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Resilience and Adaptation: Urban Muslim Communities in DKI Jakarta Facing Environmental Challenges

Teguh Luhuringbudi*
UIN Syarif Hidayatullah Jakarta, Indonesia
e-mail: sampaiteguh@gmail.com.

Panggih Abdiguno
MAN Buleleng, Bali, Indonesia
e-mail: pabdigunomanbuleleng@gmail.com

*Correspondence: e-mail: sampaiteguh@gmail.com

Abstract

This study examined the ways in which Muslim communities in DKI Jakarta have adapted and demonstrated resilience in the context of environmental challenges. This study focuses on the adaptation strategies developed by Muslim communities in response to environmental disturbances, including flooding, pollution, and water quality degradation. To investigate these strategies, the study employs theoretical approaches drawn from the fields of socio-ecological resilience, climate justice, and urban green infrastructure. The research methods employed included a qualitative analysis of environmental policies, community practices, and adaptive responses. The findings indicated that the resilience of these communities was underpinned by robust religious values, social cohesion, and pioneering adaptation strategies. The implementation of urban green infrastructure has been demonstrated to enhance the adaptive capacity of communities in response to climate change. Furthermore, this study underscored the necessity for the equitable distribution of environmental benefits in order to safeguard vulnerable communities. One limitation of this study was that its analysis was predominantly qualitative and focused on Muslim communities in DKI Jakarta. The findings of this study made a significant scientific contribution by demonstrating that a holistic approach that integrated social, cultural, and ecological aspects could effectively enhance community resilience to climate change. Additional research is required to test this hypothesis in diverse contexts with a more comprehensive quantitative approach.

Keywords:
Adaptation, DKI Jakarta, Environmental Challenges, Resilience, Urban Muslim Communities

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Introduction

DKI Jakarta, the epicentre of economic and political activity in Indonesia, is confronted with an increasingly intricate array of environmental challenges. The rapid pace of urbanisation and population growth has exerted considerable pressure on urban infrastructure and the natural environment.(Martinez and Masron 2020; Silver 2024) The city was facing significant environmental challenges, including flooding, air pollution and water quality degradation.(Costa, Burlando, and Priadi 2016; Padawangi and Douglass 2015; Prinz, Juliani, and Brontowiyono 2009; Yoo, Kim, and Hadi 2014) The Muslim community, which constitutes the majority of Jakarta's population, must adapt to these changes while maintaining their religious and social identities.(Howell 2005; Miharja, Mulyana, and Izzan 2019; Reuter 2009; SIMONE and RAO 2012; Wannewitz and Garschagen 2024) Mosques and other places of worship frequently functioned as community centres, offering social and spiritual support in the context of environmental challenges.(Hoon n.d.; Kamil and Darojat 2019; Safei and Armstrong 2024; Setiadi 2015; Wiryomartono 2009) This phenomenon reflected the resilience and adaptability of the Muslim community in Jakarta in the face of environmental disruptions. However, there was still much to be discovered regarding the precise methods by which these communities developed strategies to survive and flourish in the face of such rapid change (*pengajian* or the Qur'an study group, (AOKI, 2015. p. 69-86.) promotion of environmental conservation and sustainable horticulture, (GILLIAT-RAY & BRYANT, 2011) and introducing the Eco-Islam for local local small and medium enterprises SMEs in the region).

Prior research has demonstrated that the resilience and adaptation of urban communities to environmental challenges represents a significant and evolving area of study. In some publications, Folke emphasised the significance of social and ecological system interactions in enhancing communities' capacity to cope with environmental disruptions, a concept he termed "socio-ecological resilience".(Folke 2016; Folke et al. 2011, 2016) Robinson emphasised the importance of ensuring an equitable distribution of environmental benefits and burdens in order to protect vulnerable populations, including Muslim communities in urban areas, from the adverse effects of climate change.(Robinson and Shine 2018) McPhearson emphasised in his study on urban green infrastructure that the integration of natural elements in urban planning could increase city resilience to climate change and natural disasters.(Langemeyer et al. 2020) The success of community adaptation and resilience was shown to be highly dependent on inclusive and sustainable policies.(Birchall and Bonnett 2021; Croese, Green, and Morgan 2020; Fabbricatti, Boissenin, and Citoni 2020; Imperiale and Vanclay 2021; Keshavarz and Moqadas 2021; Musavengane and Kloppers 2020; Owen 2020) These studies provided a strong theoretical basis for understanding the dynamics of Muslim community resilience in Jakarta in facing environmental challenges.

This paper seeks to examine the ways in which Muslim communities in DKI Jakarta adapt and demonstrate resilience in the context of environmental challenges. The principal objective of this study is to identify the adaptation strategies developed by Muslim communities. Furthermore, this paper seeks to examine the role of urban green infrastructure in bolstering the resilience of Muslim communities in the face of climate change. This study employs theoretical approaches from the fields of socio-ecological resilience, climate justice, and urban green infrastructure to gain a comprehensive understanding of the adaptation and resilience mechanisms of Muslim communities in Jakarta. The findings are expected to make a significant contribution to the existing literature on urban resilience and community adaptation to environmental challenges. Furthermore, the study will inform policy makers in the design of more inclusive and sustainable environment.

This paper posits that Muslim communities in Jakarta exhibited considerable resilience and adaptation in the context of environmental challenges, through intricate interactions between social and ecological systems. The primary argument presented was that the resilience of these communities was supported by robust religious values, social solidarity, and innovative adaptation

practices. Furthermore, the integration of urban green infrastructure in policy could enhance the adaptive capacity of Muslim communities to environmental disturbances. The Climate Justice perspective emphasises that the equitable distribution of environmental benefits and burdens plays a critical role in protecting vulnerable populations. This study will test these arguments through an in-depth analysis of environmental policies, community practices, and the adaptive responses of Muslim communities in Jakarta. Therefore, this paper seeks to uncover the mechanisms and processes underlying the resilience and adaptation of Muslim communities to environmental challenges in Jakarta.

Methods

The main subject of this study was the urban Muslim community in DKI Jakarta, which was the focus of the analysis to understand how they faced and adapted to environmental challenges. The Muslim community in Jakarta was a significant group, both in terms of numbers and influence in the social dynamics of the city. This study aimed to explore how this community developed resilience and adaptation strategies in a changing and challenging urban context, particularly in relation to environmental issues such as climate change, pollution and green infrastructure planning. This unit of analysis was important because it provided insights into socio-ecological resilience that could be used to develop more effective policies and interventions in the future.

This study used a qualitative-descriptive design to gain an in-depth understanding of the resilience and adaptation of the urban Muslim community in DKI Jakarta to environmental challenges. The qualitative approach allowed the researchers to explore the community's experiences, perceptions and practices holistically and contextually.(Cantelmi, Di Gravio, and Patriarca 2021; Noël, Vanroelen, and Gadeyne 2021) The descriptive design was chosen to provide a detailed and structured description of the phenomenon under study, including the adaptation strategies used by the Muslim community in dealing with environmental change.(Islam, Amir, and Begum 2021; Savari and Shokati Amghani 2021; Swapan and Sadeque 2021) This approach was chosen because it was able to reveal complex dynamics that are often overlooked in quantitative research, resulting in richer and more contextual findings.

The primary data sources for this study were official government documents that provided up-to-date and accurate information on the conditions of DKI Jakarta. These documents included: 1) Official Statistics News of DKI Jakarta Province Volume 4 Issue 6 (2024); 2) Official Statistics News of DKI Jakarta Province Volume 4 Issue 7 (2024); and 3) Sustainable Development Goals Indicators of DKI Jakarta Province 2023 Volume 5 (2024). These documents were selected because they provide relevant empirical data on demographics, socio-economic conditions and sustainable development indicators that are important for analysing the resilience and adaptation of urban Muslim communities. Data from these sources would form the basis for identifying significant patterns and trends in the context of this study.

The data collection technique in this study was based on the method proposed by Esubalew Aman Mezmir (2020), namely identifying thematic framework, data reduction and memoing.(Mezmir 2020) The identification of the thematic framework was carried out through a thorough and systematic reading of official government documents in order to identify relevant main themes. Data reduction was carried out using the mechanisms of coding, finding themes, clustering, and writing stories that focused on the urban Muslim community in DKI Jakarta as the unit of analysis, the context of environmental challenges, and resilience and adaptation as formal objects. Memoing was used to record codes, theoretical notes and operational notes related to primary sources, units of analysis, formal objects and the context of environmental challenges. These techniques were chosen because they provide a clear and systematic structure to the process of data collection and analysis, allowing researchers to explore and understand complex phenomena in depth.

The data analysis techniques used in this study included three main approaches: 1) Carl Folke's Socio-Ecological Resilience, which explores how communities adapt and recover from environmental disturbances, providing a framework for understanding the socio-ecological resilience of urban Muslim communities(Folke 2016; Folke et al. 2011, 2016); 2) Mary Robinson's Climate Justice, which emphasises the equitable distribution of environmental benefits and burdens, with a focus on vulnerable populations, relevant to examining the impact of environmental injustice on Muslim communities in Jakarta (Robinson and Shine 2018); and 3) Timon McPhee's Urban Green Infrastructure, which discusses the integration of natural elements into urban planning to enhance resilience, providing practical insights into the development of resilience. .(Langemeyer et al. 2020) These approaches were chosen because they were able to provide a comprehensive and multidimensional perspective in analysing the resilience and adaptation of urban Muslim communities to environmental challenges in DKI Jakarta.

Results

Resilience and Adaptation through Socio-Ecological Resilience

The analysis of community adaptation mechanisms in the face of environmental challenges in DKI Jakarta could be seen from primary data on the contribution of food commodities to the poverty line in March 2024. Food commodities such as rice, filtered kretek cigarettes, broiler chicken meat, and broiler chicken eggs contributed significantly to the PML. Rice contributed 23.31 percent and filtered kretek cigarettes 14.29 percent. Instant noodles, bread and ground or instant coffee sachets also made significant contributions. These data reflect the community's dependence on certain commodities as an adaptation mechanism to economic and environmental changes. In addition, the contribution of non-food items such as housing and electricity showed how the community adapted to other basic needs. This adaptation reflected the dynamics of socio-ecological resilience in the face of increasing environmental disturbance.

Figure 1. Poverty Line Development, March 2023-March 2024

Tahun	Garis Kemiskinan (Rp/Kapita/Bulan)		
	Makanan	Non Makanan	Total
(1)	(2)	(3)	(4)
Maret 2023	548.628 (69,23%)	243.887 (30,77%)	792.515 (100%)
Maret 2024	571.647 (69,27%)	253.641 (30,73%)	825.288 (100%)

Figure 2. Food Commodities that Make the Largest Contribution to the Food Poverty Line in DKI Jakarta Province, March 2024

Figure 3. Household Poverty Line, March 2023-March 2024

Tahun	Garis Kemiskinan (Rp/kapita/bulan)	Rata-Rata Anggota Rumah Tangga Miskin	Garis Kemiskinan Rumah Tangga Miskin (Rp/Rumah Tangga/Bulan)
(1)	(2)	(3)	(4)
Maret 2023	792.515	4,89	3.875.398
Maret 2024	825.288	4,92	4.060.417
Persentase Perubahan Maret 2023 – Maret 2024	4,14%	0,61%	4,77%

Carl Folke's approach to socio-ecological resilience was used to examine how communities adapted to environmental disturbance by meeting basic needs. The concept of ability to meet basic needs was used by BPS to measure poverty. The poverty line (GK) consisted of the food poverty line (GKM) and the non-food poverty line (GKBM). The FCPL covered the minimum food requirement equivalent to 2100 kcal per capita per day. The food package consisted of 52 items, while the NFP covered minimum needs for shelter, clothing, education and health. Annual GHG emission data showed the implementation of action plans at central and regional levels to support emission reduction. This reflected community and government efforts to manage environmental impacts and adapt to environmental disruptions.

Figure 4. Poverty Profile of DKI Jakarta, March 2020-March 2024

Bulan	Garis Kemiskinan (Rp/Kapita/Bulan)			Jumlah Penduduk Miskin (000)	Persentase Penduduk Miskin	Indeks Kedalaman Kemiskinan	Indeks Keparahan Kemiskinan
	Makanan	Non Makanan	Jumlah				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Maret 2020	466.156 (68,51%)	214.245 (31,49%)	680.400 (100%)	480,86	4,53	0,590	0,114
September 2020	467.847 (68,46%)	215.491 (31,84%)	683.339 (100%)	496,84	4,69	0,669	0,152
Maret 2021	479.332 (68,71%)	218.306 (31,29%)	697.638 (100%)	501,92	4,72	0,642	0,136
September 2021	490.918 (68,65%)	224.134 (31,35%)	715.052 (100%)	498,29	4,67	0,753	0,183
Maret 2022	508.239 (68,78%)	230.716 (31,22%)	738.955 (100%)	502,04	4,69	0,768	0,194
September 2022	534.819 (69,15%)	238.551 (30,85%)	773.370 (100%)	494,93	4,61	0,682	0,158
Maret 2023	548.628 (69,23%)	243.887 (30,77%)	792.515 (100%)	477,83	4,44	0,695	0,175
Maret 2024	571.647 (69,27%)	253.641 (30,73%)	825.288 (100%)	464,93	4,30	0,645	0,043

The process of community recovery from environmental disruptions in DKI Jakarta could be seen from the decline in the export value of major commodities in April 2024. The biggest decline was in chemical products, machinery and mechanical equipment, and fish, crustaceans and molluscs. This decline showed the impact of environmental disruptions on the economic sector. The Indonesian government has also issued Government Regulation No. 32 of 2019 on Marine Spatial Planning, which emphasises the management of exclusive economic zones using an ecosystem-based approach. This approach included protecting, conserving and utilising the functions of the marine environment, as well as preventing the negative impacts of activities that damage the marine environment. Working with other countries to prevent damage to the marine environment was also part of the recovery effort. These data reflect how communities and governments have worked together to recover from environmental degradation and build sustainable resilience. When the export value of major commodities in April 2024 was seen as a result of environmental disturbances in DKI Jakarta, this not only reflected economic losses but also highlighted challenges to the social and ecological resilience of communities, including Muslim

communities. The social and ecological resilience of Muslim communities can be found in how they cope with and adapt to environmental changes that threaten their well-being. The answer can be found in cases that highlight how Muslim communities have combined religious values with sustainability practices, and how they have collaborated with governments and other organizations to mitigate negative environmental impacts. Such cases have often highlighted how Islamic values emphasizing justice, balance, and environmental responsibility are applied in a socio-ecological context. For example, the concept of "ḥimā" (environmental protection) in Islam can be used as a framework for wisely managing natural resources, which in turn supports the ecological resilience of communities. In addition, cases of community initiatives, such as tree planting programs led by mosques or environmental clean-up efforts by Muslim groups (pesantren or local Islamic organizations), have demonstrated the important contribution of Muslim communities in building resilience to environmental change. Thus, the social and ecological resilience of Muslim communities has been found in literature or community practices that have combined the study or understanding of community resilience with the principles of sustainability in Islam, as well as in real practices in the field that have shown how they have adapted and survived environmental challenges. Practical cases in communities like these have offered deep insights into how religious values have been able to support sustainable development and recovery from environmental disturbances.

Figure 5. Jakarta's Leading Exports by Class of Goods, April 2024

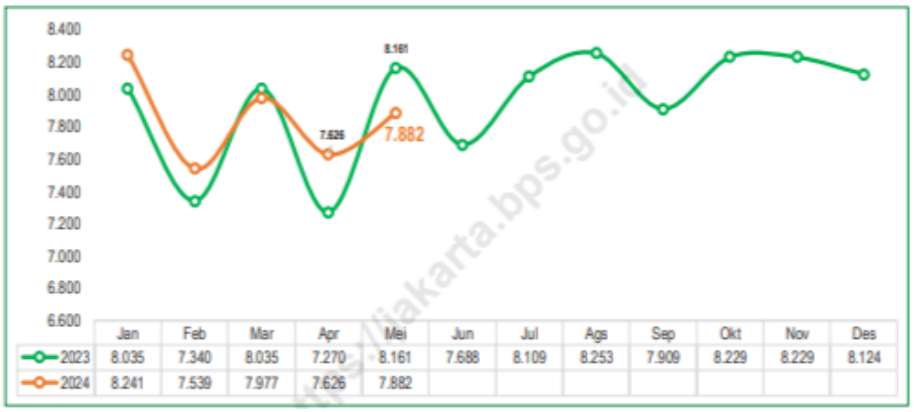
Golongan Barang	Nilai FOB (Juta US$)					Perubahan (%)			Peran Terhadap Total Apr 2024 (%)
	Apr'23	Mar'24	Apr'24	Jan-Apr'23	Jan-Apr'24	m-to-m	y-on-y	c-to-c	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Logam mulia dan perhi-asan/permata (71)	82,06	304,03	220,21	346,52	606,92	-27,57	168,36	75,15	27,35
Kendaraan dan bagian-nya (87)	173,64	191,56	144,83	925,11	708,27	-24,39	-16,59	-23,44	17,99
Ikan, krustasea, dan moluska (03)	58,66	94,92	67,44	310,11	375,97	-28,95	14,97	21,24	8,38
Mesin dan peralatan mekanis serta bagiannya (84)	57,02	87,98	62,36	319,24	312,92	-29,12	9,36	-1,98	7,75
Lemak dan minyak hewani/nabati (15)	30,73	47,93	47,66	196,26	186,06	-0,58	55,08	-5,20	5,92
Sabun dan preparat pembersih (34)	22,55	27,72	25,81	102,11	104,20	-6,89	14,47	2,05	3,21
Mesin dan perlengkapan elektrik serta bagiannya (85)	25,05	32,23	24,67	165,87	119,45	-23,46	-1,52	-27,99	3,06
Olahan dari tepung (19)	14,19	22,16	16,35	62,60	73,71	-26,23	15,17	17,74	2,03
Berbagai produk kimia (38)	22,73	40,66	15,59	125,54	122,04	-61,65	-31,38	-2,79	1,94
Pakaian dan aksesorinya (rajutan) (61)	12,36	19,55	14,21	69,29	70,90	-27,31	14,96	2,32	1,77
Total 10 Golongan Barang	498,99	868,76	639,14	2,622,64	2,680,43	-26,43	28,09	2,20	79,39
Lainnya	166,06	271,79	165,89	864,01	871,15	-38,96	-0,10	0,83	20,61
Total Ekspor	665,05	1,140,54	805,04	3,486,66	3,551,58	-29,42	21,05	1,86	100,00

Resilience and Adaptation through Climate Justice

Resilience and adaptation in the context of climate justice according to Mary Robinson were very relevant in assessing the fairness of the implementation of environmental policies that affected the Muslim environment in DKI Jakarta. Data from the second primary source on page 42 showed a significant increase in the use of public transport such as MRT and LRT in May 2024 compared to April 2024 and May 2023. This increase reflects the government's efforts to provide more sustainable transport and reduce carbon emissions. However, climate justice needs to be ensured through the equitable distribution of benefits, especially to urban Muslim communities who have often been more vulnerable to environmental impacts. Increased use of public transport could reduce air pollution, which often has a greater impact on vulnerable groups. Transportation policies that have been implemented in DKI Jakarta, such as increasing the use of MRT and LRT, have indeed shown the government's efforts to provide more sustainable transportation and

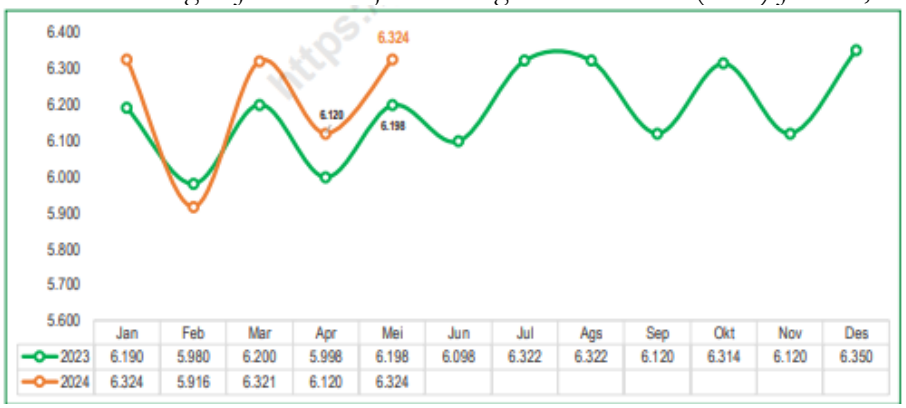
reduce carbon emissions. However, when viewed from the perspective of *climate justice* as stated by Mary Robinson, the policy still needs to be further evaluated in terms of fair distribution of benefits for all levels of society, especially urban Muslim communities that are vulnerable to environmental impacts. Although increasing the use of public transportation has reduced air pollution and its negative impacts on vulnerable groups, it is important to ensure that access to these facilities is equitable and does not exclude certain groups. Therefore, although there has been progress, the policy cannot yet be said to provide a sense of comprehensive environmental justice, because a more inclusive and fair approach is still needed in the distribution of benefits for all communities, including the most vulnerable. This analysis showed the importance of equitable and sustainable transport policies in increasing the resilience of urban Muslim communities to environmental challenges in DKI Jakarta.

Figure 6. Development of the Number of Jakarta Mass Rapid Transit (MRT) Trips, 2023-2024



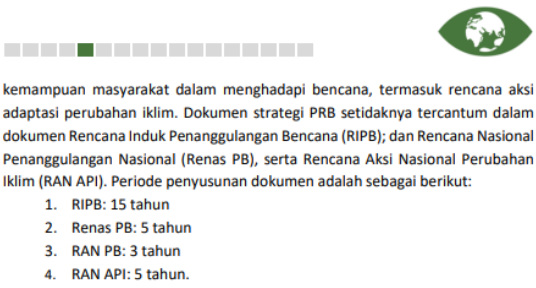
	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Ags	Sep	Okt	Nov	Des
2023	8.035	7.340	8.035	7.270	8.161	7.688	8.109	8.253	7.909	8.229	8.229	8.124
2024	8.241	7.539	7.977	7.626	7.882							

Figure 7. Perkembangan Jumlah Perjalanan Light Rail Transit (LRT) Jakarta, 2023-2024



	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Ags	Sep	Okt	Nov	Des
2023	6.190	5.980	6.200	5.998	6.198	6.098	6.322	6.322	6.120	6.314	6.120	6.350
2024	6.324	5.916	6.321	6.120	6.324							

Figure 7. Disaster Risk Reduction (DRR) or *Dokumen Strategi Pengurangan Risiko Bencana* (PRB) Strategy Document



kemampuan masyarakat dalam menghadapi bencana, termasuk rencana aksi adaptasi perubahan iklim. Dokumen strategi PRB setidaknya tercantum dalam dokumen Rencana Induk Penanggulangan Bencana (RIPB); dan Rencana Nasional Penanggulangan Nasional (Renas PB), serta Rencana Aksi Nasional Perubahan Iklim (RAN API). Periode penyusunan dokumen adalah sebagai berikut:

1. RIPB: 15 tahun
2. Renas PB: 5 tahun
3. RAN PB: 3 tahun
4. RAN API: 5 tahun.

Resilience and adaptation could also be improved through the equitable distribution of benefits, with a focus on vulnerable populations such as urban Muslim communities in DKI Jakarta. Data from the first primary source on page 42 showed that there was a decrease in MRT

and LRT trips in April 2024 compared to the previous month, but a significant increase compared to April 2023. This shows that there are fluctuations in the use of public transport that need to be addressed with policies that support sustainability and equity for all citizens. Increasing the use of sustainable public transport could provide better access for vulnerable communities and reduce reliance on polluting private cars. Mary Robinson emphasised the importance of equitable distribution of environmental benefits, with sustainable transport policies taking into account the needs and affordability of vulnerable populations. The policy of increasing the use of sustainable public transportation, such as MRT and LRT in DKI Jakarta, has indeed provided significant benefits in reducing dependence on polluting private vehicles. However, despite the increase in public transportation use, fluctuations in the number of trips have shown that the policy has not fully provided equitable benefits to all users. Users of private transportation that contribute to pollution may still choose this option due to factors such as accessibility, convenience, or costs that are considered more affordable. Therefore, policy makers (from the DKI Jakarta provincial government, Betawi community leaders, and religious leaders) need to consider how this policy can be improved with a focus on equitable distribution of benefits, ensuring that all levels of society, including vulnerable groups such as urban Muslim communities, have fair and affordable access to sustainable public transportation. Further research is needed to identify existing barriers and aspirations and design policies that not only support sustainability, but also ensure that the benefits are felt by all citizens, including those who currently still rely on polluting private transportation. This approach would help improve the resilience and adaptation of urban Muslim communities to climate change and environmental challenges.

Figure 8. Development of Transport Mode Indicators for Jakarta Mass Rapid Transit (MRT), April 2024

Indikator	Jumlah					Perubahan (persen)		
	Apr 2023	Mar 2024	Apr 2024	Jan-Apr 2023	Jan-Apr 2024	Apr'24 thd Mar'24 (*m-to-m*)	Apr'24 thd Apr'23 (*y-on-y*)	Jan-Apr'24 thd Jan-Apr'23 (*c-to-c*)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total Perjalanan (Perjalanan)	7.270	7.977	7.626	30.680	31.383	-4,40	4,90	2,29
Total Penumpang (Orang)	2.065.546	2.876.356	2.607.904	9.684.014	11.213.253	-9,33	26,26	15,79

Figure 9. Development of Jakarta Light Rail Transit (LRT) Mode Indicators, April 2024

Indikator	Jumlah					Perubahan (persen)		
	Apr 2023	Mar 2024	Apr 2024	Jan-Apr 2023	Jan-Apr 2024	Apr'24 thd Mar'24 (*m-to-m*)	Apr'24 thd Apr'23 (*y-on-y*)	Jan-Apr'24 thd Jan-Apr'23 (*c-to-c*)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total Perjalanan (Perjalanan)	5.998	6.321	6.120	24.368	24.681	-3,18	2,03	1,28
Total Penumpang (Orang)	72.318	92.004	84.571	303.662	360.140	-8,08	16,94	18,60

Equitable distribution of environmental burdens was also key to improving the resilience and adaptation of urban Muslim communities in DKI Jakarta. Data from the second primary source on pages 35-36 show that the ROR of star-rated hotels in Jakarta increased in May 2024 compared to the previous month and May 2023. This increase reflects the recovery of the tourism sector, which has the potential to increase the income and welfare of local communities. However, this increase must also be balanced with policies that ensure that the environmental burden does not increase for vulnerable communities. Just environmental policies must take into account the

impact of economic activities on the environment and public health. Mary Robinson emphasised that climate policies must protect the rights of vulnerable populations and ensure that they do not bear a disproportionate burden of economic development and climate change. In this way, the resilience and adaptation of urban Muslim communities in DKI Jakarta could be enhanced through equitable and inclusive policies.

Figure 10. Development of Room Occupancy Rate (TPK) of Star Hotels in Jakarta (%), 2021-2024

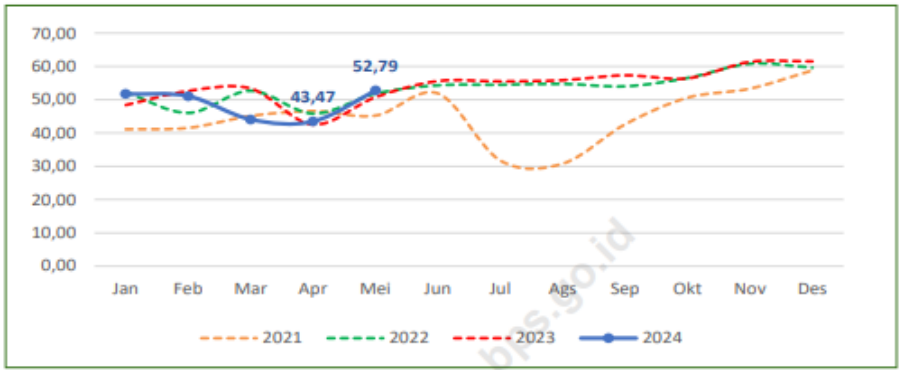


Figure 11. Room Occupancy Rate by Star and Nonstar Hotel Classification in Jakarta, May 2023, April 2024, and May 2024

Klasifikasi Hotel	Tingkat Penghunian Kamar (persen)			Perubahan (persen poin)	
	Mei 2023	April 2024	Mei 2024	Mei 2024 terhadap Mei 2023	Mei 2024 terhadap April 2024
(1)	(2)	(3)	(4)	(5)	(6)
Bintang 1	42,36	36,78	40,01	-2,35	3,23
Bintang 2	54,82	50,70	56,50	1,68	5,80
Bintang 3	51,13	44,23	55,05	3,92	10,82
Bintang 4	49,45	47,05	58,07	8,62	11,02
Bintang 5	51,09	33,03	40,95	-10,14	7,92
TPK Bintang	50,75	43,47	52,79	2,04	9,32
TPK Nonbintang	40,24	40,62	42,23	1,99	1,61

Figure 12. Average Length of Stay of Star and Non-Star Hotel Guests in Jakarta (days)

Jenis Tamu	Bulan - Tahun	Kelas Hotel Bintang					Hotel Bintang	Hotel Nonbintang
		1	2	3	4	5		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asing	Mei 2024	1,38	1,92	1,91	2,04	1,92	1,95	1,45
	April 2024	1,61	2,10	1,77	1,96	2,52	2,20	2,73
	Mei 2023	1,45	3,55	3,27	2,53	2,30	2,53	2,80
Indonesia	Mei 2024	1,27	1,39	1,39	1,59	2,25	1,53	1,18
	April 2024	1,50	1,55	1,41	1,75	2,60	1,66	1,27
	Mei 2023	1,72	1,96	1,58	1,67	1,48	1,65	1,29
Asing dan Indonesia	Mei 2024	1,28	1,40	1,41	1,64	2,15	1,57	1,18
	April 2024	1,50	1,56	1,42	1,78	2,58	1,71	1,28
	Mei 2023	1,71	1,99	1,60	1,71	1,71	1,70	1,29

Resilience and Adaptation through Urban Green Infrastructure

Resilience and Adaptation through Urban Green Infrastructure by Timon McPhearson examined the effectiveness of incorporating green spaces to improve urban resilience in Jakarta. Data from primary sources showed that in June 2024, DKI Jakarta Province experienced y-on-y inflation of 4.89 percent, with the food subgroup contributing 5.23 percent and non-alcoholic beverages 3.16 percent. Commodities that contributed the most to year-on-year inflation included rice, edible oil, various vegetables and tobacco products. On the other hand, the housing group recorded a y-on-y inflation of 0.52 percent, with house rent and housing contracts being the main contributors. The data also showed that the management of B3 waste was not optimal, with a lot of waste not being managed or being managed without a permit. Taken together, these indicators highlighted Jakarta's environmental management challenges and the need for green infrastructure to improve urban resilience. Green infrastructure has a significant influence on the microclimate in DKI Jakarta, especially in facing complex environmental challenges such as food inflation and suboptimal B3 waste management. The development of green spaces in urban areas, such as urban forests, city parks, and green roofs, has been able to function as carbon sinks, air temperature regulators, and pollution filters, so that it has directly contributed to improving air quality and reducing the urban heat island effect. Academically and indirectly, research by Timon McPhearson has shown that green infrastructure has not only strengthened the city's resilience to climate change, but has also improved the quality of life of the community by providing open spaces that have been accessible to all residents, including vulnerable communities. In the context of DKI Jakarta, strengthening green infrastructure can help reduce pressure on food commodities that experience inflation due to climate change, by improving the microclimate and supporting urban agriculture. Therefore, investment in green infrastructure (such as the development of City Parks and Green Open Spaces, implementation of Green Roofs and Green Walls, Nature-Based Rainwater Management, and greening of Road Corridors) is important as part of a broader climate change adaptation and mitigation strategy in Jakarta, with a direct impact on improving climate resilience and the quality of citizens' living environment.

The integration of natural elements into urban planning, as discussed by Timon McPhearson, illustrated the significance of urban green infrastructure in enhancing urban resilience. The primary data indicated that the recreation, sports, and culture subgroup in DKI Jakarta exhibited an inflation rate of 0.49 percent on a year-on-year basis in June 2024. The subgroup of newspapers, books, and school supplies exhibited the highest inflation rate. Furthermore, the implementation of green public procurement (GPP) policies has yielded favourable outcomes, as evidenced by the sustained growth in the number of registered green products. The implementation of ecolabels and environmentally certified products has been demonstrated to have a positive impact on the environment, reducing negative impacts and promoting sustainability. It was anticipated that these policy alterations and the implementation of initiatives would facilitate more effective environmental management and enhance the city's resilience to a range of environmental challenges. Green infrastructure has a significant impact on the microclimate in DKI Jakarta, especially in the context of complex environmental challenges as reflected by the inflation rate in the recreation, sports, and culture subgroups, as well as green-labeled products. Integrating natural elements into urban planning, such as green open spaces, city parks, and vertical forests, can effectively regulate local temperatures, improve air quality, and reduce pollution. Academically, research by Timon McPhearson shows that green infrastructure not only plays a role in mitigating climate change through carbon sequestration and reducing the *urban heat island* effect, but also in improving community welfare by providing space for sustainable recreational and social activities. In Jakarta, the implementation of *green public procurement* (GPP) policies and the use of environmentally certified products further support sustainability by reducing negative environmental impacts and encouraging more environmentally friendly consumption practices. Therefore, green infrastructure (such as Urban Agriculture Development, Mangrove Conservation and Restoration, and the Establishment of Green Lanes and Bicycle Routes) plays a crucial role in building urban resilience by creating cooler, cleaner, and

more comfortable microenvironments, which in turn contribute to a better quality of life and stronger adaptation to climate change.

Figure 13. Inflation Rate of Month to Month (m-to-m), Year to Date (y-to-d), and Year on Year (y-on-y) of DKI Jakarta Province in June, 2022-2024 (%)

Tingkat Inflasi	2022[1]	2023[1]	2024
(1)		(3)	(4)
Month to Month (m-to-m)	0,32	0,01	0,12
Year to Date (y-to-d)	1,94	0,95	0,91
Year on Year (y-on-y)	2,88	3,20	2,23

Catatan: [1]Inflasi DKI Jakarta (2018=100).

Table 14. Goal 12 Sustainable Development

INDIKATOR 12.7.1* **TINGKATAN (*DEGREE*) KEBIJAKAN PENGADAAN PUBLIK DAN IMPLEMENTASI RENCANA AKSI**

Indikator ini merupakan indikator global yang belum ada metadatanya secara global. Untuk menggambarkan jumlah negara yang menerapkan kebijakan pengadaan publik dan rencana aksi yang berkelanjutan, indikator ini diproksikan dengan indikator nasional yaitu jumlah produk ramah lingkungan yang teregister. Sebagai salah satu usaha melakukan perubahan dimulai dari Lembaga pemerintahan untuk melaksanakan pengadaan barang/jasa publik ramah lingkungan yang teregister (*green public procurement*, GPP) yang dapat menghasilkan produk-produk barang/jasa ramah lingkungan yang bermanfaat secara ekonomi, dengan dampak lingkungan yang minimal.

INDIKATOR 12.7.1.(A) **JUMLAH PRODUK RAMAH LINGKUNGAN YANG TEREGISTER DAN MASUK DALAM PENGADAAN BARANG DAN JASA PEMERINTAHAN**

Jumlah produk ramah lingkungan yang teregister merupakan jumlah produk barang atau jasa yang melalui pengadaan barang atau jasa publik ramah lingkungan yang teregister (*green public procurement*, GPP) untuk memperoleh produk barang atau jasa ramah lingkungan yang bermanfaat kepada lembaga/institusi/perusahaan dan masyarakat, serta manfaat ekonomi dengan dampak lingkungan yang minimal. Indikator ini digunakan untuk memantau dan mendorong lembaga/institusi/perusahaan dan masyarakat untuk melaksanakan pengadaan barang atau jasa publik ramah lingkungan yang teregister (*green public procurement*, GPP) yang dapat menghasilkan produk-produk barang atau jasa ramah lingkungan yang bermanfaat secara ekonomi, dengan dampak lingkungan yang minimal.

INDIKATOR 12.7.1.(B) **JUMLAH DOKUMEN PENERAPAN LABEL RAMAH LINGKUNGAN UNTUK PENGADAAN BARANG DAN JASA**

Salah satu indikator produk di dalam pengadaan barang dan jasa berkelanjutan adalah produk bersertifikat ekolabel. Ekolabel merupakan skema label lingkungan yang dikembangkan oleh Kementerian Lingkungan Hidup dan Kehutanan. Ekolabel adalah logo/label pernyataan yang menunjukkan aspek lingkungan dan merupakan salah satu perangkat dalam rangka pengelolaan lingkungan hidup. Ekolabel merupakan sarana penyampaian informasi yang akurat, verifiable dan tidak menyesatkan kepada konsumen mengenai aspek lingkungan dari suatu produk (barang atau jasa), komponen atau kemasannya (ISO 14020).

It was demonstrated by primary data that enhancing city resilience through the integration of natural elements into city planning was essential. In June 2024, the food and beverage/restaurant provision group in DKI Jakarta exhibited year-on-year inflation of 2.26 percent. Commodities such as oily biscuits, ice, soup, and ready-to-eat meatballs were found to contribute significantly to this inflationary trend. Furthermore, the prevalence of stunting and wasting in toddlers in Jakarta demonstrated an alarming increase in 2023 compared to the previous year. This indicated that food security and public health were also significant challenges. By integrating green infrastructure and natural elements into city planning, Jakarta could enhance resilience to climate change and other environmental challenges, while improving the quality of life of its citizens.

Table 14. Prevalence of Stunting (Short and Very Short) in Children Under Five in DKI Jakarta Province and Indonesia, 2022 and 2023

Discussion

This study has shown that Muslim communities in DKI Jakarta demonstrate remarkable resilience in facing various environmental challenges through the complex interconnections between social and ecological systems. One of the adaptation strategies developed is the use of green infrastructure such as community gardens and green open spaces (RTH). For example, the use of city parks and green open spaces not only provides ecological benefits in the form of carbon sequestration and heat reduction, but also functions as a gathering place that strengthens social solidarity. When Muslim communities utilize green open spaces for social and religious activities, such as joint prayers and religious studies, this helps to strengthen relationships between residents, strengthen social networks, and provide emotional support needed in dealing with environmental disasters.

Green open spaces also have a significant influence on the social resilience of Muslim communities in Jakarta. In addition to providing a place for social interaction, these open spaces are an important means for environmental education, integrated health posts, and community empowerment. For example, community gardens managed jointly by Muslim residents not only support local food security but also increase community participation in environmental conservation efforts from the RT (Rukun Tangga) to Kelurahan levels. Through gardening activities, residents can learn about the importance of sustainability and share knowledge and experiences that strengthen social ties and build collective awareness of the importance of protecting the environment. Thus, green open spaces serve as a platform to strengthen social cohesion and build community resilience holistically.

In the context of DKI Jakarta, which is often hit by flooding and air pollution, the ability of Muslim communities to adapt and build social resilience through green infrastructure is evidence of the importance of a holistic approach. The challenges faced are exacerbated by rapid urbanization and climate change, so collaboration between government, communities, and non-governmental organizations is crucial to developing sustainable solutions. This study shows that policies that support the development of green open spaces and strengthening social networks can significantly increase the resilience of Muslim communities to environmental stress. Therefore, the results of this study provide evidence that a combination of ecological and social approaches is an effective strategy in dealing with environmental challenges, while strengthening community resilience from various aspects of life in the homeland, religion, social, awareness, care, province, and civilization.

This study emphasizes the importance of implementing more inclusive and sustainable environmental policies in DKI Jakarta with high urgency. Muslim communities in Jakarta have shown significant resilience to environmental challenges through the integration of religious and social values with modern adaptation practices. Some concrete examples are the development of green infrastructure such as green open spaces (RTH), Greening of Road Corridors, Formation and Use of Bicycle Routes, Home-Based Urban Agriculture, and community gardens, which have been proven to be able to reduce the negative impacts of climate change while strengthening social

cohesion among residents. RTH not only functions as the lungs of the city that absorb carbon and lower local temperatures, but also becomes an important place for social interaction for the Muslim community, where activities such as religious studies, joint sports, and other social activities can take place. Through these spaces, the Muslim community can maintain solidarity and emotional support that are crucial in facing environmental stress.

The findings of this study are in line with previous studies, including Folke et al.'s study on socio-ecological resilience, which has underlined the importance of interactions between social and ecological systems in the process of building resilience. In Jakarta, the existence of green open spaces, green corridors, and community gardens not only provide ecological benefits but also strengthen the social networks of Muslim communities, which play an important role in disaster resilience. In this context, the Climate Justice perspective put forward by Mary Robinson becomes very relevant, especially in terms of fair and equitable distribution of environmental benefits. Green open spaces, green corridors, and community gardens also provide space for Muslim communities to engage in environmental education and raise awareness of the importance of nature protection, as emphasized in the concept of Urban Green Infrastructure by Timon McPhearson. Thus, this study contributes to the existing literature by providing empirical evidence from the local context of Jakarta, showing how the integration of ecological and social approaches can strengthen community resilience.

Based on these findings, several policy recommendations can be put forward to improve the resilience and adaptive capacity of Muslim communities in DKI Jakarta. First, the government needs to implement policies that support the development of green infrastructure throughout the city, with a particular focus on increasing the number of green open spaces, green corridors, and community gardens in densely populated areas. Second, environmental education programs involving communities should be increased to increase citizens' awareness and participation in environmental protection. Third, policies that ensure equitable distribution of environmental benefits need to be strengthened to protect vulnerable communities, including Muslim communities that are often more affected by environmental disasters. Fourth, the government should increase collaboration with non-governmental organizations and local communities to create sustainable adaptation solutions. Fifth, further research needs to be conducted to monitor and evaluate the effectiveness of policies that have been implemented. With these steps, it is hoped that the resilience and adaptation of the Muslim community in DKI Jakarta to environmental challenges will increase significantly.

Conclusion

This study reveals that Muslim communities in DKI Jakarta demonstrate significant resilience and adaptation in facing environmental challenges through a multifaceted approach, which includes religious values, social solidarity, and the use of green infrastructure. One important finding is that religious practices such as communal prayer, religious studies, and other religious activities play a central role in shaping adaptive attitudes and maintaining social cohesion. These practices not only provide emotional and spiritual support for community members but also strengthen the sense of togetherness that is essential in facing environmental pressures. In addition, the implementation of green infrastructure such as community gardens, Development of City Parks and Green Open Spaces, Greening of Road Corridors, Development of Urban Agriculture, and Establishment of Green Lanes and Bicycle Routes have been shown to offer dual benefits: ecological benefits and increased social interaction and citizen participation in environmental protection. Thus, structured and consistent religious practices help Muslim communities to remain socially and environmentally resilient amidst various challenges.

This research paper makes a significant scientific contribution by combining theoretical approaches from socio-ecological resilience, climate justice, and urban green infrastructure in the context of Muslim communities in urban areas. The finding that religious values and social solidarity play an important role in community resilience is a new aspect that has not been widely disclosed in previous studies. In addition, this study shows that a comprehensive approach that

integrates social, cultural, and ecological elements can effectively increase community resilience to climate change. Thus, religious practices not only function as a form of personal spirituality but also as a collective mechanism that strengthens community resilience in the face of environmental crises.

However, there are several limitations in this study, including the analysis that is mostly qualitative, which may have missed relevant variables in a broader context. In addition, this study only focuses on the Muslim community in DKI Jakarta, which may limit the generalizability of the findings to other contexts. Further research is needed to test this argument in various contexts with a more comprehensive quantitative approach. In addition, future studies should also consider other factors, such as economic and political factors, that may influence community resilience and adaptation. Integrating these factors in future research will provide broader and deeper insights.

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