The perception of flood risk and water nuisance


*University of Twente, Faculty of Behavioral Sciences, Department of Psychology and Communication of Health and Safety, PO Box 217, 7500 AE Enschede, The Netherlands (E-mail t.terpstra@utwente.nl)

**Tauw Consultants, Department of Water and Environmental Planning, PO Box 133, 7400 AC Deventer, The Netherlands

***Province of Flevoland, Department of Water and Environmental Planning, PO Box 55, 8200 AB Lelystad, The Netherlands

Abstract In this paper we applied the psychometric paradigm to validate a questionnaire that assesses the risk perception characteristics of flooding and water nuisance. The state-trait anxiety inventory was used as a bench mark to determine whether perceptions are related to anxiety characteristics. A focus group was used to further validate the questionnaire. Factor analyses of 49 questionnaires identified eight flooding factors (explained variance 74%) and three water nuisance factors (explained variance 62%). Internal consistencies of the obtained scales were moderate to high. Like in the perception of external safety risks, “dread” seems to be the most important concept binding different characteristics. Although dread towards both flooding and water nuisance is rather low, it seems more present in the latter case. Furthermore, the extent of dread for water nuisance seems related to someone’s state anxiety. In both cases awareness of “increasing risks” is clearly present, and we find the characteristics “(no) dread”, “(un)controllable situation” and “does not affect me” to be related.

Keywords Flooding; psychometric paradigm; questionnaire development; risk perception; state-trait anxiety inventory; water nuisance

Introduction

In our research we aim to gain insight in the determinants of the risk perception of flooding and water nuisance. The research is partly embedded in the EU Interreg IIIb project FLOWS, which focuses on developing strategies for “learning to live with flood risk”, by integrating technical and social disciplines. The project was initiated from the awareness that global climate change increases the risks of (urban) flooding and water nuisance. In anticipation to these increasing risks, many countries are working on new water management strategies, often involving the integration of water into spatial plans. We argue that incorporating approaches from social science into the domain of water management is interesting from two perspectives. First, there is a need for societies to anticipate the difficulties in water management, which arise from global climate change. Implementing new strategies requires cooperation and communication with people living in the areas at risk. Second, due to a lack of research on risk perception of flooding and water nuisance, knowledge of how to communicate about these risks and risk reducing measures is only limited.

From the vast amount of research in the domain of external safety, it is well known that the perception of risks differs between public and experts. In the early 1980s, risk researchers started focussing on the determinants of public risk assessments. These researchers found often that laypersons’ assessment of risks was best described with subjective risk characteristics in stead of objective risk indicators. Furthermore, large groups of people judged the risk levels of many human activities or technologies as unacceptably
Consequently, the “best technical measure” (from an expert’s perspective) is not always accepted easily and may even result in public opposition. Risks are then not reduced. However, according to Baum et al. (1983), man made (or technological) risks are perceived differently (more controversial) from natural risks. Since it is not clear whether flooding and water nuisance are perceived as either natural hazards, technological hazards or as a mixture of both (so-called Na-tech events), it remains speculation as to whether risk perceptions of flooding and water nuisance have similar characteristics as perceptions of man-made hazards.

The first step in our research is therefore to select a suitable approach from the risk perception approaches in the domain of external safety risks and to see whether the concepts from that domain also apply to risk perception of flooding and water nuisance. For an overview of approaches see, for instance, Renn (1992) and Sjöberg (2000). The psychometric paradigm is regarded as the leading theory in the field of risk perception. Within this theory – which was first described by Paul Slovic, Baruch Fischhoff and others – “risk” is a subjective concept: a “risk” does not exist “out there”, independent of our minds and cultures, waiting to be measured. Instead, the concept “risk” has been invented to help people cope with the dangers and uncertainties of life (Slovic, 2000c). The paradigm assumes that many characteristics of risk perception and their interrelationships can be quantified and modeled (Slovic, 2000a). Many of the risk characteristics have been found related over a wide range of hazards (Slovic, 2000b), and factor analyses have shown that they can be organised on a higher level into two factors. The first and most important factor – “dread risk” – regards the extent to which a risk is perceived as uncontrollable, dreadful, global catastrophic, fatal, not equitable, high to future generations, not easily reducible, increasing and involuntary exposed to. The higher a hazards score on this factor, the higher its perceived risk. The second factor “unknown” is more perceived when a risk is not observable, unknown to the exposed, has delayed effects, is new, and unknown to science. In some analyses, a third factor was found, interpreted as “number of people exposed”.

In this paper, we will apply elements of the psychometric paradigm. Our primary aim is to obtain a valid and reliable instrument to assess the risk perception characteristics. In a later phase of our research, we need this instrument to operate a relative new and promising theory which describes and explains sudden changes in attitudes: catastrophe theory (Van der Maas et al., 2003). We further investigate to what extent the characteristics found for the perception of technological risks also apply to the risk perception of flooding and water nuisance. Finally, the obtained data enable us to present and explain our first findings on the risk perception of flooding and water nuisance. In the subsequent sections we describe our methods and present and discuss the results.

Methods

Measurement instruments

Quantitative measures of the risk perception of flooding and water nuisance have been obtained with a questionnaire. The questionnaire was construed by developing similar statements (also called “items”) for both the risks of flooding and water nuisance. Flood risk was defined as “…a flood from the North Sea, Wadden Sea, Lake IJssel or one of the large rivers…”. Water nuisance was defined as “…abnormal amounts of water in the streets or on the land due to heavy rain fall, maximum a few decimeters”. Each of the risk perception characteristics has been addressed by multiple statements. Respondents were asked to “…respond to each statement by ticking off the answer category that best fits your opinion or feelings”, ranging on a five point scale from “very disagree” to “very agree”. The perception of flood risk was assessed by 38 statements addressing 16 risk
perception characteristics, and the risk perception of water nuisance with 12 statements addressing six risk perception characteristics. We assumed that risk perception of flooding and water nuisance are related to the individual’s anxiety characteristics. We used the validated Dutch version of the State Trait Anxiety Inventory (STAI-DY) of Van der Ploeg (2000). State anxiety is a temporary, momentary, emotional condition of an individual characterised by subjective, consciously experienced feelings of tension, as well as an increased activity of the autonomous nerve system. State anxiety varies in intensity and fluctuates in time. Trait anxiety reflects the relative stable individual differences in anxiety tendency, i.e. it refers to differences between individuals in their tendency to respond to situations, experienced as threatening, with an increased intensity of state anxiety. Both the state and trait anxiety scales consist of 20 items. The answer categories were provided on a four point scale. Van der Ploeg (2000) reports a high internal consistency of the STAI-DY (alphas for both the state and trait round 0.90). Finally, respondents registered their sex, education and profession.

Statistical and additional analysis
In order to identify which of the risk perception characteristics respondents recognised in our questionnaire, we performed an exploratory factor analysis (Principle Components with Varimax Rotation) and searched for pronounced factors representing characteristics in the dataset (i.e. eigenvalues > 1). We used the Statistical Package for Social Sciences (SPSS). Furthermore, we aimed to obtain scales (factors consisting of sets of items) which enabled characteristics to be measured in a reliable manner. Scale reliabilities (internal consistencies) were indicated by Cronbach Alpha’s. Items which were hard to interpret within a scale or items which substantially lowered Cronbach Alpha’s were withdrawn from the data set. A new factor analysis was then executed until we arrived at a satisfying set of factors and scales.

In order to gain a better understanding of the results of the questionnaires, we organised a focus group session. We consulted story tellers who developed an imaginary story about a water nuisance event and an imaginary story about a flood risk event. During the group interviews, a mediator implicitly addressed the risk perception characteristics that had been assessed in the questionnaire. We use statements from the participants as illustrations that support or contradict results from the questionnaire.

Sample and procedures
The questionnaire was mailed to approximately 100 respondents during the last 2 weeks of August 2004 and the first week of September 2004. In this period, the Netherlands experienced large amounts of rain; water nuisance was reported frequently in the newspapers. Respondents were primarily employees of the provinces of Flevoland, Friesland, Groningen and the water board of Friesland (Wetterskip Fryslân). At the time of analysis, 69 questionnaires were returned. Only fully completed questionnaires were drawn into analysis: 49 questionnaires. The focus group consisted of 14 people from the province Flevoland (five men and seven women) and was organised on December 15 2004. The selected people had different backgrounds and ages varied widely among them. The stories lasted about 15 min; the group interviews after each story lasted 30–45 min. The water nuisance story was told first.

Results and discussion
Table 1 shows the statistics of the analyses applied to the risk perceptions of flooding and water nuisance, as well as their interpretations. In the validation process, the number of items concerning “flood risk” has been reduced from 38 items to 23 items. These items...
seem to reflect eight different concepts explaining nearly 74% of the total variance. In
the validation process of the water nuisance items, three of the 12 items were removed.
Factor analysis resulted in three distinguishable factors explaining nearly 62% of the total
variance.

Risk perception characteristics of flooding
From the five items in the first factor, the respondents expressed to be well aware of
(globally) increasing risks of flooding. These items reflected different aspects of increas-
ing flood risks: flood risks increase throughout the world, affect future generations and
are caused by climate change. During the focus group people also clearly believed that
climate is changing. However, some were not sure whether that will increase flood risks.
Others reacted like: “(…) but there will be a trend (…) sea level is rising” Furthermore,
these aspects were related to the perception that risks may be hard to reduce.

Respondents also seem to believe that floods are somewhat unpredictable, as indicated
by two of the four items in factor 2. The two other items reflect, respectively, “infor-
mation” and “dread”. Respondents disagreed clearly that authorities inform them well
about flood risks. We can not explain yet how the “dread” concept fits in this factor.
A focus group participant did relate “dread” and “unpredictability”: “(…) on the one hand you think: “there is being thought about this [flood risk protection] pretty
well”, (…) and then you have a comforting feeling, but on the other hand, unexpected
things or combinations (…). It is not that one thing goes wrong, but ten things at the
same time. And then you start thinking about living behind a dike (…)”.

The concept “dread” (factor 3) is the most important determinant of risk perception
(Slovic, 2000a). We aimed to measure “dread” directly by operating three items. Two of
these items showed a significant positive correlation (0.60). Their mean item scores
seem to reflect eight different concepts explaining nearly 74% of the total variance. In
the validation process of the water nuisance items, three of the 12 items were removed.
Factor analysis resulted in three distinguishable factors explaining nearly 62% of the total
variance.

**Table 1** Results of the analyses for the risk perceptions of flooding and water nuisance, \( n = 49 \)

<table>
<thead>
<tr>
<th>Risk</th>
<th>Factor</th>
<th>Eigen value</th>
<th>% of cumulative explained variance</th>
<th>Alpha*</th>
<th>Interpretation of factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding</td>
<td>1</td>
<td>3.31</td>
<td>14.41</td>
<td>0.82</td>
<td>(Global) increase flood risk</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.31</td>
<td>24.47</td>
<td>0.69</td>
<td>Unpredictability, no dread</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2.27</td>
<td>34.35</td>
<td>0.73</td>
<td>No dread, does not affect me</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2.13</td>
<td>43.59</td>
<td>0.62</td>
<td>(Un)known risk</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2.07</td>
<td>52.60</td>
<td>0.68</td>
<td>Risk benefit trade off</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>2.00</td>
<td>61.27</td>
<td>0.39**</td>
<td>People exposed</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>1.56</td>
<td>68.04</td>
<td>0.43**</td>
<td>(Un)controllable situation</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>1.32</td>
<td>73.80</td>
<td>–</td>
<td>Public commitment</td>
</tr>
<tr>
<td>Water nuisance</td>
<td>1</td>
<td>2.17</td>
<td>24.13</td>
<td>0.72</td>
<td>Dread</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.71</td>
<td>43.12</td>
<td>0.48**</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1.67</td>
<td>61.62</td>
<td>0.37**</td>
<td>Future increase in water nuisance</td>
</tr>
<tr>
<td>Rest</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Being informed by the government</td>
</tr>
</tbody>
</table>

* Cronbach’s Alpha ranges from 0–1; the higher its value the better the internal consistency of the corresponding scale
** Internal validity indicated by inter-item correlation, ranging from 0–1, since it concerns a factor consisting of only two items

1 Between brackets […] is from the authors to clarify the context
to the concept “no dread” (factor 3), but expresses something more like “does not affect me”.

Factor 4 reflects the concept “(un)known risk”. Two of the three items addressed respondents’ knowledge about flood risks. Their mean item scores suggest that respondents doubt their own knowledge slightly. Although respondents did express confidence in experts’ knowledge, the third item reflecting this finding lowered the internal consistency of this factor significantly, suggesting that expert’s and laymen’s knowledge may be different concepts.

During the focus group, participants often expressed lack of knowledge: “(...) when you are talking to a meteorologist [about climate change], he will say: ‘I don’t know either’. It may as well be that we are in an ice age in 20 years from now, but the chances that we are facing a temperature increase are just as plausible (…)”.

Within the 5th factor, a risk-benefit trade off seems to be the central element. From the results it can be inferred that respondents find that the risks of flooding do not weigh against the benefits of their residential situation. One of the three items indicates that respondents are only slightly willing to move out in case that becomes necessary from a flood risk perspective. We speculate that respondents can hardly imagine a flood to happen: the benefits of their residential situation exceed the risks of flooding by large. In general, the focus group participants did not believe that they will experience flooding. However, they did see the risk and expressed they do have choices: “when you are frightened (...) move somewhere else”. But some participants thought moving out is not really a solution: in other countries you may be exposed to other risks like earth quakes and flash floods.

The 6th and 7th factor consist each of only two items. These factors are internally less consistent as the previous factors. One may question whether the items reflect single concepts or whether they reflect two different but related concepts. Nevertheless, we will discuss them here as single concepts. Factor 6 (inter-item correlation 0.39) seems to reflect the concept “people exposed”. From the mean item scores, we infer that respondents think that the “number of people exposed” to a single flood event is large. Factor 7 has been interpreted as an “(un)controllable situation” (inter-item correlation 0.43). Respondents expressed that they can bring themselves into safety in case of a flood while they also slightly expressed to stand powerless against a flood, in a sense that they cannot protect themselves against them. Although these two findings may seem contradictory, we speculate that they believe to have control over their safety or life, while they cannot control the flood itself or prevent it from happening. The participants of the focus group expressed similar believes: “you will never have real control [over the situation], that is why it is a disaster”. In this context, participants also expressed not to have confidence in rescue plans: “(...) rescue plans are often not working (…), first something must happen”. As factor 8 consists of only one item, we were unable to determine the validity of the concept reflected by it. It was meant to assess “public commitment to risk reducing measures”. Respondents slightly disagreed that there is sufficient support for such measures.

Although we also tried to measure the concept “trust in authorities”, the items assigned for this purpose showed inconsistent results. However, during the focus group, people often expressed concern about how flood risks are managed. Most striking was the moment that we showed them a citation about a Dutch water engineer who warned just 6 months before the flood in 1953 (almost 2000 casualties in the province of Zeeland) that the Dutch coast had many weak points which were likely to fail during a big storm. Nobody listened to his warning, neither his engineering colleagues, nor the politicians, nor journalists; the interview was never published. The first reaction during the focus group was: “and I believe that it is still the same”, many people shared this view.
Risk perception characteristics of water nuisance

The water nuisance statements are a direct derivation of some of the flooding statements. This enabled us not only to identify the characteristics of the perception of water nuisance (by exploratory analysis), but also to compare between the risk perceptions of flooding and water nuisance by comparing corresponding statements.

The first factor consists of three items clearly reflecting the concept “dread”. As for flooding, the feelings of dread for water nuisance are also small. However, the mean item scores seem to reveal more dread than for flooding. A fourth item – reflecting risk reducing measures – is difficult to explain within this factor. As for flood risk, for water nuisance the participants of the focus group did not express “dread”. However, whereas they “did not see a flood happen”, they believed that people should take practical precaution measures and take potential financial consequences of water nuisance into account: “personally I am not seriously worried. I do know that in the future we should take potential damage into account, adjust certain things [practical things in houses like electricity] and that you must accept more (…)”. We suggest this may account for the difference in the presence of “dread” between flooding and water nuisance.

We experienced some interpretation difficulties with the second factor consisting of only two items, since these items seem to reflect two different concepts: we suggest analogous to the flooding items from which they were derived, respectively, the interpretations “(un)controllable situation” and “does not affect me”. Their inter-item correlation is 0.48.

The third factor has been interpreted as “increasing risk of water nuisance”. However, the inter item correlation between the two items in this factor is considered rather weak (0.37). In response to one of the items, respondents indicated that they are just as aware of increasing risks of water nuisance as they are aware of increasing flood risks. The mean item score on the second item indicates that respondents slightly agreed that they will surely experience water nuisance in the future, while for flooding they slightly disagreed on this statement. This finding is consistent with our earlier suggestions. When questioning focus group participants about how realistic the story about the water nuisance event was, people reacted like “…extremities will occur more frequently … in the past you assumed: ‘that’s [heavy rain fall] in the autumn’, but [now] it can also happen during the summer”.

One item in the water nuisance list is considered as a “rest item”. Although it loaded on all three water nuisance factors, on item-level it did not reveal significant correlations. Nevertheless, we discuss its results since it reflects the concept “being informed by the government”, which is an important aspect of our project. Similar to their response to information about flooding, respondents expressed rather strongly that they find themselves not well informed by the authorities about the risks of water nuisance.

Correlations: bench marking with STAI-DY and relations between concepts

Although many correlations have been calculated, we will discuss only the most important ones (see Table 2). First, we hypothesised that the risk perceptions of flooding and water nuisance might be related to a person’s state and trait anxiety characteristics. In general, one may expect that individuals with a high score on the trait anxiety scale will more frequently show a high score on the state anxiety scale than individuals with lower scores on the trait anxiety scale (Van der Ploeg, 2000). We found a strong positive correlation between state and trait anxiety (0.85). Both state and trait anxiety were rather low (mean values of, respectively, 1.62 and 1.76 on a 4-point scale). Furthermore, we did not find significant relations between trait anxiety and the risk perceptions of flooding and water nuisance. From these findings we infer that the way in which flooding and water nuisance are perceived are not a personality characteristic. However, we did find a
significant correlation (0.33) between state anxiety and the concept “(no) dread” in the water nuisance case. From this finding, we hypothesise cautiously that the extent of dread for water nuisance is also determined by the anxiety one experiences at that particular moment.

Furthermore, we found 11 significant correlations between flood risk and water nuisance factors, ranging from 0.29 to 0.54. Interestingly, in the correlation of the water nuisance “dread”-factor (F1) with “(global) increase in flood risk” (F1), both factors contain an item concerning risk reducing measures. These two items correlated significantly with most of the items in the other factor, and thus account substantially for the inter-factor relation. We conclude that the concept of measures is some sort of a “binding” concept. Not surprisingly, we see that people who believe flood risks will increase often have a similar belief about increasing risks of water nuisance. Another interesting finding is the significant correlations of the rest-item. In general, people who felt less well informed about water nuisance also thought more often that risks of flooding are somewhat unpredictable and unknown, and they perceived these risks as more dreadful than people who felt better informed.

Although the correlations between flooding factors and the correlations between water nuisance factors are not shown in Table 2, we will shortly address the most interesting ones. Between flooding factors, some risk perception characteristics seem related. The inter-item correlations between the items of factors 2 and 4 imply that the characteristics “unpredictable risk” and “unknown risk” are (positively) related, which sounds logical from a conceptual point of view (correlation 0.37). This factor relation is mainly explained by an item about flood risk information in F2, which loaded in the factor analysis on F4. During the focus group, participants also related lack of knowledge to unpredictability: “if Texel [most western Dutch Wadden island] is being washed away, what would be the chain reaction following from that? How can we know? (…)”. The characteristic “risk-benefit trade off” (F5) seems to be related to “no dread” (F3; correlation 0.38). During the focus group, a participant reacted to the question as to whether she was frightened by the story about the flood: “… well, yes, if it really happens, yes, but I don’t feel that this can happen tomorrow, that it frightens me”. This supports our earlier hypothesis that the risk-benefit factor may also be explained by people’s reaction that they can hardly imagine a flood to happen. The items of the characteristic “(un)controllable

### Table 2 Correlations between the risk perception characteristics of flooding, water nuisance and the STAI-DY, n = 49

<table>
<thead>
<tr>
<th>Flooding factors: Water nuisance factors</th>
<th>F1: Dread</th>
<th>F2: Unpredictable, no dread</th>
<th>F3: Future increase</th>
<th>Rest: Uninformed</th>
<th>STAI-DY</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: (Global) increase</td>
<td>0.36*</td>
<td>0.31*</td>
<td>0.51**</td>
<td>0.13</td>
<td>0.09</td>
</tr>
<tr>
<td>F2: Unpredictable, no dread</td>
<td>0.32*</td>
<td>-0.03</td>
<td>0.32*</td>
<td>0.54**</td>
<td>0.05</td>
</tr>
<tr>
<td>F3: No dread, affects me not</td>
<td>0.05</td>
<td>0.20</td>
<td>0.10</td>
<td>0.03</td>
<td>0.11</td>
</tr>
<tr>
<td>F4: (Un)known risk</td>
<td>0.13</td>
<td>-0.03</td>
<td>0.15</td>
<td>0.43**</td>
<td>0.25</td>
</tr>
<tr>
<td>F5: Risk benefit trade off</td>
<td>0.31*</td>
<td>0.29*</td>
<td>0.24</td>
<td>0.18</td>
<td>0.13</td>
</tr>
<tr>
<td>F6: People exposed</td>
<td>0.11</td>
<td>0.36*</td>
<td>0.19</td>
<td>0.03</td>
<td>0.14</td>
</tr>
<tr>
<td>F7: (Un)controllable</td>
<td>0.12</td>
<td>0.36*</td>
<td>0.16</td>
<td>0.00</td>
<td>0.15</td>
</tr>
<tr>
<td>F8: Public commitment</td>
<td>-0.17</td>
<td>-0.17</td>
<td>-0.07</td>
<td>0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>State anxiety</td>
<td>0.33*</td>
<td>-0.11</td>
<td>0.22</td>
<td>0.16</td>
<td>0.85**</td>
</tr>
<tr>
<td>Trait anxiety</td>
<td>0.20</td>
<td>-0.15</td>
<td>0.18</td>
<td>0.15</td>
<td>0.85**</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)
situation” (F7) also correlate significantly to “no dread”-items. Furthermore, of all 25 significant inter-item correlations between items of different characteristics/factors, 14 times a dread item was involved. Surprisingly, we see no significant correlations between the water nuisance dread-factor and other water nuisance factors. We suggest that this may be explained by the fact that we only used a small number of items to assess the risk perception of water nuisance. The risk perception characteristics “(un)known risk” and “(un)predictable risk” that were related to the dread concept in the flooding case, are not reflected in these water nuisance items. However, on an item level we did find interesting similarities with the risk perception of flooding. In short, we find that in the water nuisance case the concepts “(un)controllable situation” and “does not affect me” within one factor (F2) are significantly related to the concept “no dread” (F1), while in the flooding case we find the concepts “does not affect me” and “no dread” within one factor (F3) are significantly related to the concept “(un)controllable situation” (F7). Thus, both in the cases of flooding and water nuisance, the concepts “(no) dread”, “(un)controllable situation” and “does not affect me” seem to be related.

Conclusions
The questionnaire enabled us to measure several risk perception characteristics. Our findings were supported by the focus group. However, there are still some characteristics which have not been measured at all or with insufficient reliability. The results of our questionnaire indicate that we identified eight flooding and three water nuisance characteristics. The characteristic “increase of risk” explained much of the variance, particularly in the flooding case. Both in the cases of flooding and water nuisance we measured “no dread”, with satisfying reliabilities. “Dread” seems to be more present for water nuisance. We hypothesize – also based on the focus group results – that this difference may be explained by the fact that people can not imagine a flood really to happen, while they do believe that they will experience water nuisance in the future. Although the items reflecting the concept “trust” in our questionnaire were removed in the validation process, the participants of the focus group expressed not to feel confident with regard to how risks of flooding and water nuisance are managed and with regard to how they are informed. This latter finding is also clearly supported by results of the questionnaire. As in the perception of external safety risks, “dread” seems to bind different risk perception characteristics. From the results of the State-Trait Anxiety Inventory, we hypothesise cautiously that the extent of dread for water nuisance is also determined by the anxiety one experiences at that particular moment. In both the cases of flooding and water nuisance, the concepts “(no) dread”, “(un)controllable situation” and “does not affect me” seem to be related. The characteristic “risk-benefit trade off” also seems to be related to “no dread”. However, respondents may as well have expressed here that the benefits of their residential situation exceed the risks of flooding by large, because they can hardly imagine a flood to happen.

Acknowledgements
This research was carried out in the framework of the European Regional Development Fund Interreg IIIb FLOWS (project reference number 1-16-31-7-546-02).

References


