Eco. Env. & Cons. 24 (2) : 2018; pp. (663-672)
Copyright@ EM International
ISSN 0971–765X

Preferences for settlement improvement in urban Riparian Indonesia

Maya Fitri[1,2], Sugeng Triyadi[2] and Ismet B Harun[2]

[1]Department of Architecture, Universitas Sriwijaya, Indonesia
[2]School of Architecture, Planning and Policy Development, Institut Teknologi Bandung, Indonesia

(Recieved 7 November, 2017; accepted 30 December, 2017)

ABSTRACT

Riparian is a wetland along a river bank. Many cities in Indonesia arise along the riparian. Riparian provides food and water resources, natural air and lighting, and sanitation needs, besides the important function as ecosystem services. Riparian is an area for purification, absorption, and reservoir of water. However, due to rapid city development has caused many urban riparians turn into developed areas. Since the riparian is covered by buildings, the ability in providing the ecosystem services is disturbed. So, it needs the settlement improvements with conserving the riparian ecosystem services. The study focuses on resident's preferences for the settlement improvements. It used the stated preference method. The 155 respondents who live in the settlement along the Musi riverbank in Palembang, Indonesia were required to rank the several settlement profiles. Each profile was composed on the five of the physical development attributes that influence the riparian ecosystem services. The results showed that attribute of the house get enormous attention from the residents, while the environment attributes almost were not got any attention. Thus, the planning can be optimized the building attribute to the residents' criteria and the environmental attributes to the conservation to ecosystem services criteria. It is the valuable information for a planning in urban riparian.

Key words: *Settlement preference, Wetland Conservation, and Urban riparian*

Introduction

Indonesia is an archipelagic country which most of the cities were built along the water side. Most of the cities have wetlands as the largest ecosystem. In these cities, the wetlands use for development areas. It is inevitable. The settlements on Palembang had evolved along the riparian of the city. Living in wetlands is indeed a major part of the city history and current status. Like all the city that are dominated by wetlands, In Palembang the water living cultures have been growing for a long time (Shannon, 2013).

Riparian is wetlands along the river banks. It is the concourse place between the dry land and the river. The riparian position is very important as a buffer for the both ecosystems, so that the planning of the area, shape, and function need special attention. The riparian ecosystem is very dynamic and complex (Mitsch and Gosselink, 2015). The presence of wetlands on an urban area provides aesthetical and recreational benefits of a natural landscape. It also provides very essential functions of the ecosystem services, such as controlling the water quality (Newbold *et al*., 2010), reducing the threat of flooding (Tockner *et al.*, 2009) and

***Corresponding author's email:** mayafitrioktarini@gmail.com

maintaining the diversity of an aquatic habitat (Lennox *et al. 2009)*. Ecological view has realized the importance of the wetlands ecosystem services. An abandonment of a natural riparian causes the environmental disasters, such as: flood, lack of water resources, and loss of natural habitats (Everard and Moggridge, 2012). There is a conflict between the need of development areas and the wetland ecosystem conservation. The planning in riparian needs to be maintain the balancing between ecological conservation and development purposes.

The study focuses on the planning of improvements settlement in urban riparian to restore the ecosystem services. Later there are new awareness on the planning in urban wetlands that are very concerned to an ecological view but less social understanding (Pahl-Wostl, 2006). Without understanding the social aspect, the planning would be less efficient. The implementation would face a disapproval or even denied by public. This study addresses for the planning in riparian areas with resident's preferences. The understanding of the resident's preferences could be used as input to city planning to ensure a public approval.

The public approval for planning in riparian is already examined by several papers (Shandas, 2007). The research revealed several obstacles of property owners to a riparian conservation program. Meanwhile, the preference study on restoration of a river shows river restoration cannot succeed without understanding attitudes, comprehension of preference, and estimation of values in river network (Che *et al.*, 2014). Several studies estimate value of the presence of wetlands to the property price. The distance, size, and type of wetlands affect the value of residential property. The increasing size of wet lands will increase residence value (Mahan *et al.*, 2000). The proximity to the natural landscape wetlands as water bodies has impact on house demand and positively impact sale prices (Cho *et al*., 2006). The reducing the wetland distance will increase the property price (Tapsuwan *et al*. 2009).

Our research is in the riparian areas along Musi River, Palembang. The local communities have been long living in the riparian. The settlements in riparian have become part of the city's history. The local communities live in riparian by adapting the ecosystem. Palembang is one of Indonesia's metropolitan cities that has experienced rapid population growth, included along Musi riparian. Population growth has exceeded the capacity of riparian ecosystems. Settlements have been spreading and covering al-most all the natural riparian. It decreases the performance of riparian ecosystem services. This study estimates community approvals for the various alternatives of the settlement improvements to restore the riparian ecosystem.

Materials and Methods

The planning for more ecological settlements have a greater chance for a successful implementation if planners understand how various development at-tributes might affect to behavioural intentions of individual who living there. Although there are several approaches for understanding behavioural intentions, we focus on a stated preference choice model. Stated preference is commonly used in marketing to assure the market trends. The stated preference model also is also used in environmental studies. It provides a robust method for understanding the multi-attribute nature of the problem and the trade-offs between several interactive variables in value changes of the natural resources and environment.

This paper used the conjoint analysis for stated preference research. Conjoint analysis has been used in several studies in environmental research (Alriksson and Öberg, 2008). It is a method to find out how buyers trade-off among products. The con-joint analysis takes care of situations in which an individual decides an option by considering several combinations simultaneously. The combinations are arranged varies of two or more attributes. The combinations of attributes presented in the form of product alternatives. Individual faces decision-making concerns about some possibilities for the best alternative product (Green *et al.,* 2001). An environment has some characteristics that can be divides as attributes for stimulus effects, cognitions, and behaviours of an individual (Molin *et al.,* 2001).

The conjoint analysis survey observes the part-worth utility of each attribute's level. The part-worth utility is a value of attribute in influencing individual decisions based on personal preference. Each part-worth utility has an important value that differs from one person to another. Greater focus and attention has been given to the more important attributes. The analysis is use regressions and logit to determine the effect of these utilities (Green and Srinivasan, 1990).

Attributes and levels

In this study, the settlement was divided into five attributes, i.e. house type, width of buffer area, riverside construction, riverside access, and riverside open space. Description are shown in Table 1.

The house type criteria are related to land covers, water flows, and absorption capabilities of the riparian. Building mass of the house type influence on land covers. The construction with less land covers would be better for an ecosystem restoration. The house type also is related to building foundations. Living in a riparian is faced with the risk of flooding. The risk can be suppressed by adapt to the ecosystem, either by properly modify the type of construction, or by estimate the safe distance from river edge (Watson and Adams, 2011). The building construction in riparian should use foundations such as stilts or floating which allow the tidal river to flow naturally and allow daylight into bottom of the building. The last criteria of house type related to the architectural style for raising public awareness regarding the local architecture. All the criteria produced three of house types:" floating house", "stilt row house", or "apartment".

The second attribute regarded on width of buffer area. A buffer area provides natural spaces on a riverside to absorb pollutions, purify, and store water reserves for re-processing for urban water needs (Groffman *et al.*, 2003). The buffer area also provides a safe distance to reduce the flooding risk of housing on riverside. This estimation of the optimal size of the buffer area was used for a balance purpose between ecosystem restoration and communal amenities.

The third attribute was riverside construction with three levels of the attribute: "natural"," polder", and "waterfront platform". All three constructions remain riparian in naturally flows and tidal. The natural is an option for no hard construction a long river edge. The polder is a barrier that separates the settlements and the river for protection the settlements from flood. While, the waterfront platform is an elevated platform along river edge for bordering of the settlements. It is built above stilt foundations for making no blockage of natural tidal. In addition, the construction of water front platform is unobstructed river views.

The fourth attribute was riverside access. It was defined by two levels: "dock boat" and "promenade". Riparian can be accessed from land or water. To revitalize the water access, it need to be facilitated by dock boats. It would become a unique character of a riverside settlement. Besides form the water, riparian also can be accessed from the land. The well-designed promenades, bicycle paths, lanes, and squares can revitalize the riverside area (Platt 2006).

The last attribute was" riverside open space". The riparian area has a potential open space that can be used for community activities or ecological conservation purposes (Crow *et al.*, 2006). For the community activities, public open space at riverside could create an interactive water-based city accommodating economic,

Table 1. List of attributes and its levels

Attributes	Description of preference effect	Level attributes
House type	To land covers, water flows, and absorption capabilities of riparian	1. Floating house 2. Stilt row house 3. Apartment
Width of buffer area	To river side free-building area and the convenient distance for the daily activities	1. 0-10 m 2. 10-20 m 3. 20-30 m 4. >30
Riverside Construction	To flood exposure and views of the river	1. Natural 2. Polder 3. Waterfront plat form
Riverside Access	To the access facility for revitalization of the riverside area	1. Dock boat 2. Promenade
Riverside open space	to performance of the ecosystem service or the communities' daily activities	1. Open green natural 2. Riparian park 3. Playground

culture, and aesthetic purposes. Otherwise for the eco-system restoration, open space is used for maintaining good water qualities, providing habitats for wildlife, protecting people and buildings from flood, or extending reservoir of eco-system services. For that reason, the attribute of riverside open space was divided into: "open green area"," riparian park", and "playground".

Questionnaire Design

These five attributes were used in this study; each attribute was assigned two-four levels (Table 1). With five attributes and fifteen levels, the total factorial design gave 216 (=3x3x3x2x4) alternative combinations. Full-factorial experiments generated data based on all possible combinations of attribute levels. This is impractical for stated preference surveys because subjects' cognitive and time limitations do not allow for consideration of a large number of profiles. To make the approach feasible for respondents, we created an orthogonal fraction factorial experimental design. Orthogonality (the occurrences of any two levels of different attributes are uncorrelated), and minimal overlap cases where at-tribute levels do not vary should be minimized (Molin 2011). This orthogonal fraction factorial experiment resulted in 16 alternative profiles.

The 155 surveyed respondents were limited to house owners within 250 meters from the river edge. They were adult males, especially couples who were eligible to make decisions about their house. The six-teen flash cards were shown to the respondents individually. Each card described the residential pro-file. Interviewers explained the residential profile content one at a time and asked the respondent to rate the profile. Besides using text, visual graphics were also used to illustrate the concept of each pro-file. The respondents gave rating values between one to ten which were then translated into numerical preference indicators in continuous data. To ensure consistency, each respondent was asked to rank the attributes and explain the reason for their preferences for a particular residential attribute.

Results

A. Respondent's Socio Demographic Characteristics

Table 2 presents survey data on the socioeconomic characteristics of the respondents. The largest number of the respondents were over 50 years old and the least number of the respondents were under 30 years old. 24.7% of the respondents who were 30-40 years old were and 24.7% of the rest respondents who were the 41-50 years old. The analysis results of living duration showed that 39.3% of the respondents had already lived in more than 40 years, 36% for 20-40 years, whereas 24.7% were the new residents who had lived less than 20 years. Most respondents owned the house (66.7%), 21.3% rented a house, 2% rented a land, and 10% stayed free with an owner's permission. The results imply most of the respondents are permanent residents who own s house and have lived for a long-time in the settlement.

Respondents had an education, ranging from no schooling (1.3%), less than high school, high school (36%) to bachelor degree (5.3%). The data described that more than half of respondents were low level of education. The data regarding occupations showed that most of the respondents were day laborers who work on demand and are paid daily, with no promise of further work in the future. A small business owner such as tailor, mechanic or crafts man were the second dominant job. Only a small percent-age were a boat manor a fisherman. The rest of the respondents worked as an employee, while the others held odd jobs such as a pedicab river or a domestic helper. The monthly income levels reflected the socioeconomic marginalized of most respondents; their incomes were less than 3,000,000 rupiah per month. This is relative small when com-pared to the minimum salary of the lowest paying positions in Palembang's city government, which is about 2,300,000 rupiah per month. 16% of the respondents making less than 1,000,000 rupiah per month. This result shows most of the respondents have unstable jobs and insufficient incomes.

80.7% of the respondents already received this clean water service, only 11.7% of the respondents who were not served. River centered activities are the community activities that center around the river, i.e. water transportation, fishing, and river bathing or washing. Boat as water transportation is used by some residents (21%) almost every day. 15% of the respondents use it in 10-20 days per month. Meanwhile, fishing activities have been rarely done, 95 % of the respondents done a fishing occasionally in a month. The most usage the river activities bathing and washing, either flow out river water into house or do it in the river. 68% of the respondents do it almost every day, while 31% of the

respondents do it in 10-20 days per month (Table 3). Although respondent's houses have been served by urban water services, but most residents still depend on river to fill their household water needs. The results show that the river is still be the center of community daily activities. Living in riparian create the resident's dependence on the river in providing cultural ecosystem services (Vollmer *et al.,* 2015). The cultural services mean the nonmaterial benefits community obtain from river (MEA 2005).

B. Housing and Environmental Conditions of Respondents

In this study, we also observed the respondents' housing. The data collected consisted of general characteristic of respondent's houses (Table 4) and house condition related to flood (Table 5).

Table 4 shows that most respondent's houses were more than sixty square meter house-size per family (76,6%). 13.6% of the respondents had a house with 30-60 m^2 size and the rest respondents had house with size less than $30m^2$. However, more than half (38.7% and 18%) of the respondents live with more than 5 family members. The highest percentage of the respondents shared the house with 3-4 others family members (40.7%). The small percent-age of all respondents have 3 or less of the household members (2.7%). 71.1% of the respondent's houses had no space around house.

Table 2. Socio Demographic Characteristics

		(%)
Age groups	Less than 30 years	19.3
	30-40 years	24.7
	41-50 years	24.7
	More than 50 years	31.3
House Ownerships	Own house	66.7
	Rental	21.3
	Land rental	2.0
	Free stay	10.0
Living duration	Less than 20 years	24.7
	20-40 years	36.0
	More than 40 years	39.3
Level of education	No schooling	1.3
	Primary school	26.7
	Secondary school	30.7
	High school	36.0
	Bachelor degree	5.3
Current occupation	Day laborer	34.7
	Marketplace vendor	9.3
	Employee	16.7
	Boatman and fisherman	6.0
	Small business owner	21.3
	Other odd jobs	10.0
Monthly income in rupiah	More than 5,000,000	2.0
	3,000,000 to 5,000,000	14.7
	1,000,000 to 3,000,000	67.3
	< 1, 000,000	16.0
House equipped by a clean water service	yes	80.7
	no	19.3
Using river transportation	More than 20	21.0
	10-20	15.0
	Less than 10	64.0
Fishing	More than 20	2.0
	10-20	3.0
	Less than 10	95.0
River washing or bathing	More than 20	68.0
	10-20	31.0
	Less than 10	1.0

No space around houses means that houses directly attached side by side. It indicates a poor quality of air flowing and lighting indoor. 15.4% of the respondent's houses only had space in one side, except the front side. Only 13.5% of the houses had more than two sides of free spaces. These results indicate the high populated in dense settlement.

Almost all houses in the settlement were the stilt house type, and only 8.7% houses were the landed houses. Some of the stilt houses have been modified. The under of the stilt house was modified by covering it with a wall. This modification is looked like a two-story house. It is effective way to enlarge the interior house. However, the ground floor was vulnerable to flood with low ceiling height. 49.3% of the respondents occupied stilt houses, while 27.3%the respondents occupied stilt modification houses. The rest respondents rented under-stilt houses (14.7%). The under-stilt house usually was divided into several rental houses. The houses get risk of flood, stuffy, as well as lack of natural lighting and airflow. Most of the respondent houses (38%) were less than 25 m from the river bank. Being situated in a riverbank flood plain area, the farther a house is from the river's edge, the safer it is from flooding. The houses with such distance are vulnerable to flood.

The 18.7% of the respondent's houses were in 25-49 m. While, 18.7% and 21.3%of the respondent's houses are located 50-74 m and more than 75 m from the river bank. It is enough distance to avoid flooding exposure. Only 38% houses have an ad-equate base elevation to avoid flood. Other houses were flooded in varying durations, less than 10 days by 34.5%, 10-20 days by 16%, and more than 20 days by 8.6%.

A. Resident's Preferences

Table 4 shows the resident preference's analysis results. Significant attention to attributes is indicated by *. The result shows that most respondents (71.06%) decide that "house type "was the most important attribute compared to all other attributes. Despite the attention to other attributes are significant, but the utility was much smaller. "Riverside open space "that was the second most important at-tribute only had 10.72 % importance value. "Width of buffer area" and "riverside construction" received almost equal weight (7.91% and 7.58%). Whereas "riverside access" only got 2.74% of the respondent's attention, it was not a significant attention.

Table 3. Respondent's houses characteristics

		(%)
House Size per Family	>60 m^2	76.6
	30-60m^2	13.6
	<30m^2	9.8
Number of household members	less than 4 members	2.7
	4-5 members	40.7
	6-8 members	38.7
	More than 8 members	18.0
Space around House	No Space	71.1
	One Side	15.4
	More than Two Sides	13.5
Type of occupied house	Landed	8.7
	Stilt modification house	27.3
	Stilt house	49.3
	Under-stilt house	14.7
Distance from River Edge	>75m	21.3
	50-74m	22.0
	25-49m	18.7
	<25m	38.0
Duration of house flooded in a year	Flood free	38.0
	Less than 10 days	34.5
	10-20 days	16.0
	More than 20 days	8.6

The house type was the enormous importance attribute in the resident's preferences. Structural characteristics, especially for housing preference of the low-income communities are often more influential than environmental facilities (Fierro *et al.*, 2009); (Opoku and Abdul-Muhmin, 2010). This implies that planning would be easier to approve if the building in accordance with the preference. The ecosystem restoration could be optimized by modified the environmental factors.

"Stilt row house" was the definitive preferred house type, which had a utility in the highest positive point (1.509 utility points). On the other hand, "floating house" received the lowest negative score at -1.501, which means the residents strongly disliked it. While, the utility of "apartment" was nearly neutral utility points (-0,009). This significant preference for "row stilt house" is understandable because it is the conventional house type in the riparian area. Almost all residents occupied this house type. The row stilt house accordance with riparian ecosystems and community daily activities. The construction is safe from flood with stability structures against river water tides. However, the row houses require more land for its building construction. It spreads covering of riparian surfaces. Riparian restoration requires more open space (Ahearn *et al.*, 2005). To suppressed land covers in a dense populated area, the high-rise building has more capacities in every land cover area than the row house. However, most residents were uncommon to live in an apartment, so it needs modification to adapt with the living culture of the local community. On the Tan Hoa Lo Gom canal sanitation project in Ho Chi Minh City, the three-story apartment accommodated residents in rehabilitation project of the slum settlements in the wetland area. The design of the apartment was modified in considering local com-munity living culture. It was a successful modification to increase the public acceptance for an apartment (Shannon 2009).

The buffer in "21-30 m" from river edge (0.166) was the most preferred option. The attribute utility gradually increases from an option" < 10 m" to "10-20 m" and up to"21-30 m", then it incrementally drops for width "> 30 m". It means that the residents approved a buffer width area only up to 30 m from river edge. It is the unexpected results because most of the resident's houses were located in less than 25 m from the river edge. This option will backwards their houses from the current boundary. It indicates the resident's need a wider buffer area to ensure free from flooding exposure. However, they also do not like the width of buffer area that is too far from the river edge. The very wide buffer area separates the river away from their daily activities. Thus, the planning can take the width

Table 4. Estimated Part-Worth Utility Preference of settlement improvement Attributes

Attributes	Level Attributes	Importance Value	Part worth Utility	Prob >[t]	Sig
House type		71.06%			*
	Floating House		-1.501	<0.000	
	Stilt Row House		1.509	<0.000	
	Apartment		-0.009	0.871	
Width of Buffer Area		7.58%			*
	<10 m		-0.014	0.822	
	10-20 m		0.003	0.962	
	21-30 m		0.166	0.006	
	> 30 m		-0.155	0.011	
Riverside Construction		7.91%			*
	Natural		-0.189	<0.000	
	Polder		0.044	0.425	
	Waterfront platform		0.146	0.008	
Riverside Access		2.74%			
	Dock boat		0.058	0.01	
	Promenade		-0.058	0.01	
Riverside Open space		10.72%			
	Playground Field		0.263	<0.000	*
	Open Green Area		-0.191	0.001	
	Wetland Park		-0.071	0.195	

of buffer area at around 30 m. It is enough size to conserve an ecosystem service in urban riparian.

"Waterfront platform" is the highest utility (0.146 utility points) of riverside construction. Conversely, "natural" which is the least desirable option (-0.189 utility points). While, the polder construction be-comes the second attractiveness (0.044 utility points). Most of the populations in the settlement were vulnerable to flood. As expected, the natural is the least desirable option, but unexpectedly that the residents do not approve to the polder. Even, polder protects settlements from flood, but it obstructs the views and interfere the access to the river. The waterfront platform was more preferred by the residents. Although, it is less effective to control flood, but the water front platform provides an openness view of the river without barrier of access to the river. This implies that attribute preference is more influenced by dependence on rivers than the risk of water-related hazards. The dependence on the river causes various physical obstacles to the river that will be a disruption on their daily activities would be an unapproved preference (Vollmer and Grêt-Regamey, 2013).

The result showed no significant utility for" riverside access". This indicates the residents indifferent with how access to riparian or both options are equally desirable. Because no choice that really suit with resident's preferences, the settlement planning should improve both accesses. Besides optimizing the water transportations, the promenade also needs an improvement.

"Playground" was very attractive riverside open space. It has the highest utility at 0.263. The two others level attributes had negative utilities. Residents dislike the options, both "open green area" and "wetland park". The utility for "open green area" was -0.191 and for wetland park was -0.071. The settlement was very dense with the buildings so that almost no open space can be used for the communal activities. Residents prefer open spaces that give directly function as to accommodate the community activities rather than indirect values such as for eco-system services. The well-cared wetland landscape perceived as more attractive place to enjoy nature. The local culture and natural landscape context are the attractive of site characteristics (Nassauer, 2004).

Discussion and Conclusion

Urban planning for improvement of the environment often brings out the social aspects. All the ecological process must be a part of the everyday life which is influenced by people (Glaeser and Glaser 2010). Planning leading to ecological design with an interface between measurable biophysical attributes and the surrounding social context. It needs an understanding of the interaction of people and urban river landscape (Prescott and Ninsalam 2016).

Densely populated settlements sprang up unplanned along the riparian bringing down the ecosystem vitality. The improvement of settlements aims to improve the riparian ecosystem services through the more ecological planning. The improvement aims to reduce land cover and reopen along the riverbank. The result of residential attributes preference indicates that the community considers the presence of the river as the key factor on the settlement planning. The residents do not prefer an alternative settlement planning for eliminating the river tidal dynamics or threats of flood. Preferences are more influenced by the convenience of activities related to dependence on river banks. The research finding demonstrates that the residents has dependence to the river. The residents still use the ecosystem services that should be integrated into planning when rehabilitating the ecology (Grêt-Regamey *et al.* 2016).

The settlement improvement aims to revive the living culture in riparian. It would enhance the urban riparian that mostly has been described as a slum settlement. Therefore, it would increase the appreciation of urban communities in this ecosystem. The study confirms the findings of previous studies regard the urban design by working closely with river ecology. It is an approach in the urban spatial planning that shifts from separates land and water to plan with water (Carmon and Shamir, 2010). Riparian planning should respect and strategically incorporate the public values to make plans that not only quite novel ecologically, but also with cultural values. The adaptive strategy to a balanced both social and ecological issues (Nassauer *et al.,* 2001) (Nassauer, Kosek, and Corry 2001). (Karrasch *et al.,* 2014).

The building components should be plan in focused to meet expectations of the residents. In contrast, environmental components, especially buffer area. can be focused on optimizing the conservation of ecosystem services. So, the ecological and the social interests can be integrated into a development plan. So, the planners can balance the ecological conservation and the human preferences on planning the urban riparian.

References

Ahearn, D. S., Sheibley, R.W., Dahlgren, R.A., Anderson, M., Johnson, J. and Tate, K.W. 2005. Land Use and Land Cover Influence on Water Quality in the Last Free-Flowing River Draining the Western Sierra Nevada, California. *Journal of Hydrology*. 313(3) : 234– 247.

Alriksson, S. and Öberg, T. 2008. Conjoint Analysis for Environmental Evaluation: A Review of Methods and Applications. *Environmental Science and Pollution Research International*. 15(3) : 244–257

Carmon, N. and Shamir, U. 2010. Water-Sensitive Planning: Integrating Water Considerations into Urban and Regional Planning. *Water and Environment Journal*. 24 (3) : 181–191.

Che, Y., Li, W., Shang, Z., Liu, C. and Yang, K. 2014. Residential Preferences for River Network Improvement: An Exploration of Choice Experiments in Zhujiajiao, Shanghai, China. *Environmental Management.* 54(3) : 517–530.

Cho, S. H., Bowker, J. M. and Park, W.M. 2006. Measuring The Contribution of Water and Green Space Amenities to Housing Values. An Application and Comparison of Spatially Weighted Hedonic Models. 485- 507.

Crow, T., Brown, T. and De Young, R. 2006. The Riverside and Berwyn Experience: Contrasts in Landscape Structure, Perceptions of the Urban Landscape, and Their Effects on People. *Landscape and Urban Planning*. 75(3) : 282–299.

Everard, M. and Moggridge, H.L. 2012. *Rediscovering The Value of Urban Rivers*: 293–314. Urban Ecosystems 15(2)

Fierro, K.P., Fullerton, T.M. and Donjuan-Callejo, K.E. 2009. Housing Attribute Preferences in A Northern Mexico Metropolitan Economy. *Atlantic Economic Journal*. 37(2) : 159–172.

Glaeser, B. and Glaser, M. 2010. Global Change and Coastal Threats: The Indonesian Case. An Attempt in Multi-Level Social-Ecological Research. *Human Ecology Review*. 17(2) : 135-147.

Green, P. E., Krieger, A. M. and Wind, Y. 2001. *Thirty Years of Conjoint Analysis: Reflections and Prospects*: S56–S73. Interfaces 31(3_supplement)

Green, P. E. and Srinivasan, V. 1990. Conjoint Analysis in Marketing: New Developments with Implications for Research and Practice : 3–1. *The Journal of Marketing9*.

Grêt-Regamey, A., Weibel, B., Vollmer, D., Burlando, P. and Girot, C. 2016. *River Rehabilitation as An Opportunity for Ecological Landscape Design*:142–146. Sustainable Cities and Society 20.

Groffman, P. M., Bain, D. J., Band, L. E., Belt, K. T., Brush, G. S., Grove, J. M., Pouyat, R. V., Yesilonis, I. C. and Zipperer, W.C. 2003. Down by the Riverside: Urban Riparian Ecology. *Frontiers in Ecology and the Environment*. 1(6) : 315–321.

KArrasch, L., Klenke, T. and Woltjer, J. 2014. Linking The Ecosystem Services Approach to Social Preferences and Needs In Integrated Coastal Land Use Management–A Planning Approach. *Land Use Policy*. 38 : 522–532.

Lennox, M. S., Lewis, D. J., Jackson, R. D., Harper, J., Larson, S. and Tate, K. W. 2009. Development of Vegetation and Aquatic Habitat in Restored Riparian Sites of California's North Coast Rangelands. *Restoration Ecology*. 19(2) : 225–233.

Mahan, B. L., Polasky, S. and Adams, R. M. 2000. *Valuing Urban Wetlands: A Property Price Approach*:100–113. Land economics

MEA, editor. 2005. *Ecosystems and Human Well-Being: Wet-lands and Water Synthesis: A Report of the Millennium Ecosystem Assessment*. World Resources Institute, Washington, DC

Mitsch, W. J., and J. G. Gosselink. 2015. *Wetlands*. Fifth edi-tion. John Wiley and Sons, Inc, Hoboken, NJ

Molin, E. J. 2011. *Conjoint Analysis*. Pages 127–155 in S. J. T. Jansen, H. C. C. H. Coolen, and Goetgeluk, R.W. editors. The Measurement and Analysis of Housing Preference and Choice. Springer Netherlands, Dordrecht

Molin, E. J., Oppewal, H. and Timmermans, H.J. 2001. Analyzing Heterogeneity in Conjoint Estimates of Residential Preferences. *Journal of Housing and the Built Environment* 16(3) : 267–284.

Nassauer, J. I. 2004. Monitoring the Success of Metropoli-tan Wetland Restorations: Cultural Sustainability and Ecological Function. *Wetlands*. 24(4):756–765.

Nassauer, J. I., Kosek, S.E. and Corry, R.C. 2001. Meeting Public Expectations with Ecological Innovation in Riparian Landscapes. *Journal of the American Water Resources Association*. 37(6) : 1439–1443.

Newbold, J. D., Herbert, S., Sweeney, B. W., Kiry, P. and Alberts, S.J. 2010. Water Quality Functions of A 15-Year-Old Riparian Forest Buffer System. *Journal of The American Water Resources Association*. 46(2).

Opoku, R.A. and Abdul-Muhmin, A.G. 2010. *Housing Preferences and Attribute Importance Among Low-Income Consumers in Saudi Arabia*:219–227. Habitat International 34

Pahl-Wostl, C. 2006. *The Importance of Social Learning in Restoring The Multifunctionality of Rivers and Floodplains*. Ecology and society 11(1)

Platt, R. 2006. Urban Watershed Management: Sustainability, One Stream at Time. *Environment* 48(4) : 26–43.

Prescott, M. F., and Y. Ninsalam. 2016. The Synthesis of Environmental and Socio-Cultural Information in The Ecological Design of Urban Riverine Land-scapes. *Sustainable Cities and Society.* 20 : 222–236.

Shandas, V. 2007. An Empirical Study of Streamside Landowners' Interest in Riparian Conservation. American Planning Association. *Journal of the American Planning Association.* 73(2) : 173–185.

Shannon, K. editor. 2009. *Water Urbanism: Hydrological Infrastructure as An Urban Frame in Vietnam.* Pages 55–59. Water and Urban Development Paradigms: Towards an Integration of Engineering, Design and Management Approaches: Proceedings of The International Urban Water Conference, Heverlee, Bel-gium, 15-19 September 2008. CRC Press, Boca Raton, Fla

Shannon, K. 2013. *Eco-engineering for Water: From Soft to Hard and Back*. In S. T. A. Pickett, M. L. Cadenasso, and B. McGrath, editors. Resilience in Ecology and Urban Design. Springer Netherlands, Dordrecht. 163–182

Tapsuwan, S., Ingram, G., Burton, M. and Brennan, D. 2009. Capitalized Amenity Value of Urban Wetlands: A Hedonic Property Price Approach to Urban Wetlands in Perth, Western Australia. *The Australian Journal of Agricultural and Resource Economics.* 53 : 527–545.

Tockner, K., Pusch, M., Borchardt, D. and Lorang, M. S. 2009. Multiple Stressors in Coupled River–Floodplain Ecosystems. *Freshwater Biology.* 55(1) : 135–151.

Vollmer, D., and Grêt-Regamey, A. 2013. Rivers as Municipal Infrastructure: Demand for Environmental Services in Informal Settlements Along an Indonesian River. *Global Environmental Change.* 23(6) : 1542–1555.

Vollmer, D., Prescott, M. F., Padawangi, R., Girot, C. and Grêt-Regamey, A. 2015. Understanding the Value of Urban Riparian Corridors: Considerations in Plan-ning for Cultural Services along An Indonesian River. *Landscape and Urban Planning.* 138 : 144–154.

Watson, D. and Adams, M. 2011. *Design for Flooding: Architecture, Landscape, and Urban Design for Resilience to Flooding and Climate Change.* John Wiley & Sons, Hoboken, N.J.