

The Understanding of River and Community Resilience Studies in Perspective of Landscape Architecture

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INFORMATION ARTICLE

Abstract: River is a part of community living landscape whereby their resilience protects it. However, river issues are still discussed, indicating there is opportunity and room for improvement, especially from Landscape Architecture field. While the social lens was found lacking in relation to river, the community resilience is adopted as approach to view the latter field. Hence, this paper explored the relationship between river and community resilience through literatures. 121 articles based on online database were gathered, sieved and analyzed. It was found that the river and community resilience shares fields of fluvial geomorphology, sociology, ecology, urban planning and disaster risk. These fields have impacts in people-place relationship throughout humanity. Therefore, the community has responsibility upon the river environment as their living landscape.

Keywords: River; Resilience; People-place relationship.

Abstrak: Sungai merupakan bagian dari lanskap kehidupan masyarakat dimana ketahanannya dilindungi. Namun permasalahan sungai masih didiskusikan, menunjukkan adanya peluang dan ruang untuk perbaikan, terutama dari bidang Arsitektur Lansekap. Sementara dari sudut pandang sosial ditemukan kurangnya kaitan dengan sungai, ketahanan masyarakat diadopsi sebagai pendekatan untuk melihat bidang terakhir. Karenanya, makalah ini mengeksplorasi hubungan antara sungai dan ketahanan masyarakat melalui berbagai literatur. 121 artikel berdasarkan database online dikumpulkan, disaring, dan dianalisis. Diketahui bahwa sungai dan ketahanan masyarakat berbagi bidang geomorfologi fluvial, sosiologi, ekologi, perencanaan kota dan risiko bencana. Bidang-bidang ini memiliki dampak pada hubungan manusia-tempat seluruh umat manusia. Oleh karena itu, masyarakat memiliki tanggung jawab terhadap lingkungan sungai sebagai lanskap kehidupannya.

Kata Kunci: Sungai; Ketahanan; People-place relationship.

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INTRODUCTION

River is an undeniably valuable resource for human survival and has been part of the living landscape. The irony is that due to the human hands, the anthropogenic issues have cause degradation towards the value of river. With United Nation (UN) prediction that 68% of world population will live in urban in 2050, the river is becoming more vulnerable than ever. Previous researches have been profoundly trying to establish the coexistence between human and nature in context of urban. It implies that the attempt in landscape architecture is focused on what benefits the people (Verbrugge & van den Born, 2018). This represent the opportunity in designing and planning of river. Succeeding section elaborates further on this matter.

River issues such as flood and river pollution can still be commonly found in urban areas due to the climate change and industrialization, respectively. Urbanisation degrades the river further and threatens it to be vulnerable to the urban exposure (Weil et al., 2018). This

suggests that river degradation is a prolonged environmental issue that need to be addressed. The degradation is not only river pollution but it involves ecological disturbance and ultimately, uncertainty for future generation. The uncertainty emerged as managing the river involves the decision-making process based on human capability and challenging time.

Without proper river development, the continuance of degradation on river is potentially passed from one generation to another while the overall society experiences the impact. In addition, with the appearance of polluted river and role of disposal channel, the river is already perceived as drainage by our generation and possibly by future generation as well. This is because the manipulation on river has changed the perception of how people see the nature, especially in an urban area (Wohl, 2014). The aforementioned author also indicates that with the high urban population, they are less likely to be in contact with relatively natural river. This suggests that they understand the river as what it appears to be. Thereby, the issues become inherent as well as persistent. It is not only damaging the human perception but in a larger context, it is their livelihood at stake.

Particular to river neighbourhood, it is a zone of interaction (Md. Yassin, Eves, & McDonagh, 2010) whereby it allows people to be connected with nature through the presence of river which intimately related to the naturalness and the presence of wildlife, flowers, and greenery (Chen et al., 2018). They were able to appreciate the river may have positive outcome in reducing the unclear relationship between the two subjects (Asakawa, Yoshida, & Yabe, 2004). This suggests the importance of social aspect in river studies to ensure the urbanisation, including river development, does not disturb the ability of next-generation to meet their own needs. Thus, this study is exploring the river studies and community resilience through the social aspect as the lens.

RESEARCH METHODS

The materials in this study undergo through three processes, namely gathering, sieving and analysing. Firstly, the process of gathering materials used the search engine in ScienceDirect and Google Scholar database. Seminal keywords such as ‘river development’, ‘community resilience’, and ‘community’ were used to search the reading materials. Sometimes, the keyword is combined with one and another to gather relevant reading materials; the method is known as Boolean search. Non-seminal keywords such as ‘landscape architecture’ and ‘social cohesion’ were also combined with the seminal keywords to broaden the field in reading materials. In analysing, the snowball method was also adopted to trace the initial study by the prominent author of the subject.

Secondly, the materials gathered were sieved by reading the abstract before the whole content. If the abstract was found related to the subject of study, it is read from the introduction to the conclusion. Sometimes, some parts were left out due to the different scope of study. While reading the materials, the methods of data collection, research gap, significant findings and contributions were recorded in the form of table using Excel, as shown in Figure 1. The reading materials were further categorised according to its subject, such as ‘river’ and ‘community resilience’. Colours and larger text size assisted in understanding the significant context of the article and how it relates to river and community. Separate tables were saved as one file before the analysis was run in Nvivo12.

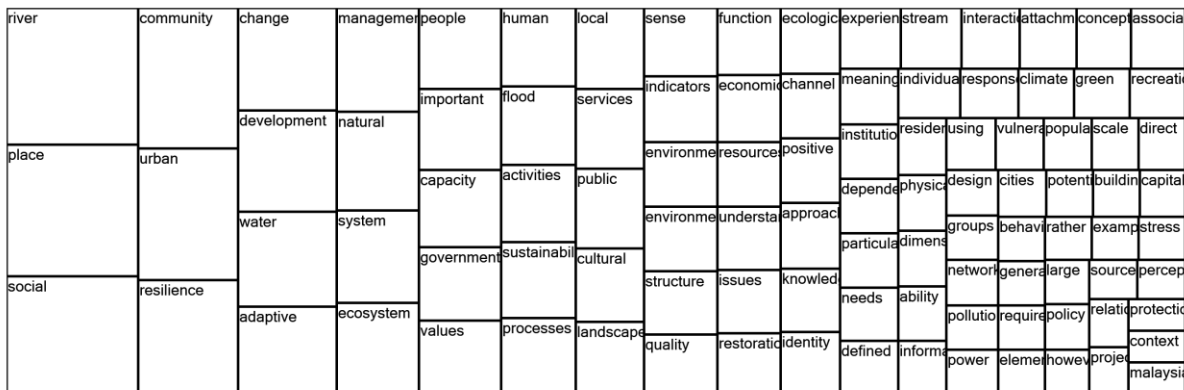


Figure 3: The treemap is also the combination generated from the subjects of ‘river’, ‘community resilience’, ‘people-place’, and ‘others’

Nevertheless, content analysis was also applied in analysing the table to deepen the understanding of the subject of this study. It helps in providing new insights into the particular phenomena (Krippendorff, 2004). The process of understanding the keywords was also done manually using mind map allowing the author to formulate the connection between one and another. Only after that, the author was able to categorise the articles according to its theme and fields as discussed in the next section.

RESULTS AND DISCUSSION

Based on the 121 articles, it was found that river and community resilience shares fields of ecology, sociology, urban planning, fluvial geomorphology, and disaster risk. However, when it comes to the people-place relationship, fluvial geomorphology and disaster risk were found not significant due to its field are more on the physical development of river and the governance, respectively. For that reason, the phenomena regarding people's life were less discussed in the the fields. Whereas, landscape architecture was found lacking in perspective of community resilience but abundant in river and people-place relationship. This is because it emphasised more on the natural resource of Earth and its user. In like manner, landscape architecture is more focused in designing and planning, thereby, references for community resilience is still scarce in the field. This shows that there is an opportunity for community resilience to be explored in the field of landscape architecture.

Meanwhile, psychology was found to have less attention on river and community resilience due to the dominance was not in human behaviour. This indicates that there is possibility for more exploration in terms of river and community resilience. It seems sensible that the psychology found in the people-place relationship because of the nature in the study. However, that is fitting for other discussion. Table 1 summarised the presence of articles found in the subject of river, community resilience and people-place relationship. The following paragraphs discussed the river through the fields of fluvial geomorphology and urban planning as they were found more dominant than the other fields.

Tabel 1. Summary of articles found in river, community resilience and people place relationship

Fields/ subject	River	Community resilience	People-place relationship
Ecology	●	●	●
Sociology	●	●	●
Urban planning	●	●	●

Fields/ subject	River	Community resilience	People-place relationship
Fluvial geomorphology	●	●	
Disaster risk	●	●	
Landscape architecture	●		●
Psychology			●

River is an entity that without its existence, many livings cannot survive well for its versatile function throughout life. Based on 48 articles regarding the river, many were found to include its fluvial geomorphology as the theme. It means that the physical form of river is important to be addressed because the body is what makes it a river. Its physical form described the characters and behaviours of river, which makes up a setting of the area. In parallel with Eze and Knight (2018), the evolution and biophysical interaction within the river catchment also have effects on its fluvial geomorphology. Meanwhile, Lanzoni, Ferdousi, and Tambroni (2018) realised that there is a need for effective river management in which has the ability to estimate the stream to dilute the pollutant. This is reflecting the fluvial geomorphology based on its management. Contrastingly, it is allowing the river to have the capacity to receive the pollutants. At this juncture, there is potential for the river to be vulnerable due to the exposure (Weil et al., 2018). Table 2 summarised the articles into three categories, namely geomorphology, human aspect and issues whereby they were found to be interconnected.

With different setting of river, the climate was found to influence its fluvial geomorphology as well as highlighting the unique of study context (Syvitski, Cohen, Kettner, & Brakenridge, 2014). It means that different context embodied a different river system due to varies factors pertaining to the area. Despite the wide spectrum of situatedness, Wohl (2014) has summarised the study regarding river geomorphology for the past 54 years in a decade gap. The focus on its fluvial geomorphology is answering to what is influencing its system. Thereby, the river is a unique entity that differs from the perspective of fluvial geomorphology due to different context. Besides, the evolution shows that the social aspect begins approximately in the 2010s that discussed on human interaction and perception toward the river due to the increase of population approaching the river as well interrelated with the environmental issues. In regards to landscape architecture, river is explored through geographic data (e.g., Johnson, Bell, and Leahy (2018)). This provides an insight on how the spatial of river study is carried out in the latter field.

Meanwhile, urbanisation has shifted the attention from the physical aspect of river into social (e.g., Khong, Loch, and Young (2020)) in which is more concern on what is important for human wellbeing. It is inevitable from addressing the community with urbanisation in which degrading the river in meeting the human needs. The urbanisation has not only caused irreversible impacts on river but it also profoundly change the fluvial geomorphology (Vietz, Rutherford, Fletcher, & Walsh, 2016). The uncertainty brought by the land use changes (Speed et al., 2016) has exacerbated the river pollution and hence, it also created uncertainty to the public concern (Khalid, Mokhtar, Jalil, Rahman & Spray, 2018). Presently, the alteration of river into drainage also increase impervious surface area and consequently, increase flood risk (Deng & Xu, 2018). These phenomena have adversely impacted the value of river as one of natural resources. Moreover, for the generation that grows up with the river been altered and engineered, their perception towards nature changed (Wohl, 2014). This shows that there is importance in ensuring the river is portraying the natural appearance to ensure the perception in society is not manipulated.

In the matter of landscape architecture, river in urban area is often studied as waterfront or riverfront that highlights the environment for human to experience. It is important because, as mentioned in earlier section, the urban is predicted to be inhabited by the majority of population. It means that urban area become the centre for human to grow. While the river serves as public realm (Latip, Shamsudin, & Liew, 2012), the economy within river catchment exists (Lerner & Holt, 2012). However, it can no longer be an excuse for the environmental recklessness as suggested by Frischenbruder and Pellegrino (2006). In conjunction with landscape architecture, designing the river can be regarded as working with nature and not against it (Gregory, 2006). Thereby, a balance and holistic river development are imperative that supports the needs of human and healthy nature.

On the one hand, fluvial geomorphology and urbanisation were highlighted in river study. On the other hand, issues regarding river were found to be the foundation of the study. It is often highlighting the attempt to provide solutions or reduction of risk in particular phenomena. The issues related are not only urbanisation (Liu, Shen, Yan, & Yang, 2018; Weil et al., 2018) but water quality (Kumar, Masago, Mishra, & Fukushi, 2018; Sakai et al., 2018), floods (Deng & Xu, 2018; Y. Jiang, Zevenbergen, & Ma, 2018), and its ecology (Frischenbruder & Pellegrino, 2006) in which involving fluvial geomorphology. These issues are interrelated with one and another whereby sometimes one triggers the other. For example, due to the urbanisation, flood becoming severe because of the impermeable surface area increases as built-up area increases.

Furthermore, the severe effect is experienced by the one that lives nearest to the river due to their exposure to the flood risk (Chiang, 2018). For that reason, the community is reasonable to have roles in river development as it is beneficial for their own wellbeing. Public participation benefits the river development for the long-term because it instils a sense of commitment to society. The involvement with the public is essential because it concerns what is desirable by them as the users (Verbrugge et al., 2019). Aforementioned authors also give insight into the result of meaning and attachment towards the river established in the community. It means that by understanding them, the value of river is likely meaningful because they are bonded to it. Verbrugge and van den Born (2018) shows that the river is part of the social place for community to have the opportunity of establishing an identity. This is mean to say that public participation is benefitting not just the river, but the community as well for both needs are met.

Tabel 2. Summary of river articles into three categories that were found to be interconnected as discussed in previous paragraphs

River study	Categories					
	Fluvial geomorphology		Human aspect		Issues	
Keywords	Physical form, ecosystem services (ESs), river ability, river indicators, habitat of flora and fauna,		Habitat establishment, benefits of river, social interaction, riverine landscape preference, attitude, public participation, restoration, management		Irreversible outcome, alteration, urbanisation, disposal channel, pollution, flood risk, uncertainty, industrialisation	
Field	Fluvial geomorphology	Ecology	Sociology	Landscape architecture	Urban planning	Disaster risk
Authors	Wohl (2014), Johnson, et al. (2018), Weil et al. (2018), Lanzoni et al. (2018), Eze & Knight (2018)	Masud, Moni, Azadi, & Van Passel (2018), Liu et al. (2018), Steward, Negus, Marshall, Clifford, & Dent (2018)	Shafaghat, Mir Ghasemi, Keyvanfar, Lamit, & Ferwati (2017), Mohamad et al. (2015), Verbrugge & van den Born (2018), Khong et al. (2020)	Latip et al. (2012), Tieskens, Van Zanten, Schulp, & Verburg (2018)	Chan, Abdullah, Ibrahim, & Ghazali (2003), Chan (2005), Chan (2009), (Md. Yassin et al. (2010), Cha, Shim, & Kim (2011), Elfithri, Toriman, Mokhtar, & Juahir (2011), Lerner & Holt (2012), Chan (2012), Lah, Park, & Cho (2015), Vollmer, Prescott, Padawangi, Girot, & Grêt-Regamey (2015), Vietz et al. (2016), Speed et al. (2016), Macan-Markar (2017), Deng & Xu (2018), Y. Jiang et al. (2018), van den Brandeler, Gupta, & Hordijk (2018)	Shah, Rahman, & Chowdhury (2017)

Jim & Chen (2003), Asakawa et al. (2004), Frischenbruder & Pellegrino (2006), Gregory (2006), Palmer et al. (2009), Everard & Moggridge (2012), Le Lay, Piégay, & Rivière-Honegger (2013), Åberg and Tapsell (2013), Rufat, Tate, Burton, & Maroof (2015), Kondolf & Pinto (2017), Hilaluddin, Ujang, & Maulan (2018), Sakai et al. (2018), Solins, Thorne, & Cadenasso (2018), Chen, Hua, Liekens, & Broekx (2018), Kumar et al. (2018), Verbrugge et al. (2019)

With human as the inhabitant that lives in urban and nearby or next to river, their resiliency has become a buzzword in understanding how changes may impact them (Parsons & Thoms, 2018). Table 3 summarised the community resilience study into the process of adaptive capacity, drivers, and the possible outcome learned from articles from diverse fields.

In respect to the community resilience, it was found that adaptive capacity is driving their ability to face challenges in regards to river. Many studies were concern on the adaptive flood management (Thanvisitthpon, Shrestha, Pal, Ninsawat, & Chaowiwat, 2020) and governance (de Kraker, 2017), and river system resiliency (Chaffin & Scown, 2018). This is because the issues are heated in urban area. Based on 39 articles on the subject of community resilience including adaptive capacity, it is understood that the need in an urban area requires the aforementioned concerns. The actors involved are commonly the stakeholder agency (e.g., Li, Beeton, Sigler, and Halog (2019)) and less attention to public involvement. The actors' responses are valuable in facing disturbances because it is a process for them to go through hardship by learning about the past. For example, the past flood experience provides the community with knowledge and, to an extent, an expectation in understanding the place (McEwen, Garde-Hansen, Holmes, Jones, & Krause, 2017); river and living environment.

Despite that, only in the early 2010s, the focus shifted to the public (Inman, Gosnell, Lach, & Kornhauser, 2018). Yet, the context is a rural setting (Chaudhury, Thornton, Helfgott, Ventresca, & Sova, 2017), and the focus is seldom on the river. This shows that there is an opportunity to explore and room for improvement through the social aspect in the setting of urban, which relates the river as an entity. Although the combination seems extensive, the importance of the latter investigation is that more people will live in the urban area. According to the United Nations, from 58% of the world population living in urban area, it is estimated increasing to 68% by 2050. This is likely causing the river becoming more vulnerable than ever due to higher demand, hence, more urbanisation in the future. Thereby, drives are important for the community moving to a resilient state along with the river as their living environment.

The urbanisation is an impetus to the community ability to adapt to their environment, as Magis (2010) suggested that without disturbance, resilience cannot be achieved. It means that without challenges, the community likely not able to adapt or cope with the ongoing livelihood because they were not sharpened to be resilient. The response facing the disturbances is what makes them resilient as well. Meanwhile, drivers are the elements that influence the adaptive capacity and similar to disturbances, they are diverse according to the context. Concerning river, actors such as stakeholders and community are involved. For instance, the community that lives nearby or next to a river in urban area is exposed to the flood risk (Chiang, 2018), while the stakeholders are responsible for helping them.

Undeniably, the flood risk, river management, and its system are needed to have the attention but to ensure community resilience is also important, especially from landscape architecture field as it receives less attention in literature. One of the ways to their resilience is through the adaptive capacity approach. Larger adaptive capacity reflecting better resilience (Wang, Deng, Wong, Li, & Chen, 2018). It means that the resources are available within the community that offers them the opportunity to cope with disturbances. In other words, they able to cope with the flood because there are resources in the neighbourhood that sustain their livelihood. This shows that the resilience for the neighbourhood depends on the resources that assisted them in times of need. The key community resilience is to not left the social aspect behind in facing the challenges.

Tabel 3. Summary of the community resilience study into the process of adaptive capacity, drivers, and the possible outcome learned from articles from diverse fields

Community resilience study	Categories				
	Process to adaptive capacity		Supporting drivers		Outcome
Keywords	Coping, changes, capacity, disturbances, everyday experiences, system, development, planning, complexity		Trust, norm, bonding, bridging, linking, belonging, togetherness, empathy, willingness		Identity, knowledge, social learning, awareness, adaptability, supportive management, participation, social cohesion, networking, relationship
Fields	Ecology	Fluvial geomorphology	Sociology	Urban planning	Disaster risk
Authors	C S Holling (1973), C. S. Holling & Meffe (1996), Brown (2014), Harper & Snowden (2017)	Chaffin & Scown (2018)	Magis (2010), W. Jiang et al. (2016), Nemeth & Olivier (2017), Chaudhury et al. (2017), Inman et al. (2018), Sapkota, Keenan, & Ojha (2018), Di Fabio & Saklofske (2018), Samuelsson et al. (2018), Patel & Gleason (2018)	Araya-Muñoz, Metzger, Stuart, Wilson, & Alvarez (2016), Lee, Chun, & Song (2018), Fielke et al. (2018), Wang et al. (2018), Dressel, Johansson, Ericsson, & Sandström (2020)	Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum (2008), Thapa, Thoms, Parsons, & Reid (2016), Choudhury & Haque (2016), Chiang (2018)
	Newman & Dale (2005), Folke et al. (2010), Engle (2011), Hunter (2011), Wilson (2012), Wilson (2014), McPhearson, Hamstead, & Kremer (2014), Maclean, Cuthill, & Ross (2014), McEwen et al. (2017), de Kraker (2017), Marzi, Mysiak, & Santato (2018), Parsons & Thoms (2018), Ling & Chiang (2018), Oestreich et al. (2019), Li et al. (2019), Oestreich et al. (2019), Thanvisitthpon et al. (2020)				

Generally, the remaining 35 articles were on the people-place relationship in which shared similar keywords and understanding of river and community resilience studies. Table 4 summarised the articles that beneficial to river and community resilience studies into the values of livelihood, built environment and the outcome of both categories.

The people-place relationship is emphasising on the human values practised in the livelihood as a society rather than specific subjects such as river and community resilience. For example, the interaction with neighbours radiating positive vibes enhance their sense of attachment towards their everyday living landscape (Fattah, Badarulzaman, & Ali, 2020). In the matter of river and community resilience, the element of attachment was discovered essential for the community to be able to appreciate the living environment. This helps the community to adapt to their surrounding because it has meaning to them. It can also be said that this paper is looking from the perspective of social aspect of river and community resilience. In relation to landscape architecture, the existence of biodiversity in environment become one of reasons to human in connected to the nature (Southon, Jorgensen, Dunnett, Hoyle, & Evans, 2018). This is suggesting that nature can afford the wellbeing of human. It also implying that designing the environment for benefits of its users is reassuring the connection with nature.

However, multiple fields are interrelated with the subjects and thereby, essential to review the related articles in Table 3. It includes the prominent author in people-place relationship such as Tuan (1977) on people experience and Rapoport (1990) on built environment. The multiple fields help in broadening a wider spectrum of understanding the phenomena on people-place relationship regarding the aforementioned studies. Thus, through this overview, the relationship between river and community resilience can be debate through the social aspect. It is anticipated that the attention through social aspect is benefitting not just the river but the overall society to appreciate nature more than as a

resource to life. It also represents an identity to their setting and has roles in driving them passing through the future disturbances.

Tabel 4. Summary of summarised the articles pertinent to river and community resilience studies into the values of livelihood, built environment and the outcome of both categories

People-place relationship	Categories				
	Value in livelihood		Built environment		Outcome
Keywords	Pride, unity, connection, cohesiveness, neighbourliness, interaction, participation, action		Identity, aesthetic, legibility, safety, security, visibility, meaning, satisfaiom		Perception, familiarity, sense of attachment
Fields	Ecology	Sociology	Psychology	Landscape architecture	Urban planning
Authors	Elmqvist et al. (2015), Schmidt, Sachse, & Walz (2016), La Rosa, Spyra, & Inostroza (2016), Southon et al. (2018)	Turner (1989), Dempsey, Bramley, Power, & Brown (2011), Smith, Davenport, Anderson, & Leahy (2011), Ujang & Zakariya (2015), Hussain, Samsurijan, Ishak, & Awang (2017)	Qazimi (2014)	Junker & Buchecker (2008), Plieninger et al. (2015), Moulay & Ujang (2016), Ridding et al. (2018)	Dendler, Sharmina, Calverley, & Traut (2012), Boyer, Peterson, Arora, & Caldwell (2016)
Tuan (1977), Rapoport (1990), Harun (2011), Salleh & Badarulzaman (2012), Gómez-Baggethun & Barton (2013), (Austin, 2014), Gleye (2015), Ujang (2016), Ujang & Abdul Aziz (2016), Bempah & Øyhus (2017), Rasidi, Jamirsah, & Said (2018), Bottini (2018), Knez et al. (2018), Zinia & McShane (2018), Sirakaya, Cliquet, & Harris (2018), Langemeyer, Camps-Calvet, Calvet-Mir, Barthel, & Gómez-Baggethun (2018), Zhou, Wu, & Anderies (2019), Fattah et al. (2020), Nørgaard & Thuesen (2020)					

CONCLUSION

In summary, this paper explored the river studies and community resilience from the social aspect as the lens. River has become part of living landscape in human life that the community entitled to be responsible upon it. Correspondingly, the adaptive capacity is one of the approaches that allow other researchers to explore community resilience. Its diversity depends on the context of study; hence, in relation to river, the study is still at infancy (Parsons & Thoms, 2018). Noticeably, the river and community resilience are interrelated because the phenomena are within the built environment inhabit by human. In the end, it reflects the people-place relationship.

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