



# 10

## Towards a Resilient Riverine Community: A Case Study in Sadong Jaya, Sarawak, Malaysia

Swee Kiong Wong and Regina Garai Abdullah

### Introduction

Climate change has become one of the main discussion topics in sustainable development studies, particularly in relation to its global impacts (Byers et al., 2018; Cramer et al., 2018; IPCC, 2014, 2018). The accelerating pace of climate change has exacerbated the levels of uncertainty in society and economy (Cramer et al., 2018). This uncertainty is increased by changes in ecological and biological systems as well as by local community access to diverse capital assets, which are difficult to capture or quantify accurately. Assets include natural, human, social, financial and physical capital. It is also believed that the most vulnerable groups in society will experience a more severe impact due to climate change (IPCC, 2018). Such impacts arise mainly because of the spatial-temporal conditions affecting socio-economic status and access to various capital assets, which in turn creates a vicious cycle.

---

S. K. Wong (✉) • R. G. Abdullah  
Universiti Malaysia Sarawak (UNIMAS), Kota Samarahan, Sarawak, Malaysia  
e-mail: [swkwong@unimas.my](mailto:swkwong@unimas.my); [argarai@unimas.my](mailto:argarai@unimas.my)

Like other parts of the world, Malaysia is experiencing the impacts of climate change. A tropical Southeast Asian country, Malaysia has a hot and humid climate all year round and plentiful rainfall. In the last decades, the country has increasingly experienced extreme weather events, characterised by days of high temperature, high rainfall, dry spells, thunderstorms and strong winds (Daniel, 2019). This is an indication of the impacts of climate change (Hashim & Hashim, 2016).

As we embrace a new decade with a higher frequency of severe weather occurrences as an impact of climate change, the global community is facing great challenges in responding to the global call to achieve the Sustainable Development Goals. Measures must be taken in order to ensure that no one is left behind as we move beyond 2021. In particular, the challenge in attaining greater societal resilience as well as bridging the inequality gaps among populations must be addressed. In Malaysia, inequality exists in various forms and includes unequal access to resources in the forms of various capital assets by different communities. This inequality is also evident in Sarawak, a resource-rich Malaysian state located on the island of Borneo (Fig. 10.1).

This limited access can arise from the unsustainable development practices which, in turn, exacerbate the inequality problem in the region (Alston, 2020; Booth, 2019; Brown & Langer, 2015). As highlighted by Donnges (2003), 'a key element of poverty is isolation, expressed as the lack of access people have to basic, social and economic goods, facilities and opportunities' (p. 9). This poses the question of how community with limited access to resources can adapt and strive to become more resilient.

Based on the definition by the Intergovernmental Panel on Climate Change (IPCC, 2014, p. 5), resilience refers to 'the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.' In fact, resilience goes beyond the ability to bounce back to an equilibrium after a disturbance (i.e. loss or damages suffered after flooding, together with heavy rain or loss of natural resources for livelihoods due to the negative



**Fig. 10.1** Locational map of Malaysia

externalities); it also includes the buffering capacity before a disturbance forces the system from its stable equilibrium state, as well as the ability to adapt in reaction to a disturbance (Lama et al., 2017). In other words, resilience does not only incorporate a reactive notion of immediate response and recovery in the short-term to cope with the impacts of disturbances or shocks, it also entails a proactive notion of anticipation and learning to develop long-term resilience by the community (Lama et al., 2017). At a household level, a resilient household is thus ‘a household that has adaptive capacity to maintain its level of wellbeing and ability to adapt in the face of climate change’ (Scheyvens, 2015, p. 14) or other shocks. According to Gitz and Meybeck (2012), building

resilience connects centrally with reducing vulnerabilities. However, it is important to note that a more resilient community might reduce vulnerabilities, but less vulnerability cannot always be an indicator of resilience. They are not just opposite sides of the same coin.

This study highlights the vulnerabilities faced by one riverine community in Sarawak, the Sadong Jaya, particularly in dealing with different types of risks and disasters, as well as the capital assets accessible to them. This riverine community is located at the downstream of the Sadong River in the sub-district of Asajaya, Samarahan, in Sarawak, a southwesterly Malaysian state in Borneo (Fig. 10.2), and shares its coastline with the



Fig. 10.2 Locational map of Sadong Jaya, Sarawak, Malaysia

South China Sea. There are approximately twenty-five settlements in the area, comprising of 3146 households with a total population of 14,937 people. The majority of the population are Malay, Iban (which is the largest indigenous ethnic group in Sarawak) and Chinese (Sadong Jaya Sub-District Office, 2019). In addition, Sadong Jaya is unique in its social composition as there are Bugis and Javanese – originally from Indonesia – who have stayed in Sarawak for decades and are now considered local Sarawakians.

Besides sharing common social and physical resources, the Bugis and Javanese have assimilated local culture into their daily lives in the multi-ethnic setting of Sarawak. In this chapter, we explain how the local community copes with socio-ecological stresses and shocks, and how its members adapt to these shocks in the long run. The manner in which they adapt to disasters is significant as it influences their capability to protect their livelihoods and to sustain themselves. Furthermore, we compare and contrast empirical evidence from studies on different riverine communities in order to analyse the similarities and the differences between their adaptation mechanisms. Each mechanism refers to the ways in which communities manage their livelihoods and optimise their capital assets.

## Methodology

This chapter provides insights on mechanisms adopted by the local community in Sadong Jaya by narrating its experience in dealing with adversity and vulnerability as a result of climate change. The findings discussed in this chapter are based on data that was collected between 2018 and 2019 using qualitative methods. A series of household interviews and focus group interviews were conducted, whereby key informants were selected using a purposive sampling approach. A total of four separate Focus Group Discussion (FGD) sessions were conducted with community leaders at Sadong Jaya District to capture data on livelihood assets, strategies and challenges, and their responses in relation to disaster risk management (DRM) and/or adaptation strategies. Specifically, the FGDs

explored the mechanisms that the community members opted for when facing different circumstances of shock and vulnerability. Content analysis was carried out, based on the different themes identified from all the data collected, either through the FGDs or in-depth interviews with the key informants, before the conclusion was derived.

## Results and Discussion

### Livelihoods and Experiences of the Local Community in Sadong Jaya

The majority of the population in Sadong Jaya are fishermen, although the number has declined drastically in recent years. The economic landscape of Sadong Jaya today is dominated by a resource-based economy. There are approximately 1171 registered fishermen in the area and all of them are traditional fishermen. The term 'traditional fisherman' is a classification used by the Fisheries Department to describe fishermen who normally catch fish within five nautical miles from the shore. Traditional fishermen normally use traditional fishing gear and frequently travel by boats that are less than 40 GRT (40 Gross Register Tonnes) and powered by small outboard engines.

Due to its topography and geographical location along the lower Batang Sadong (or Sadong River) with three settlements lying closer to the coastal area of the South China Sea, floods affect this area every year. In fact, twelve of the twenty-five settlements in Sadong Jaya experience flooding annually, particularly after heavy rainfall during monsoon season, together with occurrences of high tides (known locally as king tides). These settlements are: Kampung Semera Ulu, Kampung Semera Cina, Kampung Pelanduk Ulu, Kampung Iboi Ulu, Kampung Ulu Sadong, Kampung Jemukan, Kampung Jemukan Cina, Kampung Sungai Putin, Kampung Rangawan, Kampung Terasi Iban and Kampung Terasi Ulu.

Estuarine, coastal or riverine floods are common natural disasters experienced by the local community in these low-lying settlement areas in Sadong Jaya. Estuarine and coastal flooding occurs when overflowing river water from heavy or non-stop rainfall is trapped and not discharged

into the sea due to a king tide. This situation causes flooding in settlements that are located on adjacent land. Riverine flooding, on the other hand, happens when continuous heavy rainfall causes a river or creek to swell beyond its monsoon drain capacity, resulting in the inundation of the adjacent floodplain area. Due to their proximity to the river or the sea, as well as the availability of or access to various capital assets, the local community in Sadong Jaya experiences a variation of flood intensity and severity. With a properly maintained drainage system as well as properly functioning watergates, local communities in this vicinity would be less prone to a high degree of damage brought on by the floods. Implementing this is contingent on a number of factors, including: the availability of and access to the physical capital of watergates; human capital in the form of the skills required to operate the watergate; the right work ethic, in order to respond and take immediate action whenever necessary, as well as the social capital that ensures strong horizontal and vertical integration with relevant agencies. Local communities still remember the floods that occurred in 1974 and in 2011 as the two worst events they ever experienced in Sadong Jaya. Both disasters caused massive destruction and imposed high costs on the local community. The headman (who is the government-appointed community leader) of Kampung Sungai Buluh stated that 'some houses were submerged under the flood water during the worst flood occurrence in 2011 and we lost our crops and livestock.'

Residents in Sadong Jaya further elaborated that floods and their aftermath are becoming more unpredictable and uncontrollable. This situation is attributed to the drastic development that was carried out in the area since the 1980s. Road construction and the clearing of land by local communities for various agricultural and physical development projects are said to have caused the area to become more prone and vulnerable to floods.

Similarly, the area also experiences droughts which, according to the locals, have become more severe and unpredictable in recent years. This became more evident after the cultivation of the oil palm monocrop replaced the rich biodiversity of the forest area and when the agricultural development in the area turned from small-scale subsistence farming to small-scale cash crop cultivation during the 1990s. Furthermore, it is

important to bear in mind that the shift into a big plantation area was led by the Federal Land Consolidation and Rehabilitation Authority (FELCRA). FELCRA is a corporatised Malaysian government-linked company, incorporated in 1997, and is owned by the Ministry of Finance. FELCRA is heavily involved in oil palm plantation, rubber, paddy, fertiliser, property, livestock and agri-food related business. They develop land owned by the locals, with the aim of enhancing the standard of living of the local community. The involvement of FELCRA in Sadong Jaya is mainly in oil palm plantation, however. As a result of this shift in focus, massive destruction of the area's ecosystem is evident. In particular, turning the forest area into monocrop cultivation land has destroyed the assimilative capacity of the original natural environment.

This disturbed ecosystem cannot cope with the accelerated impacts of climate change. What once was a healthy forest ecosystem now shows signs of degradation that results in rainwater not flowing out through natural channels and not being efficiently absorbed by the soil. Consequently, flash floods are becoming more frequent in the area whenever heavy rain falls consistently over several days. In some cases, local communities are experiencing flash floods even after only a few hours of continuous heavy downpours which then meet together with the king tide. The negative consequences of flash floods include damage to electronic and electrical appliances, fixtures and furniture, as well as the destruction of crops and livestock. According to members of the community, despite the massive material cost of these extreme events, no report has ever been made of a loss of human life during floods in Sadong Jaya. A local respondent from Kampung Terasi Ulu complained that:

In 2011, the water level was three to four feet high till our waist level in the worst flood that we had ever experienced ... when the rainfall did not stop and the king tide affected us at the same time in the village.

Another local respondent from Kampung Pelandok Ulu shared his experience and described the flood of 2011 as the worst to ever hit them. The water level surpassed the cement floor in his home by over two feet. That incident occurred after a heavy rain started to fall continuously for six hours, from 10 o'clock at night to 4 o'clock in the morning.



## **Adapting, Building Resilience and Reducing Vulnerability in Sadong Jaya**

Despite the high disaster risk and vulnerability faced by the local community in Sadong Jaya, it has managed to enhance its resilience through a reactive rebound system and proactive capacity building for adaptation. Over the years, the local community has developed its capabilities through a dynamic learning curve to face climate hazards and risks in a low-lying area that is increasingly prone to floods under extreme weather conditions. Moreover, it has adapted itself well to survive and even to thrive under circumstances of limited access to different capital assets, particularly to natural capital, due to climate change or irreversible anthropogenic activities. This is particularly evident in the vicinity of Sadong Jaya at the downstream of the Sadong River which is often a waste disposal or collecting point for sediment from soil erosion and agriculture runoff or other economic activities carried out upstream. This sediment pollutes the water in the river and the sea and potentially depletes the fisheries' resources.

Members of the local community in Sadong Jaya have not only developed higher resilience through livelihood diversification, a number of them are also trying to adjust by cultivating crops that are less vulnerable or susceptible to flooding or extreme weather. The local community at Sadong Jaya also has strong vertical social capital through close links with the relevant government agencies and political representatives. This relationship has enabled it to convince the relevant authority to construct flood mitigation infrastructure in the area. Physical capital such as watergates, bunds and improved drainage systems have helped to reduce the vulnerabilities faced by the community during flooding. For instance, the construction of nine watergates in settlements of Sadong Jaya has helped to mitigate the damaging effect brought about by flash floods. Watergates reduce disaster risk and losses of crops and livestock. Additionally, the locals are also able to protect their household items from damages caused by the flash floods in their area.

Institutional intervention strengthens the local community's capability to maintain wellbeing while facing disaster risks or shocks. This is important for promoting equality, particularly in protecting resource-scarce

and socially vulnerable groups at the riverine area. The Sadong Jaya case study analysed in this chapter emphasises the importance of having good synergies between the local government and local community and institutions, thereby enhancing the human capability to face either natural or man-made shocks. In the presence of anthropogenic, industry-induced climate change, the impacts of natural phenomena such as king tides have often been exacerbated by unsustainable human activities which turn mild or even beneficial natural shocks into damaging human-induced shocks (i.e. more frequent and intense flash flood events). Therefore, more frequent maintenance of drainage systems by the relevant authorities (such as the Drainage and Irrigation Department) as well as engaging the local community in the management of watergates in the area are good examples of context-specific institutional interventions. As mentioned by Liu and Chan (2003), the flood management in Malaysia has always been an institutional approach, with the Drainage and Irrigation Department playing the key role. In this context, the Drainage and Irrigation Department is one of the institutions that plays a specific role in managing the watergate and can address the specific problems in a locality using localised intervention measures. The effectiveness of this type of disaster management can be enhanced by incorporating non-structural measures, such as those traditionally used by the people, into the official disaster management system (Liu & Chan, 2003, p. 213). This form of intervention has the tendency to enhance the social resilience of the local community in overcoming livelihood predicaments associated with recurrent flood disasters. In this context, local community empowerment and human capacity building are carried out to enhance resilience levels. This unique, strong, vertical social capital developed in Sadong Jaya should be promoted to address the factors that increase the vulnerability of local communities to flood disasters, and to shape resilience. This approach has proven more effective than focusing on short-term emergency responses alone, as highlighted by Liu and Chan (2003) in their study on the Malaysian flood hazard management programme.

Furthermore, a strong institutional support system has ensured that a portable, clean water supply is brought by the relevant agency to the local community when it raises the problem of water shortages. Despite its

limited supply, such assistance has been welcomed, particularly during prolonged dry spells/seasons of drought which, as informed by the local community, have increased in intensity over the years. It should be noted that the agency responsible for this is the Sarawak Rural Water Supply Department, a local government agency in Sarawak. One of its main roles is to develop safe water supply facilities to the rural community. In addition, the local community was provided with a water storage tank by the local government under the rural development project, enabling them to store water and mitigate the water shortage problem. Inevitably, this has enhanced community capabilities for sustaining livelihoods and improving quality of life. The latter is achieved by capitalising on the social and physical assets rendered through institutional assistance during drought season every year.

In addition, improved road conditions in the settlement area and the extension of farm roads since 2000 have enabled the local community to access more markets, increase livelihood diversification and provide access to buyers for its produce. Better physical road access since the 2000s has enabled the local community to sell its agricultural or fish produce in the markets for a better price. This is particularly relevant because the freshness of agricultural and fishery produce is a key determinant of demand from consumers and wholesale buyers in the market. Better road access also allows members of the local community to travel further from their settlements on a daily basis to seek a wider range of employment, training and educational opportunities. Thus, access to physical assets through road construction by the government has enhanced the standard of living of the local community in Sadong Jaya. With better road access to the market, it can sell its natural produce as well as agriculture produce at higher prices without relying on intermediaries. The natural produce includes wild ferns and fishery produce, while the agriculture produce includes fresh fruit, bunches of oil palm, coconuts and bananas.

Moreover, the construction of the Sadong Bridge or Sungai Buloh Bridge has facilitated the local community in accessing the nearby job market and goods and services market. Completed in October 2016, the Sadong Bridge stretches over 1.48 km from Sadong Jaya near Asajaya to Sadong near Simunjan in the Samarahan Division of Sarawak, making it the longest bridge in Sarawak. Sadong Bridge is an important physical

asset to the members of the local community, especially as it enables them to seek alternative employment opportunities outside their settlements. This provides additional income streams for locals when extreme weather affects the economic activities of their respective settlements. Furthermore, the Sadong Bridge enables commuters to reduce their travel time when compared with the previous mode of transportation (i.e. using the ferry to cross the Sadong River) to nearby towns for work. The headman of the community of Kampung Jemukan mentioned that it usually took them four hours to travel from Kampung Jemukan to Kuching using a 120-HP motorboat before the construction of the Sadong Bridge. Today, the same trip only takes about half of the time needed in the past. Commuters can use the road access to Kuching without being constrained by the ferry operation hours. The headman of Kampung Jemukan further elaborated that now the members of the community can commute at any time of the day, which is especially important in cases of emergency. This shows that the construction of the Batang Sadong bridge has indeed improved the quality of life of the local community in Sadong Jaya. Not only does it provide the inhabitants with more access to job markets, but it also improves the accessibility of markets for their goods as well as health and education services. Moreover, they have better access to government agencies to apply for physical or financial assistance to enhance their quality of life.

As discussed above, the level of resilience is dependent on the ability to bounce back and reorientate after facing shocks and stresses. The riverine community in Sadong Jaya depends mainly on agriculture as its livelihood and can cope well as long as it has access to suitable land for cultivation. As mentioned above, in order to reduce disaster risk caused by flash floods, many villagers have cultivated more flood-resistance crops such as coconut, oil palm, banana, pineapple, lime and paddy. The villagers also participate in aquaculture and animal husbandry. The study found that even though agriculture is the main economic activity, the number of villagers involved in agriculture activities, particularly swamp paddy, has reduced drastically over the years. Driven by a higher monetary return and improved access to markets through better road systems, many local villagers have shifted their focus from planting swamp paddy to other crops (e.g. oil palm). Local communities are able to enhance their

resilience while improving their food security through trade and the income generated from oil palm cultivation. They are able to use this income to purchase food and other essential items for their households. Of course, agriculture production is not without its vulnerabilities. It is, by nature, subject to different types of risk, ranging from production to price to climatic shock. In a given system, shocks in one dimension can spread into another dimension (Gitz & Meybeck, 2012). The local community in Sadong Jaya has enhanced its resilience through livelihood diversification, by taking up off-farm employment outside its own settlements, as well as diversifying its farm activities.

### Challenges for the Future

Rural communities, such as those in Sadong Jaya, are often more resource-dependent than urban dwellers. When facing socio-ecological risks, they normally strategise to adjust, reorganise and adapt themselves. Sometimes, diversified livelihood strategies are adopted as a coping mechanism in order to minimise vulnerability. This enables them to retain the same functions, structure, identity and even social dynamics and organisation to ensure livelihood security. In the context of the fishermen in Sadong Jaya, despite an abundance of fish, they face the problem of depleting natural resources. This is mainly caused by competition from illegal fishermen and/or registered fishermen who use illegal fishing gear (e.g. trawlers). Such methods are unsustainable and affect the fish stock in the area. In addition, pervasive use of pesticides in extensive oil palm plantations can cause the runoff water to be polluted, thus affecting fish stocks in the river and sea. Due to depleting fishery resources, some fishermen have diversified their livelihoods by participating in other economic activities such as subsistence farming or seeking employment opportunities outside their settlements. Ellis and Allison (2004), for instance, highlight the significance of diversification as an adaptation strategy to counter the risks and uncertainties of socio-economic shocks. Based on their studies in Tanzania, which involved 344 rural households, they explain how diversification is one of the key rural adaptation strategies (Ellis & Allison, 2004, p. 5). The findings of the study clearly show that those with better

training, either through formal education or skill enhancement, have a better resilience level compared to those who did not invest in human capital formation earlier.

According to the fishermen interviewed as part of this study, present weather conditions are extremely unpredictable. In the past, weather patterns were consistent throughout the year. For example, it was easy to predict when the monsoon season started (usually at the end of the year, in November, and continuing until March of the following year). However, climate change is contributing to increased uncertainty in the local community of Sadong Jaya. As reiterated by a community leader:

It is easier for me to tell you which months were monsoon season and which months were dry season in the past, as this happened periodically without much variation every year. But it is indeed very difficult for me to inform you when normally is the rainy or monsoon season today and when is the drought season these days. The weather is just unpredictable, without us having any clues about when we need to get ready to elevate our valuable household items to a higher ground. That is why you can see how we suffer great losses in terms of our agriculture produce, livestock, household electrical appliances and furniture and fixtures during flash floods.

In the past, fishermen would be able to predict rough sea conditions using their traditional knowledge and know when to avoid adverse weather conditions at sea. They normally scheduled repairs and maintenance work on their fishing boats and fishing gear at the turn of the year, when the weather was less favourable. Occasionally, they took up some contract work to build houses or worked as labourers, either in the settlement or outside their community, during monsoon season from November to March every year. As weather variability can no longer be predicted accurately as a consequence of climate change, the local fishing community has limited information for planning and adapting. Some fishermen opt for a secondary economic activity to reduce their livelihood vulnerability. In fact, out-migration has been a common strategy for enhancing livelihoods and reducing vulnerability (Paris et al., 2005).

As highlighted earlier in this chapter, Sadong Jaya is prone to annual flooding due to its unique geographical location on a floodplain area. Whenever a king tide and heavy rainfall coexist for long hours or days,

the most vulnerable parts of the community suffer the consequences of floods. The phenomena of floods and droughts have been common in Sadong Jaya for decades. However, the severity of disaster risk due to climate change in recent decades has resulted in local communities in Sadong Jaya facing increased levels of vulnerability. Despite being part of the same region, the level of vulnerability among local communities in the vicinity of Batang Sadong differs. For instance, those residing closer to the coastal area without the watergate infrastructure provided by the local government are more vulnerable and susceptible to loss and disruption of livelihoods whenever there is an unexpected flash flood, compared with those who reside on higher ground, with the protection of a watergate and a regularly maintained bund.

In summary, the riverine community in Sadong Jaya has experienced greater risk, brought on by the extreme and unpredictable weather that causes flash flooding. As a consequence, local communities face vulnerabilities caused by erosion from constantly strong currents and waves at coastal areas and riverbanks. The depleting forest and fishery resources due to over-exploitation, not only by the local fishermen but also by the illegal fishermen who are encroaching on the Malaysian water body, have resulted in a higher degree of vulnerability among fishermen (Viswanathan et al., 2001; Zhang & Bateman, 2017). The encroachment of fishermen into the Malaysian water body is, to some extent, part of a domino effect owing to declining fishery resources in other nearby regions. This study corroborates that local communities need to be empowered in order to become more responsible stewards of nature and resources, and to make the right decisions for supporting the resilience of their livelihoods.

The importance of institutional arrangements to plan and manage vulnerabilities, and enhance resilience among the locals, is imperative. For instance, the Australian Natural Disaster Resilience Index (ANDRI) is one of the frameworks that can be used to assess resilience based on coping and adaptive capacities. Parsons et al. (2016) explain how this framework works through taking into account arrangements and processes that enable learning, adaptation and transformation.. According to the authors, there is a need to consider what resources, skills and opportunities are available on the ground so that proper localised strategies can be devised to enhance resiliency. A number of the SDG goals are also

particularly relevant to the resilience of the local communities in Sadong Jaya, in particular: Goal 2) Zero hunger; Goal 3) Good health and well-being; Goal 6) Clean water and sanitation; Goal 12) Responsible consumption and production; Goal 13) Climate action; Goal 14) Life below water; Goal 15) Life on land, and Goal 17) Partnerships.

It should be noted that this study does not use the specific index mentioned in Parsons et al. (2016). However, the resource parameters assessed in this study are similar to that in Parsons et al.'s ANDRI framework, which are essentially the five assets in the Sustainable Livelihood Framework. Both studies highlight the importance of context-specific institutional interventions to address the livelihood predicaments associated with vulnerabilities faced by the people. Nevertheless, in order to better capture the real phenomena in the study, policy should focus more on engaging the local community. Such a focus enables localised factors to be exposed, identified and addressed, and the community's resilience to be shaped. More synergic efforts should be made to design a framework that better prepares the local community for increasing levels of risk and uncertainty brought by accelerating climate change. Engaging local communities will not only foster a transformative relationship between the state and local actors, but it will also enable participatory planning for addressing the critical needs of people in relation to vulnerabilities and risks. This is expected to create more resilient and sustainable communities in the face of increasing levels of adverse climate change as well as achieve sustainable development (Berry et al., 2019).

## Conclusions

The case study in Sadong Jaya, Sarawak, Malaysia shows how institutions can play a crucial role in assisting the local community to manage and even reduce disaster risk. It also highlights how communities adapt to changes in local ecosystems, which are the result of climate change and unsustainable development practices affecting their access to different capital assets. A synergic effort between the local community and the local government is crucial in developing resilient settlements with a high



adaptive capability level to deal with the dynamics of increasingly unpredictable consequences brought on by climate change.

As we are experiencing the adverse impact of climate change, some vulnerable groups are more affected than others. As highlighted in this chapter, riverine and coastal communities are being increasingly affected by more frequent and extreme weather events. This study highlights how access to physical, social, human, natural as well as financial capitals is crucial for reducing disaster risk among the vulnerable groups of the riverine and coastal communities. A strong social capital is able to connect the community with the relevant government agencies for information and assistance. This leads to the establishment and construction of fit-for-purpose infrastructure in their area. Consequently, this not only helps to prevent greater loss and damages suffered from the adverse effects of climate change, but also enhances the local community's access to labour and produce markets. In other words, accessibility for the local community to various capital assets enables its members to enhance their socio-economic opportunities. In addition, this chapter highlights how strong vertical integration would enable the community to access job opportunities outside of its current settlement. This diversification of economic activities enables local communities to improve their socio-economic wellbeing, especially when they are threatened with depleting natural resources. Addressing the challenges illustrated in this chapter calls for a comprehensive community strategy for capacity building to reduce climate change-related risks and increase the resilience of local communities.

**Acknowledgement** This research was funded by the Malaysian Ministry of Higher Education under the Fundamental Research Grant Scheme (FRGS/1/2017/SS08/UNIMAS/02/1). The authors would like to thank the Ministry for its funding, Universiti Malaysia Sarawak (UNIMAS) for their administrative support, and various government agencies, community leaders and local communities for their cooperation and participation in this study. The authors also thank Tan Su Jin, the project's research assistant, for her commitment in the study.

## References

- Alston, P. (2020). Philip Alston: Malaysia Backtracking on Poverty Commitment, Press Release. Available at: <https://chrgj.org/2020/07/05/philip-alston-malaysia-backtracking-on-poverty-commitment/>. Accessed 9 May 2021.
- Berry, L., Koski, J., Verkuijl, C., Strambo, C., & Piggot, G. (2019). *Making Space: How Public Participation Shapes Environmental Decision-Making*. Stockholm Environment Institute. <https://doi.org/10.2307/resrep22993>
- Booth, A. (2019). What Have We Learned? In *Living Standards in Southeast Asia: Changes Over the Long Twentieth Century, 1900–2015* (pp. 263–284). Amsterdam University Press. <https://doi.org/10.2307/j.ctvsr51jr.13>
- Brown, G., & Langer, A. (2015). Does Affirmative Action Work? Lessons From Around the World. *Foreign Affairs*, 94(2), 49–56. Available at: <http://www.jstor.org/stable/24483481>. Accessed 5 Mar 2021.
- Byers, E., Gidden, M., Leclère, D., Balkovic, J., Burek, P., Ebi, K., Greve, P., Grey, D., Havlik, P., & Hillers, A. (2018). Global Exposure and Vulnerability to Multi-Sector Development and Climate Change Hotspots. *Environmental Research Letters*. <https://doi.org/10.1088/1748-9326/aabf45>
- Cramer, W., Guiot, J., Fader, M., Garrabou, J., Gattuso, J. P., Iglesias, A., Lange, M. A., Lionello, P., Llasat, M. C., Paz, S., Peñuelas, J., Snoussi, M., Toreti, A., Tsimplis, M. N., & Xoplaki, E. (2018). Climate Change and Interconnected Risks to Sustainable Development in the Mediterranean. *Nature Climate Change*. <https://doi.org/10.1038/s41558-018-0299-2>
- Daniel, T. K. H. (2019). Climate Change in Malaysia: Trends, Contributors, Impacts, Mitigation and Adaptations. *Science and the Total Environment*, 650, 1858–1871.
- Donnges, C. (2003). *Improving Access in Rural Areas: Guidelines for Integrated Rural Accessibility Planning*. International Labour Organization.
- Ellis, F., & Allison, E. (2004). *Livelihood Diversification and Natural Resource Access* (LSP Working Paper 9) (pp. 1–46). Food and Agricultural Organization of the United Nations.
- Gitz, V., & Meybeck, A. (2012). Risks, Vulnerabilities and Resilience in a Context of Climate Change. In A. Meybeck, J. Lankoski, S. Redfern, N. Azzu, & V. Gitz (Eds.), *Building Resilience for Adaptation to Climate Change in the Agriculture Sector, Proceedings of a Joint FAO/OECD Workshop, 23–24 April 2012*. Food and Agriculture Organization of the United Nations Organisation for Economic Co-operation and Development.

- Hashim, J. H., & Hashim, Z. (2016). Climate Change, Extreme Weather Events, and Human Health Implications in the Asia Pacific Region. *Asia Pacific Journal of Public Health*, 28(2 Suppl), 8S–14S.
- Intergovernmental Panel for Climate Change (IPCC). (2014). Intergovernmental Panel on Climate Change. Climate Change 2014: Impacts, Adaptations and Vulnerability. In *Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC.
- Intergovernmental Panel for Climate Change (IPCC). (2018). *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming*. Intergovernmental Panel for Climate Change. Available at: <https://www.ipcc.ch/sr15/>. Accessed 9 May 2021.
- Lama, P. D., Becker, P., & Bergstrom, J. (2017). Scrutinizing the Relationship Between Adaptation and Resilience: Longitudinal Comparative Case Studies Across Shocks in Two Nepalese Villages. *International Journal of Disaster Risk Reduction*, 23, 193–203.
- Liu, P. S., & Chan, N. W. (2003). The Malaysian Flood Hazard Management Programme. *International Journal of Emergency Management*, 1(3), 205–214.
- Paris, T., Singh, A., Luis, J., & Hossain, M. (2005). Labour Outmigration, Livelihood of Rice Farming Households and Women Left Behind: A Case Study in Eastern Uttar Pradesh. *Economic and Political Weekly*, 40(25), 2522–2529.
- Parsons, M., Glavac, S., Hastings, P., Marshall, G., McGregor, J., McNeill, J., Morley, P., Reeve, I., & Stayner, R. (2016). Top-Down Assessment of Disaster Resilience: A Conceptual Framework Using Coping and Adaptive Capacities. *International Journal of Disaster Risk Reduction*, 19, 1–1.
- Sadong Jaya Sub-District Office. (2019). *Profile and Population of Sadong Jaya*. Sadong Jaya Sub-District Office. Sarawak Government.
- Scheyvens, H. (2015). *The Role of Microfinance and Microfinance Institutions in Climate Change Adaptation: Learning from Experiences in Bangladesh*. Institute for Global Environmental Strategies. <https://www.jstor.org/stable/resrep02933.8>
- Viswanathan, K., Omar, I., Jeon, Y., Kirkley, J., Squires, D., & Susilowati, I. (2001). Fishing Skill in Developing Country Fisheries: The Kedah, Malaysia Trawl Fishery. *Marine Resource Economics*, 16(4), 293–314. Available at: <http://www.jstor.org/stable/42629339>. Accessed 6 Mar 2021.
- Zhang, H., & Bateman, S. (2017). Fishing Militia, the Securitization of Fishery and the South China Sea Dispute. *Contemporary Southeast Asia*, 39(2), 288–314. Available at: <http://www.jstor.org/stable/44683771>. Accessed 6 Mar 2021.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

