Resilience Living Lab

A COMPREHENSIVE STUDY ON COMMUNITY DEMOGRAPHIC, POST-DISASTER NEEDS, RISK AND RESILIENCE ASSESSMENT AND PROGRAMME FEASIBILITY

mercy MALAYSIA

CONTENTS

ABOUT THIS REPORT

This report was prepared by MERCY Malaysia in collaboration with Wani Hamzah, Alicia Lee, and Fatihah Junaidi. This report is funded by Yayasan Hasanah.

EXECUTIVE SUMMARY

The Resilience Living Lab Hulu Langat study presents a comprehensive, evidence based assessment of community demographics, post disaster needs, risk exposure, and resilience capacities across six flood and landslide prone localities in Hulu Langat. Conducted by MERCY Malaysia in collaboration with Yayasan Hasanah, the study integrates quantitative and qualitative methodologies to inform the design and technical implementation of a long term, community centred Resilience Living Lab model. The findings highlight critical gaps in current resilience initiatives, structural vulnerabilities affecting both Orang Kampung and Orang Asli communities, and the need for integrated, participatory, and ecosystem based interventions.

The study was undertaken in response to persistent challenges following the 2021–2022 flood disaster, which exposed systemic weaknesses in disaster preparedness, risk governance, and community inclusion. Despite multiple government and NGO led interventions, many initiatives remain top down, fragmented, and insufficiently aligned with the lived realities of local communities. This report therefore provides a consolidated analytical foundation to guide stakeholders in designing technically sound, socially inclusive, and environmentally sustainable resilience programmes.

Study Approach and Methodology

The study employed a sequential mixed methods design combining desk research, key informant interviews, focus group discussions (FGDs), and a structured survey involving 200 respondents. The methodology emphasised participatory engagement, with Community Research Assistants (RAs) recruited and trained to support culturally sensitive data collection, particularly among Orang Asli communities in Paya Lebar, Sungai Gabai, and Genting Peras.

Desk research incorporated national datasets, spatial planning documents, disaster records, and previous assessments to contextualise community level findings. Key informant interviews with Ketua Kampung and Department of Orang Asli Development (JAKOA) provided insights into local governance, risk perceptions, and community priorities. FGDs explored thematic areas including experiential learning facilities, community based activities, livelihood development, and nature based solutions (NbS). The survey quantified demographic patterns, socioeconomic conditions, disaster experiences, and resilience behaviours across the study areas. This triangulated approach ensured robust, multi dimensional insights that reflect both quantitative indicators and qualitative lived experiences.

Key Findings

1. Demographic and Socioeconomic Vulnerabilities

The respondent profile reveals a predominantly working age population, with women slightly over represented across most locations. Employment patterns differ significantly between Orang Kampung and Orang Asli communities. Orang Kampung respondents exhibit more diversified employment pathways, including private sector and public sector roles, while Orang Asli respondents are concentrated in self employment and unemployment, with minimal representation in formal sectors.

Educational disparities are pronounced. A substantial proportion of Orang Asli respondents reported no formal education or only primary schooling, compared to higher secondary and tertiary attainment among Orang Kampung households. These structural inequalities shape livelihood opportunities, disaster preparedness, and long term resilience.

2. Evolving Post Disaster Needs

Community needs have shifted since the immediate aftermath of the 2021–2022 floods. While early recovery focused on physical reconstruction, current challenges include:

- Livelihood instability and income insecurity
- Mental health and psychosocial stressors
- Gendered caregiving burdens
- Environmental degradation and land instability
- Limited access to safe water and sanitation in certain areas

These evolving needs require adaptive, context specific interventions that extend beyond infrastructure to address social, economic, and environmental dimensions of resilience.

3. Gaps in Community Participation and Institutional Coordination

Despite numerous resilience initiatives, many interventions remain externally driven, with limited community involvement in planning or decision making. Orang Asli communities, in particular, report insufficient engagement from implementing agencies and inconsistent coordination with JAKOA. This has contributed to low ownership, reduced sustainability, and interventions that do not fully reflect local priorities. The study underscores the need for stronger institutional collaboration between JAKOA, local authorities, NGOs, and community based organisations to ensure inclusive and culturally appropriate implementation.

4. Environmental and Physical Risk Factors

The Batu 18–21 corridor and adjacent Orang Asli settlements remain highly exposed to flooding, debris flows, and landslides. Land scars from the 2021 disaster, combined with ongoing land use pressures, inadequate drainage, and slope instability, heighten risk levels. Spatial analysis indicates that several settlements lie within or adjacent to designated flood prone zones, underscoring the urgency of integrated risk reduction measures.

5. Community Priorities and Thematic Insights

Across FGDs and interviews, four thematic priorities emerged:

- Experiential Learning Living Lab Facilities: Communities expressed interest in structured learning spaces that support disaster education, skills development, and other activities.

- Community Based Learning and Activities: There is strong demand for programmes that strengthen social cohesion, local knowledge, and community led preparedness.
- Livelihood Support and Development: Income diversification, eco tourism, and skills training were identified as essential for long term resilience.
- Nature Based Solutions (NbS): Communities recognise the value of ecosystem restoration, riverbank stabilisation, and forest rehabilitation as sustainable DRR strategies.

These themes form the backbone of the proposed Resilience Living Lab model.

Implications for Programme Design

The findings indicate that resilience in Hulu Langat cannot be achieved through isolated or short term interventions. Instead, a holistic, place based, and participatory approach is required. Key implications include:

- Integrating social, environmental, and economic dimensions into programme design
- Embedding community participation at all stages, from planning to monitoring
- Strengthening institutional coordination, particularly with JAKOA and local authorities
- Prioritising vulnerable groups, including Orang Asli households, low income families, women, and elderly residents
- Leveraging NbS as cost effective, sustainable risk reduction measures
- Developing scalable and replicable models through the Living Lab framework

Conclusion

This study provides a comprehensive analytical foundation for the Resilience Living Lab Hulu Langat, offering stakeholders clear direction for designing technically robust, community-centred resilience interventions. The findings underscore the need for integrated approaches that address structural vulnerabilities, evolving post-disaster needs, and persistent gaps in institutional coordination, particularly involving JAKOA and local authorities.

To strengthen long-term resilience, the study recommends embedding participatory processes across all programme stages, prioritising vulnerable groups including Orang Asli and low-income households, and adopting ecosystem-based solutions such as riverbank restoration and slope stabilisation. Enhancing livelihood diversification, expanding community-based learning, and establishing experiential Living Lab facilities are also critical to building local capacity and ownership.

Collectively, these insights and recommendations support the development of a scalable, adaptive, and inclusive model capable of guiding sustainable resilience programming in Hulu Langat and other disaster-prone regions.

PROBLEM STATEMENT

Despite numerous initiatives implemented in Hulu Langat by government agencies, NGOs, and private partners, few have fully addressed the needs and priorities of local communities, particularly Orang Asli settlements along the Sungai Lui and Sungai Gabai corridors. Many projects, including the Hulu Langat Flood Mitigation Project (Phase 2), the Zurich–MERCY Malaysia Flood Resilience Programme, and Eco-DRR NbS projects, have contributed to physical rehabilitation, risk reduction, and environmental conservation. However, these efforts often adopt top–down planning approaches with limited community participation and insufficient engagement of the Department of Orang Asli Development (JAKOA), the agency responsible for Orang Asli affairs.

As a result, affected and underserved communities frequently remain at the margins of resilience-building initiatives. For example, interventions such as flood infrastructure upgrades or urban greening projects have tended to concentrate on accessible areas, leaving out more remote villages including Orang Asli communities in Sungai Gabai and Paya Lebar, where vulnerabilities and exposure to hazards are highest. Community members are typically positioned as recipients rather than active collaborators in project design or implementation, which reduces their sense of belonging and ownership and undermines long-term sustainability.

Furthermore, the needs and conditions of communities have evolved since the 2021–2022 flood disaster. While immediate post-flood recovery focused on physical reconstruction and relief, current challenges are more complex, often encompassing livelihood recovery, mental health, gendered caregiving burdens, and local environmental degradation. These shifting priorities require context-specific strategies that combine social inclusion, capacity building, and ecosystem-based approaches to resilience.

In short, while many projects have been undertaken for communities, far fewer have been designed with them. Addressing resilience in Hulu Langat today demands a shift from isolated or short-term interventions toward participatory, place-based, and adaptive initiatives that integrate local knowledge, respect cultural contexts, and strengthen institutional collaboration including between JAKOA, local authorities, and community-based organisations.

Guided by the scope of work defined by MERCY Malaysia and aligned with the strategic priorities of Yayasan Hasanah, the study seeks to produce evidence-based findings, analytical insights, and actionable recommendations across (1) comprehensive assessment and development studies; (2) experiential learning living lab facilities; (3) community-driven activities and knowledge development; (4) livelihood enhancement and eco-tourism support; and (5) nature-based solutions (NbS) for disaster risk reduction.

Figure 1: 2021 flood, Hulu Langat.

Study Goals

1 Prepare a comprehensive study report consolidating findings, analyses, and recommendations to guide the design and implementation of the Resilience Living Lab Hulu Langat initiative.

2 Collect and analyse data on population structure, community profiles, and vulnerable groups within the target areas, alongside other relevant information, to support evidence-based programme and project planning by MERCY Malaysia and Yayasan Hasanah.

3 Train and engage community members throughout all stages of the study to foster empowerment, strengthen community ownership of the project, and ensure the sustainability of outcomes.

4 Build partnerships between stakeholders, community leaders, and other relevant agencies through participatory engagement processes that promote mutual learning and collaborative problem-solving.

5 Actively involve at-risk communities, Orang Asli communities, and low-income individuals and families regardless of gender, to ensure resilience-building efforts are inclusive and equitable.

Study Timeline

11 July 2025	Pre-study
13 August 2025	Physical kick-off
2nd week of August 2025	Desk research
3rd week of August 2025	Survey launch
26 August 2025	Interview with Ketua Kampung
2 September 2025	Meeting with community research assistants
3rd week of September 2025	Research assistants training
	Focus group discussion
2nd week of October 2025	Submission of Inception Report
November 2025	Validation of study outputs
December 2025	Submission of Final Report

Study Methodology

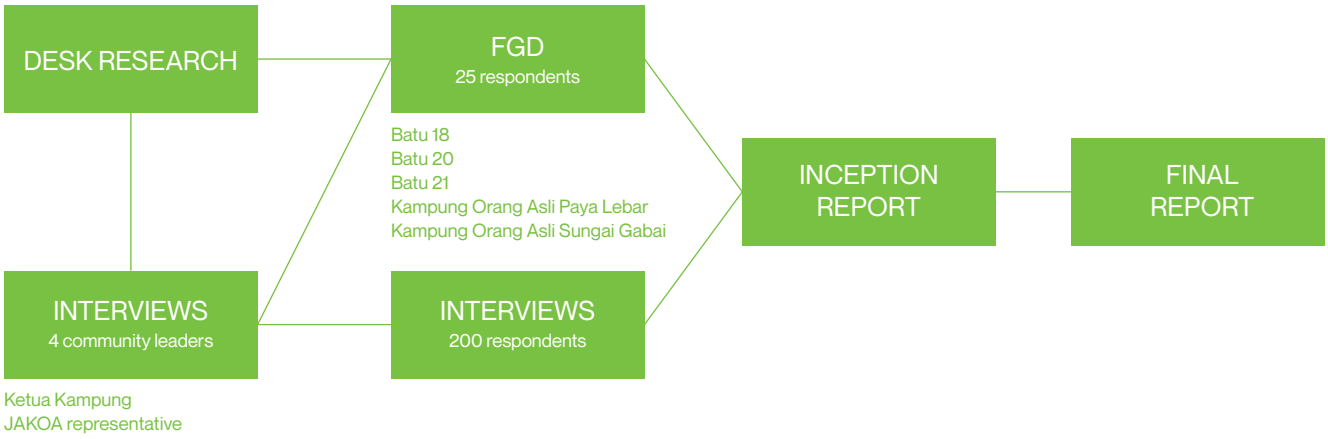


Figure 2: Study methodology.

This study employs a sequential mixed-methods design, integrating both qualitative and quantitative approaches to capture a holistic understanding of resilience and community experiences in Hulu Langat. The research design emphasises participatory methods, ensuring that community members were not only respondents but also active contributors throughout the process.

Community members played a role in participant recruitment and the dissemination of study information within their villages. Their involvement fostered trust, enhanced outreach to diverse groups, and ensured that data collection was carried out in a culturally sensitive and inclusive manner. To further strengthen community ownership and informed participation, local Community Research Assistants (RAs) were engaged and trained. Their involvement empowered them with research skills, facilitated greater transparency around local issues, and promoted dialogue that supported more informed decision-making at the village level.

The study adhered to strict ethical protocols: confidentiality was maintained across all stages, and informed consent was obtained from every participant. These measures ensured both the protection of participants and the integrity of the data collected.

The project focuses on communities frequently exposed to flooding and landslides, specifically targeting low-income individuals and families, at-risk communities, and Orang Asli communities. Participants were residents drawn from the following locations:

- Batu 18, Kampung Jawa
- Batu 20, Sungai Lui
- Batu 21, Sungai Lui
- Kampung Orang Asli Paya Lebar
- Kampung Orang Asli Sungai Gabai
- Kampung Orang Asli Genting Peras

Data Collection Tools and Process

The study utilised a combination of desk research, key informant interviews, focus group discussions (FGDs), and a survey to gather comprehensive data across multiple dimensions of community resilience, vulnerability, and local capacity. This multi-pronged approach allowed triangulation of findings and ensured that both quantitative indicators and qualitative insights were adequately captured.

Desk Research

To triangulate primary findings, the study incorporated an extensive desk review of past disaster event records, published research, and documentation from relevant institutional stakeholders. This process enabled the contextualisation of community-level experiences within broader regional and national policy and planning frameworks. Sources included policy and planning documents, disaster management reports, previous post-flood assessments (including MERCY Malaysia's 2021 PDNA), and national-level datasets from the Department of Statistics Malaysia (DOSM). All of these were utilised to derive demographic distributions, socioeconomic indicators, and household income data, which informed population estimates and facilitated the construction of an accurate sampling frame.

In parallel, spatial planning documents, particularly the Rancangan Tempatan of the Majlis Perbandaran Kajang (MPKj), were analysed to map designated flood-prone zones and settlement patterns, with emphasis on the Batu 18–21 corridor and proximate Orang Asli settlements. This phase provided the analytical foundation for identifying data gaps, refining research instruments, and aligning the study scope with ongoing Resilience Living Lab objectives.

Key Informant Interviews

To complement community-level data collection, a series of key informant interviews was conducted to gather in-depth perspectives from local leaders and institutional stakeholders. These interviews provided valuable contextual insights that informed the development of survey instruments, refined research tools, and supported the interpretation of field findings.

Three in-depth interviews were held with Ketua Kampung (Village Leaders) from Batu 18, Batu 20, and Batu 21 to capture community experiences during the 2021 floods, major affected areas, demographic changes, disaster risk reduction and resilience strategies, infrastructure challenges, waste management issues, land and tourism pressures, as well as community priorities for data collection. The Ketua Kampung interviewed were:

Ketua Kampung Batu 18	Mohammad Firdauz Bin Mohd Ayob
Ketua Kampung Batu 20	Mohd Ramdan bin Kamso
	Kamarulzaman bin Haji Abdullah
Ketua Kampung Batu 21	Mohd Razak Bin Jalaludin

In addition to providing key local knowledge, all Ketua Kampung provided recommendations on individuals and networks within Hulu Langat who are well-known within and trusted by the community. This facilitated the identification of RAs to support participant recruitment for the FGDs and to strengthen community engagement throughout the study[1].

An additional interview was conducted with a representative from JAKOA to gain insights into Orang Asli communities in Hulu Langat, particularly Kampung Orang Asli Paya Lebar and Kampung Orang Asli Sungai Gabai. The discussion explored issues related to education, economic participation, community involvement, the sociodemographic profile of Orang Asli households, and the specific impacts of the 2021–2022 flood on their livelihoods and well-being.

Focus Group Discussions (FGDs)

The FGDs were conducted to complement the quantitative survey by offering deeper insights and contextual understanding of the themes explored in this study. While the survey aimed to capture measured trends and patterns, the FGDs provided a more nuanced exploration of participants' lived experiences, perceptions, and concerns, particularly aspects that cannot be fully or adequately captured through structured questionnaires. Moreover, the FGDs served as an avenue to foster dialogue and strengthen relationships among key stakeholders including MERCY Malaysia, residents of targeted areas, Ketua Kampung, JAKOA representative and Tok Batin. All engagements and materials developed including RAs training and FGDs implementation were conducted in Malay to ensure participants' comfort.

Recruitment of Community Research Assistants (RAs)

RAs were recruited with support and recommendations from Ketua Kampung and networks identified during the key interviews. Priority was given to individuals who were trusted by the community and familiar with the study areas. Their local knowledge and relationships within the community were instrumental in ensuring culturally sensitive engagement, effective participant recruitment, and smooth facilitation of the FGDs.

FGD Training

The aforementioned RAs underwent a one-day training prior to data collection. The training included modules on facilitation techniques, gender awareness and sensitivity (e.g., recognising and being mindful of power dynamics both among participants and between RAs and participants), ensuring inclusivity, and adhering to ethical standards. The RAs were introduced to the overall purpose and expected outcomes of the FGDs, with an emphasis on their roles and how the discussions would complement survey findings while informing the broader study objectives. This preparation was critical in equipping the RAs with the skills to encourage open dialogue, handle sensitive topics with care, and capture participants' perspectives accurately.

[1] Refer to Appendix 1 for Research Assistant Criteria and Appendix 2 for Research Assistant Contract.

Preparation for FGD Sessions

Recruitment of FGD Participants

As RAs, they were tasked with the recruitment of FGD participants, given their familiarity with the targeted study areas and ability to engage directly with community members. Recruitment was guided by the following criteria:

- Malaysian citizens;
- Living particularly in the areas of Batu 18 Kampung Jawa, Batu 20 Kampung Sungai Lui, Batu 21 Kampung Sungai Lui, Kampung Orang Asli Paya Lebar, and Sungai Gabai;
- Individuals who experienced OR lived in Hulu Langat during the 2021 major flood;
- As much as possible, ensuring balanced representation in terms of gender, age, and inclusion of persons with disabilities.

To minimise potential bias, RAs were instructed not to recruit family members, close friends, or individuals with whom they had significant personal relationships. In addition, the recruitment of Orang Asli participants was coordinated by a representative from JAKOA, En. Ahmad Faiz bin Pisal, ensuring inclusivity and cultural appropriateness in the engagement process.

Roles of Other Project Stakeholders

Representatives from MERCY Malaysia attended the FGD sessions as rapporteurs to support documentation and ensure consistency across all discussions. Three external consultant teams were also present during the FGD sessions. They contributed by posing supplementary questions beyond the discussion guide and offering clarifications where needed to facilitate more comprehensive and coherent discussions.

Implementation of FGD Sessions on 19 September 2025

Two FGD sessions were conducted over the course of a day with residents from Hulu Langat. The first session was structured into four groups, organised according to participants' residential area (i.e., Batu 18, Batu 20, Batu 21, as well as Kampung Orang Asli Paya Lebar and Sungai Gabai). Discussions in this session focused on participants' experiences with the 2021 flooding. The second session was likewise organised into four groups, with discussions guided by the study's key themes:

- Experiential learning living lab facilities
- Community-based learning and activities
- Livelihood support and development
- Nature-based solutions for disaster risk reduction

Led by the elected RAs, each session lasted approximately 90–120 minutes that followed a semi-structured discussion guide[2]. This encouraged participants to share experiences, challenges, and proposed solutions related to post-disaster recovery, preparedness, and sustainable development.

[2] See Appendix 3 for the FGD guided questions.

Notably, two participants exited the discussion partway through; this was in line with the informed consent process, which outlined the participants' right to withdraw at any stage without consequence. Their departure did not significantly impact the overall flow or quality of data collected.

Thus, the following table presents the total number of participants (25) who completed both FGD sessions:

Location	Participants
Batu 18, Kampung Jawa	6
Batu 20, Sungai Lui	7
Batu 21, Sungai Lui	5
Kampung Orang Asli Paya Lebar and Sungai Gabai	7
Total	**25**

Survey

A structured survey was administered using both online and face-to-face methods to account for differing levels of internet access, digital literacy, and connectivity across the study locations. This mixed-mode approach enabled broader participation and ensured that communities with limited digital access, including remote and semi-rural settlements were not excluded.

The survey instrument was originally designed in Malay to ensure clarity and accessibility for respondents. It was then translated into English for analysis and reporting purposes. A quota sampling approach was applied based on the estimated population size of residents in the target areas. The survey aimed to reach 200 respondents, capturing perspectives from low-income households, at-risk families, and Orang Asli communities living in flood-prone zones.

The survey was designed to quantify:

- Demographic characteristics (age, gender, household composition, education, etc.);
- Socioeconomic profiles (employment status, income level, and livelihood activities);
- Household and dwelling information;
- Disaster and risk experiences, including exposure to the 2021 floods;
- Preparedness and needs related to disaster response and recovery;
- Awareness of flood risks and resilience behaviours; and
- Perceptions of resilience and community support systems.

For online data collection, the survey was disseminated by the Ketua Kampung and Community RAs through link sharing and social media channels within their respective communities. To ensure enough representation from the Orang Asli communities, where internet access was limited, two community enumerators were appointed to conduct face-to-face interviews[3]. Their engagement, with encouragement and coordination support from JAKOA, was instrumental in securing adequate participation and ensuring that responses accurately reflected the lived experiences and perspectives of Orang Asli residents.

To encourage participation and acknowledge respondents' time, contribution, and data sharing, an honorarium of RM10 was provided to participants upon completion of the survey. The incentive was distributed either in cash for in-person respondents or via Touch 'n Go e-wallet (TNG) for online respondents.

Data Processing and Analysis

All quantitative survey data were compiled and cleaned prior to analysis to ensure accuracy, consistency, and completeness. Data from both online submission and face-to-face interviews were consolidated into a unified database. Duplicate entries, incomplete responses, and inconsistencies were identified and addressed through cross-verification with the consultant team and RAs.

Descriptive statistics were used to summarise demographic and socioeconomic profiles, household characteristics, disaster experiences, and preparedness levels of respondents across the five study locations. Frequency distribution, percentages, and cross-tabulations were produced to examine patterns and variations across gender, age group, and village. Where appropriate, comparisons were drawn between Orang Asli and non-Orang Asli communities to identify distinct vulnerabilities, strengths, and coping mechanisms.

Qualitative data gathered through FGDs and key informant interviews were transcribed, coded, and thematically analysed. FGD recordings and rapporteur notes were summarised accordingly and cross-checked with RAs to ensure consistency and accuracy of interpretation. This process enabled the identification of recurring themes, community priorities, and contextual factors shaping resilience, recovery, and adaptation. The triangulation of survey results with FGD and interview findings strengthened the validity of the analysis and provided a comprehensive understanding of community conditions in Hulu Langat.

All findings were synthesised into visual summaries, including charts, infographics, and tables, to facilitate clear communication of key insights and to support evidence-based recommendations for future resilience programming under the Resilience Living Lab Hulu Langat initiative.

[3] Refer to Appendix 4 for Community Enumerators Contract.

Respondent Profile

The final survey effort and respondent distribution across kampung and areas are summarised below:

Location	Respondents	% of Respondents
Batu 18, Kampung Jawa	55	27.5
Batu 20, Sungai Lui	34	22.0
Batu 21, Sungai Lui	43	21.5
Kampung Orang Asli Paya Lebar	44	17.0
Kampung Orang Asli Sungai Gabai	12	6.0
Kampung Orang Asli Genting Peras	12	6.0
Total	**200**	**100**

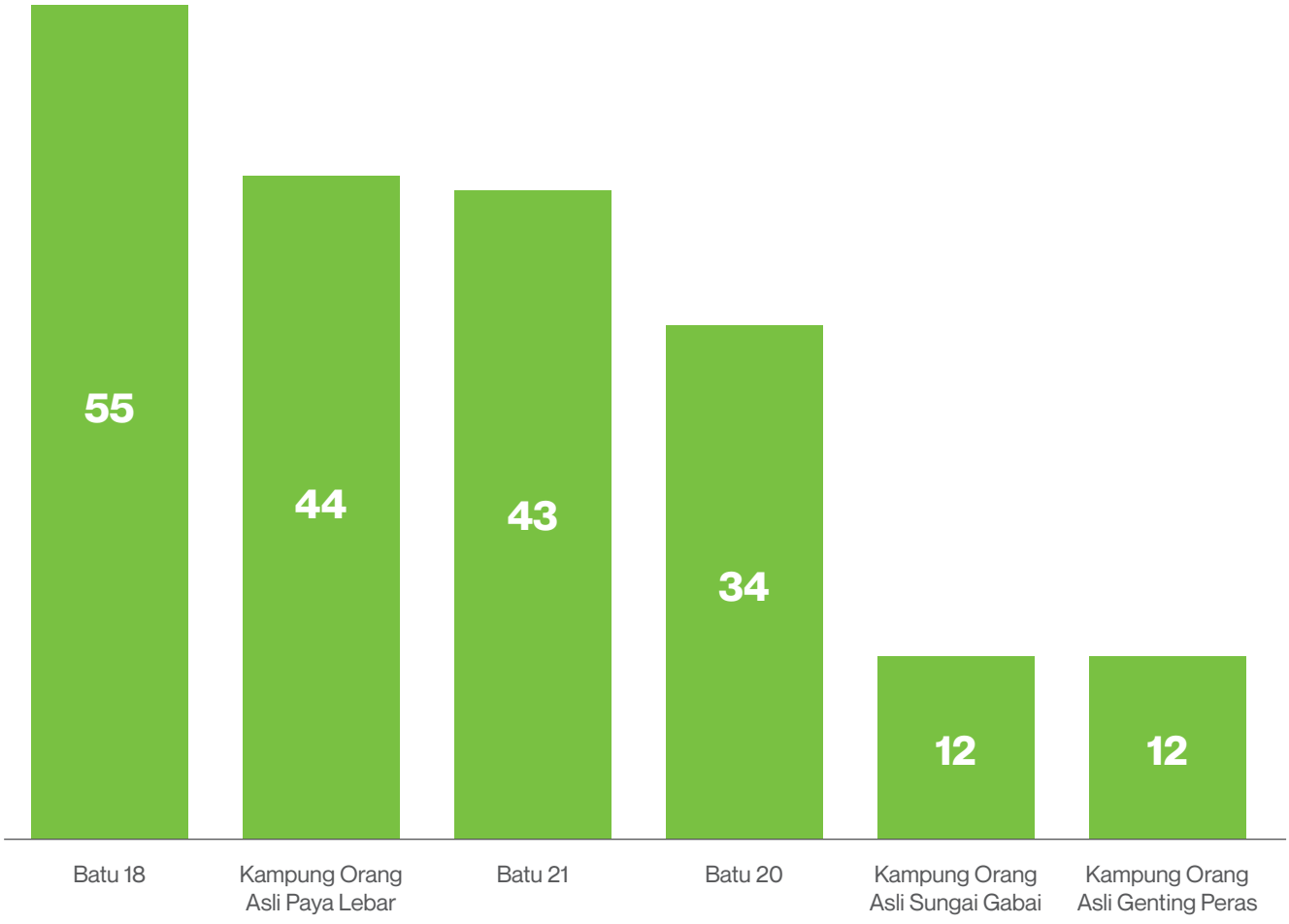


Figure 3: Distribution of survey respondents across areas and kampung in Hulu Langat.

Gender Distribution of Survey Respondents in Batu 18, Batu 20 and Batu 21

Overall, the survey achieved an almost gender-balanced sample, with 57% women and 43% men participating across all six locations in Hulu Langat. This near-equal distribution reflects strong engagement from both genders, though women were slightly more represented, especially in Batu 20, Batu 21, and the two Orang Asli kampung (Sungai Gabai and Genting Peras).

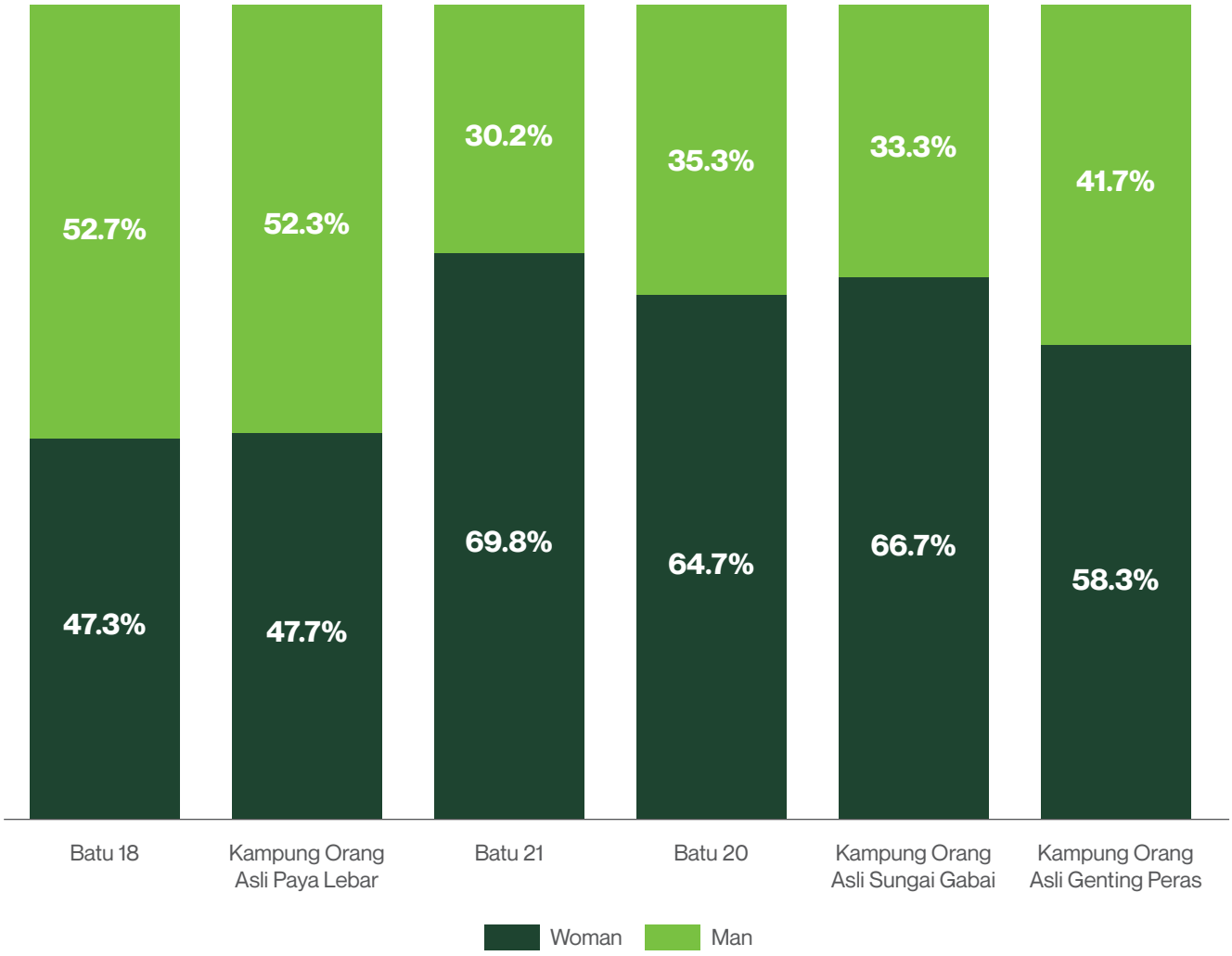


Figure 4: Breakdown of survey respondents by gender.

- Batu 18 shows a relatively balanced gender composition, with 47.3% women and 52.7% men, indicating similar participation from both genders.
- In Kampung Orang Asli Paya Lebar, the distribution is also fairly balanced, with 47.7% women and 52.3% men participating in the survey.
- Batu 21 has the highest proportion of women respondents, where 69.8% are women and only 30.2% are men.

- Batu 20 also shows a gender skew toward women, with 64.7% female respondents compared to 35.3% male.
- In Kampung Orang Asli Sungai Gabai, women again form the majority, comprising 66.7% of respondents, with men at 33.3%.
- Kampung Orang Asli Genting Peras shows a more moderate pattern: 58.3% women and 41.7% men, still indicating higher female participation.

In terms of age, respondents were drawn from a wide range of age groups, but participation was concentrated among adults aged 31-50.

- The 31-40 age group and 41-50 age group together made up the largest share of respondents overall, indicating that working-age adults were the most engaged in the survey.
- The 21-30 and 51-60 groups were moderately represented, while respondents below 20 and above 60 formed a much smaller proportion of the sample.
- In the Kampung Orang Asli (Paya Lebar, Sungai Gabai and Genting Peras), respondents were more evenly spread across age range 31-50, with Genting Peras showing a notable share in the 60 and above group.

Overall, the demographic profile suggests the survey respondents are largely taken up by working-age adults, with a slight gender tilt towards women and modest variation in age composition across survey areas.

Employment Status by Community Group

The employment patterns between Orang Asli communities and Orang Kampung in the survey reveal clear differences that reflect structural barriers and varied livelihood opportunities. Among Orang Kampung respondents, the majority were either self-employed, unemployed, or working in the private sector, indicating a diverse mix of informal work, casual labour, and small business activities typical of semi-rural Malay kampung communities.

In contrast, Orang Asli respondents showed high representation in self-employment but almost no presence in public sector employment. This absence signals limited access to formal, stable government jobs, which often require qualifications, credentials, or social networks that may be less accessible to Indigenous communities.

Overall, Orang Kampung respondents appear to have slightly more diversified employment pathways, while Orang Asli respondents remain more concentrated in self-employment and unemployment, reflecting structural disadvantage and fewer economic opportunities.

Employment Status	Orang Kampung	Orang Asli
Self-employed or running own business	31	31
Unemployed	33	27
Employed in the private sector	35	8
Employed in the public sector	16	2
Retired	15	0
Student	1	0

Education Levels Among Orang Asli and Orang Kampung Respondents

The education profile of respondents shows marked differences between Orang Asli communities and Orang Kampung households, highlighting long-standing disparities in access to schooling and educational attainment. Orang Asli respondents were significantly more concentrated at the lower end of the education spectrum with 28 of them reported no formal education, 19 had completed primary education and very few progressed into secondary levels.

This pattern reflects the structural and historical challenges faced by Orang Asli communities, such as school accessibility, transportation barriers, economic pressures, and social factors that affect attendance and retention. While JAKOA (Department of Orang Asli Development) has implemented numerous initiatives to encourage school attendance and reduce dropout rates, the persistent gaps in this dataset suggest that these initiatives have yet fully overcome the structural barriers that shape educational outcomes for many Orang Asli families.

In contrast, Orang Kampung respondents show higher and more diverse educational attainment with 71 of them completed secondary education, 31 obtained a certificate or diploma, 14 held a Bachelor's Degree and a smaller number progressed to STPM and Master's level. This data highlight a significant educational gap between the two groups and underscore how structural inequalities rather than motivation alone continue to influence education outcomes. This also point to the importance of targeted, long-term, and context-specific support to ensure that educational initiatives translate into actual improvements in access and attainment for Orang Asli communities.

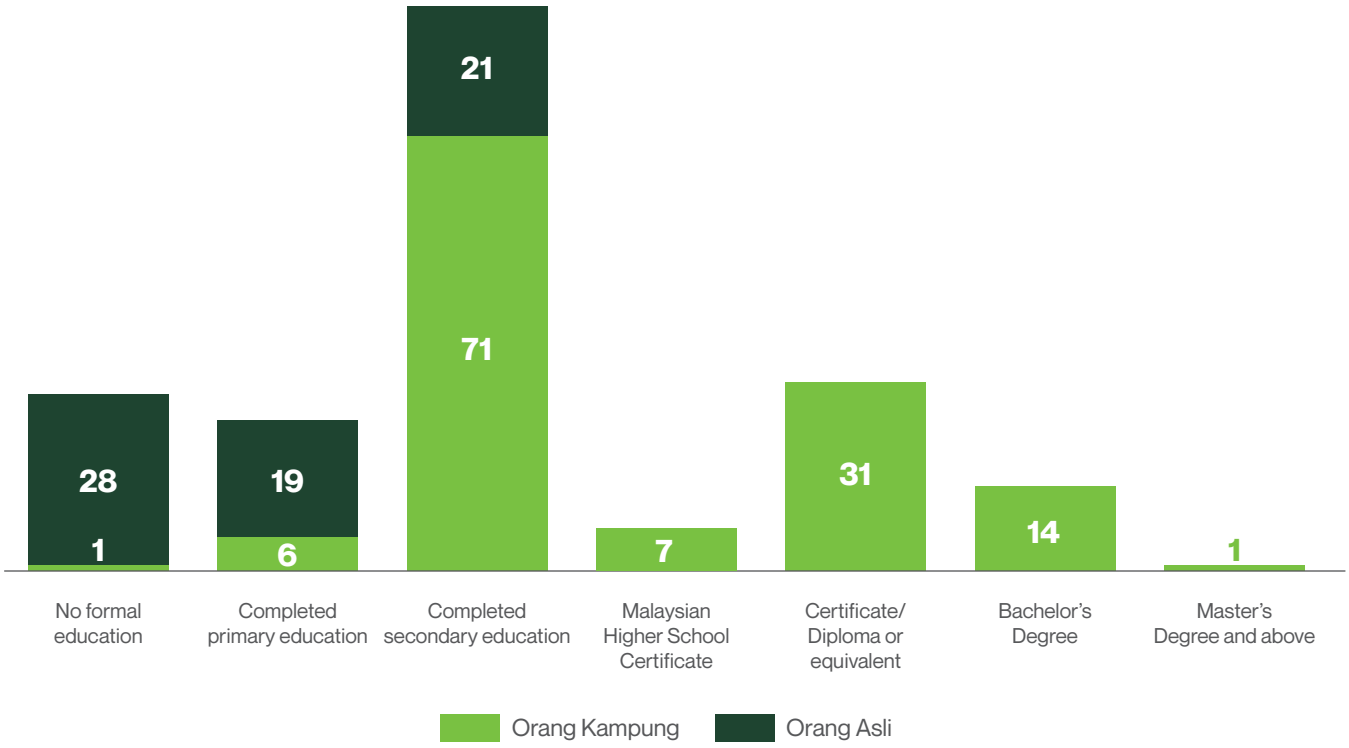


Figure 5: Breakdown of survey respondents by education level of community groups.

Figure 6: FGD training session with RAs.

Figure 7: Research assistants facilitating a group discussion with participants.

Figure 8: FGD participants, RAs, consultants, and MERCY Malaysia's project team.

OVERVIEW

Background and Historical Settlement Context of Hulu Langat

Hulu Langat is the fifth largest district in Selangor state, with an area of 840 square kilometres and the second most populous district with a population of 1,400,461 (Census, 2020), covering an area of approximately 840 square kilometres in the southeastern corner of the state, between Kuala Lumpur and Negeri Sembilan. It is also the second most densely populated district with approximately 1688 people per km2 in Selangor, with most of its administrative divisions now falling under the Kajang Municipal Council (MPKj). Currently, Hulu Langat is under Hulu Langat federal parliamentary constituency and at the state level is under Dusun Tua.

Historically, Hulu Langat was recognised as one of the older Malay reserved areas south of Kuala Lumpur. Administratively, it's divided into 7 districts, which are:

- Ulu Langat
- Ampang
- Cheras
- Ulu Semenyih
- Kajang
- Semenyih
- Beranang

Among these, Mukim Ulu Langat has the largest land area. Each district is named after its principal town or settlement. The original name "Ulu Langat" reflects its geography, as the term "Ulu" means "upper," referring to the upper reaches of the Langat River, contrasting with "Kuala," which denotes the river mouth.

At the time of British intervention in the late 19th century, Hulu Langat village was the largest settlement in the district, home to some 300 Sumatrans primarily engaged in agriculture. However, Kajang town was already beginning to grow as a commercial hub and later became the district capital. The road network of the mukim closely follows the course of the river, reinforcing the pre-colonial riverine axis of travel and trade.

Batu 18 to Batu 21, Sungai Lui Corridor

The settlements along the Langat River and its tributary, Sungai Lui, mark a distinctive socio-historical cluster. Kampung Batu 18 is located eighteen miles from Kuala Lumpur, became a significant meeting point where the road diverges: one branch follows the Langat River upstream toward the foothills of the Main Range and the hydro-electric station, while the other follows the Sungai Lui tributary southward.

Five major centres of settlement developed along this axis:

- Ulu Langat (Batu 13)
- Lubok Kelubi (Batu 19½)
- Dusun Tua (Batu 16)
- Kampung Sungai Lui (Batu 21)
- Kampung Batu 18

Figure 9: Location of Hulu Langat district in Selangor.
Source: The Peopling of Ulu Langat by David Radcliffe, Cornell University Southeast Asia Program, 1969.

Kampung Batu 18 was once thrived as a lively community but was characterised more as a transit and trading hub than a permanent settlement. It served as the turnaround point for buses, the furthest reach of Chinese traders supplying village shops, market space, and a meeting place rather than a deeply rooted residential kampung.

Further upstream, Kampung Sungai Lui and its cluster including Kampung Mesjid and Kampung Tanjong Pauh formed a distinct community. Separated from Batu 18 by two miles of uninhabited land, the Sungai Lui complex was settled mainly by Kerinchi migrants from Sumatra, a trading people noted in oral histories and local legend for their supernatural associations. Initially sustaining themselves by growing vegetables for sale downstream, they later transitioned into rubber smallholding, aligning with the wider district's economic shift.

Between these two clusters lies Kampung Jawa, a small settlement established in the 1920s by Javanese migrants. Distinctive in both language and architecture, its residents continue to speak Javanese, and their houses differ from traditional Malay kampung houses by being built predominantly at ground level rather than raised on stilts.

Current Demographic Profiling and Vulnerability Mapping

Hulu Langat is the fifth largest district in Selangor state, with an area of 840 square The Sungai Lui corridor, stretching from Batu 18 to Batu 21 and extending to Kampung Orang Asli Paya Lebar, lies within the eastern part of the Hulu Langat District. This corridor is characterized by a riverine and semi-rural landscape, situated close to the Langat and Semenyih Reservoirs, both of which are crucial components of Selangor's water supply system. The area's hilly terrain, dense vegetation, and scattered settlements contribute to its ecological importance but also heighten vulnerability to environmental hazards such as floods and landslides.

Population concentration is highest in Batu 18, which functions as a local service and commercial node with a mix of residential areas, small businesses, and public amenities. The Batu 20 and Batu 21 areas, by contrast, are less densely populated and more rural in character, comprising traditional villages and agricultural plots. Settlements are typically linear, following the main road and the river corridor, reflecting dependency on both road connectivity and proximity to water sources for daily activities.

The communities here represent a diverse demographic mix, comprised of predominantly local residents and Orang Asli communities. Based on field observations and local administrative data, the project area reflects a mixed demographic composition with distinctive social and economic characteristics.

Household sizes typically range from four to six persons per household, with multi-generational living common. The age distribution shows a notable presence of elderly residents (aged 60 and above) in long-established villages, while younger populations often commute to nearby urban centres for employment opportunities. The age distribution shows a notable presence of elderly residents (aged 60 and above) in long-established villages, while younger populations often commute to nearby urban centres for employment opportunities.

Livelihoods in the area are largely sustained through small trading activities, private sector work, informal services, and agricultural or manual labour, especially within kampung settings. Most residents possess secondary-level education, while a smaller proportion particularly among younger individuals have attained tertiary qualifications.

Socioeconomic conditions are generally moderate to low-income, with several households classified under the B40 category and reliant on unstable or informal income sources. Vulnerable groups such as low-income households, women-headed families, and the elderly, face disproportionate risks but also contribute valuable local knowledge and leadership in community preparedness and disaster recovery.

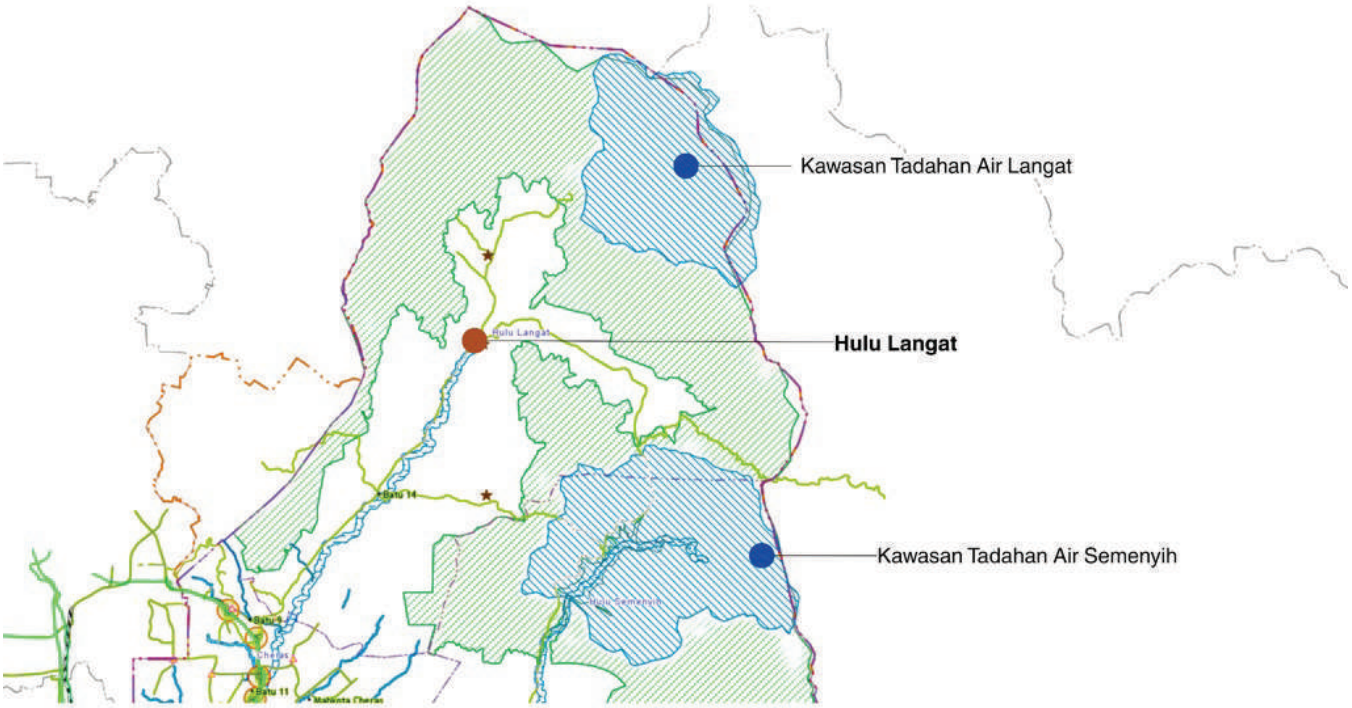


Figure 10: Location of Hulu Langat and water catchment areas.

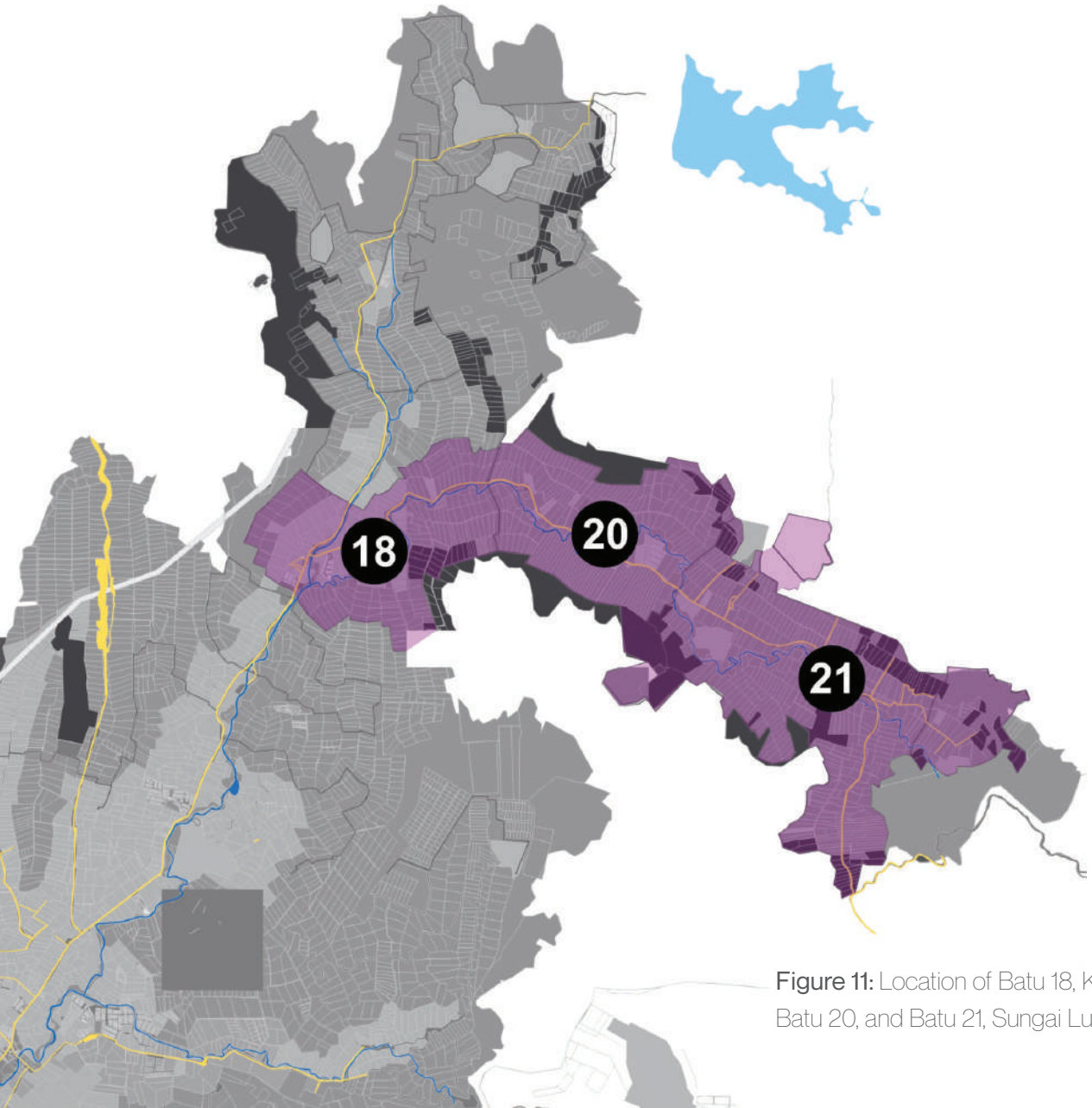


Figure 11: Location of Batu 18, Kampung Jawa, Batu 20, and Batu 21, Sungai Lui in Hulu Langat.

Batu 18, Kampung Jawa

Kampung Batu 18 serves as the main population and service centre along the Sungai Lui corridor. The area comprises approximately 4,200 residents, with a mixed demographic composition of Malay households, small business owners, and government or private-sector workers. A notable proportion of residents are elderly (aged 70 and above), alongside middle-income families and informal workers.

The commercial zone of Pekan Batu 18 functions as the local hub, featuring a market area, small shops, and essential public amenities that serve both local and nearby kampung communities. Core facilities within this area include:

- Klinik Desa Batu 18
- Balai Polis Batu 18
- Balairaya Pekan Batu 18, which also functions as a central venue for community meetings and local events.
- Pusat Komuniti Kampung Jawa
- Sekolah Rendah Agama Batu 18
- Masjid Qariah Kampung Jawa

Notably, SJKC Choon Hwa is designated as Temporary Evacuation Centre (Pusat Pemindahan Sementara, PPS) during flood emergencies, reflecting its critical role in community disaster response.

Residential clusters around Batu 18 display a mix of housing types. The Taman Impian Warisan housing area comprises four-storey walk-up apartments, representing a more urbanized and higher-density settlement pattern compared to surrounding kampungs. Taman Cempaka Lui provides additional structured housing, mainly terrace houses, indicating a more organized residential layout, while Kampung Jawa, located within the Batu 18 boundary, maintains a more rural and dispersed settlement form, with greater distances between houses and limited internal road access.

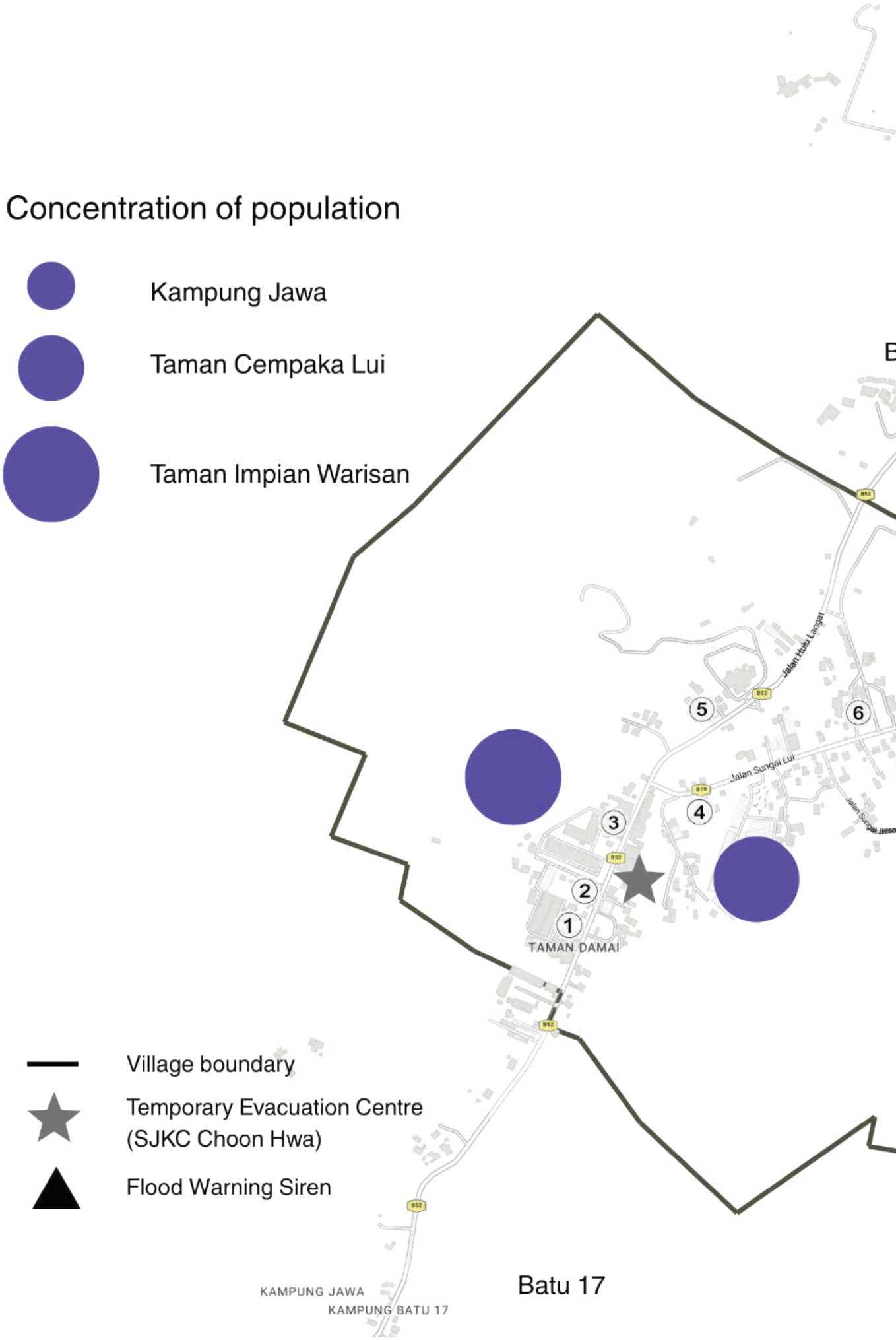
At the intersection leading to Kampung Jawa, there is the Pusat Komuniti Kampung Jawa, which serves as a local facility for social activities, community coordination, and outreach programmes. The Masjid Qariah Kampung Jawa Batu 18 functions as both a religious and social centre for residents.

The main road corridor through Batu 18 is a crucial connector linking Hulu Langat town to the Sungai Lui interior. However, narrow road width and recurring congestion, particularly at the Kampung Jawa junction, pose daily challenges for local traffic flow and accessibility. The roadside is lined with commercial shops and event venues, forming a linear activity strip that reinforces Batu 18's role as the economic and service focal point for the wider Sungai Lui area.

Figure 12: Sleepy town of Batu 18 in the 1970s.

Figure 13: Nam Wah coffeeshop in Batu 18.

Figure 14: 2021 major flood aftermath in Batu 18.


Concentration of population
Kampung Jawa
Taman Cempaka Lui
Taman Impian Warisan
Jalan Hulu Langat
Jalan Sungai Lui
5
6
4
3
2
1
TAMAN DAMAI
Village boundary
Temporary Evacuation Centre
(SJKC Choon Hwa)
Flood Warning Siren
KAMPUNG JAWA
KAMPUNG BATU 17
Batu 17

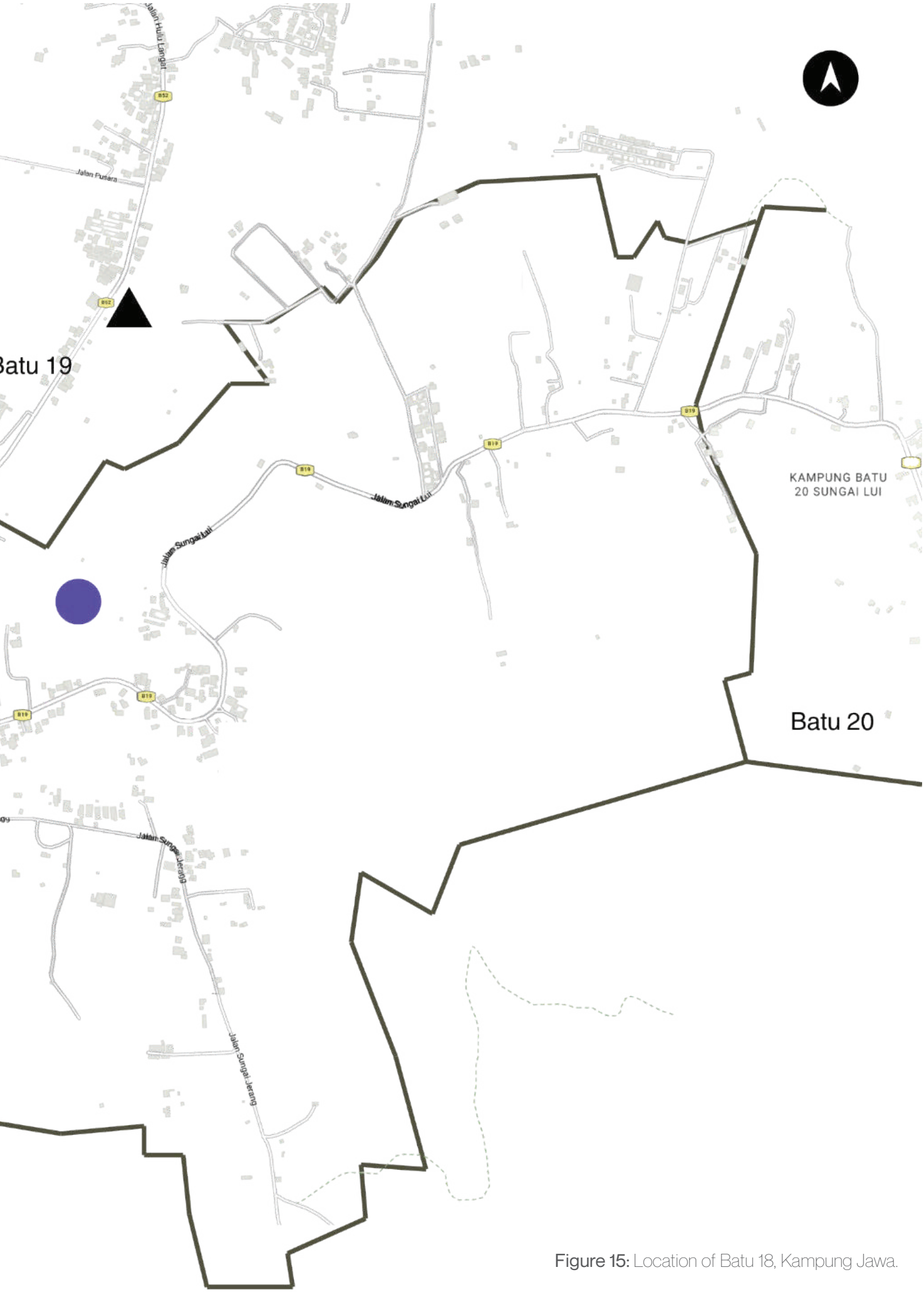


Figure 15: Location of Batu 18, Kampung Jawa.

Batu 20, Sungai Lui

Moving further along the Sungai Lui corridor, Kampung Batu 20 and its surrounding settlements are less densely populated and display more rural settlement patterns compared to Batu 18. The population is smaller and more scattered, with households primarily engaged in agriculture, small-scale trading, and informal labour as their main sources of livelihood.

The estimated population is highest in Kampung Baru Sungai Lui (approximately 100 households), followed by Kampung Batu 20 (around 70 households), and Kampung Masjid together with Kampung Batu 20½ (about 90 households combined), forming the main residential clusters in this area. Settlements are typically linear along the main road, interspersed with small agricultural plots and homesteads surrounded by secondary vegetation.

In recent years, many houses and land parcels have been converted into vacation homes, homestays, and small resorts, attracting visitors seeking nature-based and rural tourism experiences. This shift has gradually diversified the local economy but also created new pressures on infrastructure, waste management, and water resources, especially during peak tourist seasons.

Key facilities that support the local community include:
- Community Centre, Kampung Batu 20
- Sekolah Rendah Agama Sungai Lui
- Klinik Desa Sungai Lui
- Sekolah Kebangsaan Sungai Lui

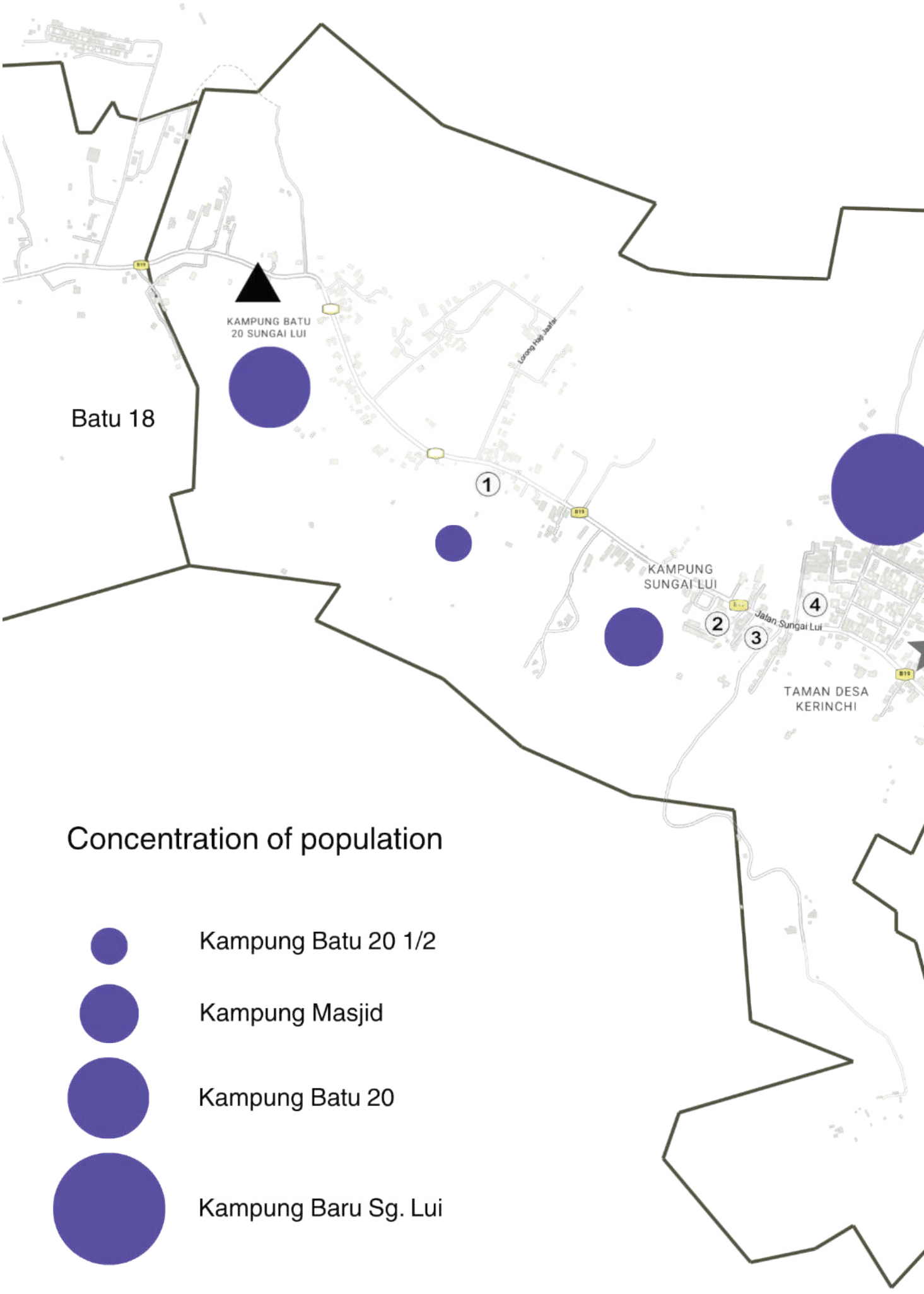
These facilities collectively provide access to basic education and primary healthcare services for residents. The Dewan Orang Ramai Sungai Lui, which also functions as a Temporary Evacuation Centre (Pusat Pemindahan Sementara, PPS) during flood emergencies, together with the nearby Community Centre, serve as important spaces for community gatherings, administrative coordination and disaster response.

While Batu 20 remains connected to the main Hulu Langat road network, accessibility into the interior kampungs becomes narrower and more rural in character, with limited pedestrian pathways and basic drainage infrastructure. The area retains a strong sense of community, with residents relying on social networks and local institutions for support during both routine activities and emergency situations.

Figure 16: Agriculture land plots in Sungai Lui.

Figure 17: Sekolah Kebangsaan Sungai Lui.

Figure 18: Frequent recurring flood at Batu 20, 2024.


KAMPUNG BATU
20 SUNGAI LUI
Batu 18
Lorong Haji Jaafar
1
KAMPUNG
SUNGAI LUI
2
3
4
Jalan Sungai Lui
TAMAN DESA
KERINCHI
Concentration of population
Kampung Batu 20 1/2
Kampung Masjid
Kampung Batu 20
Kampung Baru Sg. Lui

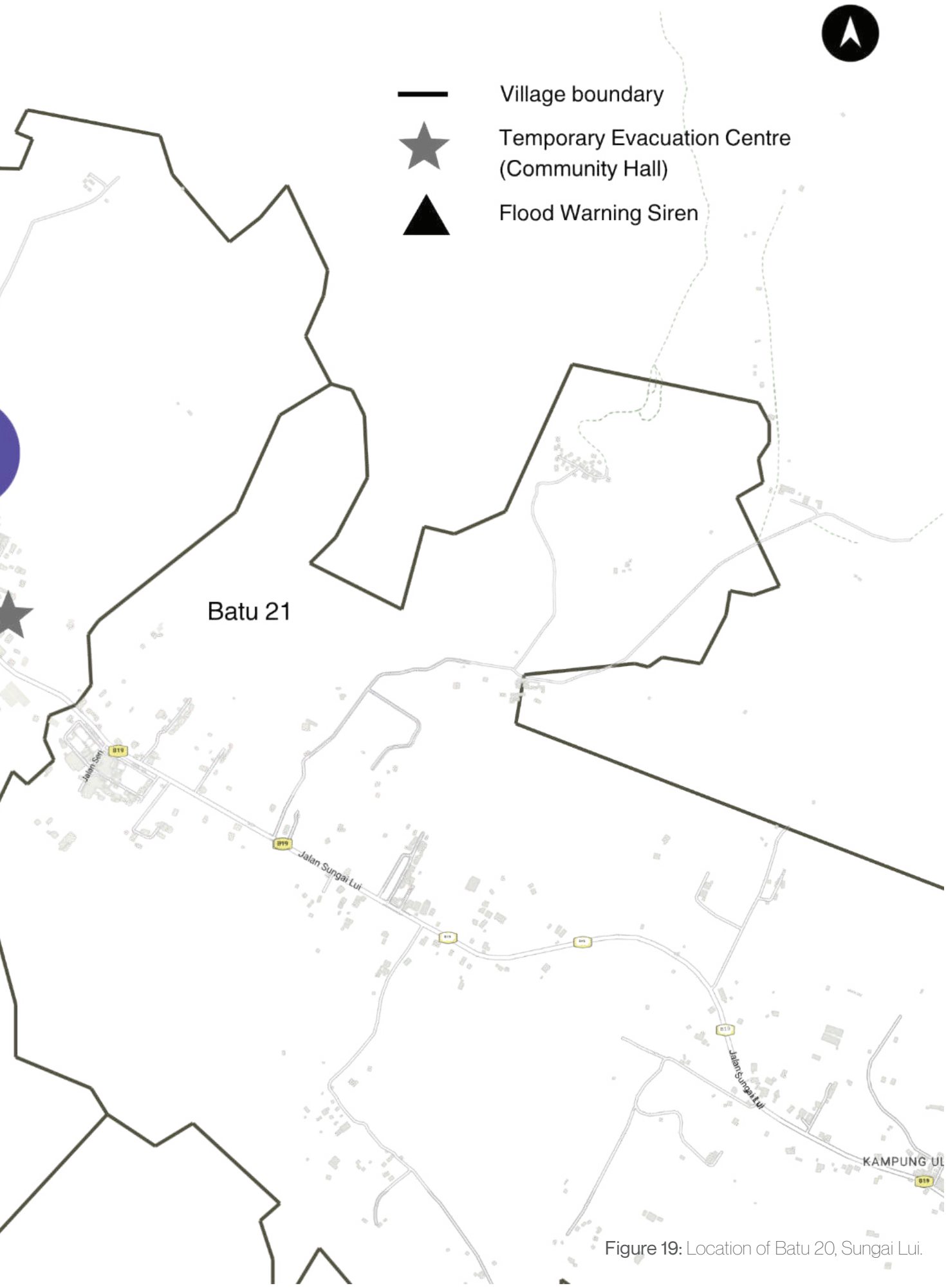


Figure 19: Location of Batu 20, Sungai Lui.

Batu 21, Sungai Lui

The Batu 21 area encompasses a larger land coverage compared to Batu 18 and Batu 20, consisting of several Malay villages and three Orang Asli settlements which is Kampung Orang Asli Paya Lebar, Kampung Orang Asli Sungai Gabai, and Kampung Orang Asli Genting Peres. While Genting Peres lies further inland, extending along Jalan Sungai Lalang toward the Negeri Sembilan border, it remains administratively linked to Batu 21.

Leadership within the Orang Asli communities is headed by a Tok Batin, who oversees traditional and community affairs, though the area remains under the broader jurisdiction of the Ketua Kampung Batu 21. The Orang Asli villages in this area are also under the supervision of the JAKOA, a government agency responsible for managing and safeguarding the affairs, welfare, and development of Orang Asli communities in Malaysia.

In terms of population distribution, Kampung Batu 23 records the highest concentration with approximately 145 households, followed by Kampung Orang Asli Paya Lebar (150 households), PKNS housing area (140 households), Kampung Tengah (70 households), Kampung Orang Asli Sungai Gabai (65 households), and Kampung Orang Asli Genting Peres (75 households). These settlements form a mix of structured housing clusters and dispersed traditional homes located along riverbanks and foothill areas.

The economic profile of Batu 21 residents reflects a relatively even distribution across employment types:

- Around 25% are employed in the government sector
- 25% work in the private sector, including factory and gig workers (e.g., delivery or ride-hailing services)
- 25% are self-employed, often in small-scale businesses, agriculture, or informal trading
- The remaining 25% are unemployed or engaged in domestic work.

Among the Orang Asli communities, livelihood patterns differ between villages. In Kampung Sungai Gabai, most residents rely on village-based economic activities such as selling forest produce (hasil hutan), with the settlement located in a more secluded area farther from main kampung centres. In contrast, Kampung Paya Lebar lies closer to the main road and nearby kampungs, allowing greater interaction and integration with the wider community. Some residents work outside the village while others continue traditional or small-scale local livelihoods.

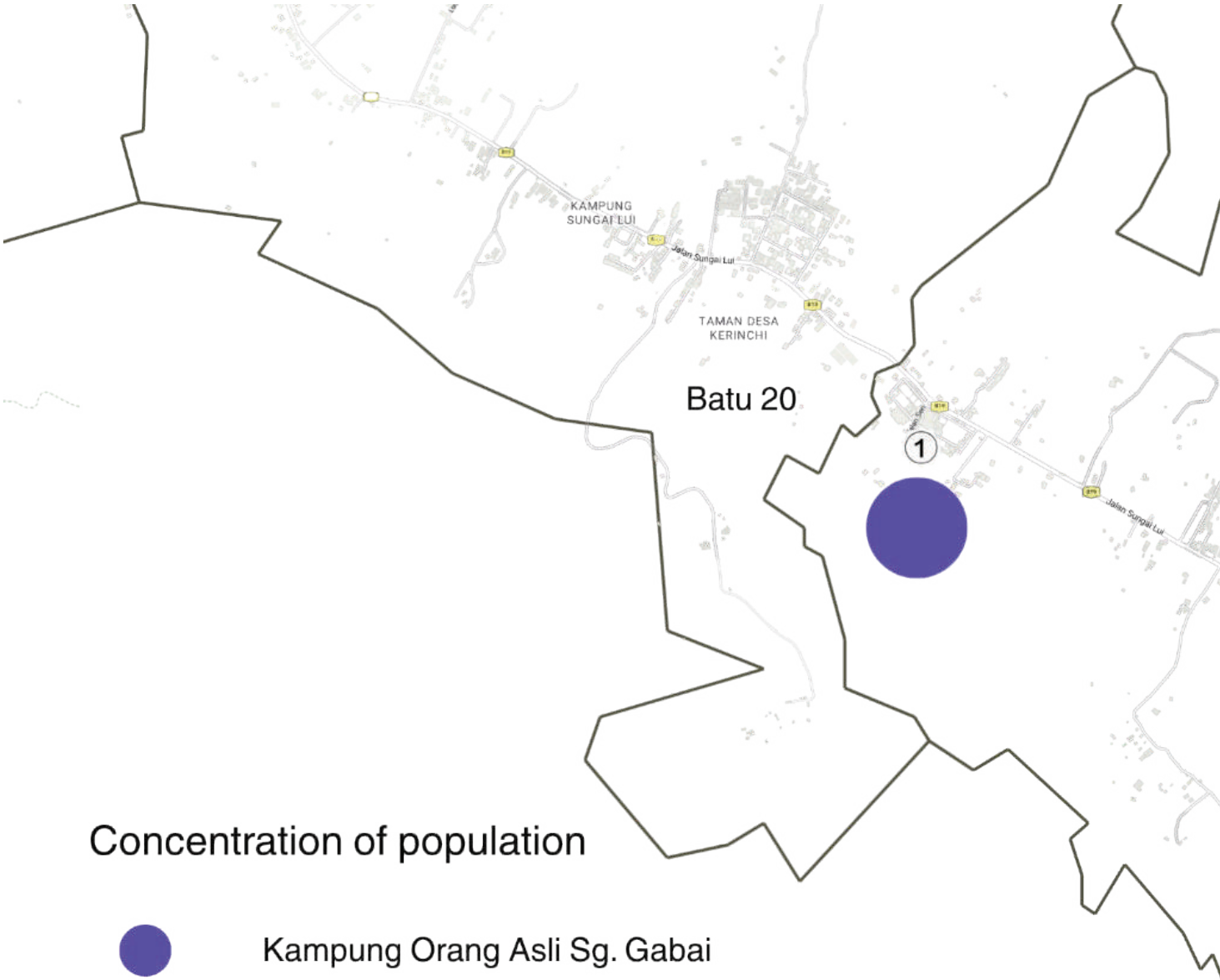
In recent years, unregulated campsites and tourism operations have expanded in the Sungai Gabai area, including on inherited land sold to outsiders and on forest reserve or state land under the jurisdiction of the Forestry Department. While these developments have created income opportunities, they also pose environmental and social risks, particularly to Orang Asli territories, due to unmanaged waste, land degradation, and safety concerns.

Key community facilities within Batu 21 include: (1) Dewan Orang Ramai Batu 21, which serves as a focal point for community events and meetings; (2) Madrasah, providing space for religious activities and informal learning.

Figure 20: Kampung Sungai Lui Batu 21.

Figure 21: Sungai Gabai multi-level cascading waterfall.

Figure 22: Kampung Orang Asli Sungai Gabai.



Concentration of population

- Kampung Orang Asli Sg. Gabai
- Kampung Gemi
- Kampung Tengah Batu 22
- PKNS
- Kampung Batu 23
- Kampung Orang Asli Paya Lebar

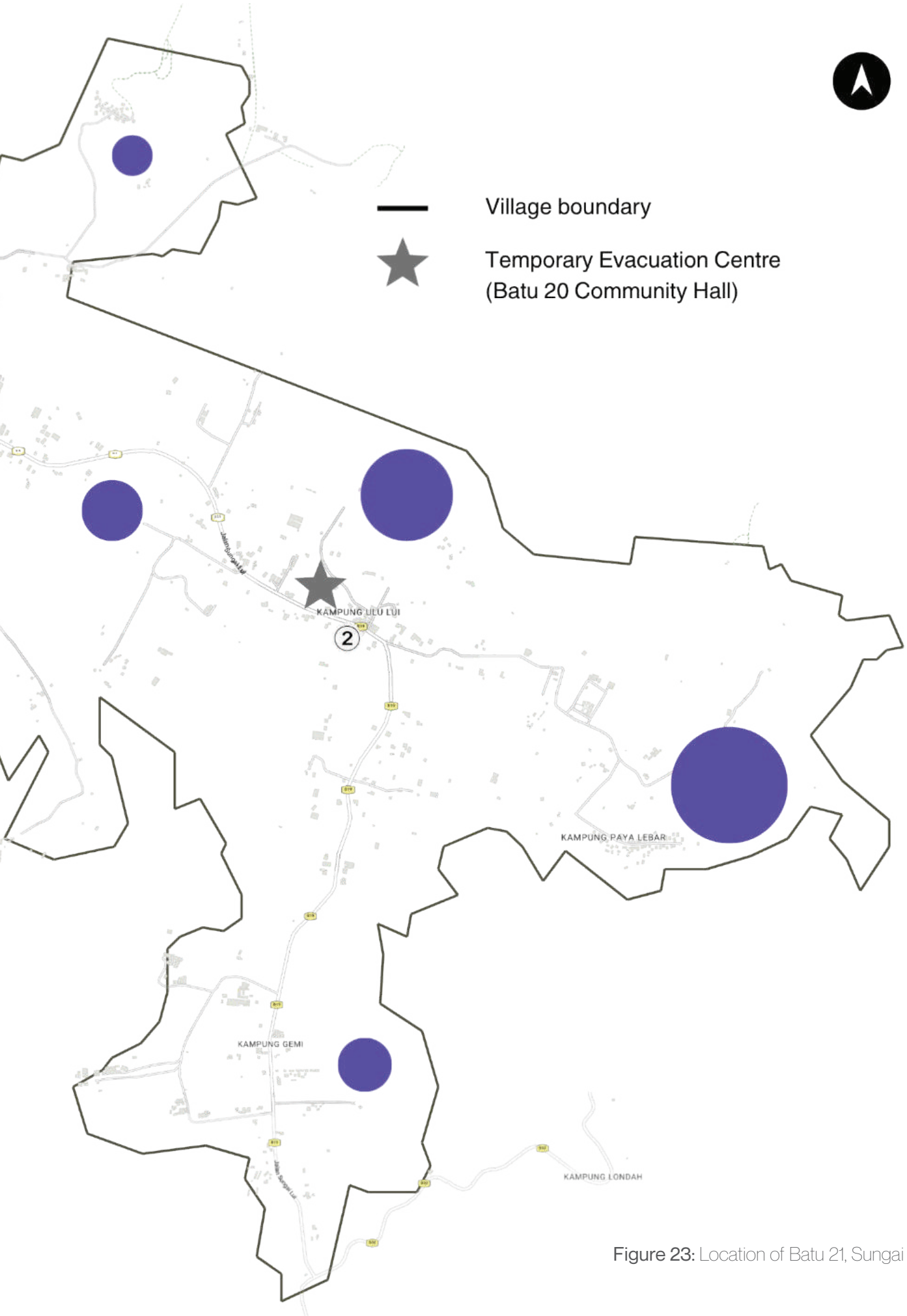


Figure 23: Location of Batu 21, Sungai Lui.

ENVIRONMENTAL AND PHYSICAL CONTEXT

Flood and Landslide Prone Areas

Hulu Langat, which is under the jurisdiction of Majlis Perbandaran Kajang (MPKj) is characterised by diverse topography and ecological systems that shape patterns of settlement, infrastructure, and environmental vulnerability. Land use and physical development are unevenly distributed with lowland areas below 150 metres making up about 52% of the total area, concentrated mainly in the western and southern parts, while highlands above 300 metres occupy around 27%, particularly in the northern and eastern zones bordering forest reserves and water catchment areas.

The Sungai Lui sub-catchment plays a crucial hydrological role within this landscape. The map indicates that the flood-prone corridor follows the Sungai Lui and Sungai Langat rivers, cutting through Kampung Batu 18, Batu 20, and Batu 21.

- Kampung Batu 18, located near the Ulu Lui town junction, lies at the confluence of several drainage paths. It is identified as a high-risk flood-prone area due to its low-lying elevation and position at the downstream end of the catchment. Runoff from the higher terrain at Batu 20 and Batu 21 converges rapidly toward this point, causing frequent flash flooding, especially during intense rainfall events.

- Batu 20, situated along the Sungai Lui tributary, also experiences flash floods linked to riverbank overflow, limited drainage capacity, and road elevations below the embankment.

- The topographic gradient between Batu 21 and Batu 18 accelerates surface runoff during storms, intensifying flood risks in downstream zones.

According to MPKj's hazard mapping, flood-prone areas and flood zones are concentrated along the Langat River and its tributaries, including Sungai Lui, Sungai Congkak, and Sungai Gabai. These rivers originate from the nearby Titiwangsa highlands and flow through a network of valleys before converging into the Sungai Lui and Langat River systems.

The 2021 flood disaster further highlighted Hulu Langat's vulnerability. The event was triggered by sudden water surge from the surrounding mountainous areas, resulting in widespread inundation and severe damage to homes, roads, and community facilities. Multiple landslides occurred in upland areas such as Sungai Gabai, Genting Peres, and Pangsun, cutting off access routes and worsening post-flood recovery challenges. This disaster underscored the area's hydro-geomorphological sensitivity and the urgent need for integrated watershed management, slope stabilization, and community-based early warning systems.

Beyond residential and agricultural zones, Hulu Langat is home to several of MPKj's main eco-tourism sites, which also intersect with hazard-prone landscapes. Among the 22 tourism attractions identified by MPKj, a significant number are concentrated here — including Hutan Lipur Sungai Congkak, Hutan Lipur Sungai Gabai, Kolam Air Panas Dusun Tua, Kolam Air Panas Sungai Serai, Kem Latihan & Rekreasi Sungai Congkak, Nur Lembah Pangsoon Eco Resort, and the Institut Kemahiran Belia Negara (IKBN) Hulu Langat. These sites contribute to local livelihoods but also require sustainable tourism and environmental management approaches to balance economic activities with flood and landslide resilience.

This map illustrates the flood-prone areas and flood zones along the Sungai Lui sub-catchment, redrawn based on MPKj's official flood hazard mapping and topographical data. The visualization highlights key locations such as Kampung Batu 18, Batu 20, and Batu 21, where runoff from higher-elevation areas converges, leading to recurrent flash floods.

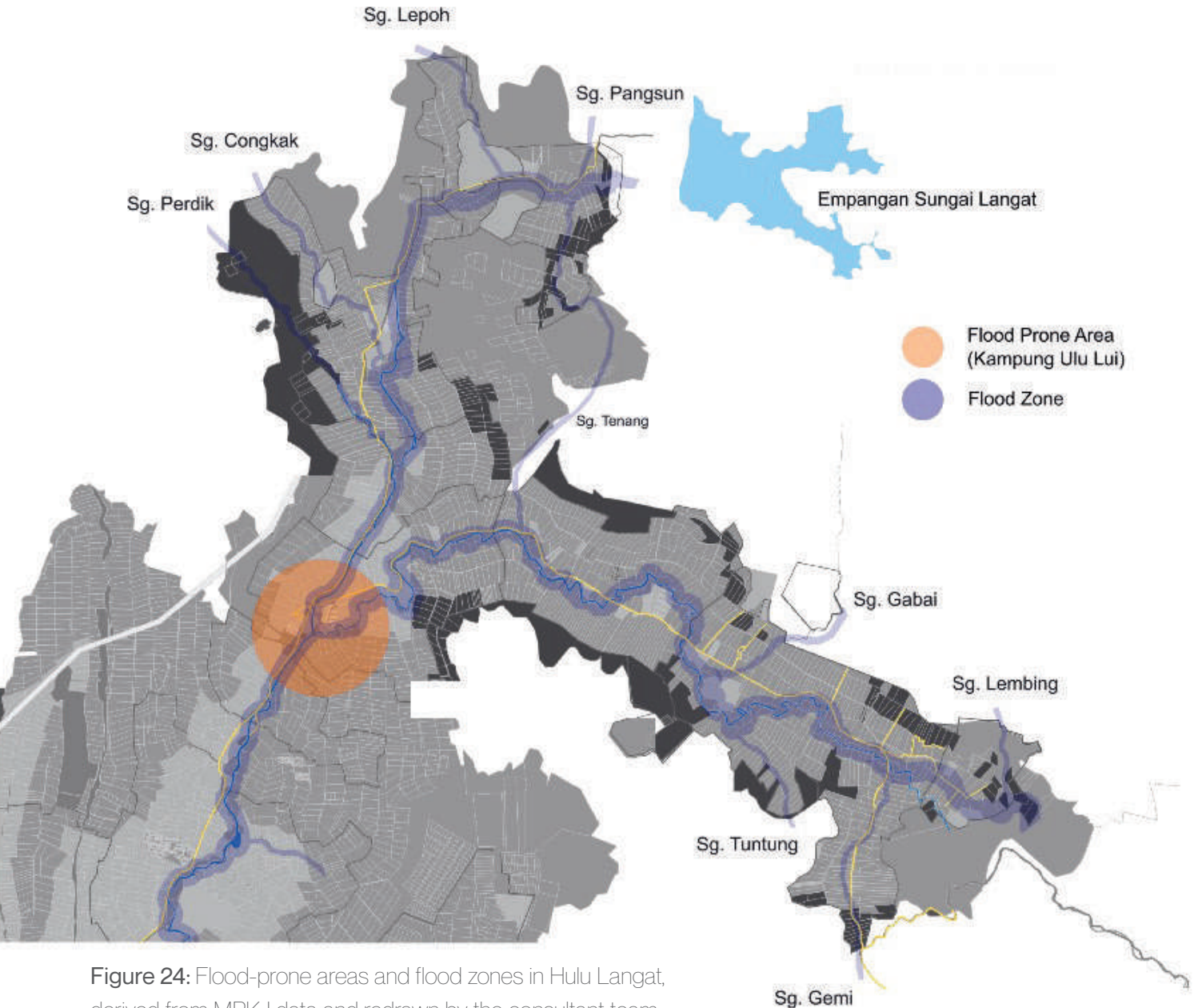


Figure 24: Flood-prone areas and flood zones in Hulu Langat, derived from MPKJ data and redrawn by the consultant team.

FINDINGS AND ANALYSIS

Themes

This study forms one of the key components within the Resilience Living Lab Hulu Langat, which applies a quadruple helix collaboration model by engaging local communities, public actors, private actors, and knowledge institutions in co-creation and co-ownership of solutions. As part of this iterative process, four sustainability-oriented themes were examined to integrate community perspectives and contextual realities:

- Experiential learning living lab facilities
- Community-based learning and activities
- Livelihood support and development
- Nature-based solutions (NbS) for disaster risk reduction (DRR)

Theme 1: Experiential Learning Living Lab Facilities

The Living Lab serves as a platform to strengthen community resilience and knowledge sharing. It provides physical infrastructure and tools for preparedness, while also creating spaces for documenting, communication and preserving collective experience. Beyond its practical, functions, the Living Lab acts as a hub where local knowledge and scientific insight are integrated, enabling communities to learn, engage and foster stronger connections across generations.

1. Proposed Functions of the Living Lab

From the community's perspective, the Living Lab functions as a multifunctional and integrative platform, combining practical preparedness, knowledge sharing, and community engagement. It provides essential infrastructure and tools for disaster preparedness, serves as a temporary assembly point during floods, and systematically collects, documents, and communicates experiences from past events to preserve critical lessons for future generations. By curating historical narratives, including photographs and personal stories from affected villages, the Lab strengthens collective memory, raises awareness of flood risks, and facilitates intergenerational learning.

The community envisions the Living Lab as a unifying space that brings together residents from Batu 18, Batu 20, Batu 21, Kampung Orang Asli Gabai, and Kampung Orang Asli Paya Lebar to exchange experiences and knowledge, foster mutual understanding, and strengthen social cohesion. While this underscores the Lab's potential to reinforce social networks, its effectiveness will depend on managing differences in local priorities, cultural variations, and participation levels. This highlights the need for inclusive facilitation and sustained engagement to ensure that all community members benefit equitably.

Taken together, these insights suggest that the Living Lab is more than a physical preparedness facility. Its multidimensional functions, linking infrastructure, knowledge management, and community engagement, enhance adaptive capacity, promote reflection and learning, and demonstrate potential as a scalable and sustainable model for

community-centered disaster resilience. The Lab illustrates how combining practical preparedness with systematic knowledge sharing and social cohesion can support long-term adaptive capacity and strengthen community resilience in flood-prone areas especially in Hulu Langat.

2. Challenges in Establishing a Resilience Living Lab

Despite these opportunities, several challenges may affect the successful establishment of the Living Lab. A key concern is how to encourage the active participation of younger generations across the Kampung. The widespread use of social media has further intensified this challenge, as young people increasingly engage in virtual interactions at the expense of in-person communication and participation in community programmes.

A participant from the Orang Asli community highlighted that young people today show less interest in community activities, preferring instead to spend time on their devices. This indicates that strategies to engage youth in the Living Lab should incorporate activities that are interactive and tailored to different age groups. Suggested activities include creative and community-based initiatives such as handicrafts or baking for young women and girls, as well as coloring and art activities for children, making participation more appealing and meaningful. Echoing this concern, the representative of Ketua Kampung Batu 20 stated that youth engagement spaces are being planned, allowing young people to gather and participate in group activities. By actively engaging the young generation from each village, it fosters a strong sense of co-ownership for the sustainability of the Living Lab.

Another challenge is identifying a safe and suitable site for the Lab, as much of the area is flood-prone. Among the 200 respondents surveyed, 120 (60%) reported experiencing flooding at least once a year. Of these 120 respondents, 54.17% experience flooding once annually, 35% experience it two to three times a year, and 10.83% are affected four or more times annually. Landslides, while less frequent, are still a concern: 39 respondents reported experiencing at least one landslide annually, with 87.18% encountering one event per year, 10.26% two to three events, and 2.56% four or more.

Hussain et al. (2024) highlight that flood-prone conditions in Hulu Langat complicate the selection of safe locations for community initiatives, emphasizing the need for careful planning to ensure safety and effectiveness. The location of the Lab is critical, as it influences both accessibility for community members and the facility's ability to function during flood and landslide events.Improper siting could reduce participation, limit engagement, and undermine trust in the Lab as a community resource. Therefore, considerations such as adaptive infrastructure, elevated structures, and flexible site design are essential. This challenge illustrates that the Lab's resilience is not only dependent on its programming and activities but also on integrating environmental risk management into its physical planning, ensuring that it can fulfill its role in preparedness, knowledge sharing, and community cohesion.

3. Agencies and Collaborative Partners

The establishment and sustainability of the Resilience Living Lab depend on the coordinated engagement of multiple actors who perform complementary roles in a shared ecosystem. This finding is consistent with the results of the FGDs, which identified four key actors as central to the success of the MERCY Malaysia Living Lab in Hulu Langat, such as local communities, non-governmental organisations (NGOs), universities, and government sectors. As highlighted by Van der Walt et al. (2009), a Living Lab operates as a multi-actor innovation ecosystem where collaboration, trust, and continuous learning underpin effective community-based development.

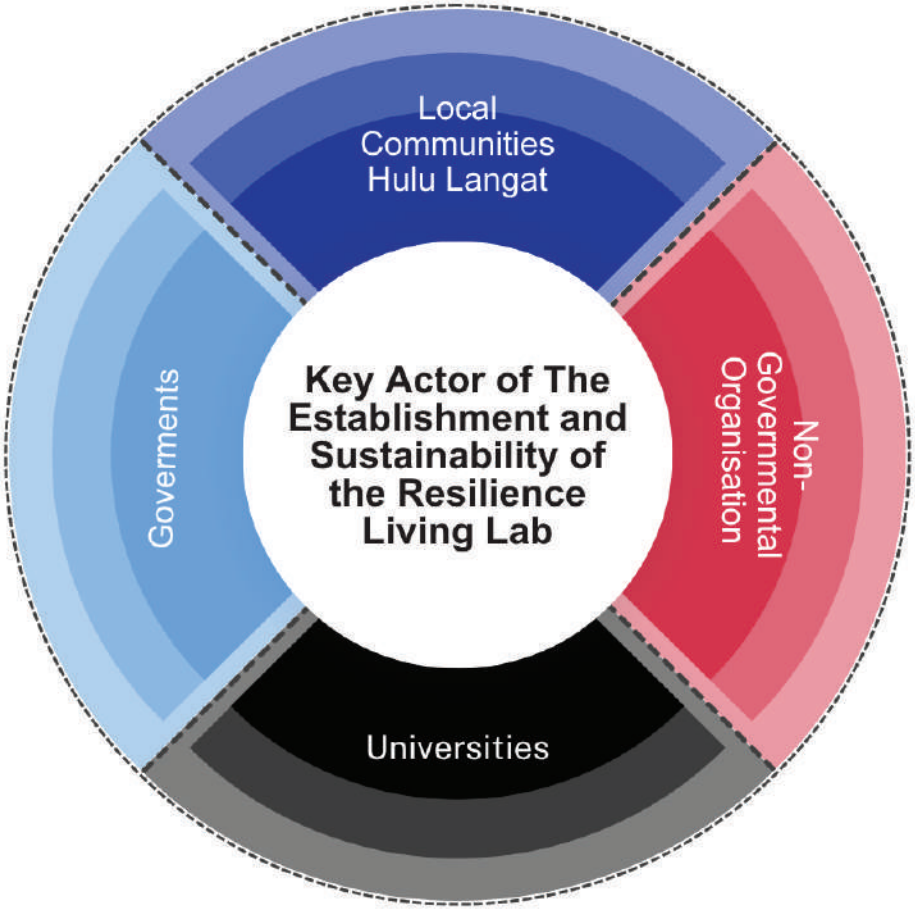


Figure 25: Key actors for the establishment and sustainability of the Resilience Living Lab.

During the FGD, participants highlighted the importance of involving the Village Development and Security Committee (JPKK) and local communities as primary users and drivers of the Living Lab concept. This approach ensures that community voices are central in identifying needs, designing solutions, and driving implementation, thereby strengthening ownership and long-term sustainability. For the Orang Asli community, particularly residents of Kampung Paya Lebar, their participation in establishing the Living Lab is viewed as essential.

The community expressed plans to develop a safer gathering centre to be used during emergencies, reflecting their proactive engagement in enhancing local preparedness and resilience. Building strong rapport and trust with the community is therefore vital as it lays groundwork for genuine ownership, recognising that the Living Lab ultimately exists for and belongs to them.

NGOs, such as MERCY Malaysia, function as facilitators that bridge stakeholders, coordinate implementation, and ensure inclusivity in project activities. Universities contribute through technical expertise, research collaboration, and evidence-based support that strengthen planning and evaluation processes. Government sectors serve as institutional enablers by providing policy support, funding mechanisms, and resources that promote sustainability and integration with broader development agendas.

The collaboration among these actors is sustained through four key enablers identified both in the literature and through FGD insights: knowledge sharing, institutional alignment, resource mobilisation, and trust building. Together, these factors create a dynamic platform for innovation, adaptive learning, and sustained community participation. This integrated approach mirrors the framework proposed by Van der Walt et al. (2009), demonstrating how multi stakeholder partnerships contribute to the effective and lasting impact of community driven Living Lab initiatives.

This approach also aligns with the objectives of MERCY Malaysia's Resilience Living Lab, where the inclusion of diverse actors, an idea introduced by MERCY, reinforces collaborative resilience building and community empowerment. The community perspectives gathered during the FGD reaffirm that the sustainability of the Living Lab is deeply rooted in local ownership. The initiative represents not only an institutional collaboration but also a collective vision shaped by community priorities to enhance resilience and long-term development.

In summary, the Resilience Living Lab serves as a comprehensive model for strengthening community resilience in Hulu Langat. By integrating practical preparedness, knowledge sharing, and social cohesion, it enhances adaptive capacity and promotes intergenerational learning. Although challenges such as youth engagement and site suitability persist, sustained collaboration among communities, NGOs, government agencies, and universities fosters shared ownership and long-term sustainability. The Living Lab ultimately exemplifies how inclusive, community-driven initiatives can build enduring resilience in disaster-prone areas.

Theme 2: Community-Based Learning and Activities

The theme of Community-Based Learning and Activities highlights how local knowledge, collective action, and social networks shape community resilience within the collaboration model. Insights from the FGD show that disaster resilience is inseparable from economic resilience: the ability of Hulu Langat residents to sustain their livelihoods depends on their capacity to anticipate, respond, and recover from recurring floods and landslides.

The interdependence between disaster and economic resilience is reflected in the community's lived realities—particularly in how different income-generating activities are likely shaped, disrupted, and redefined by the recurring natural disasters experienced by Hulu Langat residents. Most households rely on informal or self-employed work—running small businesses, collecting forest produce, or small-scale farming—livelihoods that require adaptability yet are acutely vulnerable to environmental shocks. Income is often irregular, fluctuating according to seasonal demand, weekends or holidays, or the number of orders received. Some residents take on part-time or temporary jobs subject to availability, while others combine irregular paid work with unpaid care responsibilities, such as looking after grandchildren or younger children in their families, to cope with instability. These patterns underscore both the economic precarity and adaptive capacities that characterise local livelihood systems in Hulu Langat.

The extent of this vulnerability becomes clearer when examining how floods directly affect income recovery, as highlighted in the survey data and qualitative accounts in the following section.

1. Livelihood Impacts, Adaptive Strategies, and Support Systems

The economic impacts of flooding are felt most acutely by Hulu Langat's self-employed and informally employed residents. Many rely on small-scale businesses, forest produce collection (e.g., harvesting and selling paku pakis), or bamboo-related activities like making lemang. Others supplement their income through part-time or seasonal work, agricultural labour, or smallholder farming. These livelihood forms reflect both economic ingenuity and fragility—while they offer flexibility and autonomy, they are highly sensitive to environmental disruptions.

Survey responses further illustrate the scale of these vulnerabilities. Among households affected by the December 2021 flood who reported partial or no income recovery, the most common barrier was a lack of credit or savings to restart their livelihoods (12 respondents, 6%), followed by the loss or damage of tools, equipment, and productive assets (nine respondents, 4.5%). Others pointed to reduced customer or market demand (three respondents, 1.5%) or an inability to work due to the health or disability of a household member (one respondent, 0.5%). As one respondent noted in the open-ended section, the loss of all their vehicles meant being forced to be in debt again—showing how even disruptions to mobility can place immediate financial strain on households.[4]

[4] Several survey questions allowed multiple responses; therefore, percentages reported represent the proportion of respondents selecting each option and do not sum to 100%.

Flood events directly undermine these already fragile livelihood systems. Residents with their own businesses or agricultural plots are often the hardest hit, losing equipment, stock, or access to customers when mobility and market linkages are cut off. Plantation areas have been particularly vulnerable, with floods damaging or destroying fruit and rubber trees, leading to significant income loss. For some households, particularly those reliant on crop yields, earnings have become unpredictable—fluctuating with seasonal recovery and replanting cycles.

In the immediate aftermath of floods, income-generating activities are typically suspended as households prioritise recovery. Some participants from the FGD session reported spending the first two to three months cleaning their homes and repairing damaged property before being able to resume work. Those without fixed employment, including individuals depending on zakat assistance or informal caregiving roles, faced prolonged periods of financial strain.

At the same time, several community members suggested ways to strengthen economic resilience through collective initiatives. Among the ideas proposed were establishing a central collection point for local produce, such as paku pakis, to help stabilize prices and broaden market access, and providing skills training for bamboo-based handicrafts that could leverage the area's tourism potential. Such initiatives not only aim to diversify income sources but also to foster stronger community networks and cooperative models of recovery.

Survey findings also highlighted gaps in government, NGO, and community support systems during floods. Nearly half of respondents identified the need for faster response during floods (48%), clearer coordination between agencies (46.5%), and greater transparency in aid distribution (46%). More than one-third emphasised the need for more inclusive support—particularly for women, older persons, persons with disabilities, and migrants (36%). Better communication and clearer information-sharing were also frequently cited (31%). Open-ended responses further raised issues related to kronisme (favouritism), unequal aid distribution, the need for disaster-preparedness training, and providing context-appropriate assistance, such as small fibre boats instead of large vessels. These insights reinforce the concerns raised during the FGD and highlight persistent structural barriers that undermine equitable and effective recovery.

The experiences shared by residents reveal that economic recovery and disaster preparedness are not separate processes but mutually reinforcing ones. Sustaining livelihoods in Hulu Langat depends not only on restoring income-generating activities after floods but also on the community's ability to anticipate, respond to, and recover from such disruptions collectively. Strengthening disaster preparedness through training, coordination, and local knowledge exchange thus becomes a vital form of community-based learning—one that enables residents to protect both their safety and their economic stability.

2. Disaster Preparedness, Community Learning, and Coordination

The FGD session revealed that while external aid and recovery support—particularly from NGOs such as MERCY Malaysia—are available during major flood events, systematic disaster preparedness and training remain limited. Participants recalled that MERCY Malaysia had previously provided emergency assistance, but few were aware of any formal or ongoing training programmes. This aligns with survey findings: although respondents could select multiple sources of preparedness information, only 17% reported participating in community drills or training. Most households rely primarily on their own awareness or past experience (71.5%), while others draw information from friends, family, or neighbours (31.5%), NGOs or community groups (29%), and government channels (25.5%). Only one respondent, through an open-ended response, cited social media as their main source of preparedness knowledge.

Local preparedness therefore tends to depend on informal and individual initiatives, such as the mosque maintaining basic supplies like life jackets, floats, and flashlights, though more comprehensive equipment and coordinated response mechanisms remain lacking. During floods, residents primarily depend on phone alerts and informal communication among neighbours, but these channels often fail when power or phone lines are disrupted. The absence of designated assembly points or formal warning systems, such as sirens, further complicates organised evacuation. Some households have begun building lofts (loteng) to store important belongings, though these are only temporary solutions if water levels continue to rise.

Survey findings also reveal how households and communities transmit flood-related knowledge across generations. The most common method was personal storytelling within the family (52.5%), closely followed by using social media or messaging applications such as WhatsApp and Facebook (52%). Many respondents also share knowledge through community emergency activities or drills (45%), while others were through hands-on demonstrations (23.5%) or recording experiences through notes, photographs, or videos (21%). School-based education was reported by 17.5% of respondents, while sharing knowledge through religious or cultural gatherings was the least common method (16%). These patterns suggest that informal, family-based learning and digital communication remain the primary modes of sustaining disaster-related knowledge in Hulu Langat.

Participants expressed strong interest in more structured and locally grounded preparedness measures. FGD participants suggested practical initiatives such as conducting regular community-based disaster drills, identifying safe gathering points, and providing basic training on caring for vulnerable individuals during emergencies. They also proposed using accessible social media platforms (e.g., TikTok) to disseminate emergency information and raise awareness among younger residents. Survey responses reinforce this demand: 49.5% identified the need for early warning information, 33.5% expressed a need for evacuation assistance, and 23% highlighted the need for a safer neighbourhood

environment. The most frequently identified need was improved drainage or flood protection, cited by 70.5%. Financial support was also important, identified by 29.5% of total respondents. Additional open-ended responses from the survey emphasised needs such as dedicated and strategic assembly points during floods, training for scenarios involving internet or electricity loss during heavy rains or floods, mental health support, and assistance for home protection and repairs.

Effective communication and coordination emerged as central concerns during the FGD. One participant proposed appointing a designated liaison in each village to serve as a direct link with MERCY Malaysia or local authorities, enabling rapid and accurate information-sharing. Such a system would strengthen two-way communication—allowing residents to receive timely updates while providing real-time on-ground feedback to responders.

Participants also noted government efforts, such as river-widening works by the Department of Irrigation and Drainage (JPS), although flooding persists during periods of intense rainfall. Local knowledge continues to serve as an important informal early-warning system and community awareness. Residents routinely monitor river's water levels as an informal indicator of risk, alerting neighbours when it rises above the banks. Some also observe behavioural cues in animals, such as restless pets, which they associate with impending floods. These forms of indigenous and experiential knowledge complement formal systems and could be incorporated more systematically into community-based disaster education.

While some residents living on higher ground perceive themselves as less vulnerable, they also recognise risks such as isolation if key infrastructure, like bridges, is damaged or collapses during floods. This underscores the need for comprehensive preparedness planning that includes all settlements, regardless of perceived risk levels. Youth groups were noted as among the most active during post-disaster clean-up efforts (gotong-royong), highlighting an existing foundation of community solidarity that can be built upon for future training and participatory initiatives.

Overall, the discussions highlight that strengthening community-based activities is central to enhancing disaster preparedness and long-term resilience. Participants identified practical steps such as establishing community collection centres, organising disaster management training, reintroducing warning systems, and sharing timely information through accessible digital platforms. While one participant noted that initial participation may be limited, this often reflects the need for stronger relationship-building and trust between residents, local leaders, and implementing organisations.

Strengthening collaboration with Ketua Kampung and fostering a sense of ownership among residents from the outset would encourage more meaningful and sustained community engagement. Ultimately, resilience in Hulu Langat depends not only on technical preparedness but also on the community's capacity to learn collectively, mobilise local knowledge, and sustain cooperative efforts rooted in shared responsibility.

Theme 3: Livelihood Support & Development

Livelihood support and development for communities affected by disasters should be approached holistically. Their resilience, both after floods and in preparation for future disasters, should not be assessed solely based on financial aid, but through a comprehensive understanding of how their capacities, resources, and coping strategies can be strengthened. This approach is also important to reduce vulnerability to future disasters, particularly as Hulu Langat is known to be a flood-prone area. In response to this vulnerability and high disaster risk, MERCY Malaysia aims to implement strategies to strengthen community resilience through a participatory development approach, ensuring that interventions are aligned with the specific needs, capacities, and priorities of the community.

These strategies: Upskilling for Small Business Development (SMEs), Women's Side-Income Generation, and Community-Based Ecotourism (CBET) Support. Prior to implementing these initiatives, relevant information was gathered to ensure that the community context, needs, and capacities were thoroughly understood. This will provide Mercy Malaysia with the evidence base required to design and implement programmes and activities that are appropriate, sustainable, and aligned with the long-term development priorities of the communities.

1. Small Business Development and Capacity Building

Small-scale entrepreneurship plays a crucial role in sustaining livelihoods in Hulu Langat, with community members engaging in diverse economic activities that reflect both traditional practices and market-driven strategies. FGD insights reported that many members of the Orang Asli communities are involved in small-scale agriculture and in selling produce and forest-collected goods, including rubber. Concurrently, the Orang Asli communities in Kampung Gabai have begun collecting fees from visitors to natural sites, reflecting an emerging strategy to generate income from eco-tourism and leverage their local natural resources for community livelihood.

Beyond the Orang Asli, most of the wider Hulu Langat communities are also involved in small-scale businesses, particularly in food-related ventures such as catering services, and sales of items like cakes, pastries, and frozen foods, often combined with packaging and delivery services. These activities highlight how micro-enterprises are a lifeline for many families.

Yet, despite this vibrant economic activity, challenges remain. Access to commercial spaces is sometimes restricted by local procedures. For instance, conducting business at Batu 18 requires approval from the village chief, which has limited opportunities for entrepreneurs from outside the Batu 18 community. Environmental factors, such as flooding, also disrupt business activities. At Batu 20, a business area that had served as a hub for selling goods and running community enterprises was forced to close after flood

damage. These realities point to the importance of resilient infrastructure that can support stable and organized business activities and training.

The findings point to considerable potential for community led business development, with participants expressing interest in cooperative or collective business models. They highlighted that such approaches are valuable for knowledge sharing and skill development among communities across different areas. The identified need for targeted skills development in business management, marketing, and operations, particularly among youth and emerging entrepreneurs, underscores gaps in capacity that could limit enterprise sustainability and productivity.

Survey data further contextualizes these insights. Only 18 (9%) of respondents expressed interest in training related to upskilling their business, while 28 (14%) indicated no interest and 154 respondents (77%) did not respond. Focusing on development, 72 respondents expressed a desire for training or career opportunities, whereas 128 respondents did not provide an answer, highlighting both a clear interest among a segment of the community and the potential to engage those who are currently unresponsive through targeted outreach. Collectively, these findings suggest that strategically designed, community focused interventions could enhance livelihood resilience, enterprise performance, and micro enterprise sustainability across Hulu Langat.

Overall, the discussions highlight a clear and growing interest in small and medium sized enterprises among communities in Hulu Langat. Residents are not only actively engaged in micro businesses but are also eager to explore new opportunities, including cooperative ventures and formalized commercial spaces. There is a strong desire to develop skills in business management, marketing, and operations, particularly among youth and emerging entrepreneurs. This interest reflects the community's commitment to strengthening livelihoods, increasing economic resilience, and creating sustainable sources of income through small scale enterprises.

2. Women's Economic Empowerment

Women are key contributors to household income, particularly through small businesses and traditional livelihoods. In Batu 20, for instance, few FGD participants are engaged and operate a small enterprise selling traditional kuih-muih, providing packaging services and frozen food preparation. Among all survey participants, 57% are women of whom 41% are unemployed, eight are widowed, and 11 are divorced or separated. Analysis of personal income shows that 52 women earn below RM 500, 51 earn between RM 500 and RM 2,500, five earn between RM 3,000 and RM 4,500, and six earn beyond RM 5,000. These highlight that women-led households are disproportionately represented in lower-income brackets, underscoring the need for targeted interventions to enhance economic resilience and social empowerment.

In recognition of this gap, the representative of the Ketua Kampung in Batu 20 recommended the establishment of a women's livelihood centre. Given that individual capacity is limited, a shared community space was suggested to consolidate participants, creating a proposed one-stop centre. This interconnected approach would bring together resources, training, and support mechanisms to facilitate income generation, promote entrepreneurship, strengthen skills, and foster community cohesion. By linking women's existing livelihood activities with structured support, the initiative has the potential to empower women economically, improve household welfare, and contribute to the long-term sustainability of local livelihoods.

The establishment of a women's livelihood centre represents a strategic and sustainable investment in the economic empowerment of women in Hulu Langat. By providing a centralized platform for skills development, collaborative support, and income-generating activities, the initiative will strengthen household welfare and enhance community resilience. Women are among the most vulnerable during disasters, facing unequal access to resources and recovery support (UN Women, 2021). By investing in their capacities, the centre not only addresses immediate economic needs but also builds long-term disaster-resilient communities.

3. Community-Based Ecotourism (CBET) and Environmental Concerns

Community-Based Ecotourism (CBET) is a strategy aimed at balancing ecosystem preservation with community development. Hulu Langat, located near Kuala Lumpur and known for its variety of natural attractions, is well-suited for nature-based activities, making it a popular destination for ecotourism. It offers a convenient weekend retreat for working individuals to engage in outdoor recreational activities. Insights from FGDs indicate that in Kampung Gabai, residents generate income by charging parking fees at the Sungai Gabai recreational site, and there are plans to transform a recently cleared former waste disposal site into a tourism centre with cottages and business stalls for visitors.

FGD participants also discussed community activities and expressed strong interest in establishing a community cooperative. The cooperative is expected to support the organization of economic activities, enhance bargaining power, and strengthen income opportunities. The participants supported this idea, viewing it as a way to improve coordination, reduce dependence on external systems, and ensure more equitable participation in economic initiatives.

However, the study also identifies potential environmental risks associated with ecotourism development. The majority of Ketua Kampung expressed concerns about possible negative impacts on local ecosystems, as campsites and chalets are unregulated and lack proper waste management practices, with some visitors even operators disposing of waste in areas such as Batu 18, which had been cleared on 5 September 2025. These challenges not only threaten ecosystem preservation but could also generate conflicts and increase the risk of

environmental hazards. At Batu 20 and 21, waste management challenges remain unresolved and are currently under implementation. Most operators are unregulated and lack proper waste management systems, and there is no designated place for waste disposal. This poses environmental risks, which are further exacerbated during disasters, highlighting the need for a better waste management system, as indicated by 88 respondents (44%).

Survey data from community respondents further underscores these concerns. In particular, perceptions regarding the impacts of unregulated tourism reveal strong agreement that such activities threaten the environment and increase hazard risks.

- Of the 200 respondents, 92 agreed that unregulated tourism impacts the environment (including 50 who strongly agreed), while 79 disagreed and 29 remained neutral, indicating mixed but generally positive awareness of environmental risks.
- Half of the respondents, 85, agree that unregulated tourism increases hazard risks, while 85 disagree and 30 remain neutral, showing a closely divided awareness of potential hazards.

Overall, CBET in Hulu Langat offers valuable opportunities for community income and development, particularly through cooperatives and local tourism initiatives. However, unregulated activities and inadequate waste management pose environmental risks and increase hazard vulnerabilities. Strengthening community capacity through cooperatives, awareness campaigns, and participatory management can ensure that tourism development provides sustainable income opportunities while safeguarding the environment and reducing disaster risks, including training for operators on sustainable waste practices.

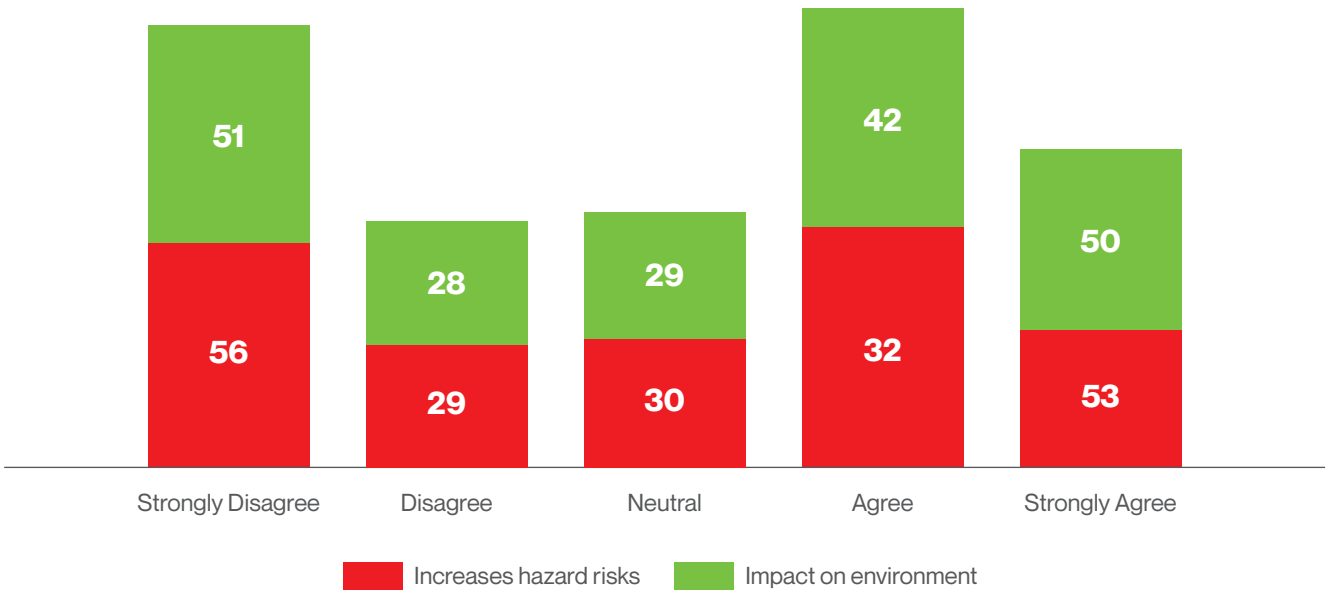


Figure 26: Impact of unregulated tourism activities.

Theme 4: Nature-based Solutions (NbS) for Disaster Risk Reduction (DRR)

Flooding remains one of the most pressing challenges in Malaysia, where conventional engineering approaches such as dams, levees, and drainage systems have proven insufficient under the pressures of climate change and rapid land-use conversion (Abid et al., 2024). Communities are often the first responders, relying on local knowledge and collective action, which underscores the importance of community-based and nature-based mitigation strategies. Recognising these limitations, MERCY Malaysia has promoted NbS, particularly bamboo planting and the conservation of native vegetation. These measures strengthen riverbanks, reduce erosion and contribute to long-term resilience. To ensure relevance and local ownership, MERCY Malaysia engaged with communities in Hulu Langat through community key informant interviews and FGDs.

The discussions revealed several key insights from community members and local leaders. The Ketua Kampung of Batu 21 noted that the riverbanks along Sungai Lui and Sungai Pangsun are highly erosion-prone, with floods typically occurring twice a year but becoming increasingly unpredictable due to changing weather patterns. Community participants further explained that continuous rainfall exceeding two hours can erode 10–15 feet of soil along riverbanks. This process widens the rivers and makes them shallower, significantly reducing their water-holding capacity and increasing flood risk. In Batu 20, residents highlighted that the construction of high retaining walls has unintentionally exacerbated flash floods by blocking the river's natural flow. They also emphasised that when intense rainfall occurs in Hulu Langat, particularly along Sungai Lui and Sungai Pangsun, floodwaters often accumulate and move downstream towards Pekan Batu 18, affecting settlements such as Kampung Jaya.

Participants also expressed concerns over land clearing on hillslopes, with 46.5% agreeing that unregulated tourism activities such as homestays and campsites harm the environment, including 21% who strongly agree. Similarly, 44.2% agreed that such unregulated operations increase hazard risks, with 16.1% strongly agreeing that these activities contribute to worsening floods and landslides. The community explains that the lateritic soil common in Hulu Langat is inherently unstable and, when exposed by deforestation or development, becomes highly prone to erosion and landslides. Reflecting on ways to reduce these risks, respondents identified stricter enforcement, with 120 respondents, as the top priority, followed by better environmental management, with 94 respondents, signalling strong support for clearer regulation and improved oversight of tourism-related development.

These insights reflect a strong local understanding of both structural and environmental drivers of flood risk, underscoring the importance of integrating technical flood management with community-led, nature-based approaches. Through participatory mapping during the FGDs, community members further identified, based on their shared observations, potential intervention areas such as Sungai Lui, Sungai Pangsun and Kampung Jawa, where riverbank vegetation restoration and bamboo planting were viewed as effective measures to strengthen slope and watershed stability.

1. Local Knowledge on Vegetation and Flood Mitigation

Following the major 2021 flood in Hulu Langat, the MERCY Malaysia team observed that several houses in Batu 21 remained undamaged. Further assessment revealed that these houses were located on slightly elevated terrain and surrounded by natural vegetation, particularly bamboo, which likely helped to reduce floodwater energy. FGDs were conducted to better understand community perspectives on this observation and to integrate local ecological knowledge in identifying effective NbS for flood mitigation.

Findings from the FGDs indicate that community members possess a clear understanding of vegetation dynamics in relation to flood mitigation. Participants recognised that areas without plant cover are more susceptible to erosion, demonstrating awareness of the stabilizing function of root systems in maintaining soil structure. Bamboo was identified as an important species for enhancing riverbank stability and regulating surface runoff through its dense root network and capacity to retain soil moisture. Species such as Buluh Aur (*bambusa vulgaris*) and Buluh Betong (*dendrocalamus asper*) were identified as the most resilient species in wet and riverine areas due to their strong root systems and tolerance to prolonged inundation. These insights highlight the community's species-specific knowledge that can inform the application of nature-based solutions for flood and erosion control.

Figure 27: Houses in Batu 21 that were lightly damaged during the 2021 flood. The area's elevated ground and surrounding bamboo vegetation are believed to have contributed to reducing flood impact.

The discussion suggested that earlier tree-planting initiatives were not implemented, possibly due to limited technical guidance and uncertainty about suitable species for erosion control. Observations from the 2021 flood, where several Buluh Aur stands were uprooted, underscored the importance of site selection, planting density, and species resilience in ensuring the long-term effectiveness of vegetation-based flood mitigation. Some participants viewed tree planting as less practical than sand extraction, which provided immediate and visible results. This preference reflects a short-term response to flood risks and indicates the need for greater community awareness and technical support to strengthen understanding of the long-term benefits of ecological restoration.

An Orang Asli representative, proposed planting Kekabu Hutan (*ceiba pentandra*), also known as the silk-cotton tree, which had remained standing during major flood events. Its extensive root system and tolerance to inundation suggest potential as a resilient native species for flood-prone areas such as Kampung Paya Lebar. This local insight demonstrates the value of indigenous ecological knowledge in identifying suitable species for restoration and emphasizes the importance of integrating community perspectives into site-specific, nature-based strategies for flood management and landscape resilience.

2. Integrating Scientific Evidence and Local Knowledge for Nature-Based Flood Solutions

Scientific studies in Malaysia have shown the important role of vegetation, especially bamboo, in stabilising riverbanks and reducing flood risks. Abdullah et al. (2020) found that bamboo root systems enhance soil shear strength and reduce surface runoff, making them effective for slope and riverbank protection in humid tropical areas. Nadzri et al. (2021) reported that mixed-vegetation buffers along river corridors in Selangor improved water infiltration and reduced sediment loss during heavy rainfall. Similarly, Shah et al. (2022) highlighted that native bamboo species such as Buluh Aur (*bambusa vulgaris*) and Buluh Semantan (*gigantochloa scortechinii*) have high tensile root strength, which helps control erosion and increase soil cohesion in flood-prone zones.

These findings align with observations by MERCY Malaysia and the community's understanding developed during the FGDs, where discussions highlighted how bamboo-dominated vegetation helps reduce flood impacts and maintain riverbank stability. Through these exchanges, participants recognised that native bamboo and deep-rooted trees play an essential role in stabilising slopes, maintaining soil cohesion, and slowing floodwater movement. Below the illustration shows how bamboo acts as a NbS for riverbank protection. Its strong and wide root system helps hold the soil together, reduces erosion, and stabilizes the riverbanks. Bamboo also improves water absorption and helps slow down floodwater, supporting better soil and water management.

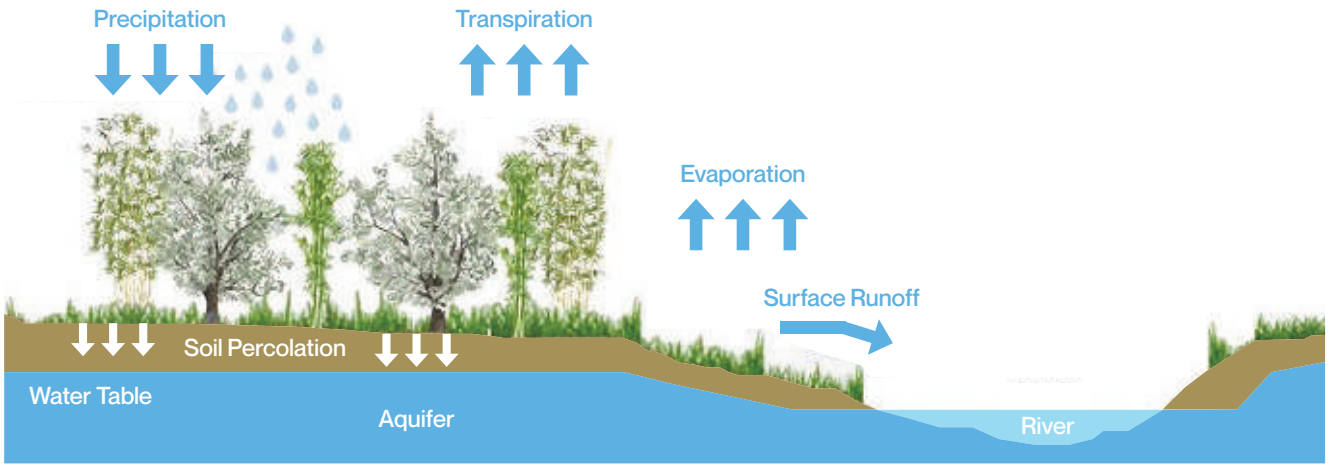


Figure 28: Conceptual illustration of bamboo as a nature-based solution, demonstrating its role in soil stabilization, erosion control, and floodwater management along riverbanks.

Combining scientific evidence with local knowledge offers a practical approach to developing effective NbS. Integrating community insights on species suitability, land-use history, and water flow with technical understanding of vegetation and soil dynamics can make NbS initiatives more relevant and sustainable. This approach ensures that interventions are scientifically sound, socially supported, and environmentally adaptive, strengthening community resilience and reducing disaster risks.

In addition, for this initiative to succeed in the long term, strong advocacy and community capacity building are essential. During the FGDs, local residents expressed that they are capable of managing bamboo planting projects with the support of the JPKK. However, the Ketua Kampung Batu 18 highlighted the need for guidance and collaboration during the initial phase to ensure proper technical implementation and maintenance practices. In this phase, bamboo planting can be implemented through collaboration between MERCY Malaysia, Universiti Putra Malaysia (UPM), and the Kajang Municipal Council (MPKj) under the "Sungai Angkat" programme, with active participation from community members. After the establishment phase, the Ketua Kampung mentioned that the village committee can be responsible for the ongoing maintenance and monitoring of the project.

In conclusion, this demonstrates how combining scientific evidence with community-driven action can create sustainable, locally owned solutions that enhance long-term flood resilience in Hulu Langat. By empowering communities to take an active role in planning, implementation, and monitoring, NbS initiatives not only address environmental risks but also strengthen social cohesion, local capacity, and stewardship of natural resources for future generations.

Figure 29: Bamboo forests protect rivers and their ecosystems by regulating the quantity and quality of water. It also helps add value to the community by enhancing environmental and lifestyle quality.

RECOMMENDATIONS

To summarize, based on the findings, this framework presents the community's recommendations to guide implementation and inform considerations for programme design. It visualizes integrated community insights and strategies across four thematic areas, anchored by core enablers: an inclusive and participatory approach, multi-stakeholder collaboration, and knowledge integration with adaptive learning. This framework serves as a guide for implementing programmes, designing interventions, and considering local contexts to effectively enhance community resilience.

Figure 30: Hulu Langat Resilience Living Lab's framework recommendation.




EXPERIENTIAL LEARNING LIVING LAB FACILITIES

- Multifunctional facilities for disaster preparedness education, knowledge sharing and community activities.
- Youth-focused activities to promote co-ownership and participation.
- Flood-resilient infrastructure and adaptable design.

COMMUNITY-BASED LEARNING AND ACTIVITIES

- Regular community disaster drills and preparedness trainings.
- Community-based early warning system (CBEWS) and safe assembly points.
- Collective knowledge transfer (storytelling, social media, school programs).
- Coordinated and inclusive disaster response and recovery.

LIVELIHOOD SUPPORT AND DEVELOPMENT

- Small businesses capacity building (business management, sales and marketing, cooperative models).
- Women's livelihood centres for economic empowerment and skills development.
- Community-based ecotourism (CBET) program with environmental safeguards and proper waste management.

NATURE-BASED SOLUTIONS (NbS) FOR DRR

- Bamboo and native vegetation planting along riverbanks and slopes.
- Community-led implementation and monitoring.
- Integration of scientific guidance with local knowledge.
- Policy and regulatory support for environmental management and risk reduction.

MERCY MALAYSIA IN HULU LANGAT

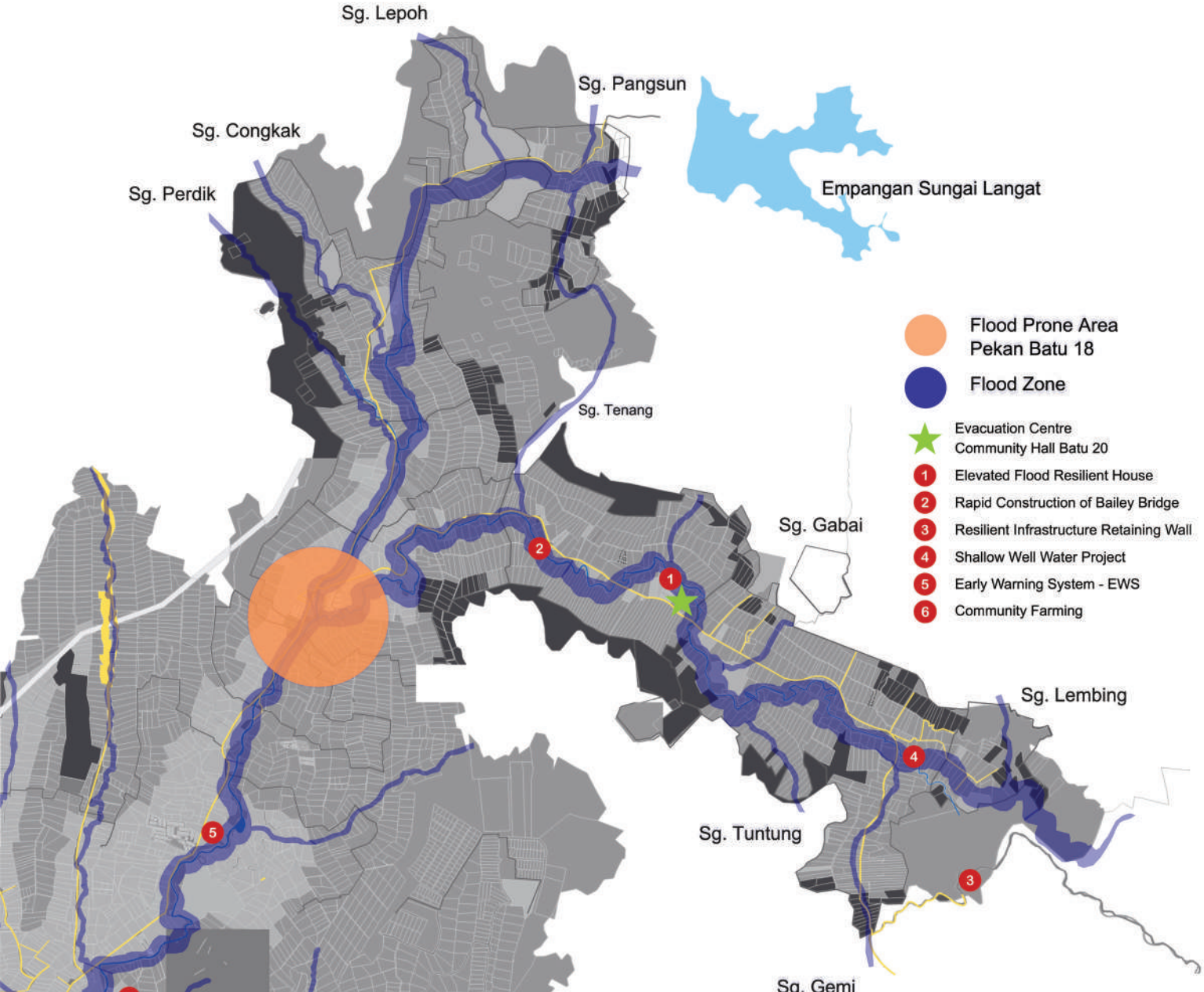


Figure 30: Locations of MERCY Malaysia's initiatives and programs across Hulu Langat since 2021.

MERCY Malaysia has maintained a sustained and multi-dimensional presence in Hulu Langat, particularly following the catastrophic 18 December 2021 floods that caused widespread destruction across Batu 18–21, Sungai Lui, and multiple Orang Asli settlements.

Guided by the Humanitarian–Development Nexus, MERCY Malaysia's interventions span emergency response, technical rehabilitation, community-based resilience, and long-term ecosystem restoration. These efforts were implemented in close collaboration with government agencies, academic partners, private sector contributors, and local communities, forming a holistic resilience ecosystem that continues to evolve.

Construction of Resilient Housing and Shelter Support

Post-disaster assessments conducted by MERCY Malaysia identified 59 homes requiring repair or reconstruction. Two flagship shelter interventions were delivered:

MERCY Malaysia constructed a flood-resilient, elevated brick house (775 sq ft, RM80,000) built eight feet above ground level to withstand future flood events, and rebuilt a fully reinforced brick home for another flood survivor.

Additionally, in Kampung Orang Asli Paya Lebar, MERCY Malaysia constructed two temporary wooden houses (RM21,600 each) for families whose homes were completely destroyed. These shelters provided immediate safety and restored dignity for affected households.

Ensuring Access to Clean Water and Sanitation (WASH)

To address chronic water shortages and post-flood contamination, MERCY Malaysia implemented WASH projects across several Orang Asli settlements, including Sungai Leweng, Sungai Pagar, and Sungai Jenarek. Key interventions included:

1. Construction and rehabilitation of gravity-fed water systems supplying 120 families in Sungai Pagar and 20 families in Sungai Jenarek.
2. Installation of new pipelines, replacement of intake filters, and repair of existing distribution networks.
3. Introduction of horizontal collector wells as an alternative clean water source for communities facing severe water scarcity.

These initiatives improved daily living conditions, reduced waterborne disease risks, and strengthened community-level water management capacity.

Livelihood Recovery and Economic Resilience

Recognising the severe economic impact of the floods, MERCY Malaysia supported livelihood restoration through targeted assistance:

1. Reconstruction of a food stall, which was swept away by floodwaters. MERCY Malaysia provided construction materials and technical support to rebuild a stronger, larger stall (10m × 6m), enabling the beneficiary to resume income generation and increase earnings from RM1,500 to RM3,500 per month.
2. Engagement with communities on future livelihood strategies, including women-led enterprises, small business development, and community-based ecotourism.

These interventions helped restore income streams, reduce economic vulnerability, and promote long-term resilience.

Community Engagement, Learning, and Capacity Building

MERCY Malaysia facilitated extensive community engagement through:
1. Focus Group Discussions across Batu 18, Batu 20, Batu 21, and Orang Asli villages
2. Participatory risk assessments, PDNA exercises, and community mapping
3. Collaboration with MJIIT-UTM to deliver the Resilience Living Lab, integrating technical expertise, local knowledge, and experiential learning

These activities strengthened community ownership, enhanced disaster literacy, and laid the foundation for a long-term Resilience Living Lab Master Plan.

Community Gardening and Nature-based Solutions (NbS) Programme in Sri Nanding

In partnership with The Habitat Foundation, MERCY Malaysia is implementing an Eco-DRR (Ecosystem-based Disaster Risk Reduction) programme in Kampung Nanding. Supported under The Habitat Foundation's Sustainability Grant 2024, the initiative integrates NbS with community gardening to reduce disaster risks and rehabilitate degraded landscapes.

Key activities include:
1. Establishment of community kitchen gardens and edible landscaping to stabilise soil and enhance food security
2. Riverbank and slope rehabilitation using native vegetation and bamboo
3. Environmental education on watershed health, composting, and sustainable land-use
4. Community co-design and stewardship to ensure long-term maintenance and ownership

This programme demonstrates how community-driven NbS can complement structural flood mitigation works and strengthen climate resilience in peri-urban settings.

Other complementary preparedness interventions included the distribution of essential disaster preparedness items to flood-affected households, reinforcing community readiness amid recurring flood risks driven by climate change. These efforts position MERCY Malaysia as a long-term resilience partner, operating alongside state-led flood mitigation and adaptation projects in Hulu Langat.

CONCLUSION

This study serves as a key component of the Resilience Living Lab Hulu Langat, aimed at understanding community needs and vulnerabilities, and embedding these insights into programme design and implementation. Hulu Langat is a flood-prone area with accompanying landslides, frequently impacted whenever heavy rain persists. The community is diverse, with many residents self-employed or running their own businesses, while others are unemployed or engaged in informal, irregular work.

The findings highlight notable differences in livelihood opportunities, education levels, and disaster preparedness between the Orang Kampung and Orang Asli communities. Most participants in this study were women, and some either live with disabilities themselves or care for family members with disabilities, underscoring intersecting vulnerabilities.

Across all four thematic areas, the findings demonstrate that resilience in Hulu Langat is rooted in community strength—their shared knowledge, adaptive capacities, and long-standing practices of collective community support that enable people to support one another during and after disasters.

Despite these strengths, residents continue to face recurring challenges that re-emerge with every major flood—unstable livelihoods, gaps in preparedness systems, and environmental pressures intensified by unregulated development. These challenges are compounded by limited access to formal support structures, uneven service delivery, and the cumulative impacts of climate variability, all of which heighten the urgency for coordinated, long-term solutions.

While communities rely heavily on one another, this reliance alone is not adequate when devastating floods and landslides occur multiple times a year and repeatedly erode their progress. Community resilience alone is not enough when devastating floods and landslides occur repeatedly throughout the year and can un-do hard-earned progress. This highlights the need for meaningful structural changes, such as coordinated institutional support, inclusive policies, improved infrastructure, and stronger environmental governance, to allow communities not only to recover, but to thrive.

The thematic findings above already outline the community-driven strategies and priorities that can guide such changes. All in all, they reaffirm that sustainable resilience must be built through a combination of community leadership and supportive systems that recognise, respect, and build upon local knowledge and experiences. These insights provide a grounded foundation for shaping interventions that are inclusive, context-specific, and responsive to the lived realities of Hulu Langat's residents.

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APPENDICES

Appendix 1: Research Assistant Criteria

CRITERIA: RESEARCH ASSISTANT (RA)

These criteria serve as a guideline for the selection of Research Assistants (RAs) from the Hulu Langat community, specifically to support the implementation of the *Comprehensive Study on Community Demographics, Post-Disaster Needs, Risk and Resilience Assessment, and Programme Feasibility*. The purpose of these criteria is to ensure that selected individuals can carry out their responsibilities effectively, ethically, and in a manner that is appropriate to the context and needs of the local community. Selection will be inclusive and unbiased, avoiding preference based on ethnicity, religion, gender, or political affiliation to ensure fair community representation.

The criteria are as follows:

Category	Criteria
Origin & Local Knowledge	A local resident/native of Hulu Langat (Has in-depth knowledge of community issues especially on flood)
Communication and Reading Skills	Able to communicate effectively and read with sufficient understanding to conduct and support Focus Group Discussions (FGDs).
Community Trust	Known and trusted by the local community, with no conflict of interest or history of disputes, and an understanding of local sensitivities.
Professionalism & Ethics	Maintains confidentiality, does not misuse personal information, and remains neutral during data collection, with the ability to navigate potential conflicts ethically.

Appendix 2: Research Assistant Contract

KONTRAK PERKHIDMATAN RAKAN PENYELIDIK

Rakan Penyelidik *(Research Assistant, RA)* Sukarela

Pasukan perunding bebas (Independent Consultant) dengan kerjasama MERCY Malaysia dengan ini melantik _____ sebagai Rakan Penyelidik (RA) bagi projek Kajian Komprehensif Mengenai Demografi Komuniti, Keperluan Pasca Bencana, Penilaian Risiko dan Ketahanan, serta Kebolehlaksanaan Program di Hulu Langat.

Gambaran Keseluruhan

Rakan Penyelidik Sukarela (VRA) akan menyokong pasukan perunding bebas dalam menjalankan penyelidikan, khususnya aktiviti pengumpulan data, memberi maklum balas selepas sesi dan penyebaran dapatan.

Usaha ini merupakan sebahagian daripada projek *Resilient Living Lab Hulu Langat* oleh MERCY Malaysia, iaitu satu inisiatif berwawasan ke hadapan yang memberi tumpuan kepada pembinaan ketahanan komuniti, mempromosikan pembangunan yang peka terhadap risiko, dan menggalakkan pemerkasaan yang mampan. Dengan menggabungkan penyelidikan, pendidikan, dan tindakan di lapangan, projek ini melibatkan komuniti tempatan secara aktif dalam mencipta penyelesaian bersama untuk pengurangan risiko bencana, kelestarian alam sekitar, dan adaptasi perubahan iklim.

Tanggungjawab Utama dan Hasil Kerja:

Setelah dipersetujui bersama, Rakan Penyelidik (RA) akan:

1. Bertindak sebagai penghubung antara pasukan perunding dan komuniti rentan yang berkepentingan, mewakili komuniti tersebut dalam projek penyelidik
2. Menguruskan, merekrut peserta dan menjalankan perbincangan kumpulan berfokus (FGD) selaras dengan latihan dan garis panduan yang disediakan
3. Merekrut peserta berdasarkan kriteria yang telah ditetapkan oleh pasukan perunding.
4. Melibatkan diri dalam sesi latihan melaksanakan FGD, sesi maklum balas selepas sesi dan perkongsian pengetahuan jika perlu
5. Membantu dalam menyebarkan survei kepada target komuniti

Tempoh

Kontrak ini akan berkuat kuasa dari 1 September 2025 hingga 31 October 2025.

Sepanjang tempoh ini, mana-mana pihak boleh menamatkan Perjanjian Perkhidmatan Sukarelawan dengan memberikan notis bertulis selama DUA (2) minggu.

Pihak Pasukan Perunding berhak untuk menamatkan perjanjian sukarelawan ini atas sebab-sebab berikut:

1. Anda telah melanggar Nilai Teras atau Kod Etika Pasukan Perunding, termasuk tingkah laku tidak profesional, diskriminasi, gangguan, atau sebarang tindakan yang boleh menjejaskan reputasi Pasukan Perunding.
2. Anda didapati mengambil dadah atau memiliki dadah yang terlarang
3. Anda telah melanggar kerahsiaan dengan berkongsi maklumat sulit dan peribadi milik peserta, menggunakan data peserta untuk kepentingan peribadi tanpa kebenaran Pasukan Perunding, serta meminta bayaran tambahan daripada klien bagi perkhidmatan yang tidak dibenarkan oleh pasukan.

Elaun Sukarelawan

Pihak Pasukan Perunding bersetuju untuk memberikan elaun berdasarkan jadual berikut, mengikut hasil utama (key deliverables) yang telah dilaksanakan oleh Rakan Penyelidik (RA):

Peranan dan tanggungjawab	**Elaun**
Menghadiri latihan pra perbincangan kumpulan berfokus (FGD)	RM50
Merekrut dan menjalankan FGD secara bersemuka.	RM150

Sila ambil maklum bahawa **tiada kos tambahan akan ditanggung melebihi jumlah yang telah dipersetujui.** Pembayaran akan dibuat melalui pemindahan dalam talian oleh Pasukan Perunding dalam tempoh satu hingga dua minggu selepas penyiapan tugasan sebagai Rakan Penyelidik. Elaun akan dibayar kepada pemegang peranan melalui pindahan bank berdasarkan maklumat berikut:

Nama:
Nombor Akaun:
Bank:

Kerahsiaan:

Pemegang peranan dikehendaki untuk menganggap semua maklumat yang diperoleh sepanjang tempoh perkhidmatan sebagai sulit dan hanya menggunakannya bagi tujuan melaksanakan tanggungjawab yang diberikan, bukan untuk kepentingan peribadi. Maklumat peribadi peserta tidak boleh disimpan atau direkodkan dalam apa jua bentuk

DITANDATANGANI DAN DIPERSETUJUI oleh:

…….
Nama:
Jawatan:
Tarikh:

…….
Nama:
Kad Pengenalan:
No telefon:
Tarikh

Appendix 3: Guided Questions for FGD

Sesi 1: Perbincangan secara umum

Bil	Soalan
1	Ceritakan pengalaman anda semasa banjir 2021, apa yang paling anda ingat dan tidak lupa?
2	Apakah perkara yang paling mencabar selepas banjir? (cth: baik pulih rumah, mencari punca rezeki, persekolahan anak, kesihatan)
3	Apa perkara atau sokongan yang paling membantu anda dan keluarga untuk bangkit semula?
4	Bagaimana komuniti saling membantu pada masa itu? Ada contoh cerita gotong-royong atau sokongan jiran?
5	Apa erti “daya tahan” bagi anda? Bila anda rasa paling kuat atau paling lemah selepas banjir?
6	Jika pengalaman anda dijadikan komik atau pameran, apakah mesej utama yang patut disampaikan?

Sesi 2: Perbincangan Kumpulan Berfokus Mengikut Tema

Tema 1: Experiential Learning Living Lab Facilities / Kemudahan Pusat Pembelajaran / Living Lab

Konteks	Soalan Utama	Soalan Probing
Kemudahan Makmal dan Infrastruktur Sokongan	1. Apakah pandangan anda tentang idea mewujudkan Makmal Hidup (Living Lab) di kampung ini? 2. Apakah cabaran utama jika kemudahan ini diwujudkan? 3. Siapa yang anda fikir sesuai menjadi rakan kerjasama (contohnya universiti, agensi kerajaan, NGO)?	1. Bagaimanakah anda rasa pusat ini boleh memberi manfaat kepada penduduk kampung? 2. Jika pusat ini dibina, kemudahan apa yang paling berguna? (cth: bilik latihan, ruang pameran, sudut pembelajaran kanak-kanak, arkib digital) 3. Adakah lokasi cadangan sesuai untuk semua? a. Jika ada koperasi untuk mengurus pusat ini, adakah anda percaya ia boleh berjaya? Apa syarat yang perlu ada untuk anda sertai? b. Ciri-ciri apakah yang boleh menjadikan kemudahan ini lebih mesra, mudah diakses dan selamat untuk semua golongan (termasuk kanak-kanak, warga emas, wanita, OKU)? 4. Bahasa atau media apa yang paling mudah untuk anda fahami untuk tujuan pembelajaran di Hulu Langat? (cth: Bahasa Melayu, komik, video, pameran visual) 5. Bagaimanakah anda ingin cerita atau pengalaman banjir 2021 di Hulu Langat didokumentasikan? (secara lisan, gambar, video, komik)
Komunikasi Visual & Reka Bentuk	1. Bahasa apa yang paling sesuai digunakan dalam bahan pembelajaran atau penyebaran maklumat di kampung ini? 2. Apakah sumber maklumat yang biasa digunakan oleh penduduk? 3. Apakah bentuk visual atau media yang paling mudah difahami (contohnya poster, video, komik, infografik)?	1. Adakah anda pernah terdedah kepada maklumat yang mengelirukan atau tidak tepat? 2. Bagaimana maklumat boleh disampaikan dengan lebih jelas kepada warga muda, wanita, atau warga emas?

Dokumentasi & Penerbitan	1. Apakah jenis cerita atau naratif komuniti yang sudah ada di kawasan anda (sejarah, pengalaman banjir, tradisi)? 2. Dokumentasi atau rakaman seperti apa yang berguna untuk dikongsi semula bagi pembelajaran atau dasar?	1. Bagaimana anda mahu kisah komuniti Hulu Langat didengar oleh pihak luar? 2. Apakah medium terbaik untuk menyampaikan cerita komuniti — tulisan, video, pameran, atau lain-lain?
Platform Digital (Laman Web & Media Sosial)	1. Apakah tahap literasi digital dalam kalangan komuniti di sini? 2. Kumpulan mana dalam komuniti yang ada pengetahuan atau kemahiran untuk mengurus platform digital? 3. Bagaimana akses digital untuk wanita, belia, dan Orang Asli di kampung ini?	1. Apakah peranti atau rangkaian internet yang biasa digunakan? 2. Bagaimana memastikan maklumat sampai juga kepada mereka yang kurang akses digital?
Penubuhan Koperasi	1. Adakah komuniti berminat menubuhkan koperasi untuk menyokong projek ini? 2. Adakah sudah wujud kumpulan atau organisasi di kampung yang boleh dijadikan asas untuk koperasi? 3. Apakah jenis latihan atau sokongan kapasiti yang diperlukan untuk menjayakan koperasi ini?	1. Apakah faedah utama koperasi kepada anda atau keluarga anda? 2. Apa cabaran yang anda bayangkan jika koperasi ditubuhkan?

Tema 2: Community-Based Learning & Activities / Pembelajaran & Aktiviti Berasaskan Komuniti

Konteks	Soalan Utama	Soalan Probing
Pembangunan Mata Pencarian Tahan Lasak Komuniti (Community Resilient Livelihood Development)	1. Apakah sumber pendapatan utama komuniti pada masa ini? 2. Adakah terdapat perubahan bermusim dalam peluang pekerjaan atau pendapatan? 3. Dalam 5 tahun kebelakangan ini, adakah pendapatan anda terjejas akibat banjir atau bencana lain? 4. Apakah bentuk sokongan yang paling diperlukan untuk mengukuhkan mata pencarian komuniti?	1. Apakah strategi atau cara yang biasanya anda gunakan apabila banjir menjejaskan pendapatan (contohnya simpanan, kerja sampingan, bantuan luar)? 2. Pada pandangan anda, program atau latihan apa yang paling sesuai untuk menjadikan pendapatan lebih berdaya tahan terhadap bencana? 3. Apakah jenis kemahiran baru yang paling diperlukan (contohnya pertanian moden, pemasaran, kemahiran digital)? 4. Waktu dan lokasi mana yang paling sesuai untuk anda sertai latihan atau program? 5. Siapa yang sesuai dijemput sebagai jurulatih atau rakan kerjasama (contohnya agensi kerajaan, NGO, universiti)?
Pengurangan Risiko & Pengurusan Bencana (Disaster Risk Reduction and Management)	1. Bagaimana anda menilai tahap kesedaran dan persediaan komuniti dalam menghadapi bencana? 2. Apakah pengetahuan atau amalan tradisional yang digunakan untuk menghadapi banjir atau bencana lain? 3. Adakah sistem amaran awal (early warning system) digunakan di kampung ini?	1. Pada kebiasaannya, bagaimana anda tahu bila banjir akan berlaku? 2. Siapa selalunya yang memberi amaran atau mengkoordinasikan persediaan? 3. Apakah cabaran utama yang dihadapi komuniti ketika membuat persiapan bencana?
Penyelesaian Berasaskan Alam untuk	1. Apakah pengetahuan tempatan atau amalan sedia ada untuk menjaga alam sekitar (contohnya	1. Adakah anda melihat perubahan ketara pada alam sekitar dalam 10 tahun kebelakangan ini? 2. Kawasan mana yang anda rasa paling terjejas dan perlu dipulihkan?

Alam Sekitar & Adaptasi Iklim (Nature-Based Solutions for Environment & Climate Adaptation)	menanam pokok, membersihkan sungai)? 2. Apakah ancaman utama terhadap ekosistem tempatan (contohnya hakisan tanah, penebangan, pencemaran)? 3. Bagaimana sikap komuniti terhadap usaha pemuliharaan (contohnya penanaman buluh, tumbuhan asli)?	3. Bagaimana aktiviti pemuliharaan boleh juga menyokong mata pencarian (contohnya eko-pelancongan, kraftangan buluh, pertanian)?
Kemahiran Teknikal & Pengurusan RLL (RLL Technical and Management Skills Development)	1. Apakah kemudahan pembelajaran atau makmal komuniti yang sudah ada sekarang? 2. Apakah kemahiran sedia ada dalam kalangan komuniti untuk mengurus kemudahan tersebut? 3. Apakah jurang kemahiran yang wujud? 4. Siapakah belia atau pemimpin komuniti yang berpotensi menjadi “champion” dalam mengurus Makmal Hidup ini?	1. Apakah bentuk latihan atau sokongan yang diperlukan untuk mengurus kemudahan ini dengan baik? 2. Bagaimana belia boleh dilibatkan secara lebih aktif dalam mengurus dan menyokong projek ini? 3. Apakah bentuk sokongan tambahan (contohnya mentor, pensijilan, latihan praktikal) yang boleh membantu anda lebih yakin?

Tema 3: Sokongan & Pembangunan Mata Pencarian (Livelihood Support & Development)

Konteks	Soalan Utama	Soalan Probing
Peningkatan Kemahiran untuk Pembangunan PKS (Upskilling for SME Development)	1. Apakah cabaran utama yang dihadapi dalam mengekalkan pendapatan (contohnya pasaran terhad, banjir, serangan perosak, modal, kemahiran)? 2. Apakah jenis perniagaan kecil (SME) yang sudah wujud di kampung ini? 3. Apakah potensi dan cabaran utama yang mereka hadapi? 4. Sokongan apa yang paling diperlukan: kewangan, kemahiran, peralatan?	1. Adakah terdapat pasaran tetap untuk produk anda? 2. Adakah anda pernah mendapat latihan atau bantuan sebelum ini? Jika ya, apakah yang berkesan dan tidak berkesan? 3. Apakah jenis kemahiran tambahan yang boleh membantu meningkatkan perniagaan (contohnya pemasaran digital, pembungkusan, pengurusan kewangan)?
Menjana Pendapatan Sampingan & Membina Kapasiti Wanita (Side-income Generation & Capacity Building for Women)	1. Apakah peranan wanita dalam mata pencarian isi rumah sekarang? 2. Apakah halangan utama bagi wanita untuk menambah pendapatan (contohnya kekangan masa, penjagaan anak, akses kepada sumber)? 3. Apakah kemahiran atau minat yang ada pada wanita di komuniti ini?	1. Adakah peluang kerja atau latihan yang fleksibel sesuai untuk wanita? 2. Apakah bentuk sokongan yang boleh membantu wanita lebih aktif dalam menjana pendapatan (contohnya kemudahan penjagaan anak, latihan di rumah, akses modal kecil)? 3. Adakah wanita di komuniti anda terlibat dalam koperasi atau projek bersama? Apa pengajaran daripada pengalaman itu?
Sokongan Ekopelancongan	1. Apakah pandangan anda tentang idea menjadikan	1. Adakah anda bimbang tentang kesan kepada alam sekitar (contohnya sampah, pencemaran, kerosakan ekosistem)?

Berasaskan Komuniti (Community-Based Ecotourism, CBET) - Perspektif Komuniti	kampung ini sebagai lokasi ekopelancongan? 2. Mengapa anda rasa komuniti tidak bersetuju dengan cadangan ekopelancongan? 3. Apakah kebimbangan utama jika ekopelancongan dijalankan di sini?	2. Adakah anda bimbang tentang kesan kepada budaya, cara hidup, atau keselamatan kampung? 3. Pernahkah ada pengalaman dengan pelancong atau projek pelancongan? Bagaimana pengalaman itu? 4. Jika komuniti tidak mahu ekopelancongan, apakah bentuk aktiviti ekonomi lain yang lebih sesuai dan selesa untuk komuniti (contohnya pertanian, kraftangan, koperasi, program berbasis alam sekitar tanpa pelancong luar)?

Tema 4: Penyelesaian Berasaskan Alam untuk Pengurangan Risiko Bencana (Nature-based Solutions for DRR)

Konteks	Soalan Utama	Soalan Probing
Tumbuhan Asli untuk DRR & Pemulihan Ekosistem	1. Di kawasan manakah di kampung ini yang paling terdedah kepada hakisan atau banjir? 2. Tumbuhan atau spesies tempatan apa yang anda rasa sesuai untuk ditanam bagi mengurangkan risiko banjir/ hakisan tanah? 3. Siapakah yang patut bertanggungjawab untuk menjaga dan menyelenggara tanaman seperti buluh ini dalam jangka masa panjang?	1. Adakah anda pernah lihat penanaman buluh atau tumbuhan tempatan digunakan untuk mengawal banjir/ hakisan? Pada pendapat anda, adakah ianya berkesan atau tidak? 2. Apakah halangan utama untuk penduduk melaksanakan usaha ini (contohnya kos, masa, tenaga kerja, akses tanah)? 3. Bagaimana cara terbaik untuk melibatkan komuniti orang kampung dalam penyelesaian ini? 4. Bolehkah usaha pemuliharaan ini memberi manfaat ekonomi (contohnya kraftangan buluh, hasil hutan, ekopelancongan kecil skala komuniti)?

Appendix 4: Community Enumerators Contract

KONTRAK PERKHIDMATAN PENGUMPUL DATA KOMUNITI
(COMMUNITY ENUMERATOR)

Pengumpul Data Komuniti *(Community Enumerator)* Sukarela

Pasukan perunding bebas (Independent Consultant) dengan kerjasama MERCY Malaysia dengan ini melantik _____ sebagai Pengumpul Data Komuniti bagi projek Kajian Komprehensif Mengenai Demografi Komuniti, Keperluan Pasca Bencana, Penilaian Risiko dan Ketahanan, serta Kebolehlaksanaan Program di Hulu Langat.

Gambaran Keseluruhan

Pengumpul Data Komuniti akan menyokong pasukan perunding bebas dalam menjalankan penyelidikan, khususnya aktiviti penyebaran survei dan pengumpulan data di Lapangan untuk

Usaha ini merupakan sebahagian daripada projek *Resilient Living Lab Hulu Langat* oleh MERCY Malaysia, iaitu satu inisiatif berwawasan ke hadapan yang memberi tumpuan kepada pembinaan ketahanan komuniti, mempromosikan pembangunan yang peka terhadap risiko, dan menggalakkan pemerkasaan yang mampan. Dengan menggabungkan penyelidikan, pendidikan, dan tindakan di lapangan, projek ini melibatkan komuniti tempatan secara aktif dalam mencipta penyelesaian bersama untuk pengurangan risiko bencana, kelestarian alam sekitar, dan adaptasi perubahan iklim.

Tanggungjawab Utama dan Hasil Kerja:
Setelah dipersetujui bersama, Pengumpul Data Komuniti akan:

1. Bertindak sebagai penghubung antara pasukan perunding dan komuniti rentan yang berkepentingan, mewakili komuniti tersebut dalam projek penyelidik (jika perlu)
2. Merekrut responden dari kawasan sasaran kajian
3. Menjalankan soal selidik di Lapangan dan memastikan responden melengkapkan soal selidik

Tempoh
Kontrak ini akan berkuat kuasa dari 26 September 2025 hingga 31 October 2025. Sepanjang tempoh ini, mana-mana pihak boleh menamatkan Perjanjian Perkhidmatan Sukarelawan dengan memberikan notis bertulis selama DUA (2) minggu.
Pihak Pasukan Perunding berhak untuk menamatkan perjanjian sukarelawan ini atas sebab-sebab berikut:

1. Anda telah melanggar Nilai Teras atau Kod Etika Pasukan Perunding, termasuk tingkah laku tidak profesional, diskriminasi, gangguan, atau sebarang tindakan yang boleh menjejaskan reputasi Pasukan Perunding.
2. Anda didapati mengambil dadah atau memiliki dadah yang terlarang
3. Anda telah melanggar kerahsiaan dengan berkongsi maklumat sulit dan peribadi milik peserta, menggunakan data peserta untuk kepentingan peribadi tanpa kebenaran Pasukan Perunding, serta meminta bayaran tambahan daripada klien bagi perkhidmatan yang tidak dibenarkan oleh pasukan.

Elaun Sukarelawan

Pihak Pasukan Perunding bersetuju untuk memberikan elaun berdasarkan jadual berikut, mengikut hasil utama (key deliverables) yang telah dilaksanakan oleh Pengumpul Data Komuniti:

Peranan dan tanggungjawab	**Elaun**
Menyebarkan dan mengumpulkan data di Lapangan	RM100

Sila ambil maklum bahawa **tiada kos tambahan akan ditanggung melebihi jumlah yang telah dipersetujui.** Pembayaran akan dibuat melalui pemindahan dalam talian oleh Pasukan Perunding dalam tempoh satu hingga dua minggu selepas penyiapan tugasan sebagai Pengumpul Data Komuniti. Elaun akan dibayar kepada pemegang peranan melalui pindahan bank berdasarkan maklumat berikut:

Nama:
Nombor Akaun:
Bank:

Kerahsiaan:

Pemegang peranan dikehendaki untuk menganggap semua maklumat yang diperoleh sepanjang tempoh perkhidmatan sebagai sulit dan hanya menggunakannya bagi tujuan melaksanakan tanggungjawab yang diberikan, bukan untuk kepentingan peribadi. Maklumat peribadi peserta tidak boleh disimpan atau direkodkan dalam apa jua bentuk

DITANDATANGANI DAN DIPERSETUJUI oleh:

…….
Nama:
Jawatan:
Tarikh:

…….
Nama:
Kad Pengenalan:
No telefon:
Tarikh:

Appendix 4: FGD Participation Consent Form

BORANG PERSETUJUAN PENYERTAAN PERBINCANGAN KUMPULAN BERFOKUS (FGD)

(Projek: Makmal Hidup Berdaya Tahan - Resilience Lab)

Tarikh: **19 September 2025 (Jumaat)**
Tempat: **Dewan Serbaguna Sungai Lui**
Lokasi: **Komuniti Hulu Langat (Batu 18, Batu 20 dan Batu 21 Sungai Lui)**

Kami, peserta yang bertandatangan di bawah, dengan ini bersetuju untuk menyertai sesi Perbincangan Kumpulan Berfokus (FGD) berkaitan keadaan semasa komuniti di Hulu Langat.

Kami memahami bahawa:

1. Tujuan kajian ini adalah untuk mengenal pasti cabaran komuniti, mencari penyelesaian bersama, melindungi alam sekitar, dan menyokong penyesuaian terhadap perubahan iklim.
2. Penyertaan ini adalah **secara sukarela**. Kami boleh menarik diri pada bila-bila masa tanpa sebarang akibat.
3. Segala maklumat yang dikongsi akan **dirahsiakan**. Identiti kami tidak akan didedahkan dalam laporan.
4. Sesi ini akan dirakam **semata-mata untuk tujuan kajian sahaja**.

Dengan menandatangani borang ini, saya mengesahkan persetujuan untuk mengambil bahagian dalam perbincangan ini. Saya juga bersetuju bahawa rakaman audio boleh dijalankan semasa sesi perbincangan serta membenarkan gambar saya diambil dan digunakan untuk tujuan dokumentasi, laporan, atau penerbitan oleh pihak MERCY Malaysia.

Sila tandakan (✓) jika bersetuju, atau (X) jika tidak bersetuju pada ruang berkenaan:

Bil	Nama	Tandatangan	Tarikh	Rakaman Audio (✓ / X)	Gambar (✓ / X)
1					
2					
3					
4					
5					


HULU


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Resilience Living Lab

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