



## Sub-Report Inventory Flood Risk Assessment (Phase 1)

### 1 Introduction

#### 1.1 Work plan for the river basin Sotla

After the approval of the INTERREG IVC secretariat for the change of partners on Slovenian and Croatian side (September 2, 2010) we have actually started up the FLOOD-WISE project by establishing river basin team and defining its tasks and objectives.

Both partners agreed to accept proposed timetable with results:

Phase 1:

- a) April-October 2010:
  - Activities: inventory of existing strategies, policies, methods, studies etc. on both sides of the border
  - Output: joint inventory report
- b) October 2010-April 2011:
  - Activities:
    - exchange knowledge with other FLOOD-WISE river basin (transfer activities)
    - establishment of cross-border Project Pilot Team
    - organization of regional meetings with the Croatian Hum Na Sutli Municipality and other relevant stakeholders to discuss the results of the existing study and agree on how flood risk is commonly defined and assessed in the Vonarje border lake area
  - Output:
    - conclusions on lessons learned from the exchange and transfer activities
    - link the existing feasibility study to the EU Floods Directive by clarifying which hydrological (flood) risk assessment method was used
    - translation of the existing hydrological study to English (in major part)

Phase 2:

- a) October 2010-April 2011:
  - Activities:
    - Compliance check to what extend the existing flood hazard maps which are included in the feasibility study are 'flood directive proof' - with the support of the Environmental Agency of Slovenia
    - Organization of regional meetings with the Croatian Hum Na Sutli Municipality and other relevant stakeholders to

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discuss the results of the previous points and agree on recommendations to national government in Slovenia and Croatia

- Output:

- inventory report
- inventory of elements which should additionally be taken into account by the national governments in Slovenia and Croatia if they are going to implement the Floods Directive in your part of the Sotla basin

b) April-October 2011:

- Activities:

- exchange knowledge with other FLOOD-WISE river basin (transfer activities)
- preparation of flood risk maps and models use to show the effects of the revitalization measures (dams) are on reducing the flood risks
- Organization of regional meetings with the Croatian Hum Na Sutli Municipality and other relevant stakeholders to discuss the results of the previous points and agree on recommendations

- Output:

- Visualization with flood risk maps or models what the effects of the revitalization measures (dams) are on reducing the flood risks / improving the hydrological situation in Sotla border region (show what the effects are with and without the dams)
- conclusions on lessons learned from the exchange and transfer activities
- presentation of the existing maps of the Vonarje border lake area to other FLOOD-WISE partners as well as the results of the EU Floods Directive conformity check and the recommendations

Phase 3:

a) April-October 2011:

- Activities: preparation of the joint (cross-border) management plan to revitalize the Vonarje lake
- Output: joint inventory report

b) October 2011-April 2012:

- Activities: preparation of concrete investment actions in the Vonarje Lake area linked to the EU Flood Directive (ready-to-go measures for the implementation of infrastructure related to the revitalisation of the Vonarje lake border area)
- Output: plans for the implementation of the “Regional Educational Centre of Sotla”, which will be connected to the educational curriculum of local schools in both Croatia and Slovenia (the overall concept of water management (flora, fauna, flood risk and prevention, quality of water etc.) will be presented here - such a Centre also suits perfectly for the promotion of the



FLOOD-WISE project)

## 1.2 Members of the Sotla river basin pilot team

Members of the pilot team are the Municipality Rogaška Slatina (Slovenia), Municipality Hum na Sutli (Croatia), Environmental Agency of Slovenia, external consultants:

FLOOD-WISE partners:

- Rogaška Slatina Municipality:
  - o Kristijan Novak – project manager
  - o Aleš Otorepec – financial expert
  - o Branko Kidrič, M.Sc., Mayor
- Hum na Sutli Municipality:
  - o Mr. Zvonko Jutriša - Mayor
  - o Mrs. Anica Kovačić – contact person from Croatian partner

Stakeholders:

- Environmental Agency of the Republic of Slovenia
  - o Mrs. Vesna Metelko Skutnik – Flood protection expert

The Agency's role in the Flood-Wise project will be as external consultancy support to our Municipality. We will also seek the Agency's positive agreement to the results, which will derive from our work on the project.

## 1.3 Relevance of Rogaška-Slatina for the FLOOD-WISE project

Competences and experiences in spatial planning and water management: Rogaška Slatina Municipality prepares spatial plans for the area of the whole municipality, while the the water, railroad, state highways etc. regimes have be to considered, including the EU Floods Directive requirements.

Capacity to directly influence regional/local policies: as a local authority the municipality is competent to develop and implement local policies in the fields of spatial planning, nature development, culture and tourism.

## 1.4 Relevance of Hum na Sutli for the FLOOD-WISE project

Competences and experiences in spatial planning and water management: co-operation in the INTERREG III A program, concerned with Study of water protection of Sutla River. The project acronym is "Water is life". The Hum na Sutli Municipality within IPA program is currently implementing project, named Construction of purification device in Hum na Sutli (HR), and construction of fecal cell in Rogaška Slatina (SLO).

Capacity to directly influence regional/local policies: as a local authority the municipality is competent to develop and implement local policies in the fields of spatial planning, nature development, cultural and tourism.



## 2 Description of the FLOOD-WISE pilot case in the Sotla border region

The Rogaska Slatina Municipality (Slovenia) and the Hum na Sutli Municipality (Croatia) are neighbouring communities situated along the border between Republic of Slovenia and Republic of Croatia. They are separated by the Sotla/Sutla River representing the border line between Slovenia and Croatia.

Since the Sotla/Sutla is a border river its management and flood prevention strategies are subject to both countries. Due to frequent floods in the past, there was already an initiative in the former Yugoslavia to prevent floods by building an artificial water storage lake. The plans were implemented and the lake was put into operation in 1980 by building two dams. It got the name Vonarje Lake. Due to ecological reasons the lake was abolished in 1986, but the dams are still in place (however they need to be modernized).

From that time on the seasonal floods are present again in this area. Rogaska Slatina Municipality is now taking the initiative to revitalize the Vonarje Lake. Since Rogaska Slatina is a touristic spa resort, the plans also include some touristic attractions which may be implemented if the Lake is revitalized. The Croatian Municipality of Hum na Sutli is also very much interested in revitalization of the lake and there were already several joint activities and meetings between both communities.

Moreover, in 2005 a feasibility study for the Vonarje Lake revitalization was carried out by Hosting d.o.o., Ljubljana, in the scope of the project Preparation Facility Grant Scheme (PPFII) SI2002/000.600.01. Its conclusions, which mainly focus on the touristic part of the revitalization, can be used as input for further revitalization steps, strategy and activities in the scope of the FLOOD-WISE project.

Only by mutual cooperation between both local communities, it will be possible to prepare feasible strategies and action plans, that could be acceptable to higher levels of government, which are ultimately responsible for water management and implementation of strategies or action plans in the field of water management.

The Sotla/Sutla river basin pilot case has an added value to the FLOOD-WISE project, since it will demonstrate a **truly integrated approach to flood risk management** in relation to regional development in a river basin which forms the border between two countries.

## 3 Existing information at each side of the border

Rogaska Slatina Municipality has previously carried out a feasibility study to revitalise the Vonarje lake area on the border with Croatia in the Sotla river basin. Within this study a hydrological study (including flood risk assessment, maps and hydrological calculations) was prepared, as well as an Environmental Impact Assessment, an implementation proposition and an investment programme.

In the framework of the FLOOD-WISE project, Rogaska Slatina would like to go a step further towards implementation of a cross border management plan for the Vonarje lake as part of project phase 3.

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Since Rogaska Slatina has already carried out a feasibility study in the past towards risk assessment and mapping, the first two project phases of FLOOD-WISE (risk assessment and mapping) will be slightly adjusted and simplified for Rogaska Slatina.

We will therefore put more emphasis on the third phase of the FLOOD-WISE project: the implementation of cross border management plans for the Vonarja Lake area. This will be done in close cooperation with our counterpart on the Croatian side of the border, Hum Na Sutli Municipality.

### **3 Activities carried out during phase 1 of the FLOOD-WISE project**

#### **3.1 Flood risk assessment methods in relation to the EU Floods Directive**

In the Phase 1 the connection of the existing feasibility study to the EU Floods Directive was explored by clarifying which hydrological (flood) risk assessment method was used.

The existing Hydrological analysis of Sotla river, including Vonarje accumulation, was part of the broader Feasibility study for establishing of the touristic infrastructure of the Vonarje lake area (Project no. 112/05 by Hidrosvet d.o.o. in May 2005).

In the mentioned study there were flood waves with the different discharges taken into account, using the Log – Pearson III method on the basis of measured data on maximum annual discharges.

The Sotla river discharges were calculated using the synthetic hydrogramme by SCS methodology, where the discharges were evaluated using the probability analysis. As the SCS methodology evaluated also the volumes of flood waves, they were used as a basis for calculation of the maximum and regular level of Vonarje lake – with the aim to diminish the effect of wave and its interconnection with floods lower on the stream. In the calculation of the regular level of the Vonarje lake also the evapotranspiration was taken into account.

Regarding the requests of the Directive 2007/60/ES (from October 23, 2007) the missing elements of the existing study are: flood risk maps and flood danger maps, which will have to be made to fulfill the Flood Directive requests.

To emphasize the above described methodology also the summary (conclusions) of the Hydrological part of the Feasibility study was prepared (attachment to the report).



### 3.2 Regional pilot team meeting

When we finished with the translation and inventory of the methodology, we prepared the regional meeting with the Croatian Hum Na Sutli Municipality and other relevant stakeholders to discuss the results of the existing study and agree on how flood risk is commonly defined and assessed in the Vonarje border lake area.

The meeting was held in Rogaška Slatina on March 21, 2011, where there were present members of the pilot team: Rogaška Slatina Municipality (Kristijan Novak – project manager, Aleš Otoresec – financial expert, Branko Kidrič, M.Sc., Mayor), Hum na Sutli Municipality (Mr. Zvonko Jutriša – Mayor, Mrs. Anica Kovačić – contact person from Croatian partner), external consultant Mr. Branko Skutnik of Hidrosvet d.o.o. (author of the existing study).

The conclusions of the meeting can be summarized as:

- There is no such study for the Croatian part of the Sotla
- The Croatian side confirms the results of the existing study
- There was common agreement taken, that the Vonarje lake area must be further stimulated and elaborated, using the expert proposal to elaborate flood risk maps and flood protection maps, which are basis for further elaboration
- All results of the further studies should be presented to both sides and confirmed by pilot team
- The expert (Hidrosvet) should prepare the proposal and offer for the next steps to be taken (preparation of flood risk maps and flood protection maps).