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# Public risk perception and public acceptance of the existing flood and drought mitigation measure in Bandung city

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**Abstract.** Flood and drought are hydrometeorological hazard that annually occurred in Bandung City. This problem occurs due to static natural conditions such as geographical, topographical conditions, as well as dynamic natural conditions such as climatological matters that are exacerbated by climate change and human activities. Flood and drought risk management in urban areas generally emphasizes physical development by ignoring various social dimensions. Therefore, this research aims to understand people's knowledge and attitudes towards disasters, represented by the public risk perception towards flooding and drought, as well as public acceptance of the existing programs that have been provided by the municipality. To identify public risk perception and their acceptance of existing programs use statistical descriptive methods. While the data collection use questionnaire with 99 samples. This research shows the affected communities can assess the risks, emotion, and expectation for the future risk, and the implemented program by municipality is mostly accepted by the community. Public risk perception and public acceptance of a program are prominent factors that determine the success or failure of a program by ensuring the compatibility of the program and the community. Thus, this research is critical to give the public perspective on implementing a community-based disaster mitigation program.

## 1. Introduction

In the recent years, Indonesia has been dealing with Hydrometeorological hazard that linked to climate change. Hydrometeorological hazards are the most dominant natural dangers occurring worldwide the impact of extreme climate and weather events like droughts, floods, tornadoes, landslides, or hurricanes [1]. Floods and droughts are common hydrometeorological dangers in Indonesia and have a complex and serious impact on various sectors of human life. In Indonesia, disaster has been increased rapidly from 2000-2010, and hydro-meteorological disasters account for more than 70% of the disasters in Indonesia [2]. Moreover, hydrometeorological hazards can also cause from static natural conditions such as geographic, topographical conditions, and dynamic natural conditions such as climate-related problems that are worsened by climate change and human activity [3,4].

West java is one of the province that has the highest vulnerability on flood and drought in Indonesia [5]. Bandung city as the capital of West Java is also prone to floods and droughts resulting from its static and dynamic natural conditions. From the side of the static natural condition, Bandung was situated in a Bandung basin surrounded by mountains and hills that served the upper part of Citarum watershed and had an important role in water catchment. Whereas, from a side of dynamic



nature, it also deals with climate change that affects precipitation and the effect human activity on the environment. In Bandung, land conversion due to urbanization pressure significantly reduced infiltration that caused water shortages or clean water crises during the dry season and increasing frequency and intensity flood in Bandung City. Moreover, the increase in the proportion of built up land in Bandung City due to urbanization pressures has caused 95% of rainwater to be unable to infiltrate which has an impact on land subsidence and drainage failure, as well as increased pollution and sedimentation in waterways [6,7]. This characteristic makes the city exposed to various climate change issues and hydro-meteorological hazards.

Floods and droughts can be controlled through structural and non-structural efforts. In Indonesia structural efforts are still likely to be prioritize [6]. Furthermore, Indonesia government also adapted the top-down approach in disaster management [8]. In accordance with Indonesia, the structural efforts and top-down policy also dominate flood and drought management in Bandung, which is reflected in various efforts taken by the Bandung city government in the last 5 years. Since 2015, Bandung City has made various structural efforts flood and drought mitigation measures in the form of the construction of 6 retention ponds, normalization of rivers watershed, the construction of water basements (toll air), *Drumpori* (a larger bio pores) programs, and others. Unfortunately, the previous efforts that have been implemented still cannot overcome the problem of floods and droughts in Bandung and continue year after year with quit a big loss.

The various infrastructure solutions and top-down plans related to flood, and drought management can be effective when the use is adapted to the characteristics of the implementation areas. The complexity of interactions in social, ecological, and physical aspects of floods and droughts issue can produce the challenges in the control the issue, especially regarding its understanding, modelling, and management [4,9]. Furthermore, the management of flood and drought risks in urban areas including Bandung City generally prioritize on physical development by ignoring various social dimensions. The public's perception of the risk they face is an important part of determining social vulnerability and guaranteeing compatibility between programs and community. Researchers believe that risk perception has a direct impact on risk prevention and countermeasures in the public [10,11]. Moreover, the knowledge regarding how community understands and responds must be considered because individual beliefs about hazards are a crucial think about individual risk-making decisions.

In addition to risk perception, in implementing a top-down perspective it is also commonly need public acceptance. Public acceptance explains whether the public in general can accept the efforts that have been made in disaster management. It is also one of the determining factors in the success or failure of a project, program, and policy [12,13]. It is crucial to understand whether the community already know about the flood and drought measures and the expectation for the measures, so the existing measures can be improved if it is not in accordance with people's expectation or the target. Therefore, this research aims to understand people's knowledge and attitudes towards disasters, represented by the public risk perception towards flooding and drought, as well as public acceptance of the existing programs that have been provided by the municipality.

## **2. Literature Review**

### *2.1. Public Perception*

Risk perception is defined as complex and subjective process for an individual in assessing uncertainty (risk), which is reflected by their attitudes, intuition, expectations, experiences, as well as information related to the context [10,11,14]. Briefly, risk perceptions are often referred to as judgments made after they evaluate and characterize hazardous technologies and activities [15]. Risk perception leads to people's actions, decisions, values, emotions related events, and researchers admit that the direct explanation for flood prevention and response is the perception of flood risk. [16]. The main factor behind individual risk-taking decisions is the individual's belief about the danger with reference to the purchase of insurance and self-protection [17].

Risk perceptions are often used to assess individuals or the community's vulnerability to an environmental hazard [18,19]. Perception of each individual aims to assess the vulnerability to disaster by approaching the risk of disaster. Since risk perception can describe how people understand the physical environment and interactions therein [20]. Risk perceptions can be identified through the community assessments of the risk, their emotions related to the risk, and their future views regarding the risk. The process of forming risk perceptions is influenced by various factors. It consists of the individual's background, characteristics or contexts of the conditions, and the characteristics of something to be perceived [21]. Vulnerability can be identified through information on socio-economic as well as exposure and sensitivity that is related to the environment and self-condition of the people [10]. Information about previous disaster is also needed to determine the characteristics of the disaster according to community's view, and how the impact due to the disaster physically, materially, and psychologically. The understanding of public perception among the populations allows agencies to get wider information and views to refine and determine the risk communication, priority, modes of delivery related to the measure of risk disaster [20,22]. It also ensures the suitability and effectiveness of a measure by considering the specific needs of the targeted community.

## 2.2. Public Acceptance

Public acceptance can be conceptualized as a passive evaluation by the public regarding policy or a measure that has been implemented [23]. Public acceptance portrays the public action towards a new policy/technology which has been implemented. It is prevalently used in a top-down perspective, in which policies or measures are given by authorities to be accepted by the public. Despite the technological/policy promise, the implementation is limited by public acceptance. Public acceptance is a key point in successful technology/policy implementation [23–26]. Moreover, previous research discovered that even public acceptance can be an obstacle in the implementation of a policy, no matter how it has been chosen [13,27]. Basically, efforts to overcome the disaster must be done by all parties, including the community. Government runs bureaucracy and provides public services, and community's a target group of government's policy and services [28]. As a common hydrometeorological hazard that occurs in all regions in the worlds, floods and drought are naturally impossible to prevent. Mitigation measures will help to be more prepared to deal with disaster, build more stable ecosystems, recover from disasters by increasing resilience, and reducing the impact of disasters. [29].

Since public acceptance is a matter in the implementation of a program, it's necessary to find out the influencing factors or shape public acceptance. Public acceptance could represented by the public support of a program, as it has been assessed by Firestone et al. [30] and Petrova [31], despite Zverinova et al. [23] stated that public support has a further meaning. Public acceptance is influenced by various factors and characteristics in society, such as personal factors, socio-psychological factors, as well as other contextual factors [23,32]. Furthermore, knowledge, expectation, and public trust related to a program also need to identify to point out psychologically the public understanding dan awareness of a program. While public involvement and perceived responsibility related to a program can be identified to know how sense of belonging and responsibility has something to do with public decision to accept a program. Drought and flood impact mitigation is one of the main water management issues that should be approached on the basis of a proactive strategy which needs to be planned in advance in terms of long-term and short-term strategies for the response to hydrometeorological hazard.

## 3. Methodology

The data collection method used in this study was carried out through secondary and primary methods. Secondary data collection is done through data collection from media popular, journal, paper, as well as the authorities related to floods and drought, such as Diskar PB and DPU of Bandung City. The primary data collection was conducted by online self-completion questionnaire surveys for 99 samples who have been affected by floods and droughts in Bandung City before. Determination of the number

of samples has done with random sampling method from the entire population in Bandung, which results a total of 99 samples. This research uses the qualitative methods to understand phenomena or occurrences affecting individuals, which in this research are the public risk perception on floods and drought and public acceptance on flood and drought mitigation measures in Bandung City. The quantitative research approach is used to measure quantitative data or objective statistics through scientific calculations [33]. Descriptive quantitative chemical analysis wont to descriptively interpret statistical data and aims to elucidate and summarize various conditions, situations or various variables that arise and become the thing of the research supported what happened. Previously, desk study is also used to determine the variables of public risk perception and public acceptance.

## 4. Result and Discussion

### 4.1. Flood and Drought Mitigation in Bandung City

To reduce the runoff volume, Bandung Municipality has carried out various programs to solve flood and drought disasters. Either specific measures aimed at a disaster or aimed at both disasters such as retention ponds and *drumpori*. Retention ponds are pond designed to attenuate surface runoff and improve water quality by promoting pollutant removal through sedimentation. In Bandung city, it was designed to release water through infiltration and groundwater recharge as well. *Drumpori* is an adapted infiltration trench into a smaller scale, using drums filled with certain materials as a medium to infiltrate water. It was an improvement of the bio pores program that was launched previously in 2013 [34]. In specifically coping with the floods, Bandung city has also launched several measures as providing water basements, maintaining the retaining wall (*TPT*), as well as dredging of sedimentation to normalize the waterbodies' function and capacity. Meanwhile to cope with drought problem, the Government of West Java in collaboration with Ministry of Public Works and Human Settlements established a drinking water supply system in January 2019. These measures are aimed to support achieving the water demand by providing access to clean water to 140,000 inhabitants with details of 250L/s for 80,000 inhabitants within the City of Bandung.

### 4.2. Characteristics of Respondents and Disasters

Based on the survey, respondents were distributed in various regions of Bandung City, with the majority being in Gedebage sub-district. Although it has a low population that is only about 0.015% of the total population, these sub-districts experienced severe flooding and drought in Bandung City. Forty-two percent of respondents' homes were semi-detached, 32% single homes, and the rest of the respondents lived in detached homes. Meanwhile, the pavement in which most respondents lived is dominated by asphalt or concrete (59%).

Most respondents experienced flooding for less than three times a year (62%), where the rest is more. The majority are flooded at an altitude of fewer than 0.5 meters (69%), followed by 0.5 - 1 meter (22%), with duration varying from 30 minutes - 1 hour (23%), to less than 30 minutes (37%), more than 3 hours (15%), and the rest were between 2 and 3 hours. This has the same flood characteristics as documented in DISKAR PB and DPU of Bandung City reports. In terms of drought, 48.5% of the respondent's experience drought for once a year. Whereas, only 11.1% of the respondent's experience drought for 5 times or more. The duration of drought that is felt by the respondents is mostly less than 1 month (64.6%), 18.2% for 1-2 months, and 6% for more than 4 months. Based on the surveys done, 60.6% of the respondents have easy access to water, yet 11.1% of the respondents have difficulty in getting water. For more than 35% of the respondents have their water streams all day long, 12.1% for more than 12 hours a day, 13.1% for 7-12 hours a day, 18.2% for less than 3 hours a day and 4% for no water at all.

### 4.3. Public Risk Perception on Flood and Drought in Bandung City

Knowledge can be defined as awareness as well as an information leading to understanding [35]. In terms of floods, most respondents viewed heavy rains and the drainage blockage due to trash as the

major cause of floods. For the drought, dryness in the main water source and lack of groundwater are believed by most of the respondents to be the main causes of drought. The result indicates that public knowledge on flood risk source is likely focus on common knowledge, the same case also applies to the respondents' knowledge on drought. It reflected on fact that the absence of infiltration areas due to the increased impermeable surfaces is less understood as one of the most significant causes of urban flooding as well as drought, including in Bandung city. In accordance with Venkataramanan et al. whereas from the 85 studies around the world, communities could accurately identify that the cause of the flooding is incomplete drainage, extreme weather, and the increased impervious surfaces in neighbourhoods. For the drought, based on the document by Mediterranean EU Water Initiative [36], drought is not only cause by natural factors (precipitation deficiency, shifts in atmospheric circulation), but also it is caused by anthropogenic factors including population growth, land use and water demand. The community's understanding on floods and drought may lead to reduce the vulnerability of the community by encouraging changes in the community's behaviour [37].

Public awareness related to the possibility of risk in their environment is an essential element that determined how they act or adapt to the risk [38]. Regarding public awareness, respondents assessed that the current possibility of floods in their neighbourhoods is very low to quite high (72%). In terms of drought, respondents estimated that the current possibility for occurrence of drought is quite high to very high (77%). Nevertheless, respondents show a more pessimistic answer that both floods (48%) and drought (77%) might happen in their future neighbourhoods. In line, most of the respondents viewed that the severity of floods (49%) as well as drought (47%) in the future will get worsen. Public awareness of future possibility of floods and drought is shown a positive signal. Since if public don't think that they might ever be suffering from floods or drought in their area, either present or within the future, they could not willing to require any action to decrease the risk [14]. Therefore, public awareness does contribute in achieving disaster risk reduction as it will increase the resilience of the community [39].

Experience with hazards has a significant effect on how people consider risks [40,41]. There is a condition referred to as "familiarity with risk source" in risk perception assessment related to the publics' experience. This condition is related to the publics' ability to tolerate and cope with risks resulting from the frequency of disasters [42]. Based on respondents' experience, most respondents felt that they rarely experienced floods (51%), which is less than three times a year. They also confessed that they feel no effect of floods as well. Further, 72% of respondents assessed that the floods led to minor losses which the losses average varies from 0 (55%) to IDR 500,000 (24%). Likewise, based on respondents' experience in flood, most respondents (48.5%) only experience drought for once a year. Only as many as 11.1% of the respondent's experience drought for 5 times or more a year. When drought happens, the effects of drought is perceived by the respondents in various levels. 62.6% of respondents feel the effects of drought, while only 6% feel no effects of drought. From these answers, it is seen that despite the lower frequency of drought compared with floods, the effects of drought bring more indicative consequences to the life of respondents. It indicated that their ability to tolerate and cope with the most frequent disaster that is flooding is increased. In the other side, public experience in varying severity time and again will influence public awareness, thus they will tend to be better informed as well as prepared [14].

Emotional reactions of individuals exposed to risk are the definition of worry [38]. Worry in the risk perception context is essential element because it serves as a normative value of awareness. Since, individual might understand the risks, but they may not be afraid of underestimating the consequences [38,40]. For the occurrence of both floods and drought, respondents' concern more on their health/safety, assets, as well as their economic condition tends to be extremely high with means of 46% on floods and 67% on drought. From these answers, respondents' concerns that tend to be high can be a potential emotion that leads them to act regarding risk but remain controlled through risk communication to avoid the excess of public fear.

When disaster appears, public's vulnerability takes a big part in determining the survival ability of the societies. The vulnerability is affected by various factors, including the receiving of disaster

warnings, ability to evacuate in response to disaster warnings and ability in accessing post-disaster aid [43]. The majority of respondents felt capable of survive during the floods (92%), while only 41% of them capable of surviving during the drought. In dealing with both disasters, less than 8% of respondents have a specifically reserved fund to cope with floods or drought risk, even though 96% of them agreed that they do need prevention efforts to deal with that disaster risk. But most of them can provide the fund from their savings or other expense if it is necessary. However, this phenomenon reflected “optimism bias” which is a condition where the individual has the power and ability to address a hazard, incomprehensibly they have small basic to do so [22,44], which is in this context is reflected in how they willing to reserve their funds specifically to a disaster risk.

#### *4.4. Public Acceptance on Flood and Drought Mitigation Measures in Bandung City*

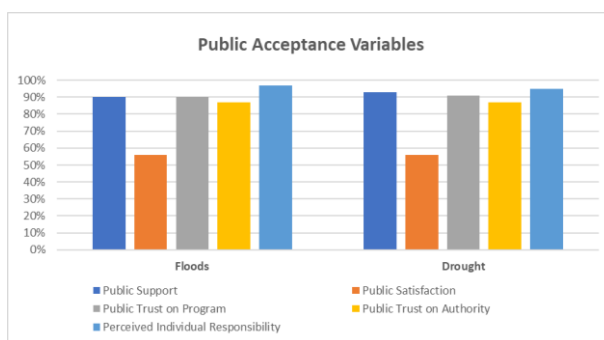
According to Zvěřinová et al. [23] conceptualized as a inactive person assessment, whereas bolster highlights a encourage meaning with respect to the behavioral response. In spite of these quick thinks about, acknowledgment and back are still utilized traded to work out whether people can acknowledge the endeavors that are made. Assessing the social acceptability of drought and flood management measures will contribute to the progress of drought and flood mitigation measures by selectors, thus it will lead to better community resilience. In terms of floods, several measures that have been launched tends to be accepted by the respondents (90%). Likewise, most of the respondents (93%) supports the provided programs related to drought. The public acceptance is reflected that most of the respondents supported to develop the same program in another area of Bandung city to deal with floods and drought.

According to Watanabe et al [45], public awareness and education related to the programs provided are the key elements for the disaster management. Awareness of the programs will contribute to the reduction of vulnerability thus cases of flood and drought can be minimized [46]. From the survey, Rancabolang Retention Pond is the closest program to where most respondents live (34%), compared to other measures related to both the flood risk as well as drought risk. However, most respondents stated that they were previously unaware of the program both for floods (54%) and for drought (59%). It is related to the absence of information regarding floods program 48% as well as drought program (54%), although some respondents received information from local governments (27%) and other sources such as social media, NGOs, and other popular media. In contrast, most of them felt that the closest program had decreased the impact of flooding that occurred in their neighborhoods (83%). Accordingly, most respondents are satisfied with the program (56%). According to Kholis et al. [47], satisfaction is an individual feeling resulting from a process that involves individual expectations and the performance of a program. Thus, the floods and drought measures in Bandung city performances have been in line with the publics' expectations reflected by the public's satisfaction with the programs.

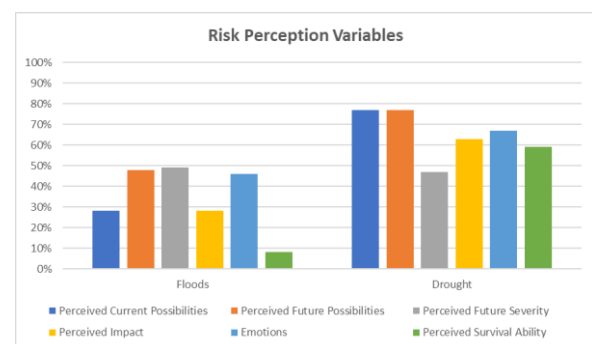
According to Ross et al. [25], trust is a critical factor in acceptance regarding risk. Trust can be defined as a psychological state where individuals have the intention of accepting something based on their positive expectations. Public trust in the given program by the municipality in Bandung city tends to be high (90%). Besides, respondents also tend to trust the institution responsible for floods management (87%). Similarly, with floods, majority of respondents trust the program provided in dealing with drought (91%) as well as trust to the institution handling the program (87%). Although public trust is a prominent element, previous studies stated that many individuals only rely on their trust in the authority to make decisions because of their limited resources [48,49]. Moreover, excessive public trust can lead the individual intention to take any action regarding risk independently decreased (Cannon, 2020).

Respondents asked to choose a sufficient measure scale to reduce the flood and drought risk. As each community is unique and has their own characteristics, the measure scale of mitigation efforts by the respondents is perceived at a different level effected by one's capability in mitigating the hazards [50]. The result pointed out that large scale and small-scale measure are the most measures selected by the respondents. Whereas in the drought program, the top two scales of drought program that

respondents believe will have the best fit are large scale (45%) and communal scale (28%). Respondents also assessed that the responsibility regarding flood risk is upon themselves as well as the government. In terms of drought, aside from government's responsibility in overcoming the drought as their most selected answer, the respondents pointed out the urgency of PDAM to participate as it becomes their second most-selected answer. Most of them assessed that it's a necessity to involve society in all stages of development from the planning process, the implementation, and the management of a program (53% for floods and 64% for drought). Individually, most of the respondents felt that they have a responsibility to carry out flood (97%) as well as drought mitigation efforts (95%). It is a positive indication since a greater sense of responsibility will lead to their intention to take any actions regarding risk. Although public involvement in flood and drought management programs requires more investment of time, efforts, as well as money, it will ensure the sustainability of measures adopted and build community resilience [4,51,52]. Public involvement, especially in the first stage of planning, will lead to the best decisions and plans, with the shared of information between the experts and the local that can also improve implementation that ensures the priorities of affected parties are addressed [4]. According to Heldt et al. [27] the most efficient way to engage the general public and find a generally recognized arrangement is to join open collaboration early in the design process.



**Figure 1.** Rate of respondents who chose positive answers to floods and drought risk perception



**Figure 2.** Rate of respondents who chose positive answers to floods and drought risk perception

The occurrences of floods and drought in Bandung City has shaped the publics' risk perception and has driven the municipality to provide several measures to cope with the risk. According to the survey, affected communities could assess the risks [see figure 1], although, its shown that the publics' flood risk perception is lower than the publics' drought risk perception. Furthermore, the affected communities supported the implemented program by the municipality that reflected the publics' acceptance of the programs. It also has been driven by the publics' trust both in the program and the authority as well as the perceived responsibility of the individual to take part in mitigation measures, even though the community satisfaction is still not shown a high number [see figure 2]. Nonetheless, all the programs provided could not be able to prevent both floods and drought yet.

## 5. Conclusion

The failure of structural measures which is expensive and publicly funded to cope with the risks has driven a paradigm shift in various countries. The core principle of these paradigm shifts is that the responsibility must be shared through engaging a wide range of stakeholders. Regarding the survey, the affected community in Bandung City has the potential to be involved in floods and drought coping efforts. It has reflected by their knowledge and awareness of the responsibility to take action as well as the view that it is necessary to involve the community in every stage of program development. Even



though there is still a low-risk perception for floods and high public acceptance of government-provided programs that contradicts protective motivation theory, which would reduce motivation to take action. But these potentials can be developed to encourage shared responsibilities in coping with the risks. By involving the public could be the right way to improve risk information, raise awareness regarding risks, and increase community resiliency, in addition to spreading the cost of risk reduction measure itself. For this reason, it leads to the conclusion that a community-based disaster mitigation program should be enhanced in Bandung City.

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### References

- [1] Wu H, Huang M, Tang Q, Kirschbaum D B and Ward P 2016 Hydrometeorological Hazards: Monitoring, Forecasting, Risk Assessment, and Socioeconomic Responses *Adv. Meteorol.*
- [2] UNISDR 2017 *Country Assessment Report for Indonesia: Strengthening of Hydrometeorological Services in Southeast Asia*
- [3] BNPB 2016 RBI Risiko Bencana Indonesia
- [4] Challies E, Newig J, Thaler T, Kochskämper E and Levin-Keitel M 2016 Participatory and collaborative governance for sustainable flood risk management: An emerging research agenda *Environ. Sci. Policy* **55** 275–80
- [5] Bencana B N P 2010 Buku Risiko Bencana Indonesia *Jakarta BNPB*
- [6] Sagala S, Yamin D and Wimbardana R 2014 Adaptasi Non Struktural Penduduk Penghuni Permukiman Padat terhadap Bencana Banjir: Studi Kasus Kecamatan Baleendah, Kabupaten Bandung *Work. Pap. Ser.* **5**
- [7] Hutasoit L 2009 Kondisi Permukaan Air Tanah dengan dan tanpa peresapan buatan di daerah Bandung: Hasil Simulasi Numerik *Indones. J. Geosci.* **4** 177–88
- [8] Efendi D, Agustiyara and Putra H A 2019 Natural Disasters Management and the Challenge of Governability in Indonesia *Indian J. Public Adm.* **65** 627–45
- [9] Jha A K, Bloch R and Lamond J 2011 *A Guide to Integrated Urban Flood Risk Management for The 21st Century*
- [10] Adelekan I O and Asiyani A P 2016 Flood risk perception in flood-affected communities in Lagos, Nigeria *Nat. Hazards* **80** 445–69
- [11] Miceli R, Sotgiu I and Settanni M 2008 Disaster preparedness and perception of flood risk: A study in an alpine valley in Italy *J. Environ. Psychol.* **28** 164–73
- [12] Takagi K, Otaki M, Otaki Y and Chaminda T 2019 Availability and public acceptability of residential rainwater use in Sri Lanka *J. Clean. Prod.* **234** 467–76
- [13] Gu Q, Chen Y, Pody R, Cheng R, Zheng X and Zhang Z 2015 Public perception and acceptability toward reclaimed water in Tianjin *Resour. Conserv. Recycl.* **104** 291–9
- [14] Messner Frank and Meyer V 2006 Flood Damage , Vulnerability and Risk Perception – Challenges for Flood Damage *Environ. Res.* 149–67
- [15] Slovic P and Peters E 2006 Risk Perception and Affect **15** 322–5
- [16] Wang Z, Wang H, Huang J, Kang J and Han D Analysis of the Public Flood Risk Perception in a Flood-Prone City: The Case of Jingdezhen City in China **10** 1577
- [17] Botzen W J W, Aerts J C J H and van den Bergh J C J M Dependence of flood risk perceptions on socioeconomic and objective risk factors **45** 15

- [18] Birkholz S, Muro M, Jeffrey P and Smith H M 2014 Rethinking the relationship between flood risk perception and flood management *Sci. Total Environ.* **478** 12–20
- [19] Armaş I and Avram E 2009 Perception of flood risk in Danube Delta, Romania *Nat. Hazards* **50** 269–87
- [20] Adomah Bempah S and Olav Øyhus A 2017 The role of social perception in disaster risk reduction: Beliefs, perception, and attitudes regarding flood disasters in communities along the Volta River, Ghana *Int. J. Disaster Risk Reduct.* **23** 104–8
- [21] Harliani F 2014 Persepsi Masyarakat Kampung Cieunteung, Kabupaten Bandung tentang Rencana Relokasi Akibat Bencana Banjir (Cieunteung Village Community Perception on *Journals.Itb.Ac.Id* **25** 37–57
- [22] Bodoque J M, Díez-Herrero A, Amerigo M, García J A and Olcina J 2019 Enhancing flash flood risk perception and awareness of mitigation actions through risk communication: A pre-post survey design *J. Hydrol.* **568** 769–79
- [23] Zvěřinová I, Ščasný M and Kyselá E 2014 What influences public acceptance of the current policies to reduce GHG emissions *Prague Charles Univ. Environ. Center. Retrieved April* **9** 2015
- [24] Dolnicar S and Hurlimann A Water alternatives-who and what influences public acceptance? n/a--n/a
- [25] Ross V L, Fielding K S and Louis W R 2014 Social trust, risk perceptions and public acceptance of recycled water: Testing a social-psychological model *J. Environ. Manage.* **137** 61–8
- [26] Stenekes N, Colebatch H K, Waite T D and Ashbolt N J Risk and Governance in Water Recycling: Public Acceptance Revisited **31** 107–34
- [27] Heldt S, Budryte P, Ingensiep H W, Teichgräber B, Schneider U and Denecke M 2016 Social pitfalls for river restoration: How public participation uncovers problems with public acceptance *Environ. Earth Sci.* **75**
- [28] Susanti G, Halwathiah S, Rukmana N S, Yani A A, Hidayat A R and Ahmad S Public Service Performance and Public Trust in Government -- An Indonesian Case Study *Proceedings of the International Conference on Administrative Science ({ICAS} 2017)* (Atlantis Press)
- [29] Solh M and Van Ginkel M 2014 Drought preparedness and drought mitigation in the developing world's drylands *Weather Clim. Extrem.* **3** 62–6
- [30] Firestone J, Kempton W, Lilley M B and Samoteskul K 2012 Public acceptance of offshore wind power across regions and through time *J. Environ. Plan. Manag.* **55** 1369–86
- [31] Petrova M A 2013 NIMBYism revisited: Public acceptance of wind energy in the United States *Wiley Interdiscip. Rev. Clim. Chang.* **4** 575–601
- [32] Devine-Wright P 2007 Reconsidering public attitudes and public acceptance of renewable energy technologies : a critical review *Architecture Working Pa* 1–15
- [33] Creswell J W 2014 *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (California, United States of America: SAGE publications)
- [34] Rianawati E and Sagala S 2014 *Communal based flood mitigation measures in Bandung city* (Working Paper Series of Resilience Development Initiative, 10)
- [35] Venkataramanan V, Lopez D, Mccuskey D J, Kiefus D, Mcdonald R I, Miller W M, Aaron I and Young S L 2020 Knowledge, Attitudes, Intentions, and Behavior Related to Green Infrastructure for Flood Management: A Systematic Literature Review *Sci. Total Environ.* 137606
- [36] MED Joint Process WFD/EUWI 2006 *Water Scarcity Management in the Context of WFD*
- [37] UNESCO Office Jakarta and Regional Bureau for Science in Asia and the Pacific 2004 *Flood Mitigation: a Community-based Project; maximizing knowledge to minimize impacts*
- [38] Bradford R A, O'Sullivan J J, Van Der Craats I M, Krywkow J, Rotko P, Aaltonen J, Bonaiuto M, De Dominicis S, Waylen K and Schelfaut K 2012 Risk perception - Issues for flood management in Europe *Nat. Hazards Earth Syst. Sci.* **12** 2299–309

- [39] Joyce C, Olivia K and Jordaan A 2013 Public awareness campaigns, a disaster risk reduction strategy for fire and flood hazards in the Western Cape, South Africa
- [40] Bubeck P, Botzen W J W and Aerts J C J H 2012 A Review of Risk Perceptions and Other Factors that Influence Flood Mitigation Behavior PERCEPTIONS AND PRIVATE
- [41] WMO 2016 Public Perception of Flood Risk and Social Impact Assessment
- [42] Figueiredo E, Valente S, Coelho C and Pinho L 2009 Coping with risk: Analysis on the importance of integrating social perceptions on flood risk into management mechanisms - The case of the municipality of Águeda, Portugal *J. Risk Res.* **12** 581–602
- [43] Substance Abuse and Mental Health Services Administration 2017 *Disaster Technical Assistance Center Supplemental Research Bulletin. Greater Impact: How Disasters Affect People of Low Socioeconomic Status*
- [44] Harclerode M A, Lal P, Vedwan N, Wolde B and Miller M E 2016 Evaluation of the role of risk perception in stakeholder engagement to prevent lead exposure in an urban setting *J. Environ. Manage.* **184** 132–42
- [45] Watanabe T, Cullmann J, Pathak C S, Turunen M, Emami K, Ghinassi G and Siddiqi Y 2018 Management of Climatic Extremes with Focus on Floods and Droughts in Agriculture *Irrig. Drain.* **67** 29–42
- [46] United Nations International Strategy for Disaster Reduction 2005 *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*
- [47] Kholis N, Ratnawati A and Farida Y N 2018 Customer Satisfaction On The Performance Of Social Security Administrator (BPJS) Health in Central Java-Indonesia *Int. J. Organ. Innov.* **10** 150
- [48] Ross V L, Fielding K S and Louis W R Social trust, risk perceptions and public acceptance of recycled water: Testing a social-psychological model **137** 61–8
- [49] Cannon C, Gotham K F, Lauve-Moon K and Powers B 2020 From the general to the specific: the influence of confidence and trust on flood risk perception *J. Risk Res.* **0** 1–19
- [50] Centers for Disease Control and Prevention 2020 Community Mitigation Framework
- [51] The Intergovernmental Authority on Development 2020 *Community participation in drought management*
- [52] Wang Y, Sun M and Song B 2017 Public perceptions of and willingness to pay for sponge city initiatives in China *Resour. Conserv. Recycl.* **122** 11–20