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Factors of influence on flood damage mitigation behaviour by households

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ABSTRACT

Based on a literature review, this paper proposes and empirically tests an extended version of the Protection Motivation Theory (PMT) of individual disaster preparedness. A survey was completed by 885 households in three flood-prone regions in France. Regression models provide insights into the factors of influence on the implementation of three categories of flood risk mitigation measures and households' intentions to implement (additional) measures. Although the results differ per category, the overall findings show that threat appraisals have a small effect on mitigation behaviour, while coping appraisals have a more important influence. Several variables that have been added to the PMT framework appear to be influential in households' preparedness decisions, such as: flood experience; local flood risk management policies and incentives; and the social network. Based on these results, two policy recommendations are made for increasing individual flood preparedness: improving communication campaigns on flood damage mitigation measures, and providing additional financial incentives.

1. Introduction

Since 1982, properties in France have been covered for natural disasters via a natural disaster coverage which is compulsory and included in home insurance contracts, the CatNat system. This coverage has been linked to Risk Prevention Plans, or in original French, '*Plans de Prévention des Risques*' (PPRs[1]), which aim to limit new construction and enforce the implementation of prevention measures by communities and households in flood-prone areas. However, research has shown that there is scope to improve incentives for the undertaking of mitigation measures by households. Poussin et al. (2013) show that between 6% and 82% of flood-prone households implement cost-effective flood risk mitigation measures, and that most households who implemented measures did so for other reasons than existing incentives.

An emerging literature exists on the factors of influence on households' flood damage mitigation behaviour, such as risk perceptions or coping appraisals (Bubeck et al., 2012a; Grothmann and Reusswig, 2006). In addition, several studies have highlighted flood experience as a dominant factor of

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[1] PPRs consist of flood maps and complementary guidance reports for the management of flood-prone areas (see Section S2, Supplementary Online Material—SOM).

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influence on flood preparedness (Bubeck et al., 2013; Kreibich and Thieken, 2009; Siegrist and Gutscher, 2008). Recent research suggests that it would be useful to further study household perceptions and behaviour across different regions, since flood preparedness may differ with respect to the local characteristics of flooding (Bubeck et al., 2012b; Kellens et al., 2012).

The overall objective of this study is to offer insights into individual flood preparedness decisions for flood risk management policy in France. Through a literature review and results obtained from a household survey conducted in 2011 in three French regions that face different kinds of flood risks, this paper has aimed to provide answers to the following question: To what extent do households implement flood damage mitigation measures, and what are the factors that influence individual decisions to prepare for flooding? To answer this question, an extended version of Protection Motivation Theory (PMT) has been applied, which explains households' decisions to prepare for risk using threat and coping appraisals, among other factors.

PMT was originally formulated by Rogers (1975), and later revised by Rogers (1983), to explain how individuals protect themselves against health risk. It has been used by Bubeck et al. (2013), Grothmann and Reusswig (2006), and Zaalberg et al. (2009) in the context of flood risk. PMT predicts that individuals will protect themselves against a particular hazard if they think that the threat of the hazard that they face ('threat appraisal') is high, and if coping appraisals are high. The latter is the case if individuals perceive that the available protective measures are effective (high 'response-efficacy'), easy (high 'self-efficacy'), and not too costly to implement (low 'response costs'). The extended version applied here includes five additional components as shown in Fig. 1 that have been extracted from a literature review (Section S1, Supplementary Online Material – SOM): flood experience; risk attitudes; flood risk management policies; social networks and social norms; and socio-economic factors.

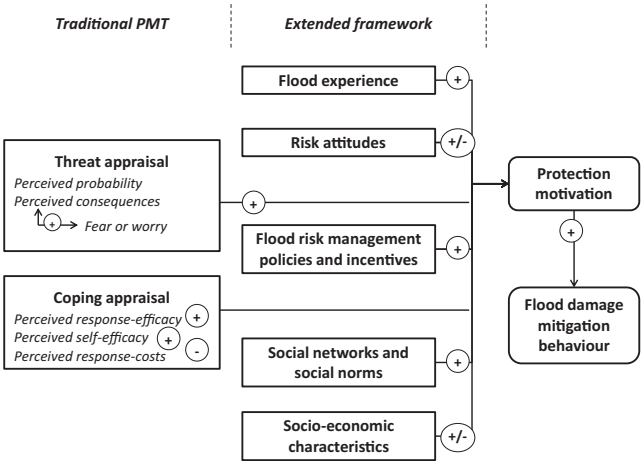

Fig. 1 – An extended framework of Protection Motivation Theory.
Source: adapted from Bubeck et al. (2012a) and Grothmann and Reusswig (2006).

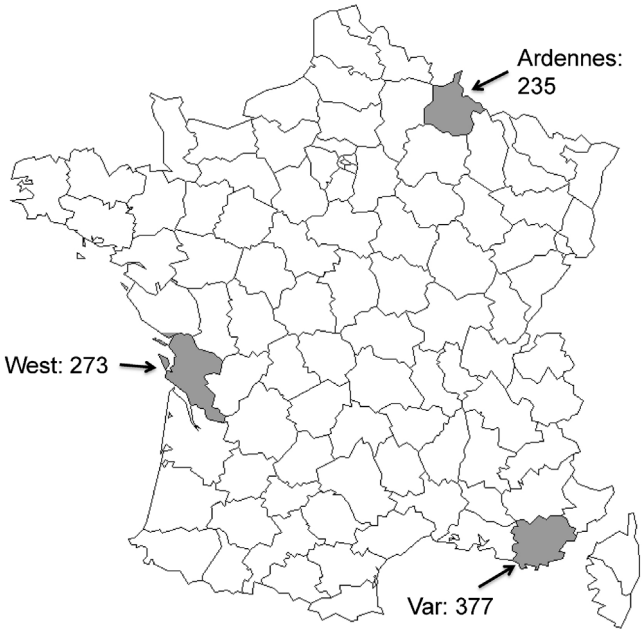

Fig. 2 – Geographical location of the three French regions surveyed and the respective number of respondents to the survey.

2. Methods

2.1. *Survey method and description of the sample*

A survey was conducted among households in three flood-prone areas in France in 2011 (Fig. 2), in order to assess the level of implementation of flood damage mitigation measures and the factors that influence these households' flood risk mitigation behaviour. The three areas are the Ardennes, the Var, and the West Coast. These areas differ with respect to flood history, the types of floods occurring, existing regulations against floods, and local flood management approaches. These characteristics are described in Table 1. The survey was conducted in villages and towns that were carefully selected on the basis of having experienced flood event(s) in the past. This selection of areas was made using flood maps of PPRs and observations and discussions with local civil servants during visits of the case study areas. It was expected that the respondents would be well-prepared for flooding, because the benefits of flood damage mitigation measures are very high for this sample of respondents.

The survey was a mail survey which was extensively pre-tested in the same sample areas as those where the final survey was conducted (Poussin et al., 2013). Observations obtained with the pre-test were excluded from the final survey. The questionnaires were pre-tested with ten face-to-face interviews and a mail pilot that was organized by IPSOS. For this pilot, 200 letters were sent to the sample areas; 26 completed questionnaires were returned. The final survey was sent by postal mail to 8,201 households, which were equally divided over the three regions. In total, 885 respondents, of

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