RESCDAM PROJECT

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Public Response to Dam Safety Issues - Kyrkösjärvi Dam Pilot Project

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1. The purpose of the sociological research

The sociological research on the public response towards dam safety issues was part of a RESCDAM pilot project. The pilot project focused on a Kyrkösjärvi dam located in Seinäjoki and on the inhabitants of the town. The sociological research played an important role in this project by concentrating on the attitude of the public towards a risk of the Kyrkösjärvi dam-break and on the possible reactions of the people in the case of a flood caused by it. By learning the population needs in the field of security matters, the research served as one of the tools for creating the emergency action plan in the case of a Kyrkösjärvi dam-break and a better preparedness for such an accident.

2. The research method

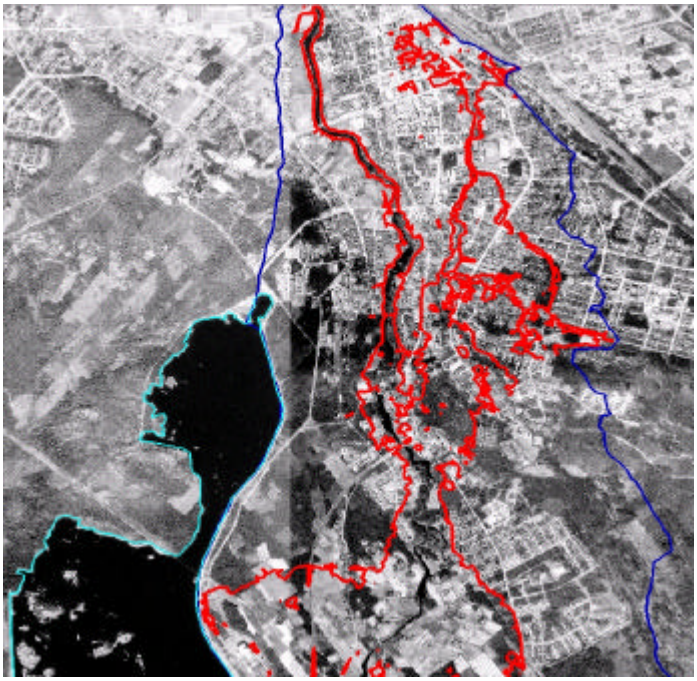
The first step of the research included preparation of a questionnaire devoted to the problems of dam-breaks in general and in the case of Seinäjoki, as well as to the alarm system. The purpose of the questionnaire was to introduce the dam-break issues to the public and to learn their perception of such a risk in Seinäjoki. The intention was also to find out how great was the interest in this problem and the will to participate in the information meeting for the general public. This meeting was replaced by a press conference held during the seminar and workshop (October 2000) which resulted in a few press articles and one radio broadcast on the issues covered by the RESCDAM project. More information on the Kyrkösjärvi dam-safety issues is planned to be disseminated in connection to the Kyrkösjärvi EAP (Emergency Action Plan) exercise designed for the autumn, 2001.

At the preparation stage, several issues and doubts came to surface, e.g. how to construct the questions in order to find out the level of public awareness on the dam-break risk problem but simultaneously not to induce unnecessary fears and stress. It was expected that a such a questionnaire might evoke doubts about the safety of the Kyrkösjärvi dam. Moreover, conducting a research which concerns the issue of a dam-break has an impact to the local authorities. A mutual agreement on the interest of the researchers and the authorities involved in the project had to be reached between the both parties. The researchers have a tendency to treat the community members as the research subjects, while the same people are often relatives or neighbours, or are perceived as potential voters by the local authorities.

In the case of Seinäjoki, it was decided that the questionnaire was to be accompanied by a short letter of explanation signed by the chief of the local fire brigade. It was stressed there that this questionnaire is part of a wider research and that Kyrkösjärvi is only an example dam in this study.

The questionnaire was divided into three parts concentrating on personal data, dam-safety issues and comments. Twelve questions were devoted to the theme of a dam-break and its potential consequences and two to the alarm signal (see Annex 1). This division corresponds to what Delta Sousa e Silva calls the two stages of the contribution of social sciences to the promotion of security in the flood prone area, that is finding out demographic and housing characterisation of the area, and learning public risk perception of a dam's security. (Sousa e Silva, 1997)

On the basis of the dam-break flood simulations a potential area at risk was defined in Seinäjoki (see Picture 1). One thousand households in this area received a copy of the questionnaire along with the explanation letter in the end of October, 1999. The questionnaires were distributed by post in envelopes carrying the logo of the local fire brigade, which is in charge in case of emergency situations in Seinäjoki. Each questionnaire form also carried the fire brigade stamp. This was to make the forms look official and to encourage people to treat the matter seriously. A free-of-charge return envelope addressed to the Finnish Environment Institute in Helsinki was also included.



Picture 1. Two-hour dam-break flood zone – the area of the project's questionnaire distribution

The questionnaires were supposed to be returned within a period of three weeks. Most answers were received within the defined period of time. Until December the 30th, 1999, two hundred eighty five responses were received. 28,5 % of the questionnaire responses was considered a satisfactory result for the statistical analysis and the idea of direct interviews of the population at dam-break flood risk in Seinäjoki was given up.

3. Demographic and housing characteristics of the Seinäjoki town

One of the important steps in the EAP development was identifying the demographic and housing characteristics of Seinäjoki. The information on the population and the buildings was obtained from the population information system maintained by the Population Register Centre. The building and residence information used in this project was updated in April 1999; and the population information was updated on December 31, 1998.

On the basis of the available data, a number of maps were created to serve the social impact study and the process of the EAP making. For instance, the town structure of Seinäjoki was analysed and all the buildings which have a major importance in an emergency situation were

marked on the map. Maps illustrating the types of building, the number of floors in each building, the location of hospitals, day-care centres, schools and other social services buildings were composed.

The information on the people living in Seinäjoki was extracted from the database by the buildings they live in. The 29 703 of the Seinäjoki inhabitants were classified into three age groups: 1) 0-15 years, 2) 16-60 years and 3) over 60 years. Maps were created to illustrate where the population or certain age classes are concentrated in. The population density per square kilometre was also computed.

For the purpose of the social impact research, maps and spreadsheets were computed for the dissemination area of the questionnaire (Valanne, 1999) (See Figures 1 and 2).

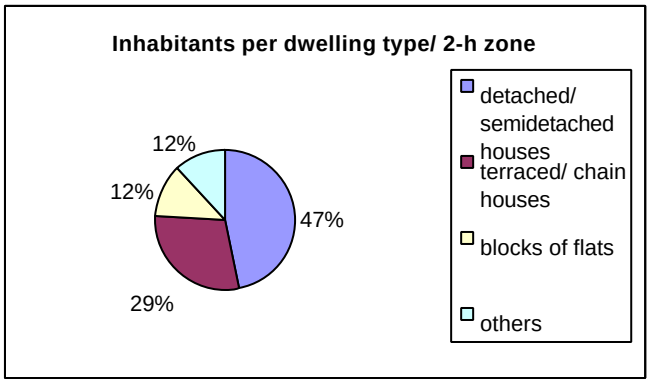


Figure 1

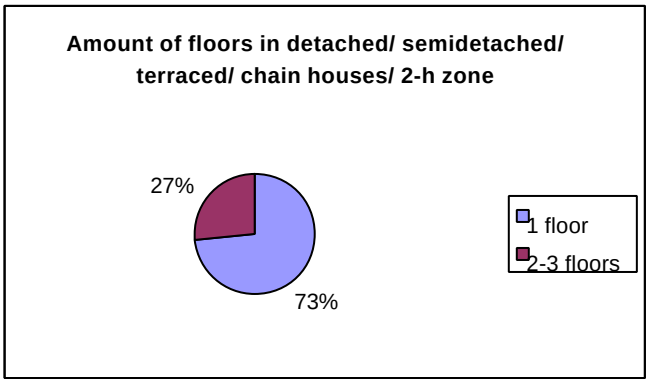


Figure 2

The results show that the majority of the population in the two-hour dam-break flood zone has very little chances for the vertical evacuation in their flats. That implies that in the case of a Kyrkösjärvi dam-break they should abandon their houses, and be evacuated or evacuate themselves to a flood safe zone.

The results of the age distribution analysis (Figure 3) prove that a considerable amount of the two-hour dam-break flood zone inhabitants might need a special assistance due to their age during a flood caused by a dam-break flood, especially if the water has already reached the houses.

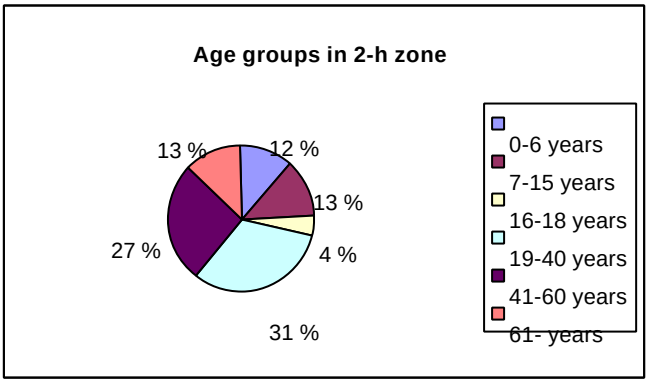


Figure 3

In general, all the maps created have served as a useful tool for the creation and will serve for the further updating of the EAP. They give a chance to prioritise the importance of rescue

actions and to monitor the population in the respect of the special assistance need in the case of a dam-break flood, e.g. aged people living alone.

4. Results of the questionnaire analysis

It had been assumed that there would be more responses to the questionnaire from the male than the female inhabitants. This assumption was made on the basis of a belief that security issues belong traditionally more to a male domain. However, it turned out that the participation of both sexes was quite equal. The division of the respondents by sex is shown in Figure 4:

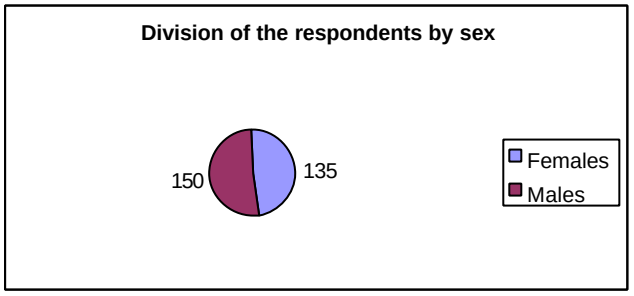


Figure 4

The average age for female respondents was 40 years, and for males 50 years.
The educational division of the respondents is illustrated by the figure below:

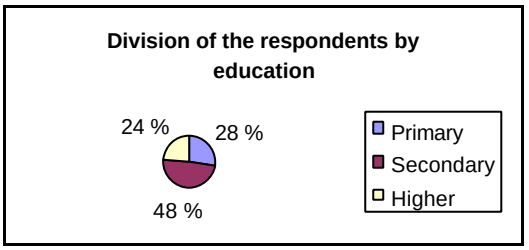


Figure 5

The respondents were also asked whether they had ever been victims of flooding (Figure 6). The result was surprising in such a respect that there turned out to be some difference in the previous flood experience between the females and males. The flood experience was investigated because according to Lustig and Haeusler, people who have once experienced a flood tend to be better prepared for the next one (Lustig and Haeusler, 1989 in Lustig and Maher, 1997) It was assumed that a previous flood experience might affect the respondents' attitude towards the potential Kyrkösjörvi dam-break. However, no direct influence of the flood experience on the answers of those respondents was observed. This could be explained by the fact that none of the respondents has ever faced a dam-break flood and this kind of flood is considered very unlikely to happen.

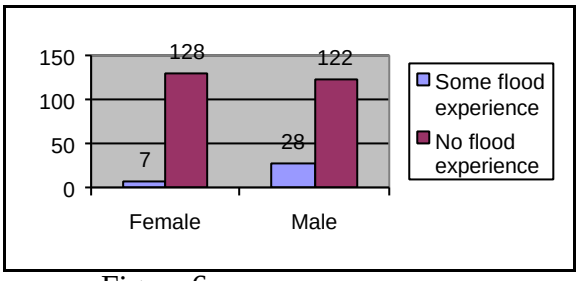


Figure 6

In the section devoted to the dam-safety issues the first question was related to the risk perception. The question was as follows: ”How big, in your opinion, is a danger of a Kyrkösjärvi dam-break?” The results are shown in the figure below.

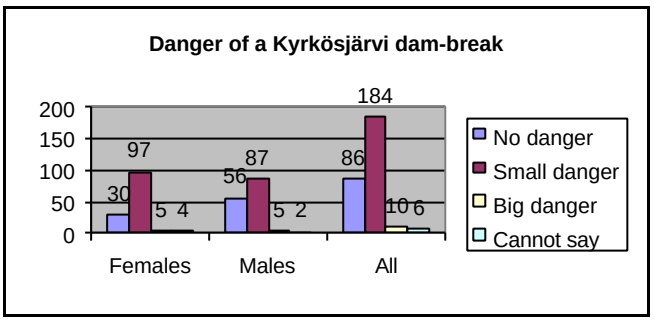


Figure 7

Moreover, 86% of the respondents stated that they were not worried about the danger of a Kyrkösjärvi dam-break. Those results show that the public considers Kyrkösjärvi dam safe. It is probably due to the fact that no major dam accident had taken place in Finland before. The other factor is the trust in good quality of the dam and the professionals skills of those who take care of its safety. The general trust in the safety of the Finnish dams seemed also to be proved by the reaction of participants of the meeting devoted to the Hirvijärvi dam-break issues (Syvänen, 2000).[1]

The respondents were also presented a few potential reasons for a dam-break and were asked to assess the degree of probability of those reasons. The results presented in Figure 8 show that the “human factor”, i.e. the negligence of rules and human mistake received the lowest scores, which again implies a trust in the officials and the dam’s staff.

[1] The public information meeting on the subject of the Hirvijärvi (in the neighbourhood of the Seinäjoki town) dam-break took place in March, 1999. 50 participants were present in the meeting. The EAP in the case of the Hirvijärvi dam-break was presented. The audience shared a deep trust in the safety of the Hirvijärvi dam, partially on the basis of the fact that many of them had participated in the construction process and were of the opinion that the work had been done properly.

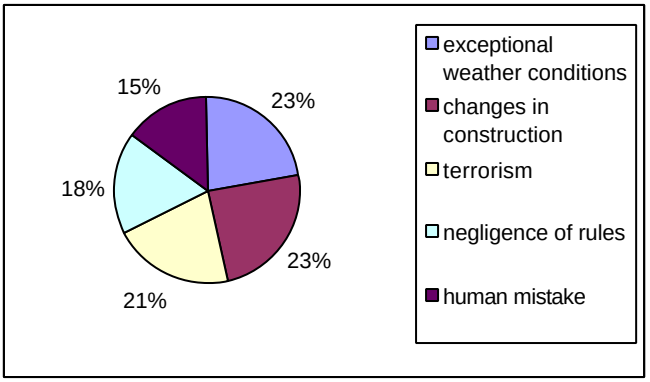


Figure 8

The respondents were also asked two questions concerning a dam-break risk in Finland. The public was requested to compare the risk of a dam-break to the risk of a nuclear power station and train accident. The public opinion on this issue is illustrated by the figure below.

The risk of a dam-break accident in comparison to a risk of a nuclear power station and a train accident is:

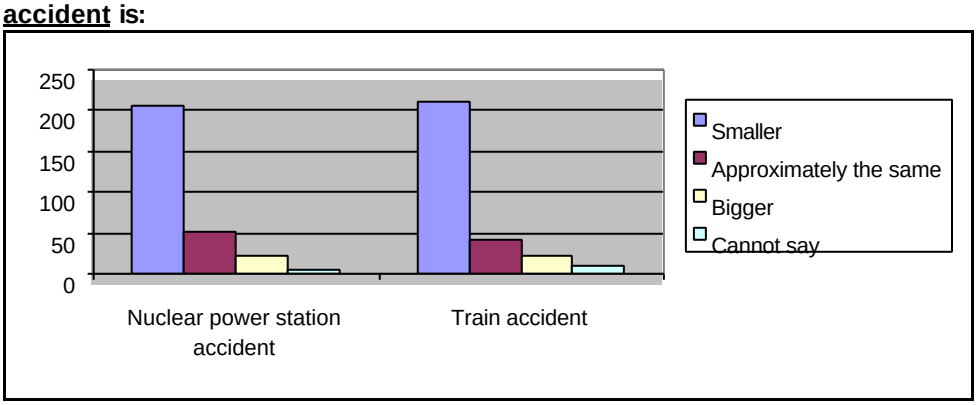


Figure 9

The low risk perception in this case and in general might be explained by the thesis of Lustig and Maher who claim that people tend to underestimate the risks because they are in need to feel control of their lives (Lustig and Maher,1997). It seems mentally easier to deny any danger than to cope with the stress that there is a certain risk that one day a dam could break.

In the section devoted to the Kyrkösjärvi potential dam-break, only 31% of the respondents did claim to know what might be the consequences of such an accident for the Seinäjoki town. Most people (74 answers) feared that a dam-break would cause a serious flood in Seinäjoki. The threat of major material damages, destruction of the roads, problems with energy supply and a disaster in hospital were also pointed out. A few of the respondents expressed the opinion that a flood caused by the dam-break would cause only minor damages (3).

37% of the respondents claimed to know what consequences a dam-break would have for their dwelling. The scenario chosen most often assumed that water would flow inside and either seriously damage the house or destroy it totally (59 answers). The possibility of minor damages, flooded cellars or mould problems afterwards was suggested in 20 cases. It seems significant that a relatively smaller number of the respondents who expected a dam-break flood to cause serious damages in Seinäjoki expected it to have an influence on their homes – this fact proves that people have a tendency to the “not to my home” attitude while thinking about disasters. Another 20 respondents regarded a dam-break flood as no threat to their dwelling.

25% of the respondents assumed that they could predict the potential safety risks in the event of a dam-break. However, in this case there was more variety in answers. Half of those who answered this question (32) expected a flood caused by a dam-break to be a major threat to their health and life. They pointed out the danger of drowning and severe injuries. The impact of a flood to the safety of children was also mentioned. Nearly the same amount of respondents (27) undermined the danger of a dam-break flood – in their opinion it would cause only a minor threat to the inhabitants' safety. One issue which came to surface in connection to the safety question was the problem of disabled people. In their case a conventional warning system might not be effective or they might not be able to react properly.

People were also asked whether they know how to act in the event of a Kyrkösjärvi break. Again the percent of the positive answers was relatively low – 26%. The respondents guessed, among others, that one should run away from the flooded area as soon as possible (35). The behaviour options are shown in the figure below.

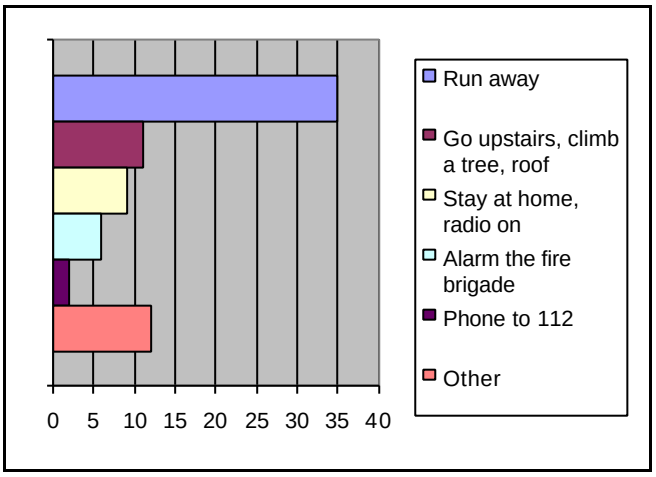


Figure 10

The respondents were also asked if they knew where from one could obtain instructions on how to act in the case of a dam-break. In this case the percentage of the positive replies was higher – 49%. However, there was no consensus on the actual source of such information. The answers are presented in the figure below.

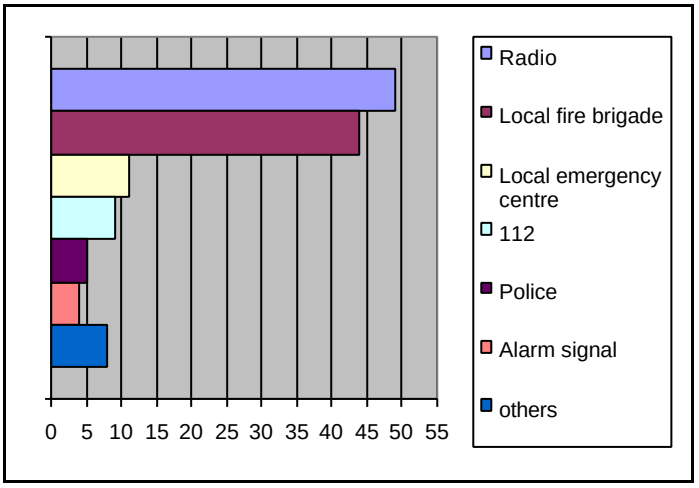


Figure 11

77% of the respondents claimed to know how to act if they heard an alarm signal. Most of them (169) stated that one should stay at home, close all windows, doors and ventilation, put on the radio or the TV and wait for instructions. 19 persons stressed that one should avoid using the phone. In 12 cases there was a suggestion that one should go the nearest bomb-shelter, 7 persons were of the opinion that one should actively try to find out what was going on. One respondent suggested that the best one can do is to pray.

62% of the respondents estimated that the members of their families know how to act if they hear an alarm signal. 30% gave a negative answer, while 8% stated that they lived alone. It was also suggested that children should receive some training on this matter at school.

Only 1% has earlier received some guidance on how to act in the event of a flood caused by a dam-break. 70% of the respondents expressed their willingness to take part in a public information meeting where the security issues in the event of a Kyrkösjärvi dam-break will be presented. The questionnaire and the information meeting constitute integral parts of the public information campaign.

Several comments to this questionnaire revealed that dam-break safety issues were a new and unexpected subject to the respondents. A few persons stated that a fact that a dam could break had never crossed their minds. Some persons, especially those who had moved to Seinäjoki recently, claimed that they were not aware that Kyrkösjärvi reservoir was an artificial one.

The alarm system in Seinäjoki received some criticism. Many respondents demonstrated their disappointment with the lack of information after a false alarm had rung in the autumn 1999. This matter seemed to have confused many of the local population. Moreover, it was signalised that the alarm sound does not reach all the sights of the town.

The respondents also emphasised the need for decent information on the dam safety issues. It was suggested that such information could be disseminated by the local press.

5. Recommendations for the EAP based on the research results

On the basis of the analysis of the answers and the respondents' comments, a few recommendations for the EAP creation were made. It was recommended that a compact guide for the population on how to act in the event of a dam-break should be created. Such a guide should be in a form of a leaflet distributed to each household in the flood prone area. The other way of disseminating this information would be to include it in the local phone-book. Phone-books are distributed annually which would solve the problem of providing the guide to the new inhabitants of the town. Moreover, the advantage of a phone-book is that it is usually within reach.

Other recommendation deals with the creation of an effective alarm system. In the case of a dam-break fast and effective warning of the population plays a crucial role for their safety. As the results of the questionnaire analysis reveal the traditional warning system by sirens might not be the best solution. There are a few reasons for such a statement. First, its relative ineffectiveness in the night time or when the TV or the radio is on. People fear that they might not hear the alarm sound. A second reason derives from the instruction how to act when one hears an alarm signal. Namely, people are supposed to go home where they should receive

instructions by radio. The weakness of such an arrangement in the event of a dam-break is a relatively long time before the inhabitants find out what the actual reason of the alarm is. Moreover, there exists also a considerable danger that a flood might stop the energy supply which would negatively influence the effectiveness of information dissemination.

At least parts of the EAP should be presented to the local inhabitants during the public information meeting. They should be given a possibility to comment and discuss the plan. Their suggestions should be taken into consideration in the process of further development of the EAP.

6. Public information campaign

Part of the RESCDAM project embraced preparing and conducting a public information campaign on the issues of a Kyrkösjärvi dam-break. At the very early stage of its preparation, it turned out that deciding on the content and amount of the information was a complex task. There was a fear that the given information might be misinterpreted and become a source of distress.[2]

Similar problems have been signalised by other researches - the degree of necessary public awareness and involvement in the dam-safety issues is generally not easy to be defined by the professionals (Geoffrey J. Syme, 1997). According to Colin Green, all professionals have a tendency to treat the public as somehow different from the specialists. There is also a frequent hesitation how much information about a potential threat should be disseminated. Green concludes, however, that the best way of reducing the risk of "panic" is to provide sufficient information on a particular issue. (Green, 1992)

Information presented to the public should be simple and comprehensive. It should stress the safety of a dam and simultaneously remind that the EAP has been created to make the dam even more safe. The problem of information overburden and its prolonged impact to the public should be tackled while designing the information campaign. Since people receive an enormous amount of different information daily, it is important to “pack” the information in such a way as to attract their attention. Moreover, the impact of the information received will gradually diminish with time and some people will move away or into the community. One possible solution to this problem is to create the web pages devoted to the dam-break issues and let people know regularly where to seek for the up-dated information.

[2] While designing a public information meeting on the Pamilo (situated in the Eastern part of Finland) dam-break issues in 1999, it was discussed whether to exclude the media from the meeting because of their tendency to produce the so-called ”scandal” news. (Hassinen, 2000)

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Annex 1

Questionnaire to the inhabitants of Seinäjoki from the area endangered by a flood in the case of a Kyrkösjärvi dam break.

SEINÄJOKI FIRE BRIGADE
KYRKÖSJÄRVI DAM SAFETY / RESCDAM PROJECT

Please, answer the questionnaire by choosing the right option.

1. Personal data
1.1.Age
1.2.Sex
a. male
b. female
1.3. Education
a. primary
b. secondary
c. higher
1.4. Profession
1.5. Marital status
a. I live alone
b. I live with my family
1.6. Dwelling type
a. detached house – one floor
b. detached house – two floors
c. semi-detached house – one floor
d. semi-detached house – 2 floors
e. block of flats
1.7. Do you have any previous flood experience?
a. No
b. Yes. When?
2. Dam safety
2.1. How big is, in your opinion, a danger of the Kyrkösjärvi dam-break?
a. no danger
b. small danger
c. big danger
d. cannot say
2.2. How big is, in your opinion, the risk of a dam-break in comparison to the risk of :
2.3.1 a nuclear power station accident
a. smaller
b. bigger
c. approximately the same
d. cannot say
2.3.2 a train accident
a. smaller
b. bigger
c. approximately the same
d. cannot say
2.4. What would, in your opinion be, the most probable cause of a dam accident?
a. changes in construction
b. exceptional weather

conditions
c. terrorism
d. negligence of rules
e. human mistake
1= not probable
2= probable in some degree
3= quite probable
4= very probable
0= cannot say
2.5. Do you know what consequences a dam-break would have for Seinäjoki city?
a. No
b. Yes. What?
2.6. Do you know what consequences a dam-break would have for your dwelling?
a. No
b. Yes. What?
2.7. Do you know what consequences a dam-break would have for your security?
a. No
b. Yes. What?
2.8. Would you know how to act if a dam-break accident happened?
a. No
b. Yes. How?
2.9. Do you know where you could obtain instructions from on how to act in case of a dam-break?
a. No
b. Yes. Where from?
2.10. Do you know how to act if you hear an alarm signal?
a. No
b. Yes. How?
2.11. Do your family know how to act if they heard an alarm signal?
a. No
b. Yes
2.12. Are you worried about the possibility of a Kyrkösjärvi dam-break?
a. No
b. Yes
2.13. Have you ever received any guidance on how to act in the event of a flood caused by a dam-break?
a. No
b. Yes. Where? When?
2.14. Are you willing to take part in a public information meeting where the security issues in the event of a potential Kyrkösjärvi dam-break will be presented?
a. No
b. Yes
COMMENTS: