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The Role of Information and Dissemination Activities in Enhancing People's Willingness to Implement Natural Water Retention Measures

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Abstract: Under a climate-change scenario, adaptation strategies to pluvial flood risk are crucial in urban and rural areas. Natural water retention measures are particularly helpful to manage runoff water, providing also additional co-benefits to the local population. However, the very limited knowledge of their benefits among citizens hinders their implementation, especially across southern European countries. Therefore, information and dissemination activities aimed at showing the benefits of these measures are particularly important to stimulate implementation by private citizens, although only a few studies have previously investigated their role. This paper considers some demonstrations of natural water retention measures—and the related information and dissemination activities to the local population—in northeastern Italy, explicitly including them as a driver in the Protection Motivation Theory framework. Through a direct survey of 219 households, it aims to quantitatively assess the impact on citizens' willingness to implement natural water retention measures of the different levels of access to information provision, namely, the role played by active access through participation in the activities; passive access to available information; and no access. The results show that citizens' willingness to implement the interventions on their properties is positively affected by their active access to information, thus highlighting the importance of high-quality information provision by public and private actors.

Keywords: pluvial flood risk mitigation; stormwater infrastructures; sustainable water management; citizens' willingness to implement; information provision

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1. Introduction

In the 21st century, climate change represents one of the main environmental problems. IPCC [1] observes that in the period 2011–2020, the global surface temperature was 1.09 °C above pre-industrial levels (1850–1900), and it is projected to reach or exceed + 1.5 °C in the near term (2021–2040), even in the very low greenhouse gas emissions scenario. As a consequence of that, hydrogeological disasters have become more frequent and severe in many areas of the world [2]. In particular, flooding represents one of the main concerns for European emergency management authorities [3,4], as well as for Italian ones [5]. Among flooding issues, pluvial flooding occurs when rainwater cannot be efficiently stored and conveyed by the local drainage system, hence not including overbank flow from streams or coastal inundation [6]. Unlike other types of flooding, pluvial flooding had received little attention until a few years ago, with a relative underrepresentation in research [6,7]. This phenomenon is usually associated with heavy—and concentrated—rainfall, which is occurring more and more often, due to climate change [8]. As a consequence, the interest in this phenomenon among researchers is definitely increasing, with the aim of improving the pluvial flood risk assessment [9,10] and the procedures adopted in the response and recovery phases [11].

Also in practice, urban areas and their local communities are seeking new strategies to cope with these climate-related pluvial flooding impacts [12], which are expected to increase in the near future. Their direct involvement is also encouraged by both the United Nations' Sustainable Development Goals [13] and the New Urban Agenda [14]. At the European Union (EU) level, a new research and innovation policy has been introduced, advocating the integration of more innovative green and blue spaces into urban planning [15].

While in the past, flood management focused on conventional solutions—such as pipes, collectors, impermeable surfaces, sewers and treatment plants—over recent decades, new approaches and systems—i.e., also including a more sustainable approach to runoff water management—have flourished [16]. Given the rise of these new types of drainage systems, new terms and concepts have developed as well, also in an informal manner [17]. In the European context, the concept of natural water retention measures (NWRMs) has been largely adopted to identify those "multi-functional measures that aim to protect and manage water resources and address water-related challenges by restoring or maintaining ecosystems as well as natural features and characteristics of water bodies using natural means and processes" [18] (p. 1). Today, the implementation of NWRMs, both with and without vegetation, is considered particularly effective, as it provides additional co-benefits to local communities [19] in terms of the provision of ecosystem services (see for example the literature review works by [12,20]). In the urban and rural contexts, examples of NWRMs without vegetation are pervious pavements and rainwater harvesting, while bioretention systems and swales are examples of green NWRMs with vegetation. All of them are aimed at increasing water infiltration and storage, hence reducing the risk of pluvial flooding [21,22].

Although in some EU countries, sustainable water-retention approaches are already developed, hence representing quite mature technology, their implementation is more limited in southern European countries. This scarce diffusion potentially represents a major drawback, and the expansion of NWRMs across the local population must be favoured also through information provision activities, targeted at private citizens. Indeed, citizens' positive attitude towards NWRMs seems crucial to their diffusion in both public and private contexts [23].

In this regard, the main goal of this paper is to contribute to the scanty existing knowledge about the willingness to implement NWRMs by private citizens (see [24] for a review of the main literature on the topic). Compared with previous work on this topic, the novelty of this study is twofold. Firstly, it assesses quantitively the role played by different levels of access to information provision in increasing citizens' willingness to implement NWRMs on their private properties. To achieve this goal, a questionnaire-based sample survey is conducted, referring to the demonstration NWRMs that have been realised under an EU-funded project (the LIFE Project "Better Water Management for Advancing Resilient Communities in Europe"—BEWARE). Households having active access to the information through participation in the project's activities, those having passive access to available information and those uninformed about the information and dissemination activities are interviewed. The role of information in enhancing citizens' willingness to implement NWRMs is estimated under the Protection Motivation Theory (PMT) framework [25] and through a multinomial logit model. To the authors' best knowledge, this role has been scarcely quantitatively explored in the specific context of the NWRMs implementation, where contributions have predominantly focused on social and behavioural drivers of implementation (e.g., the coping appraisal or the threat experience appraisal factors) [26–31]. Conversely, the role of information in stimulating private actors to implement flood risk management is generally less explored [32]. This paper aims to contribute to filling this knowledge gap, also from a quantitative point of view.

Secondly, this work focuses on a southern European context, where NWRMs are in fact scarcely adopted. For this reason, public information provision activities—targeting citizens—can represent an effective way to increase their willingness to implement them.

In particular, this paper considers two municipalities located in the flatlands and hills of the Veneto Region (northeastern Italy) and far from the coastline. The area has been affected by pluvial floods several times in recent years, and their frequency is increasing. In the area, demonstration NWRMs and information and dissemination activities have been realised under an EU-funded project. Actually, similar EU projects (e.g., the EU FRAMES Project) have mostly focused on central and northern European countries, where also NWRM diffusion is larger.

The rest of the paper is structured as follows. Section 2 describes the main characteristics of NWRMs under analysis and their limited diffusion. Section 3 presents materials and methods, showing the case study context, the survey and the adopted models. Section 4 reports the results, while Section 5 discusses them, and Section 6 concludes.

2. Characteristics of NWRMs and Their Diffusion

Urban drainage has always played a key role in mitigating the risk of pluvial flooding in urban areas. However, the management of urban rainfall has recently become more complex. While in the past urban drainage was just aimed at conveying stormwater away and protecting infrastructures and public and private assets with floodproofing structures, today multiple objectives in addition to flood protection (e.g., additional water supply, increasing biodiversity, improving microclimate) drive the design of drainage infrastructures [17], favouring the use of solutions based on natural processes and ecosystems as well [33]. In particular, the main adopted solutions for urban runoff water management are moving from conventional and centralised strategies that make large use of built infrastructure (e.g., collectors and treatment plants) towards multi-functional and distributed measures, which contribute to increasing ecosystem resilience and restoring the water cycle, for instance through bio-retention [34]. Accordingly, different types of flood mitigation measures can be distinguished (Table 1): on the one hand, conventional infrastructures (such as concrete channels and pipes; sump pumps, flood shields and flood walls); on the other, different types of NWRMs, which are not only aimed at diverting water away, but also at restoring, as far as possible, the hydrological cycle, using infiltration and biological processes to control the water runoff, hence attenuating discharge peaks, and to improve water quality. Given their general characteristics, NWRMs can be in turn divided into different categories: NWRMs without vegetation (e.g., infiltration trenches, pervious pavements, attenuation storage tanks), green NWRMs with vegetation (e.g., bioretention systems, infiltration basins), and blue NWRMs (e.g., ponds and wetlands). This classification has been adapted from [19,35] and www.nwrm.eu (accessed on 14 October 2022).

Thanks to the inclusion of different natural land cover, both green and blue NWRMs are aimed not only at controlling the quantity of water runoff—as in the case of the NWRMs without vegetation—but also at delivering additional co-benefits [36,37]. Considering the taxonomy of the ecosystem services provided by the Millennium Ecosystem Assessment [38], which distinguishes provisioning, regulating, cultural, and supporting services, NWRMs (and in particular green and blue ones) deliver a large set of ecosystem services. For example, they can increase the quality of runoff water, facilitate groundwater recharge, enhance biodiversity, reduce heat stress, and provide amenity services as well as aesthetic and recreational services (for a detailed presentation of them, see [12,20,35]). Among these different types of ecosystem services, some of them can be internalised, through payments for ecosystem services, adding value to private properties as well.

Table 1. Different types of flood mitigation measures.

Conventional Infrastructures	
	Concrete channels and pipes
	Sump pumps
	Flood shields, flood walls
NWRMs	
NWRMs (no vegetation)	
	Infiltration trenches
	Pervious pavements
	Soakaways
	Rainwater harvesting
	Attenuation storage tanks
Green NWRMs (with vegetation)	
	Bioretention systems
	Infiltration basins
	Green roofs
	Swales
Blue NWRMs	
	Ponds and wetlands

Source: adapted from [19,35] and nwrm.eu.

Although the NWRMs do not represent a novelty in the international scenario, they are scarcely adopted especially in Southern Europe [39]. This is observed even though their efficacy has been proven also for the Mediterranean climatic conditions [40]. There are several reasons for this inadequate adoption. Venkataramanan et al. [41] suggest that, in spite of the large evidence in support of the technical efficacy of NWRMs (and those with vegetation, in particular), little is known about the broader socioecological and technical system in which NWRMs could be adopted [42]. Among other issues, we must be reminded that people have little knowledge about them. This lack of knowledge represents a major obstacle to their implementation [41] even if their implementation costs are generally affordable to private citizens [33]. However, these costs are not accurately known by the public at large [24].

This limited adoption by private citizens actually represents a major drawback to the efficiency of NWRM implementation at the community level, for two main reasons. Firstly, a more scattered distribution of NWRMs in a spatial area, under specific circumstances, may lead to reduce maximum discharge more than larger-scale and more centralised ones may do [43]. Secondly, as NWRMs are based on the in-situ management of rainfall water, when choosing the best place to install them, one should consider the places where runoff originates, i.e., near buildings and impervious surfaces. This means implementing them within or near private properties [44].

3. Materials and Methods

3.1. The Context

The context of the analysis is represented by two municipalities (Marano Vicentino and Santorso), which are situated in the Veneto Region, in the northern part of the Venetian Plain, just under the first peaks of the mountains of the Alps. Given the morphology of the area, a severe rainfall regime is observed (on average, 1100–1600 mm of yearly rainfall [5,45]). Therefore, these municipalities are especially prone to pluvial flooding, which is rather frequent, in particular during the dry seasons. Pluvial flooding is also magnified by the socioeconomic features of the area: widespread soil sealing and high population density, with most of the land occupied by scattered homes and small blocks of flats.

These types of buildings—which usually include basements, hosting also living rooms or other types of residential premises—are particularly prone to pluvial flooding.

Despite the large increase in flood occurrence over time, people living in the area (as well as those in other Italian Regions) lack proper preparedness for future floods and seem to adopt only limited ex ante mitigation actions. For example, comparing Italian and French regions, Piacentini and Rossetto [46] show that local stakeholders also share a limited knowledge of innovative NWRMs and their positive effects in mitigating future events. When specifically considering pluvial flooding, it is worth noting that the implementation of NWRMs is mostly lacking in the study area, as in the rest of Northern Italy, even if pluvial floods often occur. Neither local nor national/regional governments have foreseen any particular forms of incentives for the implementation of mitigation measures by private citizens. Conversely, after an adverse natural event, if the local government issues a public state of emergency (*richiesta di stato di emergenza*, according to the Italian law), those private citizens who have suffered damage to their properties may claim monetary public compensation, which is aimed at covering part of restoration actions. Moreover, as an additional element of vulnerability for the area, the institutional context is to be mentioned. Despite the high endowment of social capital in the Veneto Region (according to the definition provided by Putnam et al. [47]), the area under analysis is largely rural, with small-sized municipalities. This specific feature may lead to a reduction in the effectiveness of local government action in managing extreme events [48].

To fill this gap, a LIFE project was financed by the EU in the area, involving also local public stakeholders, in order to increase people's knowledge about the benefits of NWRMs. Seven demonstration NWRMs were implemented in the years 2019–2020, to solve some hydraulic issues and to support information and dissemination activities. All of the NWRMs are of small to medium scale, including those without vegetation (e.g., pervious pavements, rainwater harvesting and soakaways), green NWRMs (e.g., infiltration basins, bioretention systems and swales), and blue NWRMs (e.g., ponds). Several information and dissemination activities targeting the local population (e.g., conferences, workshops, information points, teaching activities) were carried out aiming at: (i) communicating the effectiveness of NWRMs in reducing pluvial flood risk and the related benefits in terms of damage avoided and the financial sustainability of their implementation on private properties; (ii) promoting a participative approach to the implementation of NWRMs; (iii) favouring the citizens' willingness to implement them on their private properties, effectively coping with the effects of climate change.

3.2. The Model

The framework of the PMT theoretical approach has been widely adopted by social scientists in order to analyse individual behaviours since the seminal work by Rogers [18]. Only recently, a few authors have applied the PMT framework to the analysis of the reaction to pluvial floods by private citizens [26–28]. In particular, the PMT approach considers different factors affecting the actual behaviour of citizens to adopt protection measures, in particular the threat appraisal (i.e., the risk perception) and the coping appraisal. However, according to the model, there are also some barriers that may hinder adoption, even in the case of positive attitudes among citizens. Among them, lack of knowledge plays a crucial role [26]. In this work, we actually adapt the original model to the specific characteristics of the area under analysis. Given that the area is largely prone to frequent pluvial floods, here the threat appraisal is replaced by the threat experience appraisal. According to Grothmann and Reusswig [26] (p. 107), "threat experience appraisal can also be used as an indicator of perceived certainty that a flood might affect the person in the future. Threat experience appraisal should motivate people to take precautionary action".

Under this framework, the analysis considers the willingness to implement innovative NWRMs (those without vegetation, green NWRMs and blue NWRMs) as the dependent variable. In particular, we distinguish three alternative situations: (i) the one in which citizens are definitely willing to implement at least one of the proposed NWRMs on their property; (ii) the one in which citizens are probably willing to implement them (e.g., as in the case they are willing to implement some measures, but they are not sure about what exact type); (iii) the one in which citizens are unwilling to implement any of them.

Such a different willingness to implement NWRMs by private citizens is driven by different factors. In particular, according to the main literature on this topic [26,27], the following ones are tested across different models:

- the coping appraisal factors, which is proxied by: (i) perceived response-efficacy of NWRMs, as the awareness of the role played by them; and (ii) two variables addressing each resident's perceived self-efficacy when adopting adaptive measures, i.e., the implementation of protective measures in the past (e.g., pumps and flood barriers) and their opinion about the effectiveness of private actions in mitigating the pluvial flooding impact;
- the threat experience appraisal, expressed by the value of direct damage that each resident has experienced, as a result of the impact of pluvial floods on their homes (damage severity). This is expressed as the interaction of a dummy variable (i.e., having suffered damage from at least one pluvial flood event) and a continuous variable, expressing the total damage suffered in millions of euros;
- the information factor, namely addressing the impact of information and dissemination activities aimed at removing the knowledge barriers about NWRMs [26]. To this regard, an additional categorical variable was created, in order to distinguish the following degrees of citizens' access to the information provision: (i) those who participated in the information and dissemination activities (actively accessing information); (ii) those who only received information by the website, through word-of-mouth, or having simply seen the demonstration NWRMs realised in the area (passively accessing information); and (iii) those totally non-participating (the uninformed about the information and dissemination activities);
- personal socio-demographic characteristics (i.e., gender, age, high-school education or above, having at least one child), whose role is generally context specific [41].

In line with the PMT literature [26,49], all these factors are expected to positively affect people's willingness to implement innovative NWRMs. To test this hypothesis, a comprehensive multinomial model is used. From a methodological point of view, the suggested models assume the unwillingness to implement any NWRMs as the reference baseline.

In particular, three different models are proposed, differing with regard to the type of coping appraisal factor and information factor that are admitted. Model (1) includes both the perceived response-efficacy of NWRMs (coping appraisal factor) and the impact of information and dissemination activities (information factor). Conversely, model (2) and model (3) only include the information factor and the perceived response-efficacy of NWRMs, respectively.

3.3. Data

The empirical analysis is based on the data collected through a questionnaire administered to a sample of 219 households living in the area, from July 2021 to December 2021. A mixed method is adopted to administer it (i.e., by phone, by email, and in person). The questionnaire addresses the citizens' knowledge of the NWRMs, their level of access to information provision and their willingness to implement NWRMs on their private properties in the near future. Some other socioeconomic covariates are also collected.

With regard to the basic sociodemographic conditions of the respondents, they are mostly men (56.8%) and mostly aged 55 and over (51.2%). About their tenure status, 84.3% live in their owner-occupied homes, 8.8% are tenants with a price rent, while 6.9% are tenants in free accommodation (i.e., dwellings actually owned by their parents). Most of the dwellings are prone to pluvial flooding: almost all respondents (88.7%) live in a dwelling with some premises on the ground floor, while 65.7% of the respondents own a basement. Moreover, 23.3% of respondents suffered from direct damage to their property, due to rain flooding in the last ten years. Finally, 82.6% of the respondents achieved either the higher secondary school level or the university level.

With regard to the households' willingness to implement NWRMs (i.e., the dependent categorical variable of the multinomial logit models we estimated), 34.5% are definitely willing to implement at least one of them, 45.5% are unwilling to implement them in the future, and remaining 20.0% of the respondents are probably willing to implement them (e.g., they do not know whether they will implement any NWRMs in the future or not).

Table 2 shows the covariates that are included in the models. In particular, referring to the information factor, 31.6% of the respondents actively accessed information about the NWMRs (directly participating in the information and dissemination activities), 18.7% only passively accessed information (e.g., only receiving information by the website, through word-of-mouth, or having simply seen the demonstration NWRMs realised in the area) and 49.7% are the households uninformed about the information and dissemination activities.

Table 2. Model covariates (data at individual level).

Label	Factor	Question in The Survey	Levels (When Dummy)	Statistic	Value [a]
Awareness	Coping appraisal	Awareness of the role played by the NWRMs to reduce the risk of flooding [b]		Mean [a]	3.34 (0.82)
Awa_self_efficacy_d	Coping appraisal	Are you aware that individual citizens can take private initiatives to reduce the risk of pluvial flooding?	1 = Yes	%	92.7
Preparedness_d	Coping appraisal	Have you bought pumps and flood barriers for your home, in the past?	1 = Yes	%	14.6
Experience_d	Threat experience appraisal	Have you been affected by a pluvial flood in the last 10 years?	1 = Yes	%	24.2
Damage	Threat experience appraisal	Damage to the property caused by pluvial floods in the last 10 years (in € million)		Mean [a]	0.002 (0.006)
Information_provision	Information factor	How did you learn about the activities of the demonstration project?	0 = uninformed about the information and dissemination activities 1 = passively accessing information 2 = actively accessing information	%	49.7 18.7 31.6
Gender_d	Socioeconomics covariates	Gender of the respondent	1 = Male	%	56.8

Age	Socioeconomics covariates	Age of the respondent (years)		Mean [a]	52.3 (14.2)
Edu_d	Socioeconomics covariates	Highest level of education, reached by the respondent	1 = Higher secondary schools or University	%	85.0
Child_d	Socioeconomics covariates	Respondents with at least one minor (under 18 years) in the household	1 = Yes	%	21.7

[a] Standard deviation in parentheses. [b] Statement was measured on a 6-point scale ranging from 'non-aware' (0) to 'very highly aware' (5) for the set of NWRMs (i.e., excluding traditional grey infrastructures). For each respondent, the mean value of the awareness of these interventions is taken as a proxy for the overall awareness.

4. Results

Table 3 reports the multinomial models estimates for residents' willingness to implement NWRMs on their property. According to the proposed models, Table 3 distinguishes between those who are definitely willing to implement NWRMs (a) and those who are only considering the option (b). In both cases, they are compared with the baseline option, i.e., the unwillingness to implement any type of NWRMs. The number of observations used in any models is also shown. It can vary due to the presence of missing values among the set of selected variables and covariates.

The three models—which differ in terms of the inclusion of the covariates of perceived response-efficacy and of information factor—returns fairly similar results. In Model (1), which includes all the covariates, the threat experience appraisal (i.e., the interaction between the covariates Experience_d and Damage) plays a crucial role in the citizens' willingness to implement NWRMs, this interaction being positive and statistically significant. This finding suggests that having previously experienced significant financial losses due to pluvial floods positively affects the chance that one respondent is definitely willing to implement NWRMs or at least is considering this option. In addition, awareness (as a proxy of the coping appraisal factor, i.e., the general knowledge of the respondents of the role played by NWRMs) is significant and positive, but only with regard to the case of the willingness to definitely implement NWRMs, compared to the baseline option of unwillingness to implement. Moreover, Model (1) also shows that the covariate Information_provision positively affects both the willingness to definitely implement NWRMs (a) and the willingness to probably implement them (b). This factor is even more statistically significant than Awareness, particularly when active access to information is considered. Actually, while Awareness can be considered as a proxy for a general and pre-existing knowledge about NWRMs, active access to information includes citizens' direct participation into information and dissemination activities about NWRMs and this might explain such a highly-significant result.

Lastly, when considering sociodemographic covariates, only Child_d is significant, but with a negative sign.

Additional models are also estimated, by selectively excluding either the perceived response-efficacy of NWRMs (Model 2) or the information factor (Model 3). Both models largely confirm the findings from Model (1). In Model (2), threat experience appraisal and information provision positively affect the willingness to implement NWRMs. In Model (3), threat experience appraisal and perceived response-efficacy play such a similar role. The fact that coefficients are fairly similar across different models confirms the robustness of the provided results.

On a similar basis, and as a further robustness check, we have also estimated one additional model that includes two further socioeconomic covariates that are expected to explain citizens' willingness to implement NWRMs. They are: (i) the respondents' tenure status (either owners or tenants), and (ii) their ability to generate income (distinguishing employed respondents, retired and other respondents, e.g., students and housepersons). The results of this model are shown in Table A1 (see Appendix A). In particular, none of these additional covariates is statistically significant. The result for the tenure status covariate might appear as counterintuitive, but it can be explained by considering the very specificity of the study area, i.e., small towns where tenants are usually persons living in the houses owned by their own parents. Therefore, in this case, tenants might also be as willing to implement NWRMs as owners, given that they will be the future owners of their landlords' (i.e., parents') properties.

However, this additional model is less effective than Model 1. Indeed, the results of the McFadden test [50], of the Akaike Information Criterion (AIC) [51], and of the Bayesian information criterion (BIC) [52], for each estimated model, are in favour of Model (1), which shows the lowest value for AIC and the largest value for the McFadden test.

Table 3. Multinomial model estimates for residents' willingness to implement NWRMs on their property either definitely (a) or probably (b), relative to the baseline option (unwillingness to implement NWRMs).

	Model (1)		**Model (2)**		**Model (3)**	
	(a)	**(b)**	**(a)**	**(b)**	**(a)**	**(b)**
Awareness	0.533 *	−0.442			0.629 **	−0.309
	(0.314)	(0.312)			(0.295)	(0.284)
Awa_self_efficacy_d	0.135	−0.156	0.174	−0.524	0.351	−0.027
	(1.030)	(1.089)	(0.992)	(1.022)	(1.021)	(1.003)
Preparedness_d	0.699	−0.285	0.597	−0.322	0.876	−0.149
	(0.577)	(0.767)	(0.567)	(0.760)	(0.565)	(0.754)
Experience_d * Damage	31.734 ***	15.442 ***	35.377 ***	19.395 ***	16.149 ***	4.229 ***
	(0.007)	(0.005)	(0.007)	(0.006)	(0.004)	(0.005)
Information_provision = passively accessing information	−0.369	−1.147	−0.222	−1.292		
	(0.636)	(0.860)	(0.610)	(0.841)		
Information_provision = actively accessing information	1.269 **	0.986 *	1.434 ***	0.879		
	(0.498)	(0.565)	(0.482)	(0.535)		
Gender_d	0.063	−0.265	−0.09	−0.163	0.069	−0.168
	(0.451)	(0.501)	(0.434)	(0.492)	(0.432)	(0.476)
Age	−0.006	−0.027	−0.005	−0.022	−0.014	−0.033 *
	(0.018)	(0.019)	(0.017)	(0.019)	(0.017)	(0.018)
Child_d	−0.840 *	−0.962	−0.821 *	−0.916	−0.794 *	−0.829
	(0.505)	(0.592)	(0.497)	(0.577)	(0.481)	(0.543)
Edu_d	0.774	1.259	0.962	1.353	0.51	1.045
	(0.670)	(0.878)	(0.659)	(0.868)	(0.639)	(0.852)
Constant	−2.907	1.394	−1.313	−0.035	−2.418	1.464
	(1.965)	(1.949)	(1.596)	(1.738)	(1.897)	(1.836)
Observations	134		137		135	
McFadden	0.13		0.10		0.08	
Akaike Information Criterion (AIC)	292.81		302.95		302.50	
Schwarz's Bayesian criterion (BIC)	356.56		361.35		354.79	

Accuracy (%)	55.97	53.28	48.89

Note: * *p*-value < 0.1; ** *p*-value < 0.05; *** *p*-value < 0.01. Standard errors are reported in parentheses.

5. Discussion

The rise in pluvial flood damage, also as a consequence of climate change, calls for more effective flood risk management, including also self-reliance on the part of private households [30]. In order to achieve such a more efficient runoff water management at community level, increasing the overall willingness to implement NWRMs among private citizens is crucial. This is particularly true not only in Northern Europe, but also in the Mediterranean region and, for example, in an area—such as the Veneto region—which is prone to pluvial floods, and which is even more prone under a climate-change scenario [45]. To this regard, Schifman et al. [42] have already claimed the importance of planning and implementing NWRMs according to an integrated socio-hydrological approach that involves not only public stakeholders and local governments, but also private citizens, among which the adoption of NWRMs is still limited. To expand the adoption of NWRMs by private citizens, several barriers must be removed. Among them, there are: legal and institutional barriers; monetary barriers (i.e., the costs of the interventions); social barriers; knowledge barriers [53]. Thus, in order to spread NWRM diffusion at local community level, it is important to overcome them.

When addressing NWRMs, a few studies have already investigated the factors affecting citizens' behavioural intentions as well as the limitations and barriers to their implementation. Most of them have relied on the PMT framework just to study the social and behavioural drivers facilitating NWRM implementation among citizens [26–31]. Only Davids et al. [32] explicitly focused also on the role of the information factor, including the role played by governmental tailor-made flood risk advice for homeowners, even though they adopted a qualitative approach. Therefore, the analysis carried on in the Veneto region context can represent a novel empirical contribution to such a still-limited literature, shedding light on the role played by information provision when using a quantitative approach.

When considering private citizens' willingness to implement NWRMs on their own properties, the socio-economic characteristics of the respondents do not seem to significantly affect the willingness to implement NWRMs. This result is mostly in line with earlier studies on this topic [26–28,49]. Rather, as underlined by the PMT approach [26], the main drivers that have a positive effect in expressing the behaviour of both the definitely-implementers and the probably-implementers of NWRMs are: (i) the threat experience appraisal factor, expressed by the value of direct damage experienced in the past ; (ii) the coping appraisal factor, as expressed by the Awareness variable (i.e., the general knowledge of the respondents of the role played by NWRMs in reducing the risk of flooding); and mostly (iii) the information factor (Information_provision), addressing the impact of information and dissemination activities about the benefits provided by the NWRMs, especially when considering citizens who actively access information.

With regard to the threat experience appraisal (the interaction between Experience_D and Damage), this work points out the importance of not just the occurrence of damage in the past but also of its overall amount in driving citizens' willingness to implement NWRMs. Previous studies have already tackled this issue. While some contrasting findings emerge from the flood-prone areas along the river Rhine (Germany), where past flood experience seems to have no significant effects on the adoption of specific flood mitigation behaviour [28], other works agree on a more positive role played by the threat experience appraisal [31,54]. In particular, Yu et al. [16] observe that direct past experience of pluvial flooding is statistically related to the residents' willingness to implement NWRMs, while Davids et al. [32] confirm that homeowners' motivations in implementing NWRMs are low if they have never experienced floods before. When considering the coping appraisal factors, our results are mostly in line with several works that have stressed the importance of the awareness of local citizens about the efficacy of NWRMs as a driver to explain their willingness to implement them. The role of this factor is positive and statistically significant in both Model (1) and Model (3). In their literature review, Venkataramanan et al. [41] include general awareness among the triggering factors when explaining NWRM implementation by private citizens. Other empirical studies—carried on in very different contexts—confirm this role: this is the case of Yu et al. [23] in the Chinese context, of Baptiste [54] in the Northeastern US (New York State) context, of Williams et al. [55] in the UK context, and of Bubeck et al. [28] for the river Rhine watershed.

Besides the coping appraisal, active access to information provision also plays a key role, and this is even more significant than just Awareness in explaining citizens' willingness to implement NWRMs, when both components are jointly considered (see Model 1). This result is in line with Venkataramanan et al. [41], who suggest the importance of implementing tailored policy measures, with the aim of increasing awareness among the general public. However, our results emphasise that not all the different activities of information provision have the same effect on the willingness to implement NWRMs by private citizens. Actually, our work puts emphasis on the importance of citizens being directly involved in the information and dissemination activities, rather than just passively receiving information or having a more general prior knowledge about NWRMs—as proxied by the coping appraisal factor (i.e., the variable Awareness). These findings largely confirm the ones suggested by Yin et al. [56], who also addressed the positive impact of the information activities provided by some pilot projects on sponge cities in China. In particular, Yin et al. [56] observe the positive impact played by the creation of pilot areas, addressing the importance of social publicity in order to further promote the construction of additional interventions for runoff water management. The pilot projects are also important as they actually represent a way to learn from past errors and difficulties.

In the European context of Flanders (Belgium), Davids et al. [32] also show the importance of increasing coordination among the involved stakeholders—both private and public ones—thanks to similar information and dissemination activities. In this regard, the activation of participatory approaches seems to be of utmost importance. Similarly, in the Dutch case, Derkzen et al. [57] suggest the importance of a more proactive role played by public actors in providing information to private citizens. Actually, in order to increase citizens' willingness to implement NWRMs—especially in those areas where private initiatives are still scarcely implemented by private citizens –, making people more aware of climate change impacts is just part of the story: rather, it is also important to provide them key information on the multiple benefits of these measures through specific actions promoted by public actors [32].

As far as the role of the public actor is concerned, the literature addresses two main elements. First, it is important that the public actors point out clearly the costs that citizens have to bear, both for the implementation of the NWRMs and for their management over time. Similarly, it is important to clearly indicate the challenges and issues that may originate in the specific cases of the implementation of private interventions [16,58]. Second, the public actors should increase citizens' acknowledgement of the multiple co-benefits delivered by the NWRMs to multiple stakeholders. In particular, identifying and properly communicating all the different benefits that can be produced for each different type of beneficiary—i.e., not just the private monetary benefits, directly accruing to either private agents or the city itself [59], but also several additional ecosystem services [12,20,60]—could support the development of a shared understanding and a negotiated set of values, thus leading local communities to be more inclined to support NWRM implementation [61].

From a more general perspective, social acceptance is expected to be crucial in order to facilitate a dialogue among different stakeholders (e.g., private and public ones) with different individual objectives, hence going beyond more generic suggestions, such as promoting education, awareness raising and stakeholder engagement [62]. Actually, previous works have already addressed the issue represented by the lack of confidence concerning the public acceptability of NWRMs, which eventually limits their widespread adoption [58]. What is particularly critical is the so-called social and institutional acceptance [53]: when it is lacking, resistance to change, reluctance to invest, lack of resources and perceived lack of policy support can occur [61]. Actually, when the involvement of the different stakeholders is limited [63], it is difficult to enhance their implementation. A similar effect is produced by the limited capability to analyse the potential for producing co-benefits and ecosystem services [16]. In this specific regard, understanding which are the specific features that shape private preferences can help local stakeholders and planners identify more effective policy responses [57] and develop a multi-layered and multi-stakeholder framework for interventions [32].

6. Conclusions

This work has focused on the main factors that drive private citizens' willingness to implement NWRMs on their properties. By estimating a multinomial logit model, this analysis emphasises the role played by three major drivers: the coping appraisal factor, the threat experience appraisal factor and the information factor. With regard to the latter factor, this work suggests the importance of the implementation of information and dissemination activities, targeting private citizens, as a way to remove the existing knowledge barriers about NWRMs and their benefits. In a context where having direct experience of already implemented NWRMs is still difficult—such as the case of Southern Europe, due to the limited diffusion of NWRMs—the role of public institutions might be crucial, also in complementing the information provided by NWRM suppliers and practitioners. Indeed, it is clear that most of the suggested information and dissemination activities to enhance citizens' willingness to implement NWRMs in the future should come from public actors. However, the quality of the information provision also matters. Actually, active participation in the information and dissemination activities—leading to the activation of a participatory approach—is proven to enhance the willingness to implement NWRMs more than just a passive acquisition of information. While other works have already addressed the role of information provision, they have largely referred to qualitative approaches. To the authors' best knowledge, this is the first contribution that aims to quantify the effects of different levels of access to information provision as drivers of the willingness to implement NWRMs. However, among the possible limitations of this work, the limited size of the sample under consideration and the fact that it is rather context-specific should be mentioned. In this regard, future works are expected to address a more generalised context, needed to verify the results over different areas.

More generally, further empirical analyses using the PMT framework are needed, when considering the implementation of NWRMs by private citizens. Indeed, while the PMT framework is extensively used to address several environmental issues in the applied economics literature, it is still scarcely considered in the context of NWRM implementation, where it could provide useful quantitative insights in identifying the main drivers of adoption. This is particularly true when the role of information provision is explicitly taken into account.

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Appendix A

Table A1 shows the results of the additional estimated model that includes the following socioeconomic covariates: (i) the respondents' tenure status (either owners or tenants), and (ii) their ability to generate income (distinguishing employed respondents, retired and other respondents, e.g., students and housepersons.

Table A1. Multinomial model estimates for residents' willingness to implement NWRMs on their property either definitely (a) or probably (b), relative to the baseline option (unwillingness to implement NWRMs).

	Model (A1)	
	(a)	**(b)**
Awareness	0.500	−0.344
	(0.325)	(0.334)
Awa_self_efficacy_d	0.042	−0.187
	(1.038)	(1.172)
Preparedness_d	0.774	−0.179
	(0.589)	(0.776)
Experience_d * Damage	31.270 ***	20.389 ***
	(0.009)	(0.007)
Information_provision = passively accessing information	−0.314	−1.070
	(0.645)	(0.918)
Information_provision = actively accessing information	1.285 **	0.897
	(0.508)	(0.586)
Gender_d	−0.041	−0.404
	(0.460)	(0.522)
Age	0.007	−0.025
	(0.023)	(0.028)
Child_d	−0.744	−0.616
	(0.541)	(0.645)
Tenure = tenant	0.440	1.204
	(0.743)	(0.758)
Employment = Retired	−0.213	0.919
	(0.702)	(0.805)
Employment = Other	0.631	0.079
	(0.887)	(1.082)
Edu_d	0.790	1.408
	(0.681)	(0.905)
Constant	−3.450	0.420
	(2.147)	(2.237)
Observations	131	
McFadden	0.14	
Akaike Information Criterion (AIC)	296.31	
Schwarz's Bayesian criterion (BIC)	376.81	
Accuracy (%)	58.78	

Note: * p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01. Standard errors are reported in parentheses.

References

1. IPCC. Climate Change 2022: Impacts, Adaptation and Vulnerability. 2022. Available online: https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/ (accessed on 14 October 2022).
2. Weyrich, P.; Mondino, E.; Borga, M.; Di Baldassarre, G.; Patt, A.; Scolobig, A. A flood-risk-oriented, dynamic protection motivation framework to explain risk reduction behaviours. *Nat. Hazards Earth Syst. Sci.* **2020**, *20*, 287–298. https://doi.org/10.5194/nhess-20-287-2020.
3. EEA. Flood risks and environmental vulnerability. Exploring the Synergies Between Floodplain Restoration, Water Policies and Thematic Policies. 2016. Available online: https://doi.org/10.2800/03946 (accessed on 14 October 2022).
4. Faivre, N.; Sgobbi, A.; Happaerts, S.; Raynal, J.; Schmidt, L. Translating the Sendai Framework into action: The EU approach to ecosystem-based disaster risk reduction. *Int. J. Disast. Risk Re.* **2018**, *32*, 4–10. https://doi.org/10.1016/j.ijdrr.2017.12.015.
5. Sofia, G.; Roder, G.; Dalla Fontana, G.; Tarolli, P. Flood dynamics in urbanised landscapes: 100 years of climate and humans' interaction. *Sci. Rep.* **2017**, *7*, 40527. https://doi.org/10.1038/srep40527.
6. Rosenzweig, B.R.; McPhillips, L.; Chang, H.; Cheng, C.; Welty, C.; Matsler, M.; Iwaniec, D.; Davidson, C.I. Pluvial flood risk and opportunities for resilience. *WIREs Water* **2018**, *5*, e1302. https://doi.org/10.1002/wat2.1302.
7. Nicklin, H.; Leicher, A.M.; Dieperink, C.; Van Leeuwen, K. Understanding the Costs of Inaction–An Assessment of Pluvial Flood Damages in Two European Cities. *Water* **2019**, *11*, 801. https://doi.org/10.3390/w11040801.
8. Nissen, K.M.; Ulbrich, U. Increasing frequencies and changing characteristics of heavy precipitation events threatening infrastructure in Europe under climate change. *Nat. Hazards Earth Syst. Sci.* **2017**, *17*, 1177–1190. https://doi.org/10.5194/nhess-17-1177-2017.
9. Sperotto, A.; Torresan, S.; Gallina, V.; Coppola, E.; Critto, A.; Marcomini, A. A multi-disciplinary approach to evaluate pluvial floods risk under changing climate: The case study of the municipality of Venice (Italy). *Sci. Total Environ.* **2016**, *562*, 1031–1043. https://doi.org/10.1016/j.scitotenv.2016.03.150.
10. Löwe, R.; Urich, C.; Domingo, N.S.; Mark, O.; Deletic, A.; Arnbjerg-Nielsen, K. Assessment of urban pluvial flood risk and efficiency of adaptation options through simulations—A new generation of urban planning tools. *J. Hydrol.* **2017**, *550*, 355–367. https://doi.org/10.1016/j.jhydrol.2017.05.009.
11. Fekete, A.; Sandholz, S. Here Comes the Flood, but Not Failure? Lessons to Learn after the Heavy Rain and Pluvial Floods in Germany 2021. *Water* **2021**, *13*, 3016. https://doi.org/10.3390/w13213016.
12. Veerkamp, C.J.; Schipper, A.M.; Hedlund, K.; Lazarova, T.; Nordind, A.; Hanson, H.I. A review of studies assessing ecosystem services provided by urban green and blue infrastructure. *Ecosyst. Serv.* **2021**, *52*, 101367. https://doi.org/10.1016/j.ecoser.2021.101367.
13. UN. *Transforming Our World: The 2030 Agenda for Sustainable Development*; A/RES/70/1; UN: New York, NY, USA, 2015.
14. UN. *New Urban Agenda*; A/RES/71/256; United Nations, Habitat III Secretariat: Quito, Ecuador, 2017.
15. EC. *Towards an EU Research and Innovation Policy Agenda for Nature-Based Solutions and Re-Naturing Cities*; Final report of the Horizon 2020 Expert Group on 'Nature-Based Solutions and Re-Naturing Cities' (full version); European Commission: Brussels, Belgium, 2015. https://doi.org/10.2777/765301.
16. Kabisch, N.; Stadler, J.; Korn, H.; Bonn, A. Nature-based solutions to climate change mitigation and adaptation in urban areas. *Ecol. Soc.* **2016**, *21*, 39. https://doi.org/10.5751/ES-08373-210239.
17. Fletcher, T.D.; Shuster, W.; Hunt, W.F.; Ashley, R.; Butler, D.; Arthur, S.; Trowsdale, S.; Barraud, S.; Semadeni-Davies, A.; Bertrand-Krajewski, J.-L.; et al. SUDS, LID, BMPs, WSUD and more—The evolution and application of terminology surrounding urban drainage. *Urban Water J.* **2015**, *12*, 525–542. https://doi.org/10.1080/1573062X.2014.916314.
18. EC. *EU Policy Document on Natural Water Retention Measures*; European Commission: Brussels, Belgium, 2015. Available online: https://data.europa.eu/doi/10.2779/396202 (accessed on 14 October 2022).
19. Alves, A.; Gersonius, B.; Kapelan, Z.; Vojinovic, Z.; Sanchez, A. Assessing the Co-Benefits of green-blue-grey infrastructure for sustainable urban flood risk management. *J. Environ. Manag.* **2019**, *239*, 244–254. https://doi.org/10.1016/j.jenvman.2019.03.036.
20. Evans, D.; Falagán, N.; Hardman, C.; Kourmpetli, S.; Liu, L.; Mead, B.; Davies, J. Ecosystem service delivery by urban agriculture and green infrastructure—A systematic review. *Ecosyst. Serv.* **2022**, *54*, 101405. https://doi.org/10.1016/j.ecoser.2022.101405.
21. Huang, Y.; Tian, Z.; Ke, Q.; Liu, J.; Irannezhad, M.; Fan, D.; Hou, M.; Sun, L. Nature-based solutions for urban pluvial flood risk management. *WIREs Water* **2020**, *7*, e1421. https://doi.org/10.1002/wat2.1421.
22. Peng, X.; Heng, X.; Li, Q.; Li, J.; Yu, K. From Sponge Cities to Sponge Watersheds: Enhancing Flood Resilience in the Sishui River Basin in Zhengzhou, China. *Water* **2022**, *14*, 3084. https://doi.org/10.3390/w14193084.
23. Yu, Y.; Xu, H.; Wang, X.; Wen, J.; Du, S.; Zhang, M.; Ke, Q. Residents' willingness to participate in green infrastructure: Spatial differences and influence factors in Shanghai, China. *Sustainability* **2019**, *11*, 5396. https://doi.org/10.3390/su11195396.
24. Pagliacci, F.; Defrancesco, E.; Bettella, F.; D'agostino, V. Mitigation of urban pluvial flooding: What drives residents' willingness to implement green or grey stormwater infrastructures on their property? *Water* **2020**, *12*, 3069. https://doi.org/10.3390/w12113069.
25. Rogers, R.W. Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In *Social Psychophysiology: A Sourcebook*; Cacioppo, J.T., Petty, R.E., Eds.; Guilford: London, UK, 1983; pp. 153–176.

26. Grothmann, T.; Reusswig, F. People at risk of flooding: Why some residents take precautionary action while others do not. *Nat. Hazards* **2006**, *38*, 101–120. https://doi.org/10.1007/s11069-005-8604-6.
27. Bubeck, P.; Botzen, W.; Aerts, J.C.J.H. A review of risk perceptions and other factors that influence flood mitigation behavior. *Risk Anal.* **2012**, *32*, 1481–1495. https://doi.org/10.1111/j.1539-6924.2011.01783.x.
28. Bubeck, P.; Botzen, W.J.W.; Kreibich, H.; Aerts, J.C.J.H. Detailed insights into the influence of flood-coping appraisals on mitigation behaviour. *Glob. Environ. Chang.* **2013**, *23*, 1327–1338. https://doi.org/10.1016/j.gloenvcha.2013.05.009.
29. Buchecker, M.; Salvini, G.; Di Baldassarre, G.; Semenzin, E.; Maidl, E.; Marcomini, A. The role of risk perception in making flood risk management more effective. *Nat. Hazards Earth Syst. Sci.* **2013**, *13*, 3013–3030. https://doi.org/10.5194/nhess-13-3013-2013.
30. Kreibich, H.; Christenberger, S.; Schwarze, R. Economic motivation of households to undertake private precautionary measures against floods. *Nat. Hazards Earth Syst. Sci.* **2011**, *11*, 309–321. https://doi.org/10.5194/nhess-11-309-2011.
31. Siegrist, M.; Gutscher, H. Natural hazards and motivation for mitigation behavior: People cannot predict the affect evoked by a severe flood. *Risk Anal.* **2008**, *28*, 771–778. https://doi.org/10.1111/j.1539-6924.2008.01049.x.
32. Davids, P.; Boelens, L.; Tempels, B. The effects of tailor-made flood risk advice for homeowners in Flanders, Belgium. *Water Int.* **2019**, *44*, 539–553. https://doi.org/10.1080/02508060.2019.1614251.
33. Ruangpan, L.; Vojinovic, Z.; Di Sabatino, S.; Sandra Leo, S.; Capobianco, V.; Oen, A.M.P.; McClain, M.E.; Lopez-Gunn, E. Nature-based solutions for hydro-meteorological risk reduction: A state-of-the-art review of the research area. *Nat. Hazards Earth Syst. Sci.* **2020**, *20*, 243–270. https://doi.org/10.5194/nhess-20-243-2020.
34. Young, K.D.; Dymond, R.L.; Asce, M.; Kibler, D.F. Development of an Improved Approach for Selecting Storm-Water Best Management Practices. *J. Water Res. Plan. Manag.* **2011**, *137*, 268–275. https://doi.org/10.1061/(ASCE)WR.1943-5452.0000110.
35. Alves, A.; Gersonius, B.; Sanchez, A.; Vojinovic, Z.; Kapelan, Z. Multi-criteria Approach for Selection of Green and Grey Infrastructure to Reduce Flood Risk and Increase CO-benefits. *Water Resour. Manag.* **2018**, *32*, 2505–2522. https://doi.org/10.1007/s11269-018-1943-3.
36. Chenoweth, J.; Anderson, A.R.; Kumar, P.; Hunt, W.F.; Chimbwandira, S.J.; Moore, T.L.C. The interrelationship of green infrastructure and natural capital. *Land Use Policy* **2018**, *75*, 137–144. https://doi.org/10.1016/j.landusepol.2018.03.021.
37. CIRIA. *The SuDS Manual C753*; CIRIA: London, UK, 2015.
38. Millennium Ecosystem Assessment. *Ecosystems and Human Well-Being: Synthesis*; Island Press: Washington, DC, USA, 2005.
39. Sañudo-Fontaneda, L.; Robina, R. Bringing community perceptions into sustainable urban drainage systems: The experience of Extremadura, Spain. *Land Use Policy* **2019**, *89*, 104251. https://doi.org/10.1016/j.landusepol.2019.104251.
40. Andrés-Valeri, V.C.; Perales-Momparler, S.; Sañudo Fontaneda, L.A.; Andrés-Doménech, I.; CastroFresno, D.; Escuder-Bueno, I. Sustainable Drainage Systems in Spain. In *Sustainable Surface Water Management: A Handbook for SUDS*; Charlesworth, S.M., Booth, C.A., Eds.; John Wiley & Sons: Oxford, UK, 2016; pp. 355–369. https://doi.org/10.1002/9781118897690.
41. Venkataramanan, V.; Lopez, D.; McCuskey, D.J.; Kiefus, D.; McDonald, R.I.; Miller, W.M.; Packman, A.I.; Young, S.L. Knowledge, attitudes, intentions, and behavior related to green infrastructure for flood management: A systematic literature review. *Sci. Total Environ.* **2020**, *720*, 137606. https://doi.org/10.1016/j.scitotenv.2020.137606.
42. Schifman, L.A.; Herrmann, D.L.; Shuster, W.D.; Ossola, A.; Garmestani, A.; Hopton, M.E. Situating green infrastructure in context: A framework for adaptive sociohydrology in cities. *Water Resour. Res.* **2017**, *53*, 10139–10154. https://doi.org/10.1002/2017WR020926.
43. Loperfido, J.V.; Noe, G.B.; Jarnagin, S.T.; Hogan, D.M. Effects of distributed and centralized stormwater best management practices and land cover on urban stream hydrology at the catchment scale. *J. Hydrol.* **2014**, *519*, 2584–2595. https://doi.org/10.1016/j.jhydrol.2014.07.007.
44. Bernello, G.; Mondino, E.; Bortolini, L. People's Perception of Nature-Based Solutions for Flood Mitigation: The Case of Veneto Region (Italy). *Sustainability* **2022**, *14*, 4621. https://doi.org/10.3390/su14084621.
45. Barbi, A.; Cagnati, A.; Cola, G.; Checchetto, F.; Chiaudani, A.; Crepaz, A.; Delillo, I.; Mariani, L.; Marigo, G.; Meneghin, P.; et al. Atlante climatico del Veneto. Precipitazioni—Basi Informative per L'analisi Delle Correlazioni tra Cambiamenti Climatici e Dinamiche Forestali nel Veneto. Mestre: Regione del Veneto. 2013. Available online: https://www.arpa.veneto.it/arpavinforma/pubblicazioni/atlante-climatico-del-veneto-precipitazioni-basi-informative-per-l2019analisi-delle-correlazioni-tra-cambiamenti-climatici-e-dinamiche-forestali-nel-veneto (accessed on 12 June 2022).
46. Piacentini, S.M.; Rossetto, R. Attitude and actual behaviour towards water-related green infrastructures and sustainable drainage systems in four north-western Mediterranean Regions of Italy and France. *Water* **2020**, *12*, 1474. https://doi.org/10.3390/w12051474.
47. Putnam, R.D.; Leonardi, R.; Nanetti, R.Y. *Making Democracy Work: Civic Traditions in Modern Italy*; Princeton University Press: Princeton, NY, USA, 1994.
48. Pagliacci, F.; Russo, M. Be (and have) good neighbours! Factors of vulnerability in the case of multiple hazards. *Ecol. Indic.* **2020**, *111*, 105969. https://doi.org/10.1016/j.ecolind.2019.105969.
49. Zaalberg, R.; Midden, C.; Meijnders, A.; McCalley, T. Prevention, adaptation, and threat denial: Flooding experiences in the Netherlands. *Risk Anal.* **2009**, *29*, 1759–1778. https://doi.org/10.1111/j.1539-6924.2009.01316.x.
50. Hausman, J.A.; McFadden, D. A Specification Test for the Multinomial Logit Model. *Econometrica* **1984**, *52*, 1219–1240.
51. Sakamoto, Y.; Ishiguro, M.; Kitagawa, G. *Akaike Information Criterion Statistics*; D. Reidel Publishing Company: Dordrecht, The Netherlands, 1986.
52. Schwarz, G. Estimating the Dimension of a Model. *Ann. Stat.* **1978**, *6*, 461–464.

53. Pagano, A.; Pluchinotta, I.; Pengal, P.; Cokan, B.; Giordano, R. Engaging stakeholders in the assessment of NBS effectiveness in flood risk reduction: A participatory System Dynamics Model for benefits and co-benefits evaluation. *Sci. Total Environ.* **2019**, *690*, 543–555. https://doi.org/10.1016/j.scitotenv.2019.07.059.
54. Baptiste, A.K. "Experience is a great teacher": citizens' reception of a proposal for the implementation of green infrastructure as stormwater management technology. *Community Dev. J.* **2014**, *45*, 337–352. https://doi.org/10.1080/15575330.2014.934255.
55. Williams, J.B.; Jose, R.; Moobela, C.; Hutchinson, D.J.; Wise, R.; Gaterell, M. Residents' perceptions of sustainable drainage systems as highly functional blue green infrastructure. *Landscape Urban Plan.* **2019**, *190*, 103610. https://doi.org/10.1016/j.landurbplan.2019.103610.
56. Yin, D.; Xu, C.; Jia, H.; Yang, Y.; Sun, C.; Wang, Q.; Liu, S. Sponge City Practices in China: From Pilot Exploration to Systemic Demonstration. *Water* **2022**, *14*, 1531. https://doi.org/10.3390/w14101531.
57. Derkzen, M.L.; van Teeffelen, A.J.A.; Verburg, P.H. Green infrastructure for urban climate adaptation: How do residents' views on climate impacts and green infrastructure shape adaptation preferences? *Landscape Urban Plan.* **2017**, *157*, 106–130. https://doi.org/10.1016/j.landurbplan.2016.05.027.
58. Thorne, C.R.; Lawson, E.C.; Ozawa, C.; Hamlin, S.L.; Smith, L.A. Overcoming uncertainty and barriers to adoption of Blue-Green Infrastructure for urban flood risk management. *J. Flood Risk Manag.* **2015**, *11*, S960–S972. https://doi.org/10.1111/jfr3.12218.
59. Johnson, D.; Geisendorf, S. Are Neighborhood-level SUDS Worth it? An Assessment of the Economic Value of Sustainable Urban Drainage System Scenarios Using Cost-Benefit Analyses. *Ecol. Econ.* **2019**, *158*, 194–205. https://doi.org/10.1016/j.ecolecon.2018.12.024.
60. Scholz, M.; Uzomah, V.; Almuktar, S.; Radet-Taligot, J. Selecting sustainable drainage structures based on ecosystem service variables estimated by different stakeholder groups. *Water* **2013**, *5*, 1741–1759. https://doi.org/10.3390/w5041741.
61. O'Donnell, E.C.; Lamond, J.E.; Thorne, C.R. Recognising barriers to implementation of Blue-Green Infrastructure: A Newcastle case study. *Urban Water J.* **2017**, *14*, 964–971. https://doi.org/10.1080/1573062X.2017.1279190.
62. Santoro, S.; Pluchinotta, I.; Pagano, A.; Pengal, P.; Cokan, B.; Giordano, R. Assessing stakeholders' risk perception to promote nature based solutions as flood protection strategies: The case of the Glinščica river (Slovenia). *Sci. Total Environ.* **2019**, *655*, 188–201. https://doi.org/10.1016/j.scitotenv.2018.11.116.
63. Calliari, E.; Staccione, A.; Mysiak, J. An assessment framework for climate-proof nature-based solutions. *Sci. Total Environ.* **2019**, *656*, 691–700. https://doi.org/10.1016/j.scitotenv.2018.11.341.