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Community Perceptions on Urban Forests Development in Riparian Areas of Cisadane River, South Tangerang City

(Persepsi Masyarakat terhadap Pengembangan Hutan Kota di Sempadan Sungai Cisadane Kota Tangerang Selatan)

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ABSTRACT

The continuous decrease in green open spaces due to urban development leads to harmful environmental problems for communities. Land scarcity is one of the significant reasons for the difficulty in urban forest development in riparian areas. The development of riparian urban forests serves a dual purpose, namely preserving the natural riparian function for vegetation and increasing the green open space area size. Therefore, this study aimed to analyze the riverside community's understanding and views on urban forests and their perceptions of riparian urban forest development. Data were collected through questionnaires and interviews and analyzed using descriptive statistics. Approximately 63.64% and 96.97% of the respondents understood and viewed the urban forests well. Furthermore, 90.91% of the respondents agreed with the riparian urban forest development. Generally, 66.67% agreed to create greener, tidier, cleaner, and more beautiful riparian areas to attract tourists. The positive perception of the community regarding the urban forest development in riparian areas became a rational basis to sustain its function and increase the size of urban forests and green open space areas.

KATA KUNCI
Ruang terbuka hijau,
hutan kota riparian,
masyarakat pinggir sungai,
konservasi sungai,
pembangunan perkotaan

INTISARI

Semakin menurunnya ruang terbuka hijau (RTH) akibat pengembangan kota berdampak pada timbulnya masalah lingkungan yang merugikan masyarakat. Keterbatasan lahan di perkotaan menyebabkan semakin sulitnya peningkatan luas RTH di daerah perkotaan. Sempadan sungai merupakan area yang potensial untuk meningkatkan RTH. Pengembangan hutan kota di sempadan sungai akan memberikan fungsi ganda yaitu dapat melestarikan fungsi sempadan sungai yang secara alami diperuntukkan bagi vegetasi dan dapat menambah luas RTH di perkotaan. Tujuan penelitian ini untuk mengetahui pemahaman dan pandangan masyarakat tentang hutan kota, serta persepsi masyarakat di pinggir sungai terhadap pengembangan hutan kota sempadan sungai. Data dikumpulkan dengan menggunakan kuesioner dan wawancara dan diolah dengan menggunakan statistik statistik deskriptif. Hasil penelitian menunjukkan bahwa 63,64% dan 96,97% dari responden mempunyai pemahaman yang tinggi dan mempunyai pandangan yang baik terhadap hutan kota. Sekitar 90,91% dari responden menyatakan setuju adanya pengembangan hutan kota di sempadan sungai Cisadane. Secara umum, 66,67% setuju agar sempadan sungai jadi lebih sejuk, rapi, indah, tidak ada sampah, dan dapat untuk wisata. Respon positif masyarakat terhadap pengembangan hutan kota ini diharapkan dapat menjadi dasar untuk pengembangan hutan kota sempadan sungai, sehingga kelestarian fungsi sempadan sungai dapat terjaga serta luas hutan kota dan RTH semakin meningkat.

Introduction

The primary essence of development is to boost the quality of life (Peet & Hartwick 2015). However, continuous development often needs to pay more attention to the existing green open spaces (GOS), especially in urban areas (Kurniastuti 2013). Dwihatmojo (2013) stated that the size of green open space in urban areas is decreasing due to land scarcity and inconsistency of spatial plan implementation. Meanwhile, in Jakarta, Bandung, and Yogyakarta city, the decrease in GOS for the past 31 years, 22 years, and 41 years is approximately 1.8%/year, 2%/year, and 1.5%/year, respectively (Budiman et al. 2014). The decreasing size of GOS causes environmental problems such as flooding, air pollution, and temperature warming (Iriani 2017). Developing GOS, such as urban forests, is crucial to protect the urban environment (Subarudi & Samsoedin 2012) and urgent to minimize environmental problems (Frick & Mulyani 2006; Iriani 2017; Syaputri & Suryawati 2021). Urban forests are open spaces with woody plants in urban areas, which provides environmental benefits for city dwellers (Frick & Mulyani 2006). Government Regulation (PP) Number 63 of 2002 concerning Urban Forest defines it as a stretch of land where trees grow densely and compactly, both on state and private lands, determined by the competent authority. Urban forests usually comprise clusters, spreads, and stripes (Syaputri & Suryawati 2021). Thus, an urban forest should be located in an urban area, determined by the competent authority, and comprised of clusters, spreads, or stripes.

According to the Regulation of the Minister of Public Works Number 5 of 2008 concerning Guidelines for Provision and Utilization of GOS in Urban Areas, striped urban forests are on paths alongside river channels, roads, beaches, and canals with a minimum width of 30 m. The urban forests investigated in this research are striped urban forests located in urban riparian areas with a minimum width of 30 m. Subarudi and Samsoedin (2012) suggested that using riparian areas could increase GOS size. The government could utilize riparian areas to increase the size of striped urban forests following several regulatory stages, namely appointment, development, designation, and management (Syaputri & Suryawati 2021).

Riparian areas are natural in situ protected areas for vegetation and sustaining the river functions (Wardiningsih & Salam 2019). Riparian areas have spatial potential to solve urban area problems, such as landfills, public toilets, and illegal slum settlements (Kautsary et al. 2021). In Banjarmasin city, the riparian areas experienced conversion into settlements due to asymmetric information concerning the regulations on construction activities provisions on riparian areas (Firdaus et al. 2021). In Bangka, around 2,041 m^2 of a total of 2,249 m^2 of Pedindang river riparian areas become built-up areas (Ferianda & Setiawan 2016). Vegetation has dominated the riparian of Code River in Yogyakarta, although there are also roads, built-up areas, and barren lands (Listyaningrum et al. 2017). The inappropriate use of the riparian area will eliminate its function as a green belt to control hydrology, prevent erosion, maintain amenities (Firdaus et al. 2021), filter pollutants, improve fauna habitat, maintain aesthetic elements of river corridors, and provide space for the lateral movement of the river (Listyaningrum et al. 2017). The riparian conversion into settlements negatively impacts the physical environment, river water quality, and the aesthetics of the riverine environment (Wardiningsih & Salam 2019). Thus, using riparian as urban forests offers dual purposes: preserving its natural function for vegetation and increasing the size of the urban forest and GOS.

Urban forests were selected to increase GOS in urban areas because they have high ecological and

social functions (Kurniastuti 2013). Urban forests should have dense vegetation with various species and form a multi-strata canopy. They could infiltrate water into the soil, control surface runoff and erosion, provide habitat and food sources for wildlife, and control the urban physical environment, especially those with critical conditions (Samsoedin & Waryono 2010). These criteria are necessary to protect the riparian environment.

Compared to other types of GOS, the number of trees is more crucial in urban forests. Urban forests should have 900 trees/ha with more than 15 species (Samsoedin & Waryono 2010). Urban forests also exhibit social and aesthetic functions with numerous benefits to the community (Maulana et al. 2012; Hastita et al. 2020; Kautsary et al. 2021). An urban forest is a form of environmental preservation that considers the environmental, social, and cultural aspects (Syaputri & Suryawati 2021). Based on the Regulation of the Minister of Environment Number 7 of 2011 concerning Guidelines for the Implementation of the Adipura Program, the urban forest was also one of the components assessed in the Adipura award. For example, Adipura's assessment in 2006 considered that Rengat City lacked urban forests (Formen et al. 2012). Government Regulation 63 of 2003 concerning Urban Forests mandated a minimum of 0.25 ha of urban forests determined by the authorized officer. A forest in urban areas could become an urban forest after an official designation by the mayor (Syaputri & Suryawati 2021). With this designation, this area has a permanent allocation for GOS, and users cannot easily convert it into other uses, such as settlements.

Developing urban forests on riparian rivers could increase the GOS in urban areas. Using lands along the river banks, waterways, beaches, toll roads, lakes or reservoirs, railroads, and under high voltage power could expand the size of GOS in urban areas (Subarudi & Samsoedin 2012; Bisjoe et al. 2019), primarily because of the land scarcity in urban areas (Kautsary et al. 2021). Many big cities in Indonesia use riparian areas to expand their GOS (Aprillia et al. 2020), such as in Semarang (Kautsary et al. 2021). Another way to deal with land scarcity in urban areas is by enriching the barren or abandoned lands (Suryandari & Alviya 2015). The riparian areas of the Cisadane River in South Tangerang City have experienced increasing areas of open field area (1.58 ha) and shrubs (25.57 ha) (Izzati et al. 2019), which could become a riparian urban forest to preserve vegetation and increase the size of GOS in the South Tangerang City.

According to the Decree of the Head of the South Tangerang City Regional Environment Agency Number 660 of 2011 concerning the Appointment of City Forest Locations in the South Tangerang City Area, there are six urban forests with a total area of 12.23 ha (0.083% of the area city area). The size of the urban forest is less than required by Law Number 26 of 2007 concerning Spatial Planning (30%) and Government Regulation Number 63 of 2002 concerning Urban Forests (10%) because the size of the South Tangerang City is 14,719 ha (BPS 2019). The riparian areas along the Cisadane River could contribute to expanding an urban forest area in South Tangerang City by 61.31 ha (Izzati et al. 2019).

Community perception of the development of urban forests is crucial to ascertain its success. Perception is a person's ability to distinguish, classify, and focus one's mind on something and its interpretation (Alizamar & Couto 2016). According to Qiong (2017), this process comprises selection, compilation, and interpretation stages. The selection stage is receiving part of the obtained information. The compiling stage is grouping the information into a meaningful pattern. The interpretation stage entails attaching a meaning to the received stimulus. Each individual's perception tends to differ due to the diverse stimulus interpretation (Qiong 2017).

The community's perceptions of urban forest development are related to the people's understanding and views. In Bloom's taxonomy, understanding lies in the cognitive domain or the ability to understand something (Sekar 2022). Communities tend to accept urban forest development when they understand urban forests well (Masyuroh 2020). Meanwhile, the Big Indonesian Dictionary defines views as opinions. Imaginations and stories about the environment will develop one's view. This view will influence the interpretation of the environment and determine behavior (Iskandar 2009). Communities with a favorable view of GOS tend to support the development of urban forests (Formen et al. 2012).

Favorable community perceptions and views on developing riparian urban forests are needed to create a functional, aesthetic, and environmentally friendly riparian area (Adzkia & Fatimah 2020). Identifying the community's perception and support is critical for the success of riparian urban forest development (Formen et al. 2012). However, knowledge about the community's perception of urban forest development in riparian areas is still limited and needs to be improved. Therefore, this research aimed to determine the community's understanding, perceptions, and views about urban forest development in the riparian areas of Cisadane River, South Tangerang City. The knowledge generated from this research will contribute to developing riparian urban forests in South Tangerang City to maintain the natural function of riparian areas for vegetation, increase the size of GOS, reduce environmental problems, and contribute to socio-economic activities in the urban areas.

Materials and Methods

Time, Location, and Study Sample

The research was conducted from January to March 2017 in the riparian areas of Cisadane River, South Tangerang City. The population comprises all those residing at a radius of 30 m from the riverside, with 114 people. The respondents were determined using purposive sampling to meet the research objective. The respondents were the head of the households or representatives over 17 years old. The number of respondents was 33, of which 90.91% were from South Tangerang and 84.85% were residential owners. Therefore, this research assumed that the present population conditions and 2017 have similar characteristics.

Data Collection and Analysis Methods

This research used questionnaires and interviews to collect data on the communities understanding and views about urban forests using the Likert scale, as shown in Table 1. This research employed structured interviews of open and closed questions to collect data on community perception of riparian urban forest development. The questions asked about community approval for the development, benefits, form preferences, and the willingness of the community to participate in the development and maintenance of the riparian urban forests.

The next step was data checking for sufficiency and consistency before proceeding to the tabulation,

Table 1. Questionnaire Rating Scale

Answer	Score Scale
Fully understand, Strongly Agree	4
Understand, Agree	3
Less Understanding, Less Agree	2
Do not Understand, Disagree	1
Strongly Don't Understand, Strongly Disagree	0

coding, and analysis. Coding was necessary to make the results more readable. The analysis of understanding and views of riparian urban forests used the categories proposed by Azwar (2016).

	X	<	(μ - 1,0σ)	Low, Bad
(μ - 1,0σ)	≤ X	<	(μ + 1,0σ)	Medium, Fairly Good
(μ + 1,0σ)	≤ X			High, Good

with description: X = subject score results; μ = population mean; σ = population standard deviation. The analysis also used descriptive statistics to calculate the percentage and tabulation for presenting data on the community's understanding, followed by descriptive analysis.

Results and Discussion

The community's perceptions of the riparian urban forest development are related to their understanding and views. The followings are the results and discussion of the community's understanding, views, and perceptions of urban forest development in the riparian areas of Cisadane River, South Tangerang City.

Understanding of Urban Forests

Figure 1 illustrates the community's understanding of urban forests. From Figure 1, most of the respondents understanding (63.64%) was classified as high. Similar research by Gafur et al. (2017) in Malaingkedi Village and South Remu Village found that 83.33% and 86.36% of respondents were aware of the urban forest. Likewise, Harahap et al. (2020) stated that the community's understanding of the urban forests' function was quite good, with an average value of 67.19%. Communities with high knowledge about urban forests tend to feel comfortable (Masyruroh 2020) and provide full support to urban forest development in their area (Formen et al. 2012). However, around 3.03% of the respondents' understanding fell into the low category (see Table 2).

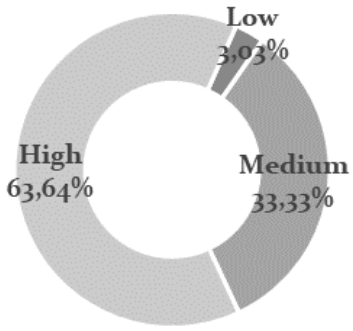

Figure 1. Respondents Understanding about Urban Forest

Table 2. List of Ordered Cumulative Value Statements about Community Understanding of Urban Forests

No	Questions	Score
1	Urban forests could become recreational and sports areas.	94
2	Urban forest development needs to involve the community around the urban forest.	94
3	Communities could actively participate in protecting riparian urban forests.	93
4	The urban forest could become a tourist attraction for the community.	92
5	Riparian urban forest development was possible.	90
6	Community involvement in urban forest management would increase the sense of urban forest ownership.	90
7	Urban forests minimize environmental problems in urban areas.	88
8	Urban forests could improve the local economy for communities around the urban forests.	88

In Table 2, the higher the cumulative values, the better public's understanding of urban forests. The first to fourth statements gained the highest cumulative values, which indicate that urban forests could become recreation, sports, and tourism areas, and communities should involve in their development and maintenance. Hastita et al. (2020) revealed that public GOS in South Tangerang City, including urban forests, has a social function as a space for social interaction, sports, and recreational activities. Moreover, Maulana et al. (2012) suggested that the most dominant activities in the urban forest were tourism and sports by 20.69% and 17.82%, respectively. This result is consistent with Acong et al. (2020) that people understand urban forests more as places for recreational activities and taking pictures. In addition, similar research in the Deo airport area, Sorong City, revealed that 100% of the respondents agreed that the community should be involved in developing and maintaining urban forests (Gafur et al. 2017) for its success (Formen et al. 2012).

Two statements had the lowest cumulative values (88 points). The first statement related to urban forests' function in minimizing environmental problems in urban areas. This lowest score indicated that communities needed to be more aware of the function of urban forests to enhance community support for developing and maintaining urban forests (Formen et al. 2012; Redha et al. 2012). There was a need for dissemination and group formation to improve community understanding and participation in activities related to urban forests and their ecological benefits. The second statement was related to the urban forest's contribution to the surrounding communities' local economy. However, 60.61% of the respondents agreed that developing urban forests on riparian rivers could increase economic opportunities, indicating that respondents needed clarification about the economic improvements despite their awareness of its opportunities (Figure 2).

The economic opportunities referred to by the community were job opportunities (Harahap et al. 2020), including business and labor. However, around 39.39% of respondents were unaware of the economic opportunities created by urban forests because they were elderly, already working in other unrelated sectors, or just wanted to become urban forest connoisseurs. Tourism activities that involve local communities in riparian urban forest development could improve regional income through retribution (Formen et al. 2012) and become sources of income for local communities (Riyanti et al. 2020).

Views on Urban Forests

Around 96.97% of respondents view the urban forest well (Figure 3) because most respondents in the

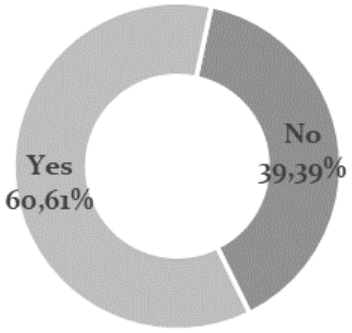

Figure 2. Economic Opportunities for Urban Forest Development

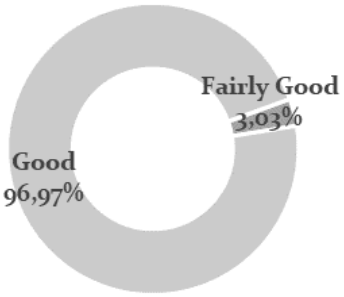

Figure 3. Respondents' Views on Urban Forest

Table 3. List of Ordered Cumulative Value Statements about Community Views on Urban Forests

No	Statements	Score
1	Communities need urban forests for recreation and sporting areas.	99
2	Urban forests could become an alternative tourist area.	99
3	Community involvement in urban forest management could create a sense of ownership.	99
4	Urban forests could be beneficial for the community.	98
5	Urban forests could create jobs for the surrounding communities.	98
6	Communities were involved in urban forest development.	97
7	Communities would participate in maintaining the urban forests.	97
8	Urban riparian areas need to become riparian urban forests.	88

Cisadane riparian areas fully understand the urban forests and their positive attributes (Formen et al. 2012). Table 3 summarizes the views of respondents on urban forests.

Almost all scores on respondents' views about the urban forest were high (Table 3), with an average of 96.88. The lowest value was that urban riparian areas need to become riparian urban forests because they had a moderate understanding of this matter (Table 2). South Tangerang had clustered urban forests in the middle of the city, not along the riparian areas. This condition was similar to Surabaya, which hosted eight existing clustered and spread around the region, not in the form of lines (Syaputri & Suryawati 2021).

Perceptions of Riparian Urban Forest Development

Most respondents (90.91%) agreed on the riparian urban forest's development (Figure 4) for many reasons (Figure 5). Similar research in Serang City found that 100% of respondents agreed with urban forests because they could make the air fresher, provide beautiful scenery and comfort, and decrease air pollution (Masyruroh 2020). In Pasar Baru Village, Kota Manna Sub-district, South Bengkulu Regency, 73.61% of respondents responded positively about the development of urban forests (Redha et al. 2012). Meanwhile, around 9.09% disagreed with the riparian urban forest development due to fear of flooding, which can be dangerous to the children. Therefore, there was a need for dissemination activities regarding the development plan and the benefits obtained from the urban forest (Acong et al. 2020).

Approximately 66.67% agreed with the reasons to make the riparian fresher, tidier, and more beautiful for tourism (Figure 5). This agreement aligned with the respondents' views on the need for urban forests for recreation and alternative tourism. Respondents' positive expectations of the urban forests would lead to positive support for their development (Formen et al. 2012), such as in Srengseng Urban Forest, where all respondents stated that they were not disturbed by the

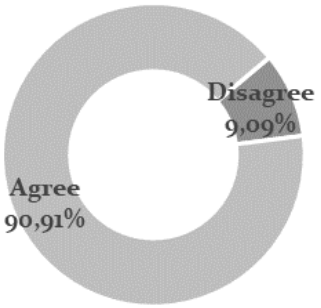

Figure 4. Urban Forest Development on the River Border

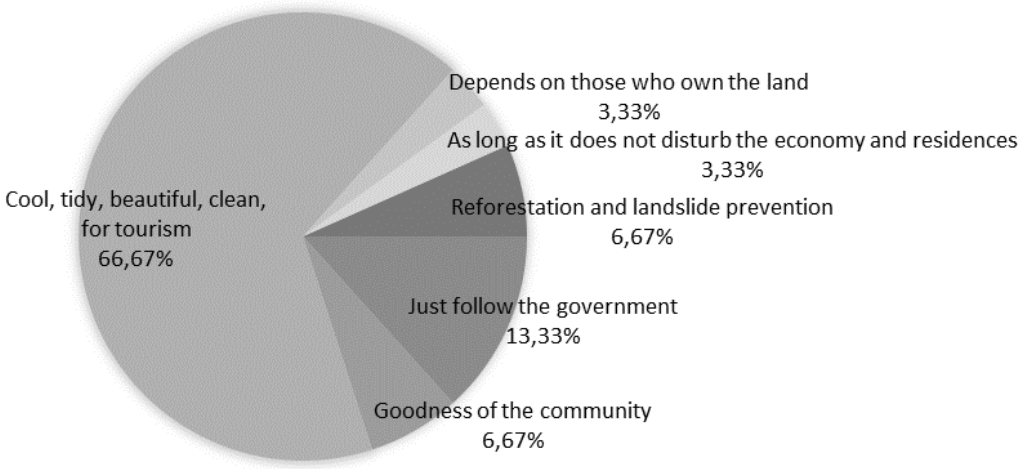

Figure 5. Reasons for Approval for Urban Forests Development on the River Border

existence of the urban forest (Kurniastuti 2013).

The respondents understanding that urban forests could minimize environmental problems had the lowest score (Table 2). However, 93.94% stated that developing riparian urban forests would benefit the community (Figure 6). The benefits of urban forests for 77.42% of respondents were creating neat, beautiful, refreshing, clean, and comfortable riparian areas for recreation. Similar research revealed that the motivation for visiting urban forests was to enjoy the atmosphere and amenities of urban forests to relax and relieve from the high intensity of social and economic activities in the cities (Maulana et al. 2012). Around 9.68% of respondents stated that urban forests protect the rivers and prevent landslides because they host relatively dense vegetation (Kurniastuti 2013), which was related to the lowest understanding of urban forests to minimize environmental problems in urban areas.

The riparian urban forests were in strips due to elongated vegetation formations. Respondents preferred green belts with various trees (45.45%) over city parks (30.30%) or fruit trees (24.24%) (Figure 7). This preference was similar to the Cipinang riparian landscape design, Cibubur Village, Ciracas Sub-district, where approximately 80% of the respondents wanted trees in the landscape (Adzkia & Fatimah 2020). Planting trees was necessary to protect the water and provide comfort and beauty (Formen et al. 2012). Riparian landscapes as an GOS could serve the surrounding community's needs while sustaining the riparian functions (Adzkia & Fatimah 2020). Izzati et

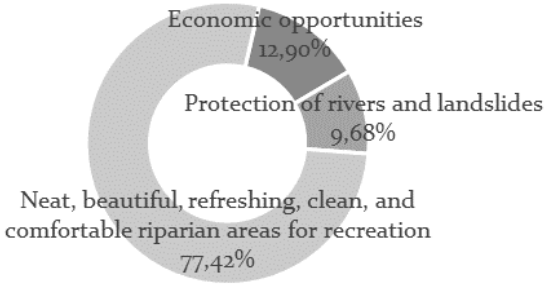

Figure 6. Benefits of Urban Forests Development on the River Border

al. (2017) divided riparian urban forests into three zones, namely undisturbed, managed, and runoff control and aesthetic zones. The undisturbed zone was for ecological protection, while the managed zone could accommodate ecological and socio-economic functions. The runoff control and aesthetic zone was to control runoff and serve aesthetic and socio-economic functions, with a one-meter jogging track as the outer boundary. In contrast, Wardiningsih and Salam (2019) divided riparian areas in GOS development into buffer, conservation, and aesthetic zones. Considering respondents' preferences was crucial to supporting riparian urban forest development.

The community involvement also needs to be involved in implementing urban forest development, as this will foster a sense of ownership and obligation to protect and maintain the urban forests (Hidayat 2017). Most respondents were willing to voluntarily be involved in developing and maintaining the urban forest because they understood the importance of community participation in developing and maintaining urban forests (Table 2). Around 75.76% and 87.88% of the respondents were willing to involve in the development and maintenance of riparian urban forests, respectively (Figure 8). The respondents' expectation of a cleaner, tidier, and better environment became why they participated in the government development urban forest program. They were happy and felt responsible for participating when needed as long as it was outside their working hours because they were the closest neighbors of the urban forests. These results showed that the community was willing to protect the surrounding

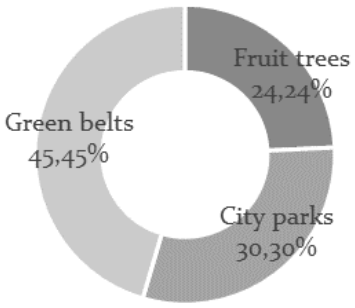

Figure 6. Benefits of Urban Forests Development on the River Border

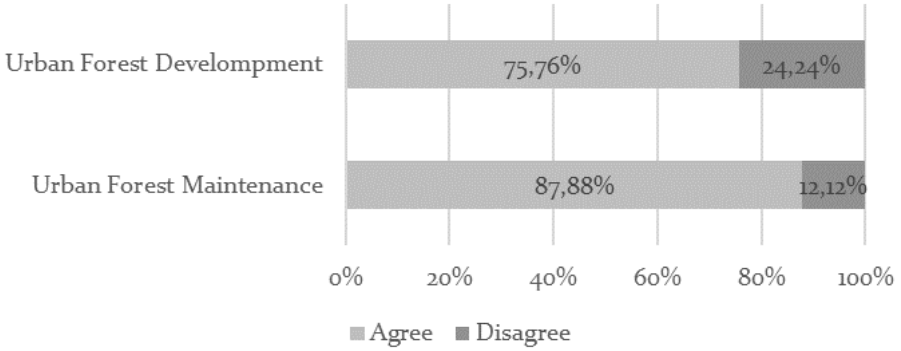

Figure 8. Community Involvement in Urban Forest Development and Maintenance

environment (Sandaluyuk & Samsudin 2013), similar to the respondents in the Tapin river (Aina et al. 2021). Communities with great concern and a sense of belonging supported implementing urban forest development (Hidayat 2017).

Meanwhile, 24.24% and 12.12% were unwilling to be involved in the development and maintenance process (Figure 8) because of age, tight schedule, and expectation for compensation. Around 37.5% of respondents expected compensation for participating in urban forest development and maintenance. Similar research in Gorontalo also found that voluntary community participation in developing and maintaining urban forests was not universal (Sandaluyuk & Samsudin 2013), depending on their sense of belonging (Hidayat 2017).

The results of the community perceptions indicated that the development of urban forests along the Cisadane riparian areas in South Tangerang City to increase the GOS size and maintain the function of riparian areas gained sufficient support from the community. Government Regulation No. 63/2002 on Urban Forests mandated the development of urban forests, but the size of urban forests in many regions had stagnated (Suryandari & Subarudi 2014). The development of urban forests should consider multi-sectoral coordination (Suryandari & Subarudi 2014), a supported funding system (Formen et al. 2012; Suryandari & Subarudi 2014; Suryandari & Alviya 2015), supported regional regulations (Kurniastuti 2013; Suryandari & Subarudi 2014; Suryandari & Alviya 2015), clear incentives and disincentives mechanisms (Suryandari & Subarudi 2014), competence human resources (Formen et al. 2012), and active community participation (Formen et al. 2012; Suryandari & Subarudi 2014). Considering these factors and good community perception, the government could realize the development of riparian urban forests along the Cisadane river in South Tangerang City.

Conclusion

In conclusion, around 63.64% of respondents understood urban forests very well, but their understanding of the function of the urban forest to minimize environmental problems in urban areas needed to improve. The majority (96.97%) had good views on urban forests, but their views on the striped riparian urban forests needed to improve. In addition, around 90.91% agreed on developing riparian urban forests along the Cisadane river in South Tangerang City because it would create a fresher, tidier, cleaner, and more beautiful new tourism area. Approximately 75.67% were willing to involve in the development, while 87.88% wanted to involve in its maintenance. These results showed that the community had a good understanding of urban forests, accepted, supported, and would involve in the development and maintenance of the riparian urban forests. This positive response could become the basis for the

riparian urban forest along the Cisadane River in South Tangerang City to maintain the function of riparian areas and increase GOS's size. The government should consider supporting regional regulations on urban forests, including a funding system, multi-sector coordination, incentives and disincentives mechanisms, and competent human resources.

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