Community Involvement

Community Responses to Urban Groundwater Contamination
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Summary
This report describes the background to, the methodology and the results of, our empirical study of urban groundwater contamination in part of Ghent for the Flemish Public Waste Agency OVAM. As requested by OVAM, we hereafter present these details about our survey – which was taken before the start of the decontamination and the redevelopment of the site. We end with some recommendations regarding communication between OVAM and the residents in the contaminated neighborhood.
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Other titles on this subject

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1 Community context

The study population of this research concerns the inhabitants of the 'Toekomstwijk' in the city of Ghent, Belgium. This community locates in the Dampoort, a dense suburban area consisting of several neighborhoods including the 'Scheldebuurt'. The groundwater contamination in the Toekomstwijk was caused by the activities of a laundry in the preceding decennia. Specifically, since the 1950s and 1960s licenses were given to Flanders Cleaning Services NV for dry cleaning and cleaning with perchlorethylene (Mava, 2010). In 1995 the Flemish government ratifies a decree concerning soil remediation. This decree contains some key issues that reveal new ways to handle the issue. It explains the differences between historical and new soil pollution, and outlines the register of polluted soil and the necessity of a soil certificate in case of conveyance of land property (cf. Vandermoere, 2006). Against this background, the former owner of the laundry orders a soil research. The results of this study and subsequent analyses indicate groundwater contamination with chlorinated solvents. The laundry Flanders Cleaning Services NV went bankrupt in 2004, and two years later, its successor Rapid Was O Matic moved its activities to an industrial area outside the urban area of Ghent (cf. Mava, 2010; Wasserij Rapid, 2011).

2 Methodology

2.1 Research design

Data for this study were collected by means of mail surveys. The data collection strategy was based on the tailored design method (Dillman, 1978): first, a pre-notice letter was sent to the residents. Second, one week later the questionnaires were sent together with a stamped addressed envelope and an introductory letter (wave 1). Third, a postcard was sent to all the interviewees one week after the first wave, thanking them for their co-operation and to remind those who have not yet responded. Fourth, a second wave was organized seven to ten days after the reminder was sent, once again including the questionnaire together with a stamped addressed envelope, thus reminding those residents who have not yet sent back the questionnaire (wave 2).

2.2   Response analysis

Based on the research design as outlined above we gathered data from 170 residents out of 395 eligibles. The eligibility was based on age and exposure (i.e. adults who live in the contaminated plume). Further, we contacted those families (face-to-face) where three or more persons were domiciled in order to exclude those residents who are domiciled at this place but who are not actual residents. As such, the number of eligibles could be refined (from 435 to 395), indicating an overall response rate of 43% (=170/395). 97.1% of the returned questionnaires were complete (i.e. questionnaires wherein 80% or more of the applicable questions were answered). Almost half of the questionnaires (44,1%) were sent back during the first week, 28.2% during the second week, and 18.2% three weeks after the beginning of the first wave (cf. Figure 1). Given that only a limited number of questionnaires were sent back during the fourth and fifth week (12 and 4 questionnaires respectively) one could expect the marginal increase of a third wave to be low.
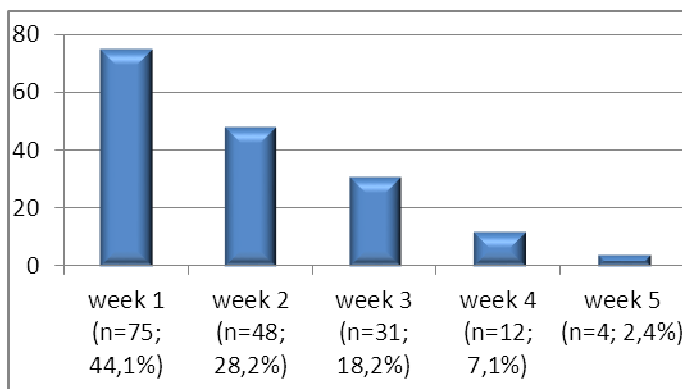

Figure 1: Response arrival questionnaires

2.3   Sample characteristics

When we look at social-demographic characteristics of the sample (N=170) we see that there are slightly more women than men (57.7% women). The average age is 43 years, ranging from 18 to 84 years old. About one third of the respondents have children of twelve years or younger (35.5%). The education level ranges from secondary education or less (34.3%), to higher non-university education (35.5%) and university education (30.1%). The average duration of residence is 13 years, ranging from 1 to 46 years. A majority of the respondents are homeowners (82.9%), 17.1% of the residents in our sample are tenants. The ratio homeowners/tenants in our sample is similar to the community population, with comparable ratios of 17 to 83% and 22 to 78% respectively. Although complete data at the community level are lacking (cf. e.g. ethnic background), we can expect that, overall, and on most characteristics, the sample is roughly representative for the community area under study.

3   Analysis

The focus of the analysis is on descriptive statistics. In some cases additional t-tests (i.e. comparisons of mean-values), (partial) correlations and (logistic) regression coefficients are reported. Data were analyzed using SPSS for Windows (version 20.0). The operationalization of the variables are addressed in the results section when clarification is needed as well as summarized in the Appendix.

4   Results

4.1   Problem awareness and self-estimated knowledge

A majority of the residents in this sample already heard about the contamination of the groundwater in their community (84.7%) – only 15.3% of the people (25/163) did never hear about it before they took part in this study. Whereas one could expect that the latter partially relates to the (limited) number of years that people live in this area, additional analyses revealed that problem awareness associates only marginally significant with duration of residence (with r=0,145, p=0,068). Initially people mainly seem to have heard about the contamination via newsletters of the OVAM (63.7%), other community residents (38.4%), the action group (37.7%), and the city of Ghent (37%). Further, people's self-estimated knowledge about chlorinated solvents was measured by questioning: "To what extent do you feel informed about the health risks of chlorinated solvents?" 79,2% of the respondents estimated their knowledge to be low to very low; 16,1% mentioned to have moderate knowledge, and only about 5% of the people estimated their knowledge to be high (8/168).
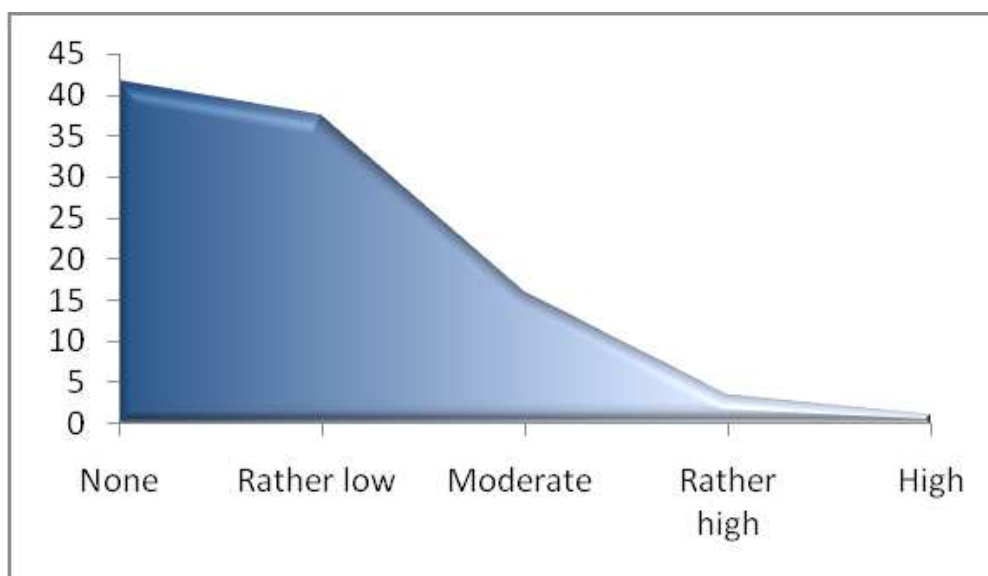

Figure 2: Self-estimated knowledge of health risks (N=168, range0-4, *M*=0,85)

4.2 Communication channels: risk construction and risk mitigation

Figure 3 represents the different ways in which residents aim to be informed about the potential health risks of chlorinated solvents on the one hand, and the decontamination strategy on the other. Residents were allowed to mention multiple communication channels. In the first place, people in our sample point to the relevance of newsletters as provided by the OVAM. This applies both to the provision of risk information and to information that relates to the decontamination (with 79.3% and 76.8% respectively). This is followed by internet-communication and resident meetings. Relatively remarkable is that only one fourth of the residents mentioned direct contacts, both by means of an information point and by house visits. The communication channel which seams least desired is contact by phone (approximately 5%). In general the results on preferred communication channels on risk information are similar to those directed at the process of decontamination (see figure 3).
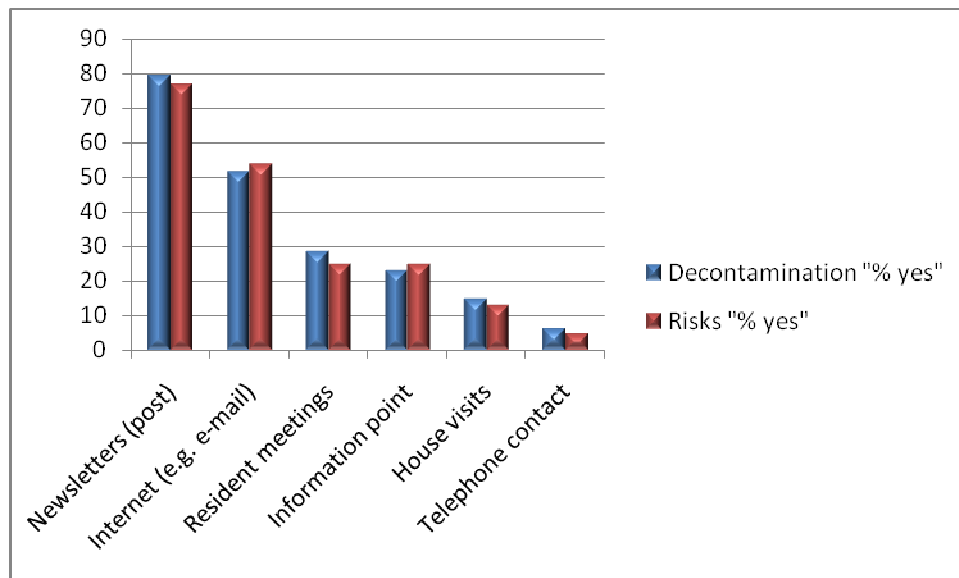

Figure 3: Preferred information channels

4.3 Trust an problem awareness

Figure 4 visualizes residents' trust in different stakeholders, ranging from experts, regulatory scientists and the Public Waste Agency, to local government officials and the former owners of the laundry. As shown in this figure, people's levels of trust are comparable across the stakeholders with average scores around 3, indicating moderate levels of trust. However, trust in the former owners of the laundry is low, indicating the tensed relationship between community residents and the previous industrial activities. Further, additional correlation analyses revealed that trust in the OVAM associates positively with problem awareness (r=0,210,

p<0,01). In other words, on average, those people in our sample who did not hear about the contamination before they took part in this study, have relative lower levels of trust in the Public Waste Agency. The same applies to trust in experts and regulatory scientists (with r=0,218,p<0,01). Although we cannot infer from this that information provision (e.g. newsletters) induces higher trust levels, it suggests that a lack of citizen involvement or a lack of communication associates with distrust, which might be difficult to recover in subsequent phases.
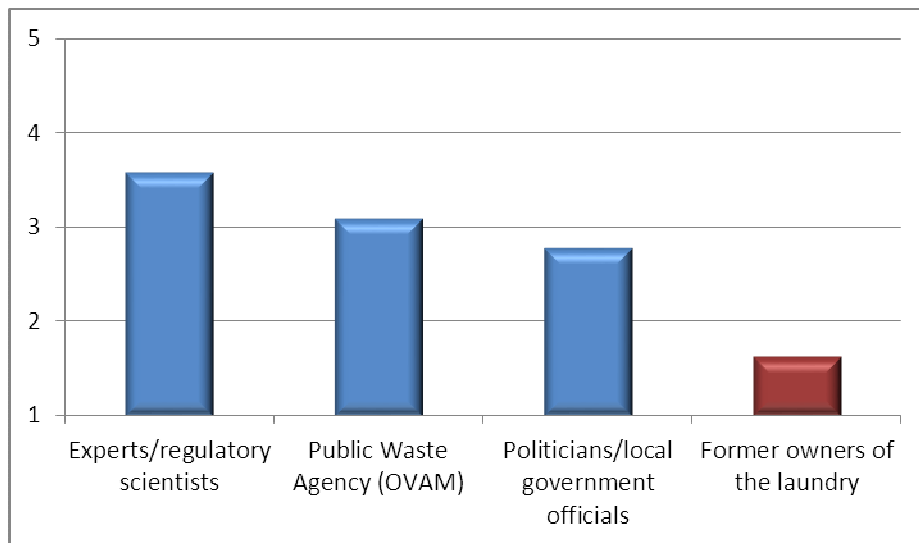

Figure 4: Residents' trust in different stakeholders (average scores, range 1-5)

4.4 Relativ risk measures and site-specific concerns

Risk perception was measured by four items. A distinction was made between perceptions of the environmental impact of the groundwater contamination on the one hand, and health risk perceptions on the other. Hazard perception was measured by questioning "How do you estimate the risks of the groundwater contamination on the environment" (ranging from 1 'very low' to 5 'very high'). For health risk perceptions a distinction was made between risks for oneself, risks for children, and risks for other community residents (cf. Appendix). As shown in figure 5 the average scores are highest for environmental risk perception (M=3.88) followed by health risks for children (M=3.04), other community residents (M=2.77), and risks for oneself (M=2.62). Considering these mean values and knowing that the scales ranged from 1 to 5, it is clear that the overall risk perceptions are rather low to moderate.
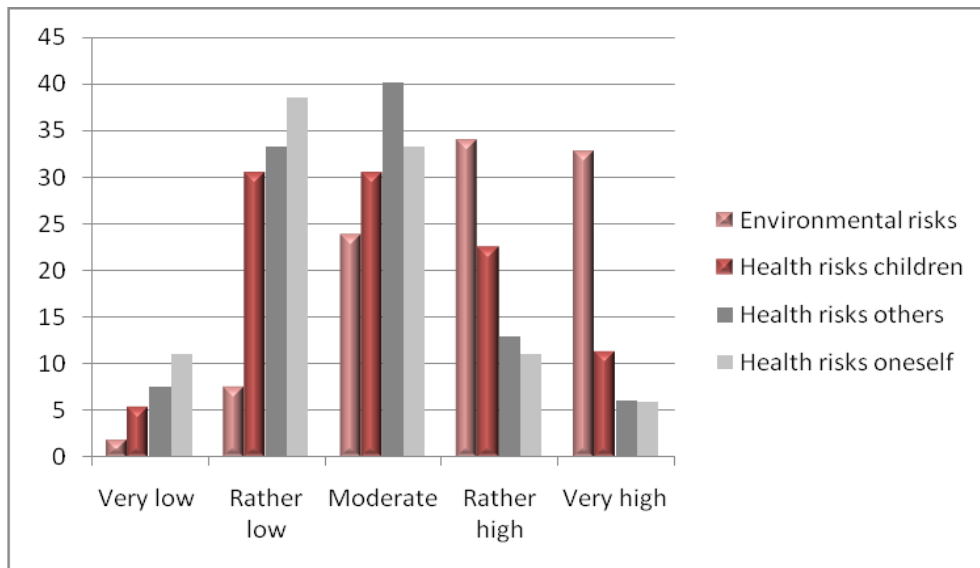
Figure 5:Risk perceptions (%)

The moderate to low average scores of health risk perception relate to the fact that only a minority of the residents in our sample make actual use of groundwater (91.8% don't). Besides, there is a significant amount of people who don't have a garden (38.8%), making the importance of perceived control over the exposure routes all the more relevant. Higher levels of perceived control further associate positively with the distinction that people make between risks for the environment and health risks for oneself (r=0.247, p<0.01). In other words, residents felt able to control the exposure routes and the eventual health risks despite recognizing the presence of hazards (cf. Vandermoere, 2008b). In addition, other local concerns were of greater importance to many residents. For example, many people pointed at the lack of parking space in their community, litter and illegal dumping, road traffic congestion, and the (in)security for cyclists (see figure 6). The latter problems were clearly higher on many people's local priority lists than the environmental impacts or health risks of groundwater contamination (see also figure 6).
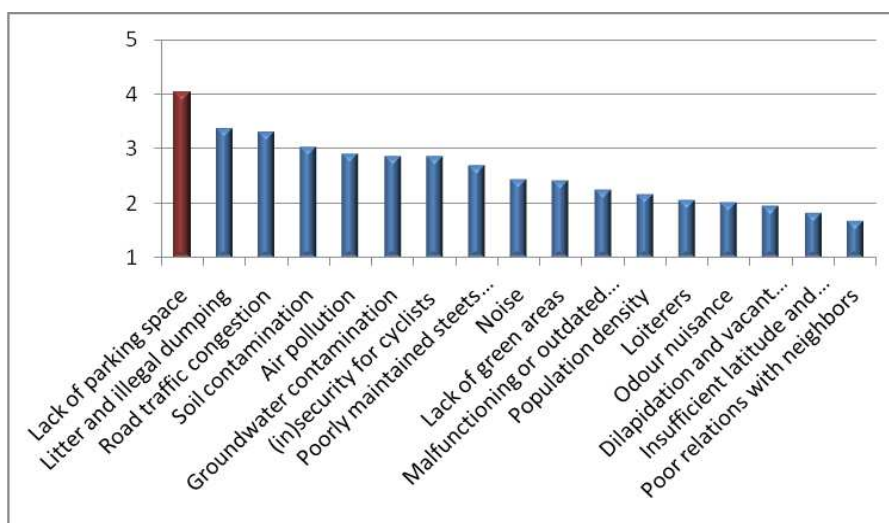

Figure 6: 'Residents' local priority lists (average scores, range 1-5)

4.5　Back to the future: Reconsidering residential choice

Next to the risk perception items as outlined above we also included a more indirect, what could be termed a 'back to the future' measure of risk perception and its connection to risk aversive behavior. Specifically, residents were asked: "Suppose you could reconsider your residential choice. Would you then decide to live here again?" The results of logistic regression analyses (cf. table 1) first reveal that people's secondary concerns such as those relating to the redevelopment of the site, the potential decrease of property values, etc., and thus not residents' risk perceptions or so-called primary concerns, relate significantly to people's intention to reconsider their residential choice. In a second step, however, it is shown that the effect of these secondary risks disappears once ambient stressors such as traffic congestion are included in the model (i.e. people who report high scores on ambient stress are more likely to reconsider their residential choice relative to people who report low levels of ambient stress). This is consistent with the previous findings on relative risk measures (cf. 5.4 Relative risk measures and site-specific concerns).

	STEP 1		STEP 2	
	B / sig. (SE)	Exp (B)	B / sig. (SE)	Exp (B)
Risk perception	sig.: .42			
Low vs. high	-.45 (.52)	.64		
Moderate vs. high	.23 (.51)	1.25		
Secondary concerns	sig.: .04		sig.: .26	
Low vs. high	-1.17* (.56)	.31	-.80 (.55)	.45
Moderate vs. high	-.96* (.48)	.38	-.58 (.48)	.56
Ambient concerns			sig.: .014	
Low vs. high			-1.62** (.56)	.20
Moderate vs. high			-.66 (.48)	.52
Pseudo R-Square (Nagelkerke) / N	25.3% / N=138		28.1% / N=147	

Logistic regression analyses, controlled for the social-demographics:
gender, age and education. *p<0.05, **p<0.01

Table 1: Residential choice and site-specific concerns

4.6   Mental health impacts and social cohesion

In order to examine the mental health impacts of exposure to chemical contamination a standardized four-items measure of perceived stress was included in the questionnaire (i.e. the Perceived Stress Scale, cf. Cohen, 1986). Further, the findings of this study on stress-responses to groundwater contamination in Ghent were compared to data from a previous study on soil contamination in the Kouterwijk community. The latter locates in Sint-Amands, Belgium, which used to be contaminated by heavy metals and polyaromatic hydrocarbons (cf. Vandermoere & Vincke, 2004, 2005; Vandermoere, 2006, 2008a,b). As shown in figure 7 the comparative analysis shows that people in the Toekomst community report relative lower levels of distress. Additional analyses revealed that, on average, most residents did not report higher stress-levels than a matched, non-exposed, comparison group either. It can be assumed that the limited mental-health impacts of groundwater contamination in the Toekomst community in Ghent partially relate to perceived control over the exposure routes (cf. supra), the decontamination phase and remediation strategy, and the relative high levels of perceived social cohesion (cf. figure 7)
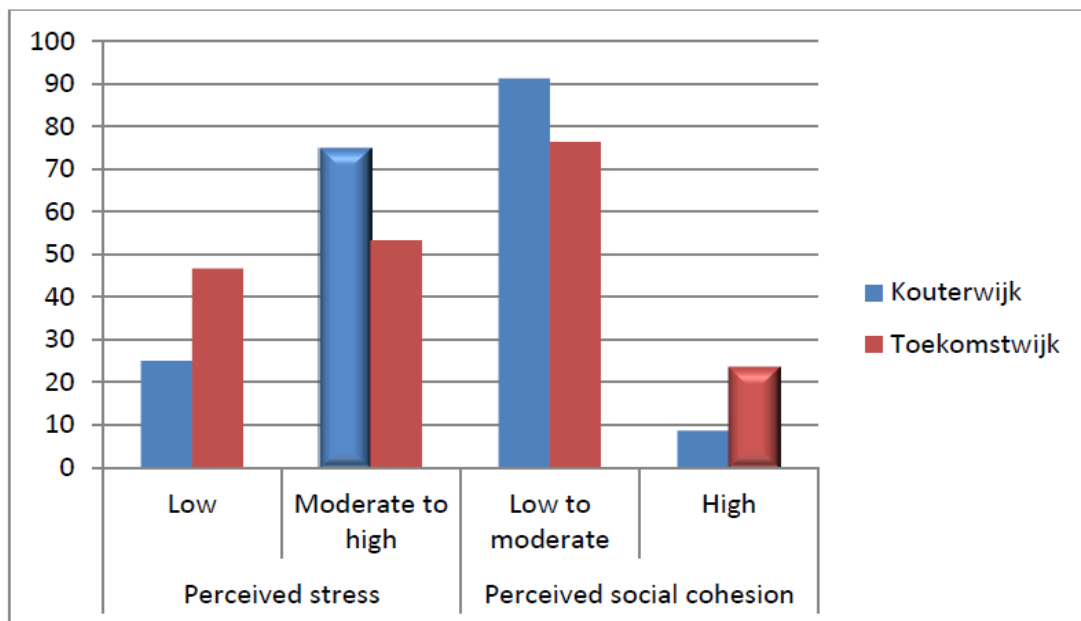

Figure 7: Psychosocial impacts and perceived social cohesion

4.7   Communication needs and site redevelopment

Next to the preferred information channels as outlined above we also included an open question where people could describe their major needs in terms of risk communication and public participation (thus in terms of what should be communicated rather than how). Results first showed that, despite previous communication initiatives by the OVAM, some residents still need more information on the seriousness of the contamination, its potential health risks, and the ways in which potential risks can be avoided. This is consistent with the previous finding on people's low average levels of self-reported knowledge. Second, many residents in our sample ask for more information on the decontamination strategy: which strategy will be chosen? What will

be its impact on the (modified and built) environment(s)? When will the decontamination process finally start? And how much time will it take to decontaminate the groundwater? A third major concern relates to the future use of the building of the former laundry: will it again be used for commercial purposes? Will it cause new or additional problems such as traffic congestion, noise, etc.?

In addition to major needs in terms of risk communication, residents could also mention their preferences regarding the redevelopment of the site. In particular, participants were asked: "What would you like to see happen in the future with the location of the previous laundry?" Subsequently, people's preferences were re-coded in the following categories: social-cultural (e.g. social-artistic space), green space (e.g. urban gardens), commercial (e.g. shops), residential (housing), and parking space. About two thirds of the people in our sample responded to this question (i.e. 112/170 or 65.9%). As people were allowed to mention more than one preference, 167 preferences were eventually given by 112 residents. The results as shown in Figure 8 illustrate that a majority of these residents ask for more green and parking space (45.5% and 38.4% respectively), followed by social-cultural and residential projects (19.6% and 17.9% respectively). While several people mentioned both green space and parking space simultaneously, the potential of additional parking space was often mentioned under the condition that it remains local (i.e. for residents' use only) and that it doesn't create additional problems (e.g. noise, traffic congestion, etc.).
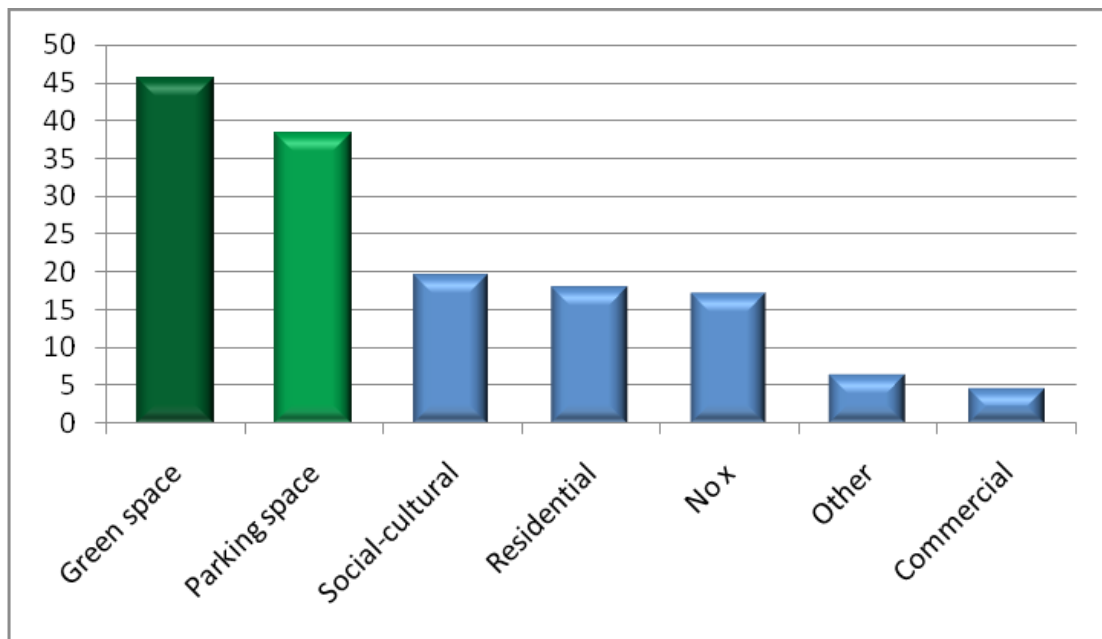

Figure 8: Site-redevelopment: preferred future destinations (%, N=112)

5 Recommendations

Due to delays in the process of decontamination and site redevelopment the survey is only done 'before' remediation. Against this background, we would like to formulate the following general suggestions and recommendations.

People's risk perceptions and estimations of 'how safe, safe enough is' should, at least partially, be understood in terms of residents' local agenda settings. Moreover, those problems which are relatively high on people's priority list can then be used as instruments for site-redevelopment.

Communication between the Public Waste Agency and community residents requires sufficient understanding, coordination and communication among the OVAM and other stakeholders such as local government officials and previous owners of former industrial activities.

Time-management is crucial to build up residents' trust and engagement. Moreover, conflicting interests and priorities among those parties on which the OVAM is partially depending (e.g. consultancy groups, local governments, previous industries, etc.) can create communication fatigue and feelings of powerlessness.

The long period, often five years or longer, taken between the announcement of the groundwater contamination and the final decontamination and redevelopment of the site, may not only indirectly question the seriousness of the case, it may also make any, often well-intended, communication plans doomed to fail.

Rather than questioning what and how to communicate to the residents during long periods of 'non-news', priority lists among different stakeholders should first be equalized. If no real actions can be undertaken within a reasonable time frame, any investment in communication strategies as well as public participation initiatives runs the risk to be seen as being part of a broader deflection politics.

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7   Appendix

Operationalization of the variables

Concept	Measure	Items
Perceived social cohesion	Social Cohesion Scale (SCS)	Q4.1 until Q4.5
Site-specific concerns	Int*	Q7.1 until Q7.17 and from Q22.1 to Q22.6
Risk perception, intention and behavior	Int*	Q14, Q15, Q16, Q17, Q18, Q21, Q23
Trust in different stakeholders	Int*	Q24.1 until Q24.5 & Q20
Communication	Int*	Q9, Q25, Q26, Q27 & Q28
Knowledge and problem awareness	Int*	Q8 & Q19
Perceived Stress	Perceived Stress Scale (PSS)	Q31.1 until Q31.4
General mental well-being	General Health Questionnaire (GHQ)	Q32.1 until Q32.12

*Int: Partially based on interviews with the residents