of tides in simple language. Turn the earth to see that the high tide and low tide change constantly.
- **What the sea represents in Sasak culture (values and respect)**
Read the story connected to Sasak culture and the sea. Emphasise values like respect, patience, and care for nature.

4. Silent reflection (±10 minutes)

"Now we take a quiet moment."

Children reflect individually in the small diary through drawing or writing.

Explain that this is private and does not need to be shared.

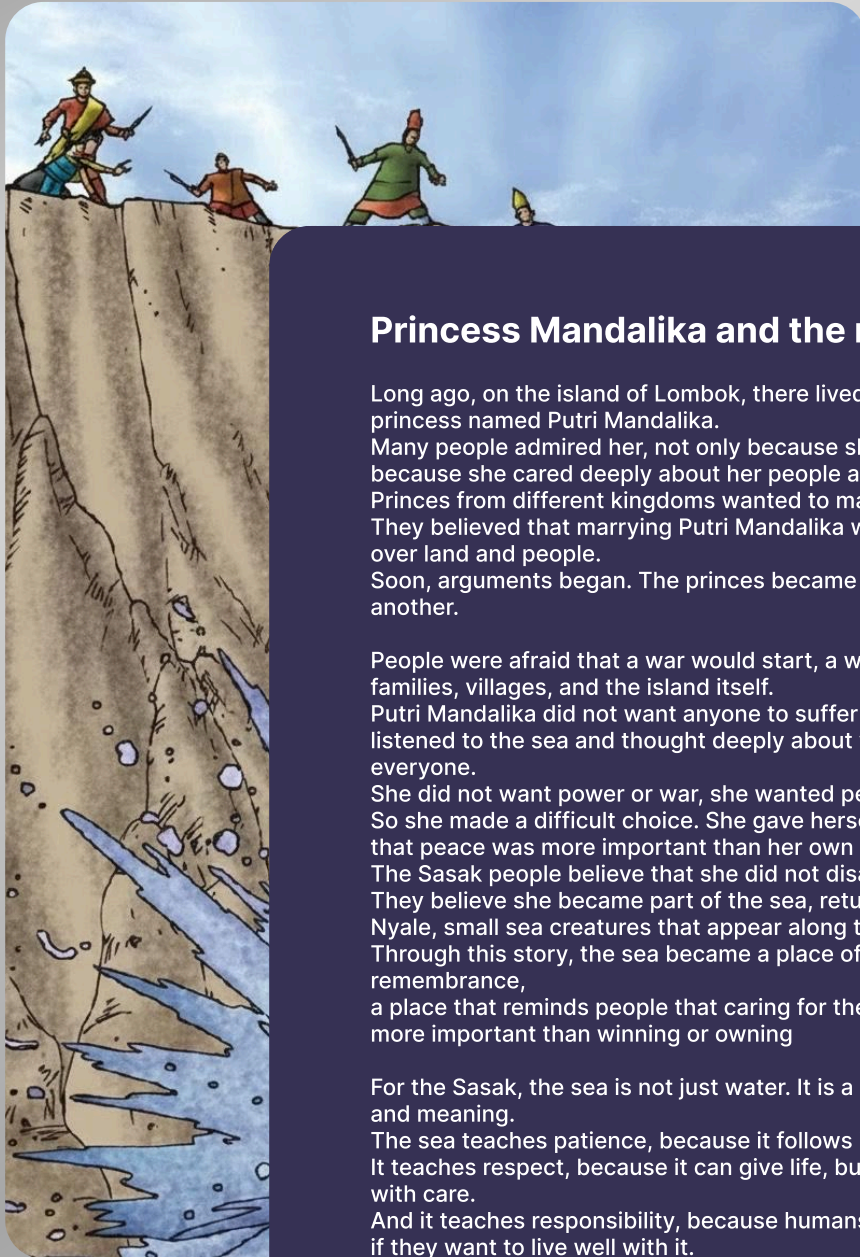
5. Optional sharing and closing (±10 minutes)

"Would anyone like to share something?"
Sharing is voluntary.

Teacher closes:
"Today we listened, learned, and reflected. Nature can teach us in many ways."

Children return to the classroom calmly

Spiritual card - English version



Princess Mandalika and the moving sea

Long ago, on the island of Lombok, there lived a wise and kind princess named Putri Mandalika. Many people admired her, not only because she was a princess, but because she cared deeply about her people and the land. Princes from different kingdoms wanted to marry her. They believed that marrying Putri Mandalika would give them power over land and people. Soon, arguments began. The princes became angry with one another.

People were afraid that a war would start, a war that would hurt families, villages, and the island itself. Putri Mandalika did not want anyone to suffer because of her. She listened to the sea and thought deeply about what was best for everyone. She did not want power or war, she wanted peace for her people. So she made a difficult choice. She gave herself to the sea, believing that peace was more important than her own life. The Sasak people believe that she did not disappear. They believe she became part of the sea, returning each year as Nyale, small sea creatures that appear along the shore. Through this story, the sea became a place of wisdom and remembrance, a place that reminds people that caring for the whole community is more important than winning or owning.

For the Sasak, the sea is not just water. It is a place of life, rhythm, and meaning. The sea teaches patience, because it follows its own timing. It teaches respect, because it can give life, but it must be treated with care. And it teaches responsibility, because humans must care for the sea if they want to live well with it. These stories help people feel connected to nature, to each other, and to themselves.

Science card - English version



**The moving sea
(a science perspective)**

The sea is always moving. Sometimes the water rises high on the beach, this is called high tide. At other times, the water moves away, and the beach looks much bigger, this is called low tide. The sea moves like this all the time.

Scientists wondered why tides happen. They discovered that the Moon, which moves around the Earth, has a strong pull called gravity. This pull gently tugs on the sea, stretching the water around our planet.

On the side of the Earth closest to the Moon, the sea rises, and high tide happens. On the opposite side, the water also rises because the Earth is slightly pulled away from the water there. As the Earth spins, different places experience high and low tides every day. Science helps us understand how the sea moves. Isn't that amazing?

Diary - English version**MY SMALL DIARY**

This diary is just for you.
You may write or draw in it.
There are no right or wrong answers.

You do not have to share what is inside this diary with anyone, unless you want to.

How do you feel right now?

(You can draw or write a word.)

What did you see, hear, or feel around you?

(For example: sounds, movement, wind, water.)

What do you think the sea teaches people?

(About life, patience, care, or something else.)

When I think about the sea, it makes me feel:

Appendix D.3: Lesson 2

pillar: nature as a interdependent system

Teacher briefing - English version

Teacher briefing – lesson 2

Pillar: Nature as interdependent

Theme: Plastic and the sea

Format: Design workshop

Goal of the lesson

Children learn to think together about a local problem and experience that their ideas matter.

The focus is not on finding the "best" solution, but on thinking together, listening, and creating ideas.

About this pillar

Nature as Interdependent explores the idea that people and nature depend on each other.

This pillar invites children to see that:

- what happens in their community affects nature
- what happens in nature affects people
- caring for nature can start locally

The lesson does not focus on blame or guilt. Instead, it creates space for:

- shared responsibility
- creative thinking
- confidence in local action

Lesson context

The lesson focuses on a local and visible issue: *"plastic waste and how it can end up in the sea."*

Children are invited to become problem-solvers, thinking together about how their school and community could reduce plastic waste.

Pedagogical approach

- Design-based learning: children learn by creating
- Democratic thinking: all voices matter
- Local relevance: problems close to home
- Collaboration: ideas grow together
- There are no right or wrong solutions.

Teacher tips

- Keep the tone positive and calm
- Encourage listening as much as speaking
- Remind children: "There are no wrong ideas"
- Help groups solve small conflicts by asking them to vote or combine ideas
- Focus on process, not on perfect outcomes

Key message

This lesson helps children understand that caring for nature starts locally, and that they can become actors in making change possible.

Lesson structure

1. Introduction – setting the problem (±10 min)

Teacher says:

"Today we are going to think about a real problem from our own place. Plastic sometimes ends up in the sea, and that affects animals, people, and the environment. First, we will talk about the problem. We will not think about solutions yet."

Teacher does:

- Write the problem statement on the board:
"How can we stop plastic from going into the sea?"

* *Optional: You can show a video explaining the problem to get start this discussion.*

- Ask children to share what they have seen or noticed. Let multiple children speak.
- Make a mindmap on the schoolboard of all the things the children say in the discussion.

Important:

- Do not correct answers.
- Do not suggest solutions yet.

2. Explaining brainstorming (±5 minutes)

Teacher says:

"Now we are going to brainstorm."

"Brainstorming means putting all our ideas together."

"All ideas are welcome. Nothing is wrong."

Explain the rules clearly:

- All ideas are allowed
- No judging
- Build on each other's ideas

3. Group brainstorming (±15 minutes)

Teacher does:

- Divide children into small groups (3–4).
- Put worksheet with the beginning of the mindmaps, markers, post its on the table.
- Tell them they can draw, write, or talk.

Teacher says:

"Work together. Write or draw as many ideas as you can."

"You don't have to agree yet."

Teacher role:

- Walk around
- Encourage quiet children
- Help groups that feel stuck by asking questions (not giving ideas)

4. Choosing ideas (±10 minutes)

Teacher says:

"Now look at all your ideas together."

"Which ideas do you like the most?"

Though discussion the children are encouraged to choose one idea for the presentation in front of the class.

5. Making a poster (±15 minutes)

Teacher asks children to make a poster of the idea the children landed on. Explain this can be drawings or text. Give the idea a cool name and try to think how this would work in the real world.

Teacher does:

- Give each group one poster paper.

6. Presentations (±10 minutes)

Teacher says:

"Each group will show their idea."

"We listen to each other."

Teacher does:

- Let each group present briefly.
- Thank them for sharing.

Closing (optional)

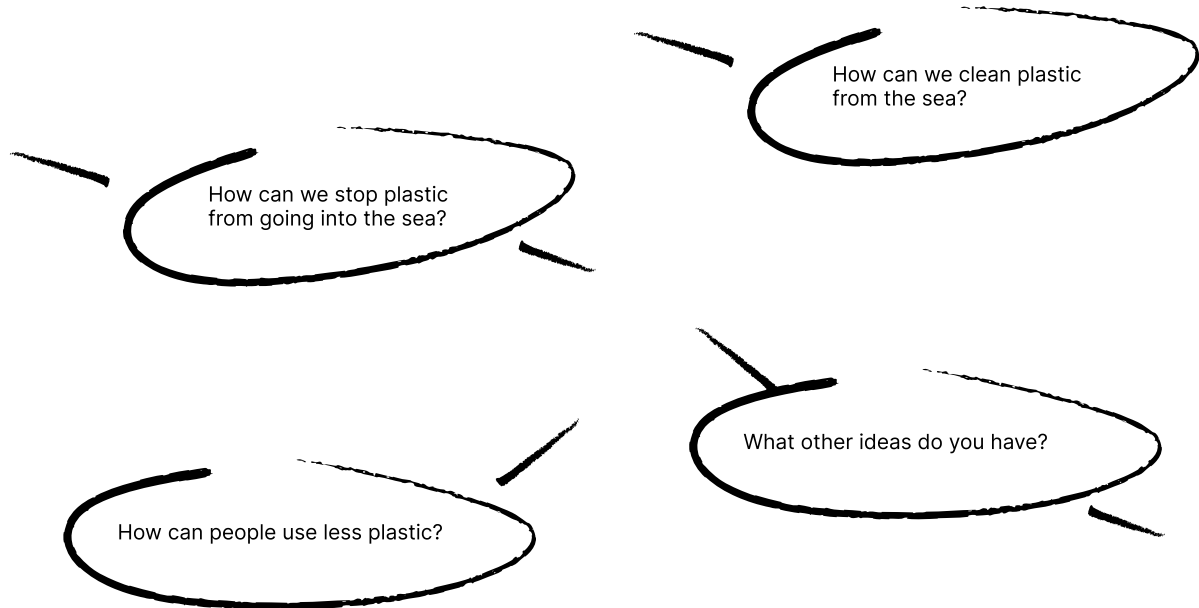
Teacher says:

"Today you worked on a real problem together."

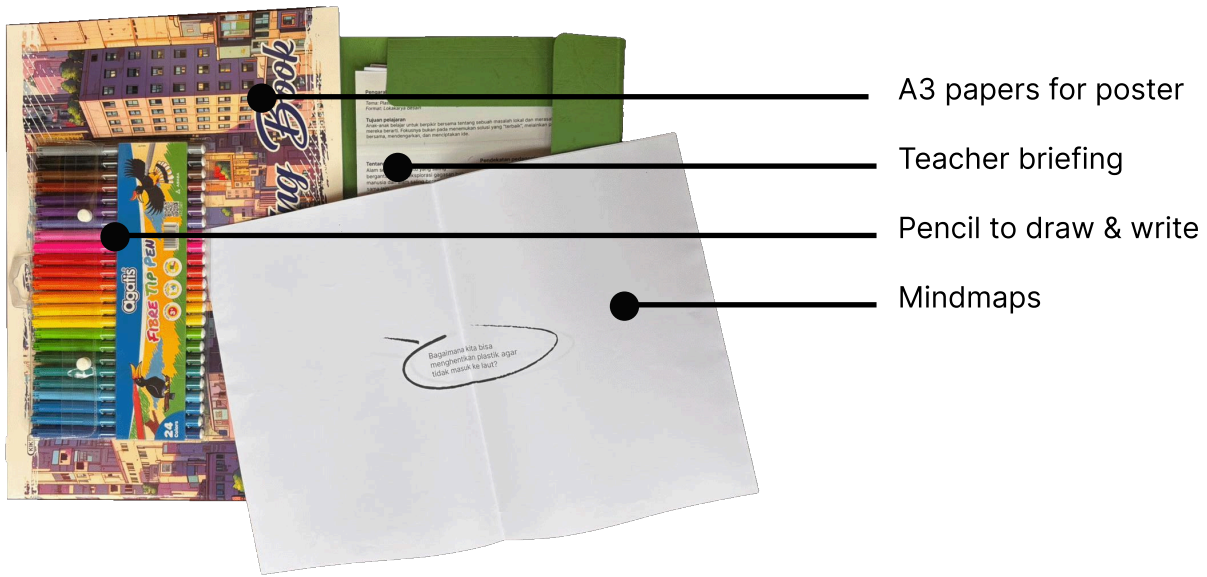
"Your ideas show how people can think and care for their own place."

Posters can stay in the classroom as a reminder that children's ideas matter.

Mindmap questions - English version



Supporting materials



Appendix D.4: Lesson 3

pillar: nature as a uncontrollable

Teacher briefing - English version

Teacher briefing – lesson 3

Pillar: Nature as a uncontrollable

Theme: Natural change and preparedness

Format: Discussion-based learning game with map and scenario cards

Goal of the lesson

The goal of this lesson is to help children respond to natural change in a calm, thoughtful, and collective way, focusing on preparedness rather than fear.

About this pillar

Nature as a threat explores the idea that nature changes, and that humans must learn how to live with these changes.

This pillar invites children to:

- understand natural changes common to Lombok
- practice calm decision-making
- focus on cooperation rather than fear

The lesson does not teach fear or emergency drills.

Instead, it creates space for:

- awareness
- confidence
- collective responsibility

Lesson context

This lesson takes place in a place with enough floor space.

The teacher positions themselves behind the map and the children gather around the map in a big circle.

The map functions as a shared thinking tool rather than a test.

Pedagogical approach

- Scenario-based learning: thinking through real situations
- Collective decision-making: choices are discussed together
- Reflective discussion: reasoning matters more than the answer
- Embodied learning: placing figures supports understanding
- Calm facilitation: emotional safety is prioritised
- There are no right or wrong choices.

Teacher tips

- Keep your tone calm and steady.
- Avoid dramatic or frightening language.
- Encourage children to explain their thinking.
- Emphasize staying together and listening.

Key message

This lesson helps children understand that while nature changes, people can learn to respond wisely, together.

Lesson structure

1. Introduction (±10 minutes)

"Today we will play a learning game about nature. Nature sometimes changes. We cannot stop all changes, but we can learn how to respond together."

Explain that:

- children will think
- listen
- and move their figures on the map
- Tell them they may change their mind.

2. Exploring places on the island (±10 minutes)

Exploring Places on the Island

The teacher introduces different types of places on the map with the location cards:

- high ground
- sheltered places
- gathering points
- staying where you are

You can point out on the map where every location is.

Next every child can pick up one figure to represent themselves in the next step.

3. Natural change cards (±30 minutes)

Teacher does:

Read one scenario card at a time.

After each card, ask:

"Where would you go?"

"What would you do there?"

Children place their own figures on the map.

Important:

Let children explain their reasoning

Do not say what is "correct"

Encourage listening to each other

The teacher emphasizes: The place helps, but what you do matters too.

Repeat till card are all done.

4. Reflection and Sharing (±10 minutes)

The lesson ends with a group reflection on what was learned and how decisions were made together.

"What did we learn today?"

"How did we decide together?"

"How did it feel to stay calm?"

Children are encouraged to continue the conversation at home using a flyer shared with their parents.

→ give every child a flyer to take home and show their parents.

Supporting materials

- location cards to facilitate the intro of the lesson
- natural change cards to facilitate the core of the lesson
- the fictional map
- personal game pieces
- a take-home flyer with discussion prompts



Island map



Location cards - English version



Location

High ground

- Hills, higher land, raised areas
Helps when water rises or moves
- Not always the best place for wind or falling objects

Use when:

- water is involved
- the sea or river changes

Location

Sheltered place

- Strong buildings, away from windows, trees, loose objects

Use when:

- the ground shakes
- wind, ash, or falling objects are involved

Location

Gathering point

- Designated safe meeting place
- Follow the evacuation signs

Use when:

- things calm down
- people need to find each other

Location

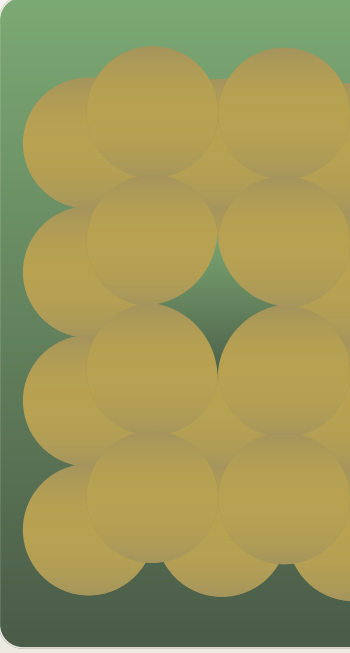
Staying where you are

- Not moving immediately

Used when:

- you are unsure moving could be unsafe
- This is sometimes okay, but not always.

Natural change cards - English version



The ground shakes

What is happening
 “The ground begins to shake.
 It feels strange under your feet
 and objects start to move.”

What should you do
 Stay calm.
 Protect your head.
 Stay low and close to the ground.
 Move only if it feels safe.

Good places to choose
 A sheltered place.
 Staying where you are if you are
 already safe.

Heavy rain for many days

What is happening

“It has been raining very hard for many days.

The ground feels wet and soft, and the streets are filled with water.”

What should you do

Choose higher places.

Stay away from rivers.

Think ahead and prepare together.

Good places to choose

High ground.

Places away from rivers and slopes.

The river is rising

What is happening

“The river is getting wider and higher. The water is moving faster than before.”

What should you do

Move away from the river early.

Go to higher ground.

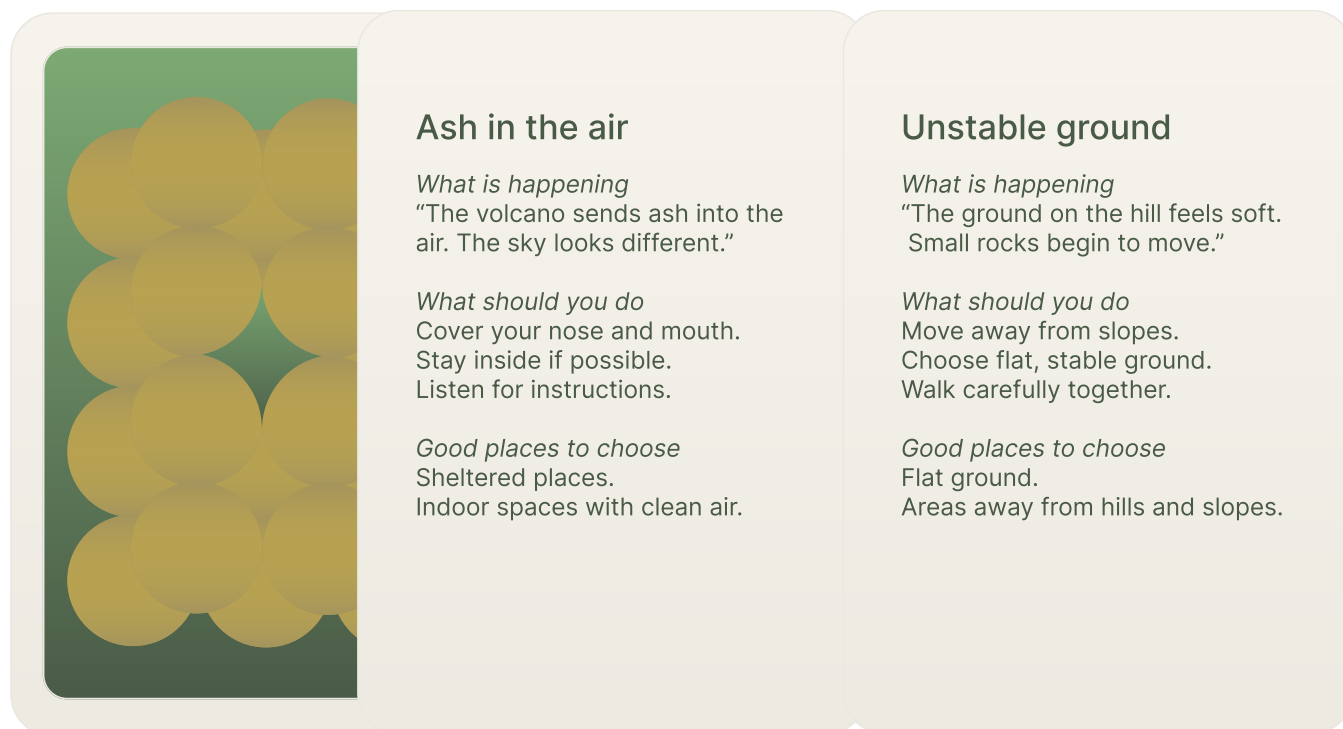
Help others and stay together.

Good places to choose

High ground.

A nearby gathering point, if safe.

Natural change cards - English version



After the shaking stops

What is happening
"The shaking of the ground has stopped. Everything feels quiet again."

What should you do
Check on others.
Stay together.
Go to a gathering point.

Good places to choose
A gathering point.
Places where people meet.

Not sure what is happening

What is happening
"Something feels different. You are not sure what is happening."

What should you do
Stay calm.
Talk together and stay together.
Check what is happening and what you should do online.

Good places to choose
Staying where you are.
A gathering point, if agreed before.

Today I learned how to respond when nature changes.

Today I learned what to do when:

- the ground moves
- the sea changes
- it rains for many days
- the wind becomes strong
- something feels different

I learned that:

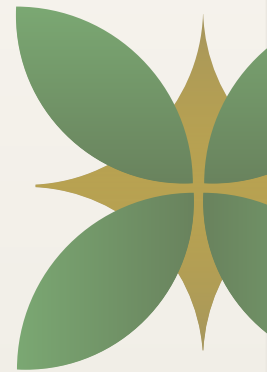
- staying calm helps
- thinking together helps
- listening to others helps

Nature changes.
People learn how to respond.
Together, we stay prepared.

Questions to talk about together (for example during dinner tonight)

- What is our evacuation route?
- Where would we go if the water rises?
- Where would we meet if we get separated?
- What is a safe and comfortable place in our house?

There are no right or wrong answers.
Talking together helps us learn.



Appendix D.5: Lesson 4

pillar: nature as to be controlled

Teacher briefing - English version

Teacher briefing – lesson 4

Pillar: Nature as to be controlled

Theme: Making careful choices over time

Format: Guided exploration using a website and reflection worksheet

Goal of the lesson

The goal of this lesson is to help children practice ethical decision-making by carefully considering different perspectives and the short- and long-term consequences of a choice.

The focus is not on choosing the “right” answer, but on learning to slow down, listen, and think carefully before deciding.

About this pillar

Nature as something to be controlled explores the idea that humans have the ability to change nature, but that this ability comes with responsibility.

This pillar invites children to think about:

- how human choices affect both people and nature
- the difference between short-term and long-term outcomes
- when to act, and when to act with care

The lesson does not teach what the “right” choice is. Instead, it creates space for:

- ethical reflection
- listening to multiple perspectives
- understanding the impact of decisions over time

Lesson context

This lesson takes place in the classroom and is guided by an interactive website, used by the teacher in front of the class.

Use the smartboard offered by the government to showcase the website.

Children explore one shared situation: a rice field where insects reduce the harvest, and different responses are possible.

The lesson stays with this single question for the full duration, allowing depth rather than speed.

Pedagogical approach

- Guided inquiry: the teacher guides, children think
- Perspective-taking: multiple voices are presented
- Ethical reflection: values and consequences are explored
- Slow learning: time is taken before choosing
- Structured reflection: worksheets support reasoning
- There are no right or wrong answers.

Teacher tips

- Keep the tone calm and neutral
- Avoid suggesting which option is “better”
- Allow silence and thinking time
- Encourage children to explain their reasoning
- Emphasise that it is okay to change your mind

Key message

This lesson helps children understand that controlling nature requires ethical evaluation and future thinking.

Lesson structure

1. Introduction (± 10 minutes)

The teacher introduces the situation using the website: rice as essential food, insects reducing the harvest, and rising prices. Children are invited to think carefully rather than choose quickly.

2. Exploring two choices (± 10 minutes)

Using the website, the class explores two possible ways to respond:

- a fast solution using strong pesticides
- a slower, gentler method that works with nature

The teacher emphasizes that every choice has benefits and costs.

3. Listening to many voices (± 20 minutes)

Children choose which perspectives to listen to and in what order, including people, nature, and the future.

Each voice offers a different view on the same decision.

You can use the website to read it out loud, or you can ask a child to read it out loud for every different voice.

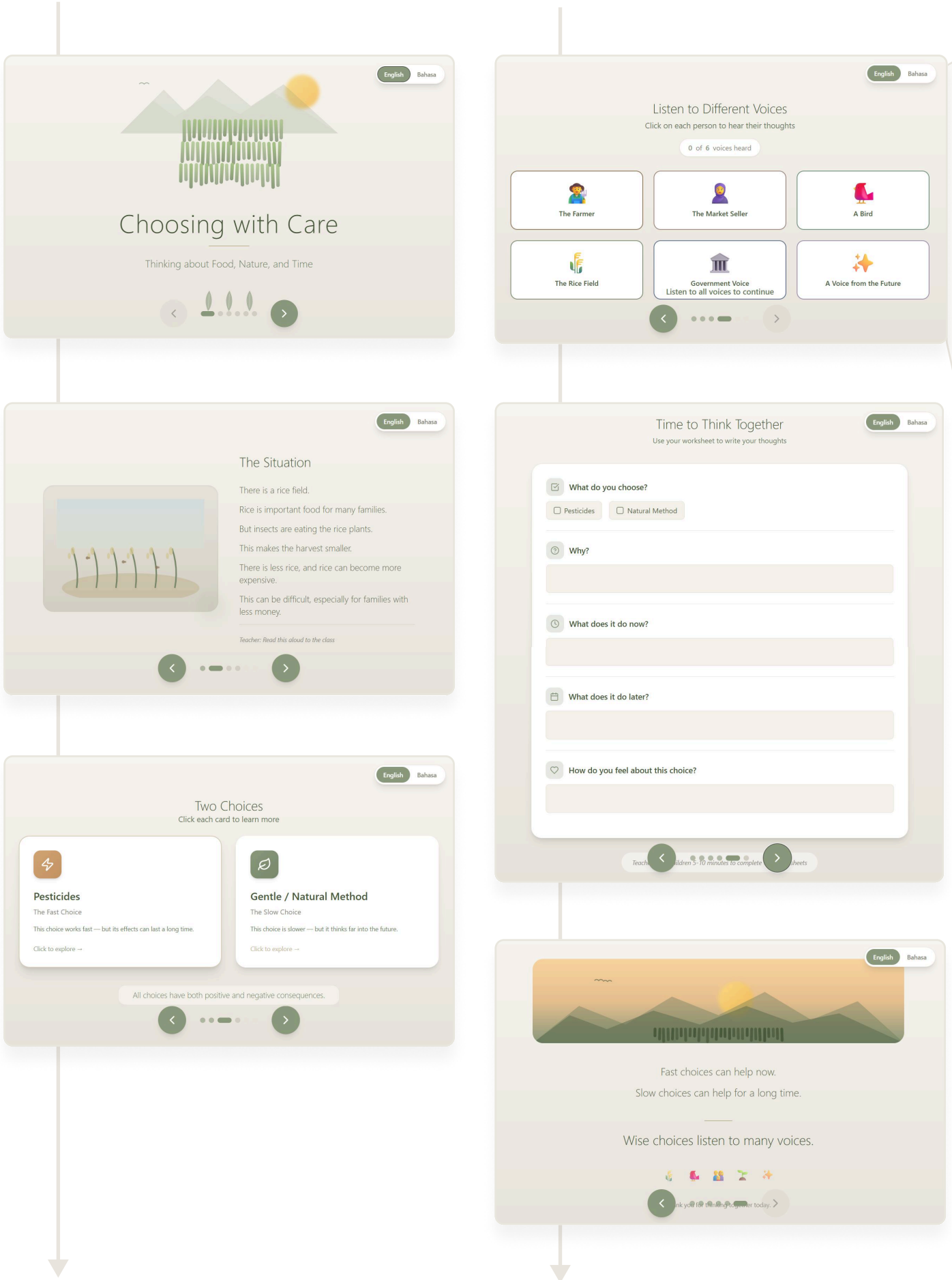
4. Reflection and evaluation (± 15 minutes)

Children complete a worksheet reflecting on short- and long-term effects and how the choice feels.

"Now you can think for yourself."

Explain that answers can be different.

Website user flow



Listen to different perspectives - English version

**The Farmer***calm, thoughtful, practical*

"I wake before sunrise to care for my rice. This field has been in my family for three generations. When insects eat my crops, I worry about my income and feeding my children. I need to protect what I grow. But I also think about my grandchildren. Will they be able to farm this same land? I want to make choices that help me now, but also have an impact in the future. It is not easy to decide."

Listen aloud

I understand

**The Rice Field***deep, calm*

"I am the soil beneath the rice. I have been here for hundreds of years. I remember the roots of many plants. When chemicals come into me, I hold them for a long time. Some things I can clean. Some things stay. I feel healthiest when worms and tiny creatures live in me. They help make me rich and soft. Please be gentle with me."

Listen aloud

I understand

**The Market Seller***neutral, informative*

"I sell rice at the market every day. When there is less rice, the price goes up. This affects both my business and the families that cannot afford to buy as much rice anymore. I think using pesticides is more reliable and ensures everybody has access to food now."

Listen aloud

I understand

**Government Voice***calm, professional*

"Our job is to help keep people healthy. We test food to see if it has chemicals in it. Some pesticides can stay on food even after washing. If people eat a little every day for many years, it might affect their health. We want farmers to have good harvests, but we also want food to be safe for everyone, especially children."

Listen aloud

I understand

**A Bird***soft, slow*

"I fly over the rice fields every morning. I eat the insects that live there. The insects are my food. When the farmer uses pesticides, the insects die. Then I have nothing to eat. I must fly far away to find food. But when the field is gentle, I can stay. I help the farmer by eating some insects. We help each other."

Listen aloud

I understand

**A Voice from the Future***hopeful, reflective*

"I am someone who will be born many years from now. I do not know you yet, but the choices you make today will shape the world I live in. Will the soil still be rich? Will birds still sing in the fields? Will the water be clean? I trust that you are thinking carefully."

Listen aloud

I understand

Worksheet - English version

Choosing with Care

Name: What do you choose? Pesticides Natural Method Why? What does it do now?



What does it do later?

A large, empty, light-colored rectangular box with rounded corners, intended for the user to write their answer to the question above.



How do you feel about this choice?

A large, empty, light-colored rectangular box with rounded corners, intended for the user to write their answer to the question above.

Appendix D.7: Expanded thematic clustering

A: Low-hanging fruit

B: IBF

Fast education & awareness

Explainer guide:
A guide for explorers uses through sites with immediate opportunities about digital, traditional and experiential how to behave respectfully. Possibilities to make a inspired by previous guide - making it with physical through things to fit their ideas.
Each location offers small narratives, stories told by elders, local historians, or grassroots acts of care and engagement.
The guide can be used in two forms or combined:
• Digital inspired by Pearson Co, visitors unlock stories, clues, and local voices as they move through space, encouraging presence rather than culture.
• Analog: travelers collect stamps or reports from each site, gradually filling a exploring companion booklets, where each mark represents understanding.

Safety campaigns:
Campaigner that inspires risk measurements making people more aware and engaged.

Music song:
A list of people in London sing songs, where sharing walking stories. Creating a song about nature a shared theme on internet singer here can help connect people as well as raise the knowledge about the topic. Could also be a movie of social media sites.

Storytelling books:
Through interactive art tech installations that use modern technology to convey traditional spiritual stories through experience, users can explore nature.

Curriculum for young kids (school/uni):
In order to physically connect with nature and pass on the sacred knowledge.

Games & Participatory Tools

Family game:
Connecting all generations about their connection and knowledge of the natural world.

Preparation game:
Non-playing game considering that London has a lot of earthquakes, floods, eruptions. But blending it a bit with what providing survival stories.

Curriculum

Risk curriculum:
Schools and community centers integrate risk literacy as part of cultural heritage, stories of disasters to local lessons in change.

Ethical curriculum:
A secondary course, thinking about ethics, the relation to nature and thinking into the future and analyzing things that might happen.

Programs

Repair & prepare hubs:
Small neighborhood hubs offering:
• shared tools
• skilled meetings
• training on prevention
• storage of waste resources
• guidance

Link the neighborhood safety round to ecological safety:
Every month neighborhood get together normally to do a 2 hour check up and have a social event. But now able to plan events, train or emergency.

Community innovation

Design hub:
Platform where locals gets matched with neighbors, to together develop ideas that could help the community.

Rebuilding ecological protection as community identity:
Like planting mangroves, coral reefs, oysters.

Neighborhood game:
Each neighborhood gets a fund, there get a pitching event and the winner gets in funding to get the neighborhood will become involved in the development and it will help the whole neighborhood.

Certificating &

Ethical reporting:
Before starting any project that is helping nature in a way, the city have to fund in a ethical report, the through of problems and how to act against that.

Redesign certification connecting social to ecological:
A global certification framework that measures social in both ecological and human terms. For every metric, local health, an ecosystem indicator that reflects community health, an ecosystem indicator that reflects community health, and an ecosystem indicator that reflects community health and community.

Mandatory nature based solutions check:
With every engineering proposal there needs to be a reporting with proof, why this will make more impact ecosystem based alternatives.

Community monitoring network:
An app where data is collected collectively, as well as by humans. AI analyses from pictures taken given by the smart things to have guides, system learns from human replaces them.

Governance innovations

Connected to global research, working locally:
A global employment ecosystem connecting people to create global research work while living locally.

Shared safety measures and adaptive living:
Community willing to jointly invest in, as a whole has the same opportunities and security, can help building a platform, in which everyone knows what to do in case of an emergency. People are used to more adaptive living.

Framework / guidelines for natural disaster:
A framework that channels international funding into local but reserves exceptional instead of reporting locally, the platform connects global resources to community knowledge networks. Digital open source recovery blueprints are created / connected across the Global South, exchanging adaptive practices peer to peer and how to improve global funding.

Social mapping:
A participatory tool that merges official census maps with community defined "sacred geographies". Makes invisible connections visible with policy discourse.

Wildlife preservation zones:
Designate 30% of urban areas as strictly no-intervention zones which local government process without management or engineering. Protected from both destruction and development.
→ Using both to protect this system, in cheap way.

C: Political or strategic leverage

Platforms & Networks

Attainment platform:
 A network of actors (NGOs, companies etc.) in London to work together closely with local authorities. Preparing standards that meet a set of regional/competitiveness within London. Providing jobs for graduates as well as local knowledge and growth opportunities to the local companies.



Coast commons platform:
 An open-access based for local reef restoration/adaptive, low-cost version of high-end tech. Strong groups, enhancing local collaboration.



Collective smart:
 Society places a bet in the distribution of protection. There are alternative, contribution with decisions all the distribution of the protection resources. As well as distribution-probabilities between existing members, using supply, innovation routes, to collectively manage local future their demand.



Local innovation labs:
 A network for a set of NGOs, companies etc. in London to work together closely with local authorities. Preparing standards that meet a set of regional/competitiveness within London. Providing jobs for graduates as well as local knowledge and growth opportunities to the local companies.



Governance structure

Goal of the Science:
 A governance structure recognizing vertical constraints on regional/decision-makers. Each region has local optimal representation, whose knowledge is translated into spatial policy, with every decision the local quarters need to agree.



Goal of the Science:
 Creating the first green party to represent a voice for nature in the parliament.



Ministry of life:
 Like a minister of an orchestra, ensuring habits thinking in large organizations. Strengthening coordination and cooperation within institutions, as well as getting system input to higher levels in the structure.



Economische Instrumenten

Create ecology-friendly jobs:
 Align short-term income with long-term ecosystem stability. By creating economic gains to local ecosystems. Jobs on farms can be sustainable, local get paid to collect and recycle the waste.



Co-owned framework:
 Each institution has to be regulated as a framework within a local cooperation. Global investors can fund projects but not own them. Participation requires sharing with help and return.



Universal climate insurance:
 Socialized insurance covering of coastal residents equity. Backed by progressive taxation on relative global property and tourism revenue. Those profiting from coastal tourism, large property owners' liability protection by those being there out of necessity.



Roots scholarship:
 Encourage local and global profits focused on the local growth. Study support + mandatory return projects (3-5 years) where knowledge is used for local programs.



Policy frameworks

Schools are required to offer a dual curriculum:
 Scientific nature literacy and integration of local ecological practices have to be taught together in a complementary way.



Policy change:
 Percentage of business needs to stay in the country percentage-wise. Rules and policies require benefit sharing. So it links the big profits to leaves the country.



Standards



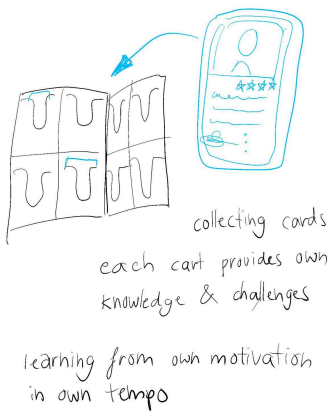
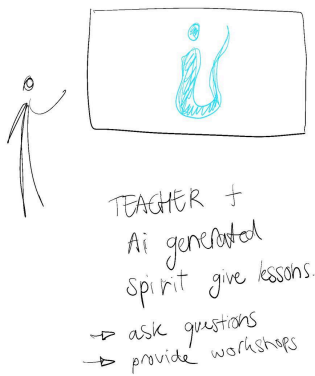
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Feel harmony between spiritual beliefs and scientific understanding.

Appendix D.8: Ideation in knowledge layer

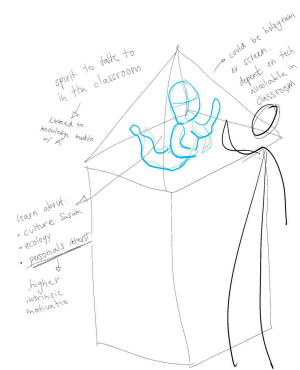
Within formal education



worksheet
2 ways of knowing
+ combined

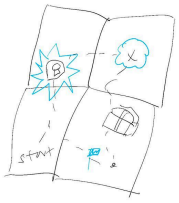
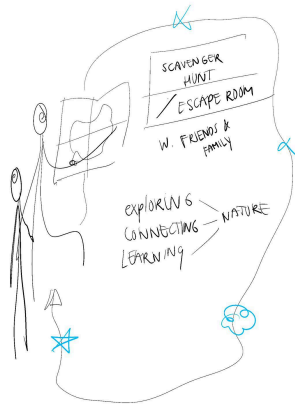
	what faith/tradition tells us	what science tells us	what we learn from both
Rain			
coral			
palm tree			

Experiential Learning



Outside formal education


Learning



SCAVENGER HUNT
As school trip
with: - spiritual learning
- scientific learning
about the same places.

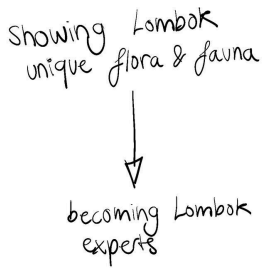
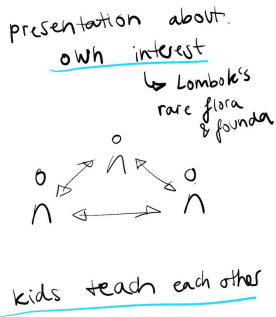


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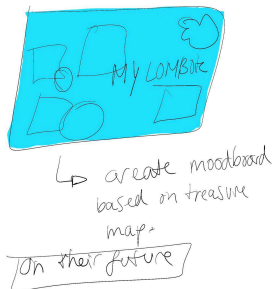
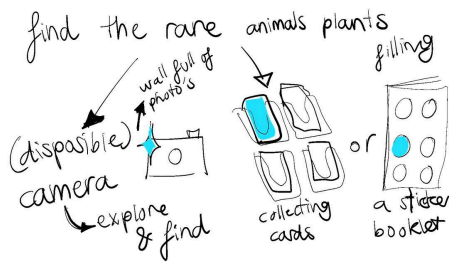
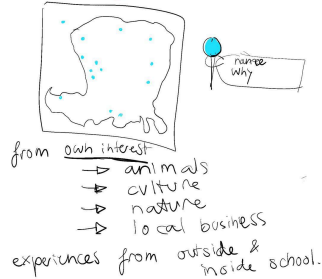
See educated youth able to stay, contribute, and thrive locally.

Within formal education



LEAD FROM OWN INTEREST

making Lombok's personal treasure map

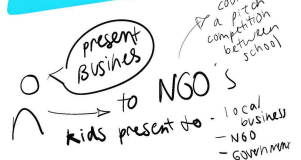


Experiential Learning

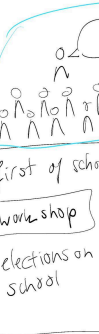
If I would run this place

local problem

make a fictive business



ANNUAL BETWEEN



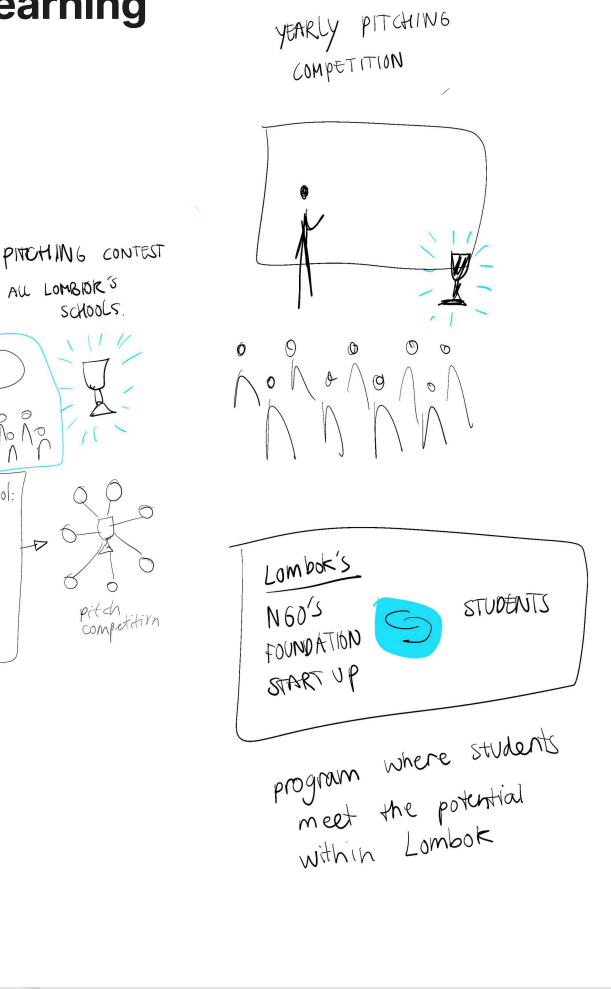
schooltrip to

local businesses
NGO'S
Innovation

As A source of inspiration & providing a potential role model

Outside formal education

Learning

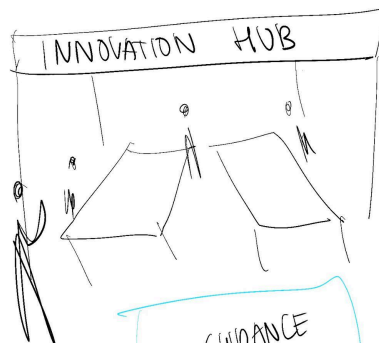


BLEND COFFEE CULTURE W. INNOVATION



- clients
- workshops
- NETWORK

physical space



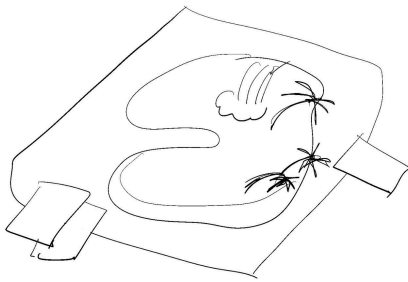
- GUIDANCE
- FUNDS
- NETWORK

11



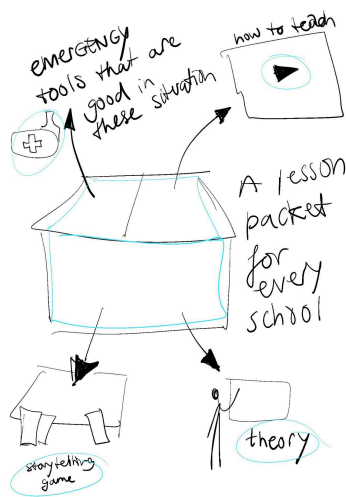
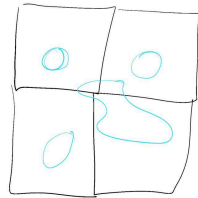
Feel prepared and supported when natural hazards arise.

Within formal education



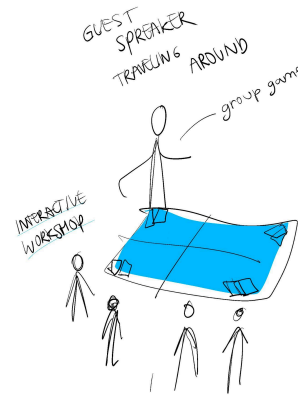
GAME FOR PREP

→ how to act in... map making of local neighbourhood



- circle:
- Hazard zones
 - safe zones
 - resource map

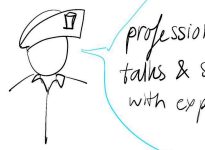
Experiential Learning



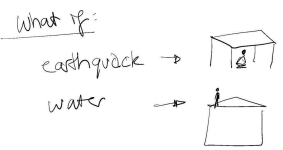
trip to → local disaster

BASARWA

- how professionals prepare & respond
- how systems coordinate



simulation day



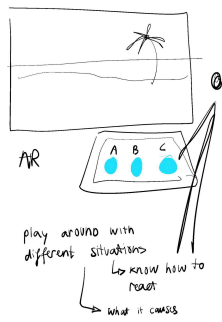
Outside formal education

arning

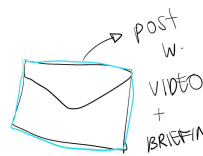
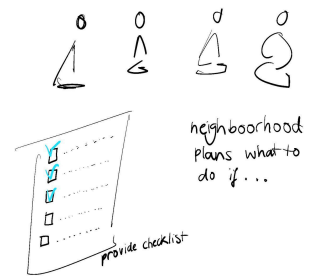
r responds
team

prepare
respond

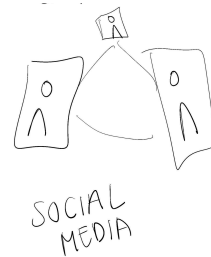
shows
entise



sim kanling
linked
to risk plan




NATURAL RISK CAMPAIGNE



12 

Use technologies guided by ethics, responsibility, and care for the living world.

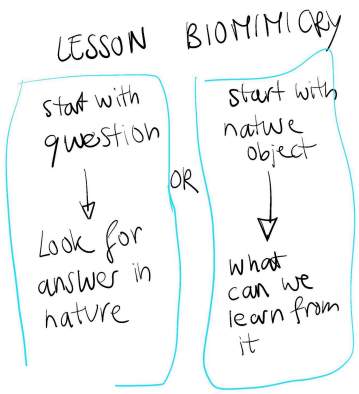
Within formal education



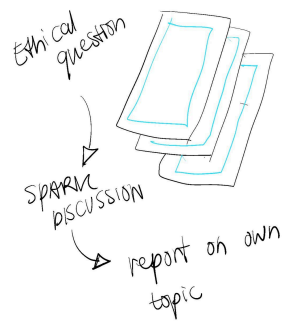
COUNCIL SIMULATION

Should we? ... talk to / video / roleplay

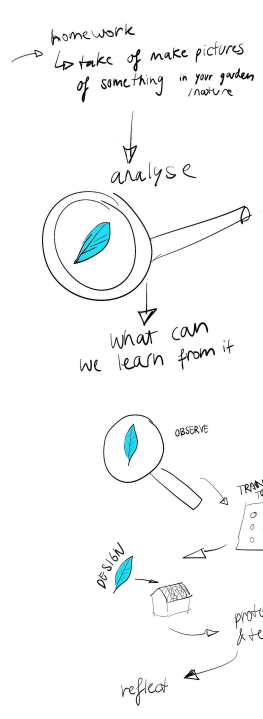
- plant mangroves? → farmer
- build a dam? → seller
- make fishing illegal? → tourist
- make a law against plastic bags? → fish
- officer



Ethics lesson



Experiential Learning



DESIGN CONTEST

1. problem
2. learn from nature
3. design
4. think all consequence through
5. present

E

Kids

about

→ vs

→ wa

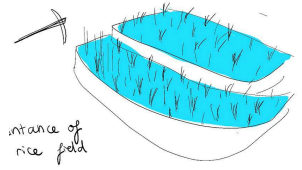
→ in

Outside formal education

Learning

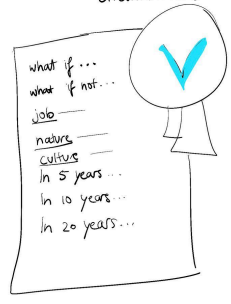
Ethics Committee

become actors
schools decisions:
c. airco?
waste recycling?
invest in solar power?



instance of rice field
→ are we going to use pesticides?
↓
impacts:
• farmer
• birds
• insects
• economy
• community

MANDATORY ETHICAL REPORTING
↑
improved to local circumstances



ETHICAL CERTIFIED

tech

ethical quality mark
on technologies
+ products

9



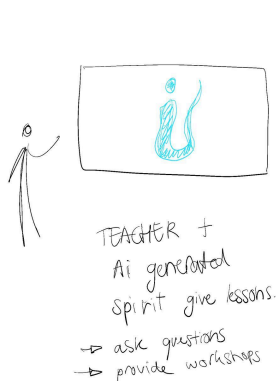
Feel harmony between
spiritual beliefs and
scientific understanding.

Appendix D.9: Ideation in on lesson modules for the course on nature relation

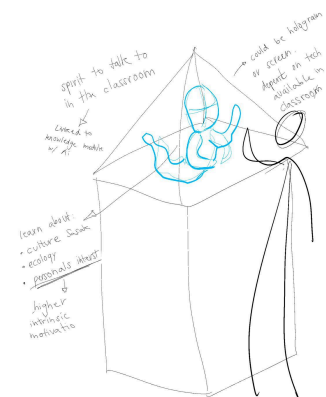
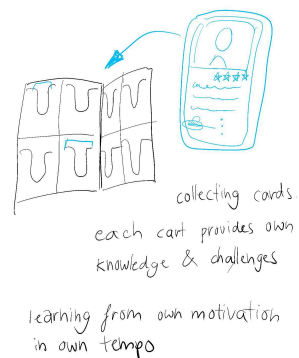
An AR spirit co-teaches with the human teacher, using dialogue, comparison, and play to help learners explore spiritual and scientific ways of knowing.

both collectively and individually

with the entire classroom



out of own interest



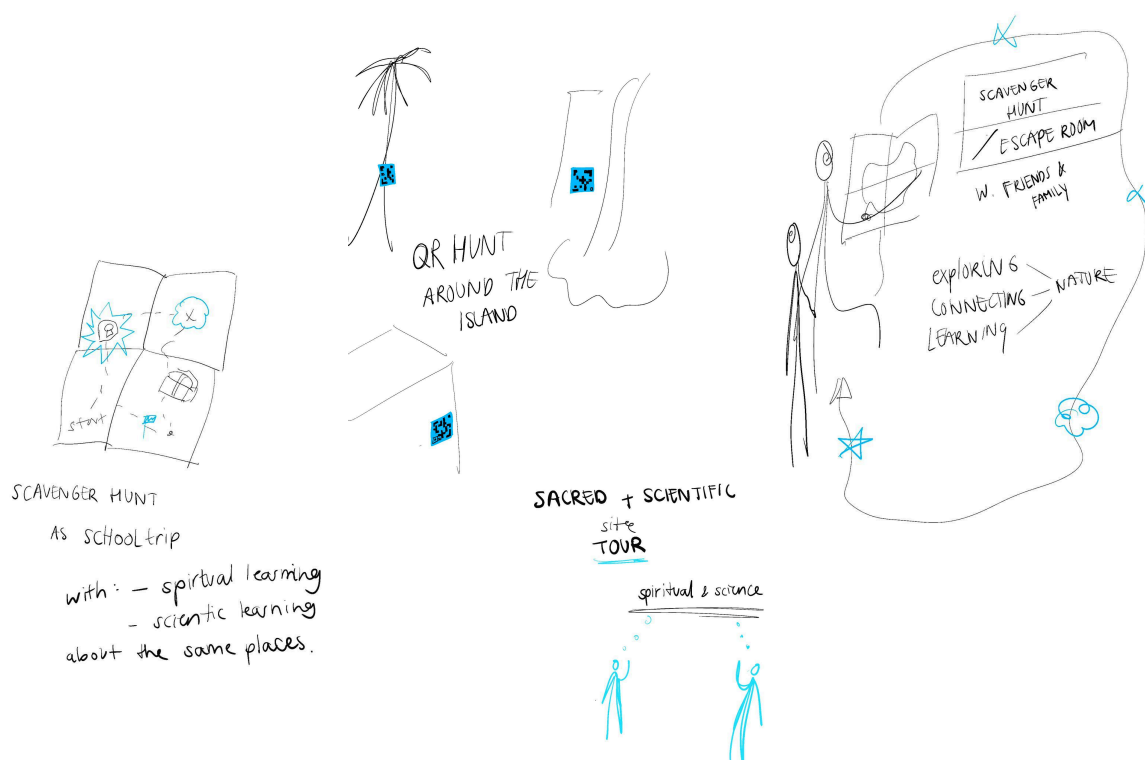
Qualities:

- **Reflective:** learners compare belief systems and reflect on meaning
- **Dialogical:** interaction with AI spirit, peers, and teacher
- **Integrative:** spiritual, cultural, and scientific knowledge are paired
- **Balanced:** co-teaching model prevents dominance

Feedback:

- Be careful when using technology for spirituality
- Does the website/AR replace the real connection with nature?

Reflection of spiritual and scientific knowledge, regarding the same place
embodied experience
through exploration and play



Pedagogical learning model:

- **Situated learning theory:** learning embedded in authentic places and practices
- **Experiential learning:** embodied exploration followed by reflection and insight
- **Information processing theory:** AR, QR, maps
- **Connectivism:** knowledge distributed across AI, culture, science, and learners

9



Feel harmony between spiritual beliefs and scientific understanding.

creating Lombok experts

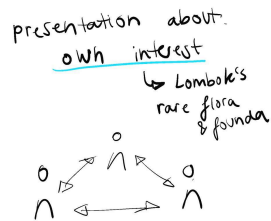
creating proudnes on Lombok's flora & fauna

everyday encounters

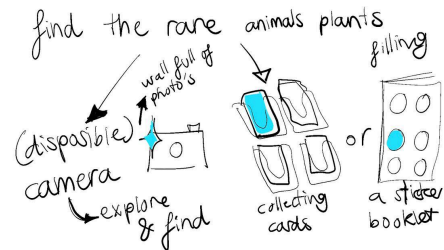
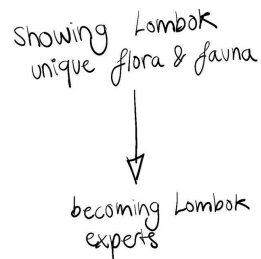
individual combined with class



teaching each other



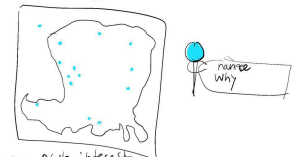
kids teach each other



learning out of own interest helping think of own values

LEAD FROM OWN INTEREST

making Lombok's personal treasure map



- from own interest
- animals
 - culture
 - nature
 - local business
- experiences from outside & inside school.



↳ create based on map on their future

Constructivism: learners build knowledge through observation and documentation

Experiential learning: learning through direct engagement with nature

Humanistic education: fostering pride, identity, and intrinsic motivation

Situated learning theory: context specific learning

Qualities:

- enabling: learners are empowered to explore, document, and share independently
- smooth: simple tools (camera, stickers, collection books)
- accessible: everyday environments
- inviting: playful collecting and personal choice encourage participation

job inspiration
 creating possible role models
 showcasing career pathways



learning out of own interest
 helping think of own values

schooltrip
 to
local businesses
 NGOs
 Innovation

As A source of inspiration
 & providing a potential
role model

Situated learning theory: learning rooted in real jobs

Humanistic education: learning is driven by personal growth, intrinsic motivation

Qualities:

- **enabling:** exposure to real careers
- **smooth:** structured visits engagement without overload
- **accessible:** local role models feel relatable and reachable
- **inviting:** storytelling and real-world encounters

10



See educated youth able to stay, contribute, and thrive locally.

identifying gaps
kids become actors



possibility link to cel:
nature to be contolled.

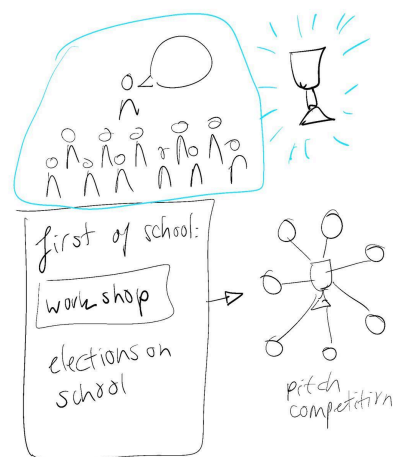
Wlthin a follow up ethical excersize

Constructivism: learners design solutions to real problems
Critical pedagogy: identifying local challenges and power gaps
Experiential learning: ideation, prototyping, and pitching
Social constructivism: collaboration across schools and communities

Qualities:

- **enabling:** learners are supported to act on real local issues
- **smooth:** guided frameworks help structure complex challenges
- **accessible:** local problems
- **inviting:** pitching and collaboration motivate participation

ANNUAL PITCHING CONTEST
BETWEEN ALL LOMBOK'S SCHOOLS.



pitch comp with different schools

firstly voting with school
 prep for pitch with small budget for
 prototype for competition.
 price for the competition

11

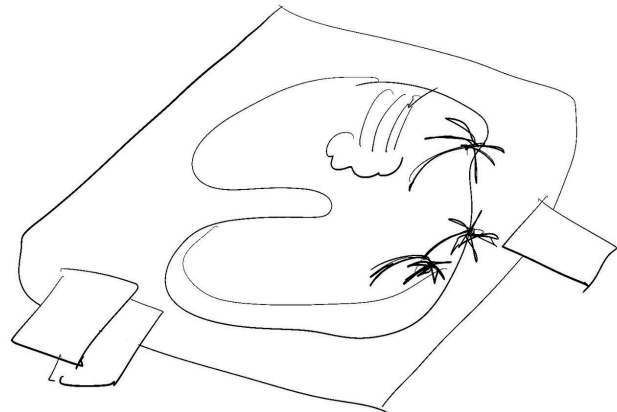


Feel prepared and supported when natural hazards arise.

Children play a map-based physical game around a fictional island that resembles Lombok.

Not natural risk, but natural changes we have to change with them.

Take flyer home for conversation at the family table, about their safety spots are and what to do when.



- **Experiential learning**
- **Social constructivism**
- **Situated Learning**

GAME FOR PREP
→ how to act in...

Qualities:

- **Instructive:** clear scenarios, maps, and rules guide learning
- **Wise:** learners reflect on nature's signals and collective judgment
- **Strategic:** focus on adaptation rather than panic
- **Skilled:** builds foundational response and decision skills

11



Feel prepared and supported when natural hazards arise.

Schooltrip to Basarnas (local disaster respons team)

trip to → local disaster respons team

BASARNAS

→ how professionals prepare & respond

→ how systems coordinate



professional talks & shows with expertise

- Social constructivism
- Situated learning
- Social learning theory: observing expert behavior and coordination

Qualities:

- instructive:
- wise:
- strategic:
- skilled:

simulation day at school learn by doing

simulati

What if:

earthquake

water

Where took:

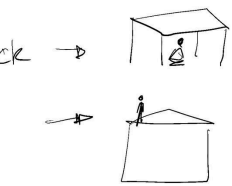


- Social constructivism
- Situated learning
- Experiential learning

Qualities:

- instructive:
- wise:
- strategic:
- skilled:

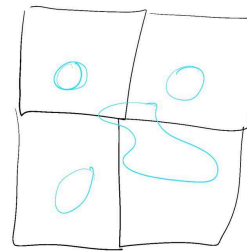
on day



→ animal behaviour
→ ocean

Mapping out your own safe zones / resource zones / hazard zones

map making
of local neighbourhood



circle: • Hazard zones
• safe zones
• resource map

- Social constructivism
- Situated learning
- Experiential learning
- Constructivism

Qualities:

- instructive:
- wise:
- strategic:
- skilled:

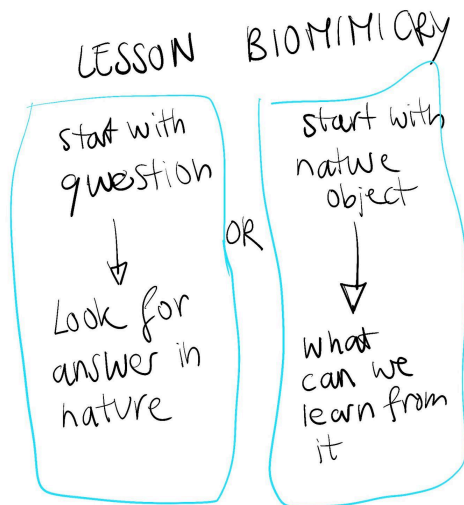
12



Use technologies guided by ethics, responsibility, and care for the living world.

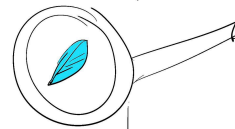
De nature as teacher

boundaries of nature, by listening and learning from nature

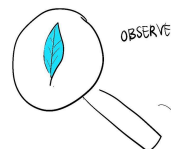


homework
→ take of make pictures of something in your garden / nature

analyse



what can we learn from it



TRANSLATE TO PRINCIPLES

DESIGN



prototype & test

reflect

- Experiential learning
- Social constructivism
- Situated learning

Qualities:

- deliberate:
- wise:
- ethical:
- skilled:

learning by doing
real life scenarios through interviews/videos/roleplay



COUNCIL SIMULATION

- Should we?
...
- e.g.
- plant mangroves? → farmer
 - build a dam? → seller
 - make fishing illegal? → tourist
 - make a law against plastic bags? → fish
 - officer
- talk to / video / roleplay

Qualities:

- deliberate:
- wise:
- ethical:
- skilled:

12



Use technologies guided by ethics, responsibility, and care for the living world.

Children become real life actors

Ethics committee by kids for school.

Ethics Committee

kids become actors

about school's decisions:

- use airco?
- waste recycling?
- invest in solar power?

learning by doing

Qualities:

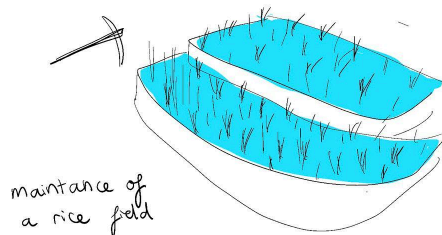
- deliberate:
- wise:
- ethical:
- skilled:

Class take care of the rice field.

but has to make a decision about pesticides.

they have to think through everything, impacts on: human (farmer, markets, family, government) and nature (rice, birds, insects)

evaluate options.



→ are we going to use pesticides ?

↓
impacts:
• farmer
• birds
• insects
• economy
• community

Qualities:

- **deliberate:**
- **wise:**
- **ethical:**
- **skilled:**

Appendix D.10: Understanding local education system

To understand everyday educational practice in Lombok, I conducted two school visits, including two semi-structured teacher interviews and one morning of classroom observation during three lessons (English, Religion, and Physical Education).

Key findings:

- **Learning is highly structured, repetitive, and embodied.**

Lessons follow a clear rhythm built on repetition, music, movement, games, and short activities. Teachers use songs and rituals to gain attention, review previous content, and support memorization.

- **Teachers rely on government-provided materials as a framework, but design the teaching themselves.**

Textbooks and curricular guidelines from the government provide structure and learning goals, while teachers independently decide how content is explained, adapted, and translated into classroom activities.

- **Strong emphasis on classroom management, manners, and emotional safety.**

Behavioral rules (e.g. sitting posture, raising hands) are consistently integrated into lessons. Teachers see emotional and social well-being as a core part of learning and invest significant effort in relational and emotional support.

- **Nature-based and experiential learning is highly effective but fragmented.**

Outdoor learning and field trips strongly increase engagement and understanding. However, education about nature, sustainability, and risk remains scattered across subjects and activities rather than embedded in a coherent curriculum.

- **Teachers face structural challenges alongside high commitment.**

Key challenges include limited formal training in differentiated teaching and classroom management, high preparation workloads outside school hours, and the emotional demands of supporting students' personal and social issues.

- **Technology infrastructure exists, but classroom implementation remains challenging.**

The government recently provided smart boards for every school, creating new opportunities for visual and digital learning. However, teachers report ongoing difficulties in integrating this technology effectively into daily teaching practice.

- **Teachers are highly motivated and open to innovation.**

Both teachers expressed strong willingness to test new educational modules and provide feedback, especially when materials are practical, age-appropriate, flexible, and supportive rather than fear-based.

Overall Insight

Effective elementary education in Lombok is adaptive, teacher-driven, and experience-based. While national curricula and infrastructure provide important structure, learning outcomes largely depend on teachers' ability to translate these frameworks into meaningful, engaging classroom practices. This highlights the need for educational initiatives that align closely with teacher realities and support them with concrete, flexible tools.

Disclaimer:

This study is exploratory in nature. The findings are derived from a limited number of interviews and classroom observations conducted at one school, and therefore do not constitute a statistically or qualitatively representative overview of the Lombok education system.

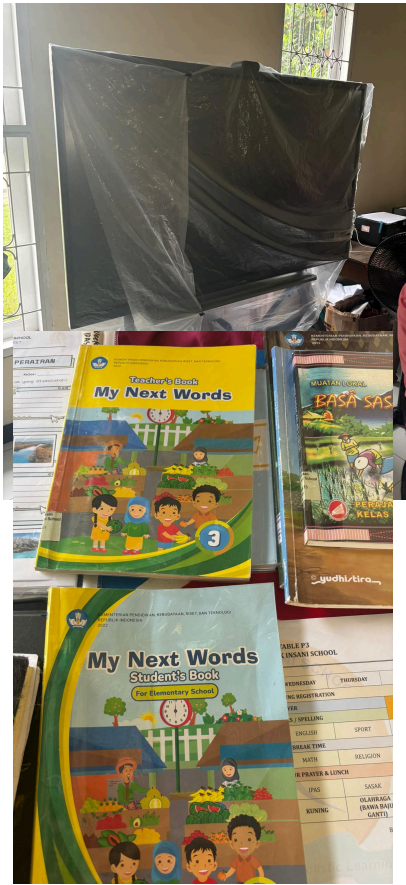


Figure D2: Visual documentation of the observed school context, including teacher- and student-produced lesson materials, classroom teaching tools (whiteboard and smart board), themed classroom environments, and outdoor spaces used for learning and physical education.



Appendix D.11: Prototype lesson 1

Child evaluation form

The evaluation forms with the children who did the lesson had the following questions. In Figure D3 you see the translated version in bahasa.

Child feedback form – lesson 1

Please give some honest feedback about how you experienced this lesson.

How to answer:

1 = not at all · 5 = very much

Reflective

I had enough quiet time to think during this lesson.

1 2 3 4 5

The quiet moment helped me understand my own thoughts better.

1 2 3 4 5

I liked having time to draw or write for myself.

1 2 3 4 5

Dialogical

I understood that the same place can be explained in different ways.

1 2 3 4 5

I felt comfortable listening to ideas that were different, but about the same topic.

1 2 3 4 5

I understood the science explanation about the sea.

1 2 3 4 5

Integrative

I understood the story about the sea from Sasak culture.

1 2 3 4 5

I could connect the science, the story, and what I noticed myself.

1 2 3 4 5

Balanced

The lesson felt calm.

1 2 3 4 5

Each part of the lesson had enough time.

1 2 3 4 5

Today I thought about:

(Choose all that feel true for you)

How science explains things in nature

(Integrative)

How sasak explains things in nature

(Integrative)

My own thoughts and feelings while being in nature (Reflective)

That different ideas about nature can exist together (Dialogical)

That the lesson was easy to follow (Balanced)


Tolong berikan pendapat jujur tentang bagaimana kamu mengalami pelajaran ini.

Cara menjawab:
1 = tidak sama sekali - 5 = sangat

	tidak sama sekali	1	2	3	4	5	sangat
Saya memiliki cukup waktu tenang untuk berpikir selama pelajaran ini.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Momen tenang membantu saya lebih memahami pikiran saya sendiri.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya senang memiliki waktu untuk menggambar atau menulis untuk diri saya sendiri.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya memahami bahwa tempat yang sama bisa dijelaskan dengan cara yang berbeda.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya merasa nyaman mendengarkan ide-ide yang berbeda, tetapi tentang topik yang sama.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya memahami penjelasan ilmiah tentang laut.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya memahami cerita tentang laut dari budaya Sasak.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya bisa menghubungkan ilmu pengetahuan, cerita, dan apa yang saya amati sendiri.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Pelajaran ini terasa tenang.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Setiap bagian dari pelajaran memiliki waktu yang cukup.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Hari ini saya memikirkan tentang:
(Pilih semua yang terasa benar bagi kamu)

Bagaimana ilmu pengetahuan menjelaskan hal-hal di alam
 Bagaimana budaya Sasak menjelaskan hal-hal di alam
 Pikiran dan perasaan saya sendiri saat berada di alam
 Bahwa berbagai ide tentang alam bisa ada bersama
 Bahwa pelajaran ini mudah untuk diikuti

Terima kasih 

1

Figure D3: Evaluation form for kids lesson 1

Teachers evaluation form

Teacher feedback form – lesson 1

Pillar: Nature as sacred

How to answer

1 = not at all · 5 = very much

There are no right or wrong answers.h

Reflective

The lesson created sufficient space for quiet, individual reflection.

1 2 3 4 5

Children engaged meaningfully with the silent reflection moment (drawing or writing).

1 2 3 4 5

The reflective component felt appropriate for this age group.

1 2 3 4 5

Dialogical

To what extent did children show openness to different perspectives during the lesson?

1 2 3 4 5

Children were able to listen to different explanations without rejecting one as wrong.

1 2 3 4 5

Integrative

The scientific and cultural elements felt clearly connected within the lesson.

1 2 3 4 5

The lesson enabled children to relate scientific, cultural, and personal perspectives on the same place.

1 2 3 4 5

Balanced

The time distribution between science, storytelling, and reflection felt appropriate.

1 2 3 4 5

No single part of the lesson dominated the session.

1 2 3 4 5

The overall structure of the lesson felt calm and manageable.

1 2 3 4 5

The lesson could be realistically integrated into the school context.

1 2 3 4 5

What moments in the lesson worked particularly well?

.....

Where did children seem confused or disengaged?

.....

To what extent did children demonstrate understanding of different perspectives during the lesson?

.....

What adaptations would you suggest for future iterations?

.....

This lesson felt relevant to the local context.

1 2 3 4 5

I could imagine adapting this lesson to another natural environment near the school.

1 2 3 4 5

Do you think this lesson could be repeated or adapted for other local matters?

Yes Maybe No

Why or why not?

.....

Results - Child evaluation forms.

1 = not at all · 5 = very much

Reflective

I had enough quiet time to think during this lesson.	<i>Mean</i> 3,54
The quiet moment helped me understand my own thoughts better.	3,14
I liked having time to draw or write for myself.	3,82
Reflective score	3,5

Dialogical

I understood that the same place can be explained in different ways.	3,14
I felt comfortable listening to ideas that were different, but about the same topic.	3,46
I understood the science explanation about the sea.	3,86
Dialogical score	3,5

Integrative

I understood the story about the sea from Sasak culture.	3,93
I could connect the science, the story, and what I noticed myself.	3,43
Integrative score	3,7

Balanced

The lesson felt calm.	4
Each part of the lesson had enough time.	3,75
Balanced score	3,9

78,6% of students indicated that they thought about: How science explains things in nature
(**Integrative**)

53,6% of students indicated that they thought about: How sasak explains things in nature
(**Integrative**)

71,4% of students indicated that they thought about: My own thoughts and feelings while being in nature (**Reflective**)

53,6% of students indicated that they thought about: That different ideas about nature can exist together (**Dialogical**)

67,9% of students indicated that they thought about: That the lesson was easy to follow (**Balanced**)

Results - Teacher evaluation forms.

1 = not at all · 5 = very much

	<i>Mean</i>
Reflective	
The lesson created sufficient space for quiet, individual reflection.	4
Children engaged meaningfully with the silent	4
The reflective component felt appropriate for this age group.	4
Reflective score	4
Dialogical	
To what extent did children show openness to different perspectives during the lesson?	4,33
Children were able to listen to different explanations without rejecting one as wrong.	4
Dialogical score	4,2
Integrative	
The scientific and cultural elements felt clearly connected within the lesson.	4
The lesson enabled children to relate scientific, cultural, and personal perspectives on the same place.	4,33
Integrative score	4,2
Balanced	
The time distribution between science, storytelling, and reflection felt appropriate.	4
No single part of the lesson dominated the session.	3,33
The overall structure of the lesson felt calm and manageable.	4,3
Balanced score	3,9
The lesson could be realistically integrated into the school context.	4
This lesson felt relevant to the local context.	4,7
I could imagine adapting this lesson to another natural environment near the school.	4,3
Do you think this lesson could be repeated or adapted for other local matters?	3/3 yes

What worked well in this lesson?

Everything is well, because the students can learn a new things ,new knowledge especially about Nature

Student can understand how nature works, and they have so many questions about that

Yes, the lesson worked well

Where there moments when the children seemed confused or disengaged?

No moment, because all the student is interested to learn

No moment, the student seems so excited

When they trying to look for what is the meaning, and when they make the ideas on what they got from the teacher

To what extent did children demonstrate understanding of different perspectives during the lesson?

The could demonstrate their understanding Cleary

The children could demonstrate their understanding of different of their perspective

When they should deliver their ideas in the secret book, it helped the student to think about nature environment

Would you adapt anything if you were to teach this lesson again?

Yes i would

Yes i would

I will introduce more about how nature works to the students and deepen their knowledge about nature and environment

Do you think this lesson could be repeated or adapted for other local matters?

Yes, because this lesson is so interesting to developed

Yes, Because it related to our nature

Yes, Because this really increases students' insights in knowing the conditions around them and how to handle them

Classroom observations

The lesson on the first pillar was conducted at the beach, which added experiential value by situating the activities within a natural environment. However, moving the group to the location and finding sufficient shaded space required considerable time. Recent storms had also resulted in large amounts of waste on the beach, creating additional practical challenges.

During the storytelling phase, the children showed strong curiosity toward the scientific explanation and asked many follow-up questions. In contrast, the story of Princess Putri Mandalika was already familiar to most children and therefore generated less discussion, despite an enthusiastic initial response.

In the reflection activity, different engagement styles became visible. The girls worked individually and with focused attention, while the boys more often worked in small groups. Children chose varied forms of expression, including drawing, writing, or a combination of both, indicating that the open-ended reflection successfully supported personal expression.

A practical limitation emerged during the writing activity, as the reflection booklets required a firm surface in order to write or draw, which was difficult to find in the beach setting. This caused minor interruptions and highlighted the need to adapt materials for outdoor lesson contexts.

Interview findings

What worked well

- High student engagement and enthusiasm.
- Learning in a real-life context (the beach) strengthened understanding of natural phenomena.
- Storytelling stimulated curiosity and follow-up questions.
- Students continued asking questions after the lesson.

Critical reflection

- Significant distraction due to the outdoor environment.
- Limited attention span remained a challenge.
- Classroom management was more demanding than in regular lessons.

Improvement points

- Clearer behavioral agreements before outdoor activities.
- Shorter instruction blocks (5 minutes) followed by active tasks can help sustain engagement.

Prototype lesson 2

Child evaluation form

The evaluation forms with the children who did the lesson had the following questions. In Figure D4 you see the translated version in bahasa.

Child feedback form – lesson 2

Please give some honest feedback about how you experienced this lesson.

How to answer:

1 = not at all · 5 = very much

Accessible

I understood the problem we were working on.

1 2 3 4 5

The problem felt close to my own environment.

1 2 3 4 5

The materials on the table helped me think and explain my ideas.

1 2 3 4 5

Enabling

I felt that I could share my ideas.

1 2 3 4 5

I felt like my ideas mattered.

1 2 3 4 5

I felt like I could help think about my community.

1 2 3 4 5

Smooth

The lesson structure felt calm and clear.

1 2 3 4 5

I knew what we needed to do during each step of the lesson.

1 2 3 4 5

Inviting

Working in a small group helped me join in.

1 2 3 4 5

I felt comfortable talking in my group.

1 2 3 4 5

Today I thought about:

(Choose all that feel true for you)

A real problem in my own environment

(Accessible)

How I can work together on local issues

(Inviting)

That my ideas can contribute to my community

(Enabling)

That the lesson was easy to follow (Smooth)


Tolong berikan pendapat jujur tentang bagaimana kamu mengalami pelajaran ini.

Cara menjawab:
1 = tidak sama sekali - 5 = sangat

	tidak sama sekali	1	2	3	4	5	sangat
Saya mengerti masalah yang sedang kami bahas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Masalah ini terasa dekat dengan lingkungan saya sendiri.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Bahan-bahan di atas meja membantu saya berpikir dan menjelaskan ide saya.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya merasa bisa membagikan ide saya.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya merasa ide saya penting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya merasa bisa ikut memikirkan tentang komunitas saya.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Struktur pelajaran terasa tenang dan jelas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya tahu apa yang harus kami lakukan di setiap bagian pelajaran.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Bekerja dalam kelompok kecil membantu saya ikut berpartisipasi.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Saya merasa nyaman berbicara di dalam kelompok saya.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Hari ini saya memikirkan tentang:
(Pilih semua yang terasa benar bagi kamu)

Masalah nyata di lingkungan saya sendiri
 Bagaimana saya bisa bekerja sama untuk masalah di sekitar saya
 Bahwa ide-ide saya bisa berkontribusi untuk komunitas saya
 Bahwa pelajaran ini mudah untuk diikuti

Terima kasih 

2

Figure D4: Evaluation form for kids lesson 2

Teachers evaluation form

Teacher feedback form – lesson 2
 Pillar 2: nature as a interdepent system
 How to answer
 1 = not at all · 5 = very much
 There are no right or wrong answers.

Accessible

The problem statement was easy for children to understand.

1 2 3 4 5

The problem felt relevant to the children's local environment.

1 2 3 4 5

The materials (paper, markers, stickers) supported idea generation and explanation.

1 2 3 4 5

Enabling

Children felt encouraged to share their ideas.

1 2 3 4 5

Children experienced that their ideas were taken seriously.

1 2 3 4 5

Children showed a sense of agency in thinking about their community.

1 2 3 4 5

Smooth

The lesson structure was clear and easy to follow.

1 2 3 4 5

Transitions between lesson phases felt natural.

1 2 3 4 5

Time allocation per phase felt appropriate.

1 2 3 4 5

Inviting

Working in small groups supported active participation.

1 2 3 4 5

The classroom atmosphere felt open and safe for sharing ideas.

1 2 3 4 5

Children who are usually quieter were able to participate.

1 2 3 4 5

The lesson could be realistically integrated into the school context.

1 2 3 4 5

What moments in the lesson worked particularly well?

.....

Where did children seem confused or disengaged?

.....

To what extent did children demonstrate understanding of different perspectives during the lesson?

.....

What adaptations would you suggest for future iterations?

.....

This lesson felt relevant to the local context.

1 2 3 4 5

I could imagine adapting this lesson to another natural environment near the school.

1 2 3 4 5

Do you think this lesson could be repeated or adapted for other local matters?

Yes Maybe No

Why or why not?

.....

Results - Child evaluation forms.

1 = not at all · 5 = very much

Accessible

I understood the problem we were working on.	<i>Mean</i> 3,76
The problem felt close to my own environment.	3,71
The materials on the table helped me think and explain my ideas.	3,95
Accessible score	3,8

Enabling

I felt that I could share my ideas.	4,15
I felt like my ideas mattered.	4,09
I felt like I could help think about my community.	3,76
Enabling score	4,0

Smooth

The lesson structure felt calm and clear.	4,24
I knew what we needed to do during each step of the lesson.	3,9
Smooth score	4,1

Inviting

Working in a small group helped me join in.	4,05
I felt comfortable talking in my group.	3,9
Inviting score	4,0

66,7% of students indicated that they thought about: A real problem in my own environment
(**Accessible**)

47,6% of students indicated that they thought about: How I can work together on local issues
(**Inviting**)

80,9% of students indicated that they thought about: That my ideas can contribute to my community
(**Enabling**)

52,4% of students indicated that they thought about: That the lesson was easy to follow (**Smooth**)

Results - Teacher evaluation forms.

1 = not at all · 5 = very much

Accessible		<i>Mean</i>
The problem statement was easy for children to understand.		4,33
The problem felt relevant to the children's local environment.		4,67
The materials (paper, markers, stickers) supported idea generation and explanation.		5
	Accessible score	4,7
Enabling		
Children felt encouraged to share their ideas.		5
Children experienced that their ideas were taken seriously.		4,67
Children showed a sense of agency in thinking about their community.		5
	Enabling score	4,9
Smooth		
The lesson structure was clear and easy to follow.		4,67
Transitions between lesson phases felt natural.		5
Time allocation per phase felt appropriate.		5
	Smooth score	4,9
Inviting		
Working in small groups supported active participation.		5
The classroom atmosphere felt open and safe for sharing ideas.		5
Children who are usually quieter were able to participate.		4,67
	Inviting score	4,9
The lesson could be realistically integrated into the school context.		4,7
This lesson felt relevant to the local context.		4,7
I could imagine adapting this lesson to another natural environment near the school.		5
Do you think this lesson could be repeated or adapted for other local matters?		3/3 yes

What worked well in this lesson?

Everything is worked because the students was excited when they are learning

Yes

The correlation between the lesson with the environment was great and related

Where there moments when the children seemed confused or disengaged?

No moments

No moment, the children happy and enjoy the lesson

When they do the lesson and assignment

Did you observe moments where children showed ownership or engagement with the local issue?

Yes i did

Yes

Yes it is relateable

Would you adapt anything if you were to teach this lesson again?

Yes i would

Yes i would

Sure

Do you think this lesson could be repeated or adapted for other local issues?

Please, explain your answer.

yes, because the issue especially about plastic waste is so important ,and the students must know about how to overcome the issue

yes, because this lesson having related to our nature issue , especially about plastic waste

yes, this lesson giving so many information for the kids also for the teacher

Classroom observations

During the lesson on the second pillar, the children discussed the topic but initially appeared to have limited prior reflection on the subject, which made the discussion challenging. The teacher introduced a video to support the lesson content, which proved effective in clarifying the concept and re-engaging the group.

From my perspective as a non-teacher and observer, the lesson appeared relatively challenging to manage. The teacher asked the children to sit on the floor in small groups rather than arranging the tables together. This seating arrangement led to increased playfulness and distraction among the children, which required significant effort from the teacher to manage.

Despite this, the children clearly enjoyed the lesson, and the topic continued to resonate beyond the classroom. In the weeks following the lesson, children were observed discussing the subject more frequently, suggesting that the lesson successfully stimulated ongoing reflection.

The final presentations were well executed, and the teacher expressed satisfaction with this component, as one of the learning goals was to increase children's confidence in presenting, an area that had previously received limited attention in class.

Interview findings

What worked well

- Students generated diverse and original ideas.
- They understood the local plastic pollution problem.
- Presentations were delivered confidently.
- The lesson stimulated problem-solving and creative thinking.

Critical reflection

- The mind map format was not new; only the topic was new.
- Unclear whether all students engaged in deep reasoning or followed peers.

Improvement points

- Encourage stronger justification of ideas ("Why do you think this will work?").
- Add a structured reflection moment after presentations.

Prototype lesson 3

Child evaluation form

The evaluation forms with the children who did the lesson had the following questions. In Figure D5 you see the translated version in bahasa. Without the red text.

Child feedback form – lesson 3

Please give some honest feedback about how you experienced this lesson.

How to answer:

1 = not at all · 5 = very much

Instructive

I understood what was happening in the different situation cards.

1 2 3 4 5

I understood what the cards were asking me to think about.

1 2 3 4 5

Wise

The lesson helped me think calmly about what to do

1 2 3 4 5

I did not feel scared during this lesson.

1 2 3 4 5

Strategic

The map helped me think about where to go.

1 2 3 4 5

I thought about safe places like high ground, shelter, or meeting points.

1 2 3 4 5

Skilled

I learned how to react when nature changes.

1 2 3 4 5

I practiced staying calm and thinking clearly.

1 2 3 4 5

Seeing different situation cards helped me learn what to do.

1 2 3 4 5

Today I thought about:

(Choose all that feel true for you)

Where to go when nature changes

(Strategic)

What to do when nature changes

(Instructive)

How to stay calm in changing situations

(Wise)

That thinking about what to do helped me feel more prepared.

(Skilled)

Tolong berikan pendapat jujur tentang bagaimana kamu mengalami pelajaran ini.

Cara menjawab:
1 = tidak sama sekali · 5 = sangat

	1	2	3	4	5
Saya memahami apa yang terjadi dalam berbagai kartu situasi.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saya memahami apa yang diminta oleh kartu-kartu tersebut untuk saya pikirkan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pelajaran ini membantu saya berpikir dengan tenang tentang apa yang harus dilakukan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saya tidak merasa takut selama pelajaran ini.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rasa penasaran saya berkurang tentang isi materi ini.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saya memikirkan tempat-tempat aman seperti tempat yang lebih tinggi, tempat berlindung, atau titik berkumpul.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saya belajar bagaimana bersikap ketika alam berubah.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saya berlatih untuk tetap tenang dan berpikir dengan jelas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Melihat berbagai kartu situasi membantu saya belajar apa yang harus dilakukan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Mau isi saya menambahkan tentang:
SP3N (sebuah survei tentang belajar di kelas)

Bagaimana kelas yang lebih baik akan terlihat
 Apa saja hal yang dilakukan ketika alam berubah
 Bagaimana cara belajar tentang alam dengan cara yang berbeda
 Bagaimana cara belajar tentang alam dengan cara yang berbeda

Terima kasih 

Figure D5: Evaluation form for kids lesson 3

Teachers evaluation form

Teacher feedback form – lesson 3

Pillar: Nature as a uncontrollable

How to answer

1 = not at all · 5 = very much

There are no right or wrong answers.

Instructive

The situation cards were clear and understandable for the children.

1 2 3 4 5

Children understood what each situation asked them to think about or do.

1 2 3 4 5

The scenarios helped children recognise different types of natural change.

1 2 3 4 5

Wise

The lesson supported children in staying calm while discussing natural change.

1 2 3 4 5

Children were able to think calmly, even when situations suggested urgency.

1 2 3 4 5

Children did not show signs of fear or distress during the lesson.

1 2 3 4 5

Strategic

The island map helped children think about where to go in different situations.

1 2 3 4 5

Children discussed movement and positioning together before making choices.

1 2 3 4 5

Skilled

Repeated scenarios helped children develop skills that support preparedness for natural change.

1 2 3 4 5

Children became more confident in deciding what to do across different scenarios.

1 2 3 4 5

The lesson could be realistically integrated into the school context.

1 2 3 4 5

Which moments in the lesson worked particularly well?

.....

Where did children seem confused or disengaged?

.....

Did any moments cause tension or anxiety? If so, please describe.

.....

Would you adapt anything if you were to teach this lesson again?

.....

This lesson addressed topics that are relevant to the local context.

1 2 3 4 5

This lesson helped children feel prepped when natural changes arise.

1 2 3 4 5

Do you think this lesson could be repeated or adapted for other local issues?

Yes Maybe No

Why?

.....

Results - Child evaluation forms.

1 = not at all · 5 = very much

Instructive

I understood what was happening in the different situation cards.

Mean
4,03

I understood what the cards were asking me to think about.

3,69

Instructive score**3,8****Wise**

The lesson helped me think calmly about what to do

3,93

I did not feel scared during this lesson.

3,52

Wise score**4,0****Strategic**

The map helped me think about where to go.

4,0

I thought about safe places like high ground, shelter, or meeting points.

4,03

Strategic score**4,0****Skilled**

I learned how to react when nature changes.

3,66

I practiced staying calm and thinking clearly.

3,79

Seeing different situation cards helped me learn what to do.

3,79

Skilled score**4,0****79,2%** of students indicated that they thought about: Where to go when nature changes (**Strategic**)**75%** of students indicated that they thought about: What to do when nature changes (**Instructive**)**75%** of students indicated that they thought about: How to stay calm in changing situations (**Wise**)**62,5%** of students indicated that they thought about: That thinking about what to do helped me feel more prepared. (**Skilled**)

Results - Teacher evaluation forms.

1 = not at all · 5 = very much

	Mean
Instructive	
The situation cards were clear and understandable for the children.	4,5
Children understood what each situation asked them to think about or do.	4,5
The scenarios helped children recognise different types of natural change.	4,5
Instructive score	4,5
Wise	
The lesson supported children in staying calm while discussing natural change.	4,5
Children were able to think calmly, even when situations suggested urgency.	5
Children did not show signs of fear or distress during the lesson.	4,5
Wise score	4,7
Strategic	
The island map helped children think about where to go in different situations.	5,0
Children discussed movement and positioning together before making choices.	4,5
Strategic score	4,8
Skilled	
Repeated scenarios helped children develop skills that support preparedness for natural change.	4,5
Children became more confident in deciding what to do across different scenarios.	4,5
Skilled score	4,5
The lesson could be realistically integrated into the school context.	4,5
This lesson addressed topics that are relevant to the local context.	5
This lesson helped children feel prepped when natural changes arrive.	5
Do you think this lesson could be repeated or adapted for other local issues? <input type="checkbox"/> Yes <input type="checkbox"/> Maybe <input type="checkbox"/> No	2/2 yes

What worked well in this lesson?

They enjoyed the lesson was talked and got so much information about nature

They know what they Will do if there is something urgent happen.

Where there moments when the children seemed confused or disengaged?

No moments, because they are so interested to learn this lesson.

The moments when we explained about how disaster come out and to Look for the Nice place and safe.

Did you observe moments where children showed ownership or engagement with the local issue?

No moments, the students looks happy.

No, nothing

Would you adapt anything if you were to teach this lesson again?

Yes i would

The media was good and interactive

Do you think this lesson could be repeated or adapted for other local issues?

Please, explain your answer.

Because this lesson is very useful and related to the real situation

It motivated me as a teacher to make some medias that purposes to make it easier for the kids to understand about the lesson or nature.

Classroom observations

The lesson on the third pillar generated high levels of enthusiasm among the children from the start. During the design phase, a key concern was that the topic might evoke fear; however, this was not reflected in practice. Throughout the lesson, the children appeared confident and curious rather than anxious, and the framing of the content as a game clearly contributed to their engagement.

The learning activity based on mapping concepts appeared to work effectively, supporting understanding through visual organisation.

All children took the flyers home with them, although it was not possible to observe how these materials were used outside the classroom context.

The teacher required minimal preparation and read the instruction cards during the lesson itself, which did not negatively affect the flow of the session. The lesson was completed more quickly than anticipated, suggesting that additional content or an extension activity could be considered in future iterations.

Interview findings

What worked well

- Maps and scenario cards supported practical understanding.
- Students discussed and supported each other.
- The topic felt realistic and relevant (local disaster context).

Critical reflection

- Frequent distractions during group work.
- Attention lasted only short periods.
- Required continuous teacher intervention to maintain focus.

Improvement points

- Shorter, clearly timed tasks.
- Assign roles within groups to increase accountability.

Prototype lesson 4

Child evaluation form

The evaluation forms with the children who did the lesson had the following questions. In Figure D6 you see the translated version in bahasa.

Child feedback form – lesson 4

Please give some honest feedback about how you experienced this lesson.

How to answer:

1 = not at all · 5 = very much

Deliberate

I felt calm during this lesson.

1 2 3 4 5

I had enough time to think before choosing.

1 2 3 4 5

I felt comfortable in the flow of the lessons.

1 2 3 4 5

Wise

I thought about what happens now and later.

1 2 3 4 5

Listening to the future helped me think more carefully.

1 2 3 4 5

Ethical

I listened to different points of view.

1 2 3 4 5

I noticed that every choice has good and difficult sides.

1 2 3 4 5

Skilled

I could explain why I chose option A or B.

1 2 3 4 5

The worksheet helped me think clearly about my choice.

1 2 3 4 5

Today I thought about:

(Choose all that feel true for you)

- How this choice helps people now (Ethical)
- How this choice helps nature (Ethical)
- How this choice affects the future (Wise)
- That thinking slowly can help (Deliberate)
- Thinking step by step helped me make a better choice (Skilled)

Figure D6: Evaluation form for kids lesson 4

Teachers evaluation form

Teacher feedback form

Lesson 4: Choosing with care

Pillar 4: Nature as to be controlled

How to answer

1 = not at all · 5 = very much

There are no right or wrong answers.

Deliberate

The children had enough time to think before making choices.

1 2 3 4 5

The lesson supported deliberate thinking (slowing down, considering options).

1 2 3 4 5

The flow of the lesson felt clear and manageable for this age group.

1 2 3 4 5

Wise

The children understood that choices can have both positive and negative effects.

1 2 3 4 5

The children showed awareness of short-term and long-term consequences.

1 2 3 4 5

The lesson supported wise decision-making (balancing people, nature, and future).

1 2 3 4 5

Ethical

The lesson supported ethical awareness

1 2 3 4 5

Children showed awareness that choices affect others and the environment.

1 2 3 4 5

Children engaged with different perspectives during the lesson.

1 2 3 4 5

Skilled

The lesson supported skill development (listening, reasoning, explaining choices)

1 2 3 4 5

Children were able to explain their choice during discussion.

1 2 3 4 5

The worksheet helped structure reflection and discussion.

1 2 3 4 5

The lesson could be realistically integrated into the school context.

1 2 3 4 5

What worked well in this lesson?

.....

Where did children seem confused or disengaged?

.....

Did any moments cause tension or anxiety? If so, please describe.

.....

Would you adapt anything if you were to teach this lesson again?

.....

This lesson addressed topics that are relevant to the local context.

1 2 3 4 5

This lesson helped children feel prepped when natural changes arise.

1 2 3 4 5

Do you think this lesson could be repeated or adapted for other local issues?

Yes Maybe No

Why or why not?

.....

Results - Child evaluation forms.

1 = not at all · 5 = very much

Deliberate

I felt calm during this lesson.

Mean
4,26

I had enough time to think before choosing.

4,26

I felt comfortable in the flow of the lessons.

4,33

Deliberate score **4,3****Wise**

I thought about what happens now and later.

4,15

Listening to the future helped me think more carefully.

4,4

Wise score **4,3****Ethical**

I listened to different points of view.

3,85

I noticed that every choice has good and difficult sides.

4,22

Ethical score **4,0****Skilled**

I could explain why I chose option A or B.

3,89

The worksheet helped me think clearly about my choice.

4,59

Skilled score **4,2****74,1%** of students indicated that they thought about: How this choice helps people now (Ethical)**74,1%** of students indicated that they thought about: How this choice helps nature (Ethical)**77,8%** of students indicated that they thought about: How this choice affects the future (Wise)**70,4%** of students indicated that they thought about: That thinking slowly can help (Deliberate)**77,8%** of students indicated that they thought about: Thinking step by step helped me make a better choice (Skilled)

Results - Teacher evaluation forms.

1 = not at all · 5 = very much

Deliberate

	<i>Mean</i>
The children had enough time to think before making choices.	4
The lesson supported deliberate thinking (slowing down, considering options).	4,5
The flow of the lesson felt clear and manageable for this age group.	4,5
Deliberate score	4,3

Wise

The children understood that choices can have both positive and negative effects.	5
The children showed awareness of short-term and long-term consequences.	5
The lesson supported wise decision-making (balancing people, nature, and future).	5
Wise score	5

Ethical

The lesson supported ethical awareness	4,5
Children showed awareness that choices affect others and the environment.	4,5
Children engaged with different perspectives during the lesson.	5
Ethical score	4,7

Skilled

The lesson supported skill development (listening, reasoning, explaining choices)	5
Children were able to explain their choice during discussion.	4,5
The worksheet helped structure reflection and discussion.	5
Skilled score	4,8

The lesson could be realistically integrated into the school context. **5**

This lesson addressed topics that are relevant to the local context. **5**

This lesson helped children feel prepped when natural changes arrive. **5**

Do you think this lesson could be repeated or adapted for other local issues? **2/2 yes**
 Yes Maybe No

What worked well in this lesson?

Everything in this lesson is worked

When the student should deliver their ideas and argumentation on the worksheet

Where there moments when the children seemed confused or disengaged?

No moments, because they look so happy

No I believe the class was good and the students feel excited during the lesson.

Did you observe moments where children showed ownership or engagement with the local issue?

yes, kids will always have the moment when they feel unsure about their opinion. But as a teacher we should make sure the student always confident with their opinion and answers.

yes

Would you adapt anything if you were to teach this lesson again?

No changes

no

Do you think this lesson could be repeated or adapted for other local issues?
Please, explain your answer.

this really increases students specially for this p3 students, knowing about how nature works, such as the difference of using pesticides and natural method to produce rice it may help them to giving some of their ideas about that. That was a great experience.

I think this lesson is very interested and important to learn.

Classroom observations

The lesson on the fourth pillar was delivered using the smartboard, which generated high levels of excitement among the children. As the smartboard was recently introduced from the government to the school, the novelty of the technology contributed to strong engagement and active participation.

Although a recorded narration was prepared for the lesson, allowing the children to read the content aloud proved more effective. This approach increased engagement and aligned well with the group's existing learning goals related to reading and verbal participation.

The evaluation forms were completed calmly and with focus. Children were able to clearly articulate and justify their choices. Most children selected the natural approach, while a smaller number chose alternative options and were equally able to explain their reasoning. This indicated a well-considered decision-making process rather than uniform or unreflective responses.

Interview findings

What worked well

- The website had strong educational impact.
- Students demonstrated critical thinking.
- Some students independently defended the use of pesticides for economic reasons, while the majority of students tended to advocate for natural methods. Showing individual and critical thinking
- Students considered long-term consequences (health, future generations).
- Worksheets effectively supported structured thinking.
- Working with the website was perceived as useful, and the teacher expressed interest in incorporating more lessons structured in a similar way.

Critical reflection

- Most students chose the "healthy" option, possibly influenced by social desirability.
- The information in the lesson, is a bit steering into the natural method

Improvement points

- Introduce structured debate formats.


APPENDIX


E

RESPONDING TO:
CONCLUSION

6

The original project brief, as it was approved at the start of the project.





IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20%;">Family name</td><td>van der Klauw</td></tr> <tr><td>Initials</td><td>I.S.</td></tr> <tr><td>Given name</td><td>Iza</td></tr> <tr><td>Student number</td><td>5088003</td></tr> </table>	Family name	van der Klauw	Initials	I.S.	Given name	Iza	Student number	5088003	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">IDE master(s)</td> <td>IPD <input type="checkbox"/></td> <td>Dfi <input checked="" type="checkbox"/></td> <td>SPD <input type="checkbox"/></td> </tr> <tr><td>2nd non-IDE master</td><td colspan="3"><input type="text"/></td></tr> <tr><td>Individual programme (date of approval)</td><td colspan="3"><input type="text"/></td></tr> <tr><td>Medisign</td><td colspan="3"><input type="checkbox"/></td></tr> <tr><td>HPM</td><td colspan="3"><input type="checkbox"/></td></tr> </table>	IDE master(s)	IPD <input type="checkbox"/>	Dfi <input checked="" type="checkbox"/>	SPD <input type="checkbox"/>	2 nd non-IDE master	<input type="text"/>			Individual programme (date of approval)	<input type="text"/>			Medisign	<input type="checkbox"/>			HPM	<input type="checkbox"/>		
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Medisign	<input type="checkbox"/>																												
HPM	<input type="checkbox"/>																												

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	Matthijs van Dijk	dept./section	HCD (DA)	<p>! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.</p> <p>! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.</p> <p>! 2nd mentor only applies when a client is involved.</p>
mentor	Natassia Jacobs	dept./section	HCD	
2 nd mentor	<input type="text"/>			
client:	Indonesia Biru Foundation			
city:	Lombok	country:	Indonesia	
optional comments	Matthijs van Dijk (chair): vanwege zijn expertise rondom de VIP-methode en het ontwerpen van transitie naar de toekomst. Natassia Jacobs (mentor): omdat zij veel kennis heeft van biomimicry, wat ik graag in mijn afstuderen wil toepassen.			

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)



Name	Prof. Ir. M.B. van Dijk	Date	9 Sep 2025	Signature	<input type="text"/>
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CHECK ON STUDY PROGRESS

To be filled in by SSC E&SA (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total EC

Of which, taking conditional requirements into account, can be part of the exam programme EC

<input type="checkbox"/>	YES	all 1 st year master courses passed
<input checked="" type="checkbox"/>	NO	missing 1 st year courses

Comments:

IDEM1103 - Research to/for/through Design

Sign for approval (SSC E&SA)

K. Veldman
Digitally signed by K. Veldman
Date: 2025.09.25
16:55:48 +02'00'

Name

Date

Signature

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	<input checked="" type="checkbox"/>	Supervisory Team approved
NO	<input type="checkbox"/>	Supervisory Team not approved

Comments:

Based on study progress, students is ...

<input checked="" type="checkbox"/>	ALLOWED to start the graduation project
<input type="checkbox"/>	NOT allowed to start the graduation project

Comments:

Research missing

Sign for approval (BoEx)

Paul Mommers
Digitally signed by Paul Mommers
Date: 2025.09.26
10:02:20 +02'00'

Name

Date

Signature



Personal Project Brief – IDE Master Graduation Project

Name student Iza van der Klauw

Student number 5,088,003

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Designing Coral Futures: Co-creating Ecological and Social Interventions in Lombok

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Coral reefs in Lombok are ecologically vital and socially entangled systems, currently under severe threat from a mix of global and local factors. Ecologically, coral die-offs accelerate climate breakdown and thereby destroy marine biodiversity. Socially, the causes of degradation are interlinked with waste management, destructive fishing, global warming, tourism, and a lack of awareness.

The Indonesia Biru Foundation operates at the intersection of marine restoration and community development in coastal Lombok. Their work offers an anchor point for this project, which seeks to explore how design can contribute to the regeneration of coral reefs not just as natural systems, but as social ecosystems as well.

Key stakeholders will likely include local communities, fishermen, tourists, and governmental actors. More will emerge during the research phase. Their challenges range from economic dependency on harmful practices to limited understanding of coral's ecological role. Design can open up new futures: from temporary physical interventions that help coral survive extreme heat, to participatory approaches that build long-term social resilience. Co-design, education, and awareness will play a central role. This project will investigate what exists, what works, and what future paths are imaginable through an iterative, participatory design process.

→ space available for images / figures on next page

introduction (continued): space for images



image / figure 1 Dying coral reefs



Restoration and Research

Through research & method development, our team aims to maximise our overall impact to the reef. Discovering the most effective ways to restore coral reefs and other marine habitats will ensure the long term sustainability of our restoration projects.



Local Community Engagement

We don't just value local community involvement in our restoration efforts but think it's crucial in the adoption of sustainable practice community wide. Preserving Lombok's marine habitat is both economically and environmentally advantageous.



Education

The plight of marine ecosystems is largely unseen by the public and education is a key antidote to this epidemic of unawareness. IBF works in schools and universities to address this, helped by our on shore coral labs providing an important window into the underwater world.

image / figure 2 IBF's Mission; Restoration and Research, Local Community Engagement, Education



Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.

(max 200 words)

Coral reefs in Lombok are dying. While the causes seem ecological, such as warming seas, acidification, pollution, the roots are deeply human and systemic. The decline is driven by large-scale issues like industrial waste flows, unsustainable fishing practices (both local and commercial), unregulated tourism, and a lack of effective policy. This loss diminishes marine biodiversity and reduces the ocean's ability to absorb CO₂, thereby worsening global climate change.

Yet underlying these factors is a more fundamental challenge: a disconnection between people and the marine environment, which often stems from economic pressures or systemic constraints rather than a lack of will. The challenge is not just to restore coral, but to reimagine how all stakeholders, from local communities to global industry and policymakers, relate to the reef. This project investigates how design can engage with these layered, interconnected issues. The design challenge is therefore not just environmental but behavioral, systemic, and cultural. What prevents positive change is not one actor, but a web of habits, incentives, and blind spots. This is the complex space this project seeks to explore.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for.

Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence)

As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Investigate and co-create a Vision in Product (ViP) roadmap, supported by a tangible set of future interventions (such as products, services, or policies) to foster a symbiotic relationship between local stakeholders and the coral reef ecosystem in Lombok.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

The project will begin in the Netherlands with literature research, stakeholder mapping, and initial expert interviews. This phase will also focus on preparing for design in different cultural contexts: planning co-design sessions, and studying local culture and policies. Deconstruction and context mapping will be used to investigate current relationships with the reef and define the core problem space.

From October to January, fieldwork in Lombok will include participatory observation, interviews, co-design workshops, and prototype testing. Using a ViP (Vision in Product design) framework, I will co-create a shared vision of the future with local stakeholders. This vision will guide the identification of opportunities for intervention, further developed through methods such as biomimicry and context mapping.

Insights from the context and continuous feedback loops will shape an iterative and responsive pro

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting, mid-term evaluation meeting, green light meeting and graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	8 sept 2025
Mid-term evaluation	7 nov 2025
Green light meeting	16 jan 2026
Graduation ceremony	13 feb 2026

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	
For how many project weeks	20
Number of project days per week	5,0

Comments:
I did an extra week for settling there, because of the jetlag and moving places.

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.

(200 words max)

This project merges my fascination for the underwater world with my passion for complex, real-world design challenges. I'm deeply motivated to contribute to a topic that matters, ecologically and socially, through a design lens.

I've never designed in a non-Western, intercultural setting before. Living and working in Lombok offers the opportunity to learn deeply from a different context and reflect on my role as a Dutch designer. I want to avoid the extractive trap of 'flying in and out'; instead, I aim for presence and shared ownership. This is one of my key learning objectives: understanding how to navigate cultural differences and language barriers in order to co-design meaningfully and respectfully in a local community.

Key personal ambitions:

- Reflect critically on my position and ethical responsibility as a designer.
- Facilitate co-design in a rural, intercultural setting.
- Bridge theory and practice in social and sustainable design
- Explore more-than-human design and ecosystemic thinking.
- Learn and apply biomimicry and VIP methods in depth.