# WP6

*Activity 6.1*
*Application: Floodplain tools optimization, application and dissemination*

***Deliverable D 6.1.2 (Part II)***
*Floodplain Evaluation Matrix Tool tested and applied in pilot site to assess the restoration projects*

## Results of applying FEM-Tool on Suhaia-Zimnicea and Bistret pilot areas

Project co-funded by the European Union (ERDF, IPA funds)

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# Introduction

The proposed floodplain area Suhaia-Zimnicea has 1063 ha and is located in southern Romania along the Danube, in Teleorman county.
From administrative point of view it belongs to Lisa commune.
From the recent events we mention the period from beginning of March 2018 when the sudden melting of the snow, high temperatures and rain led to high water levels. In March 11-18, 2018 when the level in Lake Suhaia increased permanently by 10-15 cm per day. On March 19, the pumping station Garla Iancului started operating with 4 $m^3/s$, taking into account the forecast on the nearby rivers Calmatui and Urlui in the area.
On March 27, 2018, when the water level in the lake was about 1.5 m above the normal level, the water spilled over the canopy of the western dam on a length of 10 m with a water blade of 3-4 cm.
The Danube water level raised beginning with 16 March 2018, and in 28 March the inundation level at Zimnicea gauging station exceeded inundation level.
The intervention was done by protecting the western dam of Lake Suhaia and raising the eastern dike to prevent the spill.
At the same time, the high water discharger of the western dike was put into controlled operation by lowering it by 30 cm for a controlled discharge in the drainage channels inside the enclosure.
On the western dike, the pitching was 80% destroyed, and on the eastern dike, the outer slope was 85% destroyed.

## Assessing the creation of a naturally flooded area upstream lake Suhaia

The enclosure of Seaca-Vanatori-Suhaia-Zimnicea has an area of 14,161 ha. The area was in natural regime until 1965 - 1966. On the bank of the Danube there were willow forests, and inside the reed ponds: Luciei, Rosie, Listeava, Bran, Vasluietului, Suhaia, Lake Nasada and the rest of the reed swamp.

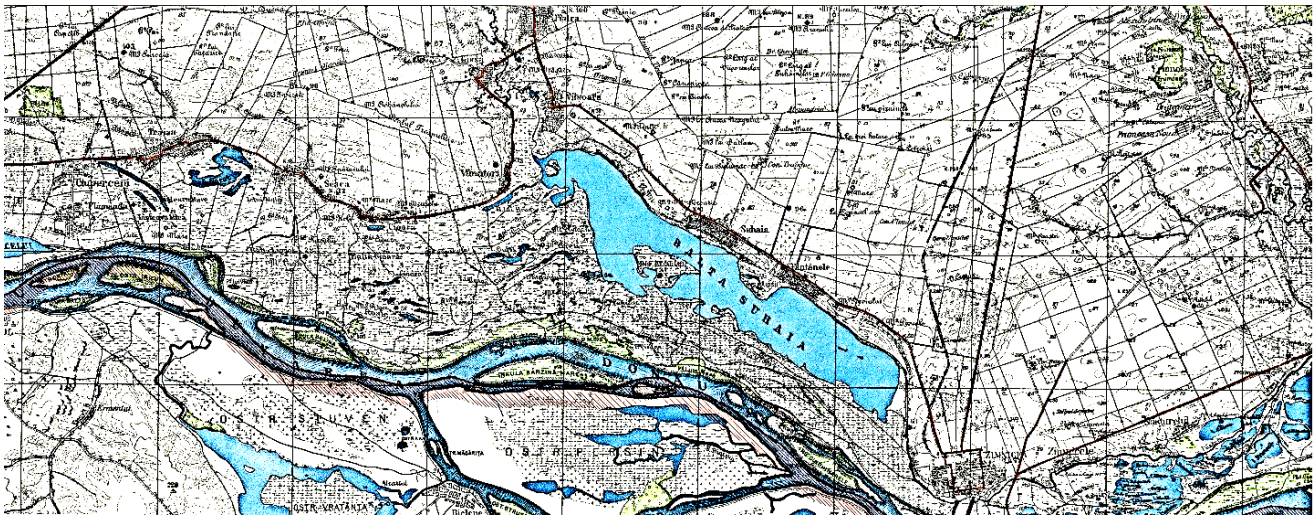


Figure 1: Historical map of the Suhaia area

Suhaia lake is recognized as a major component of what remains of the former Danube floodplain and is an integral part of the plan to rebuild the lower Danube green corridor, an agreement signed in year 2000 by Romania, Bulgaria, Moldova and Ukraine. Also, the presence of the Persina Natural Park (Bulgaria) in the vicinity of the Suhaia Lake, creates the premises for cross-border cooperation for the conservation of biodiversity and the functions of these ecosystem complexes on both banks of the Danube.
*Balta Suhaia* natural reservation is located in Teleorman county, belonging, from an administrative point of view to Suhaia commune. It is an avifauna reservation, being included in the fourth category of the International Union for Conservation of Nature.

Figure 2: Suhaia natural protected areas

The Suhaia area has a double protection status: Natura 2000 site (ROSPA0102 Suhaia) and wetland of international importance (RORMS0012 Suhaia).
The Natura 2000 site was declared a Special Protection Area by the Government Decision no. 1284 of October 24, 2007 (regarding the declaration of special avifauna protection areas as an integral part of the European ecological network Natura 2000 in Romania) and covers an area of over 4,515 hectares.
The Suhaia wetland of international importance (since June 2012) is protected by the Ramsar Convention. The site of over 19594 ha offers habitat to numerous threatened species of birds which feed, rest and breed here, including 21 bird species of European importance as well as the globally vulnerable Dalmatian Pelican (*Pelecanus crispus*). Moreover, several threatened species of invertebrates, fish, amphibians, reptiles and mammals can be found, including the globally vulnerable European Mudminnow (*Umbra krameri*).

## Engaging stakeholders at the Suhaia – Zimnicea pilot site

The Suhaia City Hall has been involved (consulted by telephone) for the ESS assessment in the potential floodplain Suhaia-Zimnicea.

# Setting up 1D and 2D models

The 1D hydrodynamic model developed for the entire length of the Danube River on the Romanian sector was used to calculate the parameters defined in the FEM. A 2D hydrodynamic model was developed to detail the flow in the area proposed for renaturation.

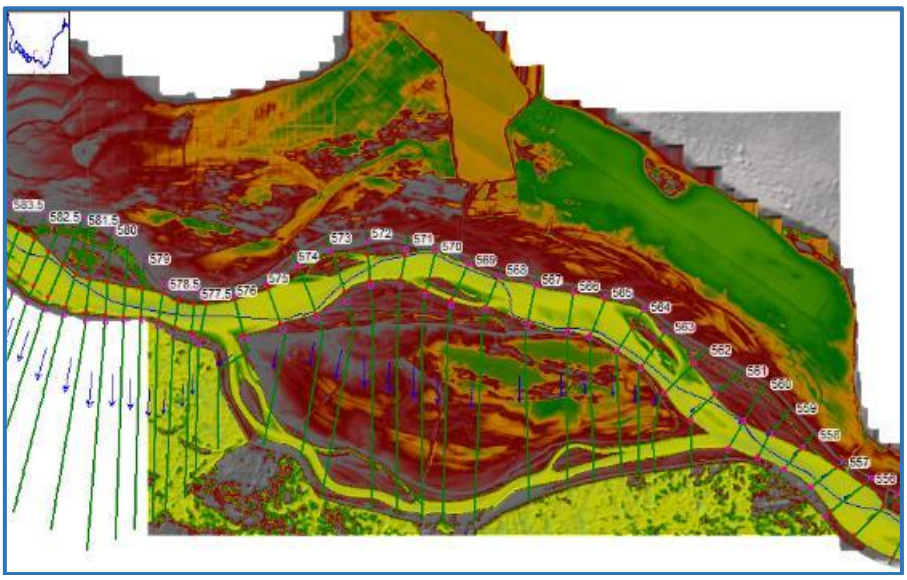



Figure 3: Distribution of cross sections along the Danube - Suhaia sector

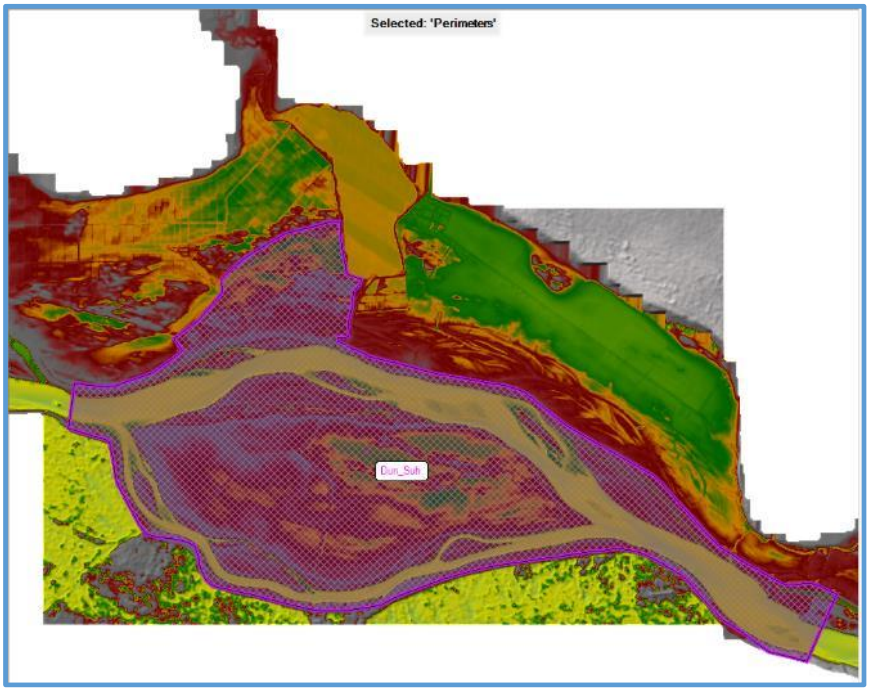



Figure 4: Field of analysis for the 2D simulation model - Suhaia area

The upstream limit condition consisted of the flow hydrograph corresponding to the flood recorded in 2006 scaled in accordance with HQ100.

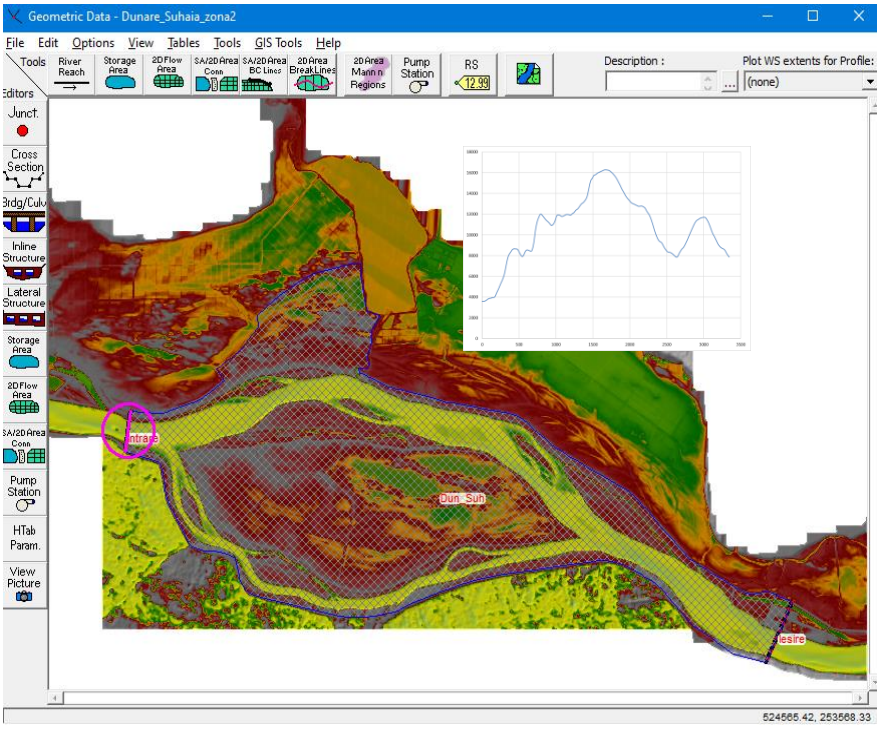



Figure 5: The upstream limit condition was the hydrograph corresponding to the flood recorded in 2006 scaled in accordance with HQ100

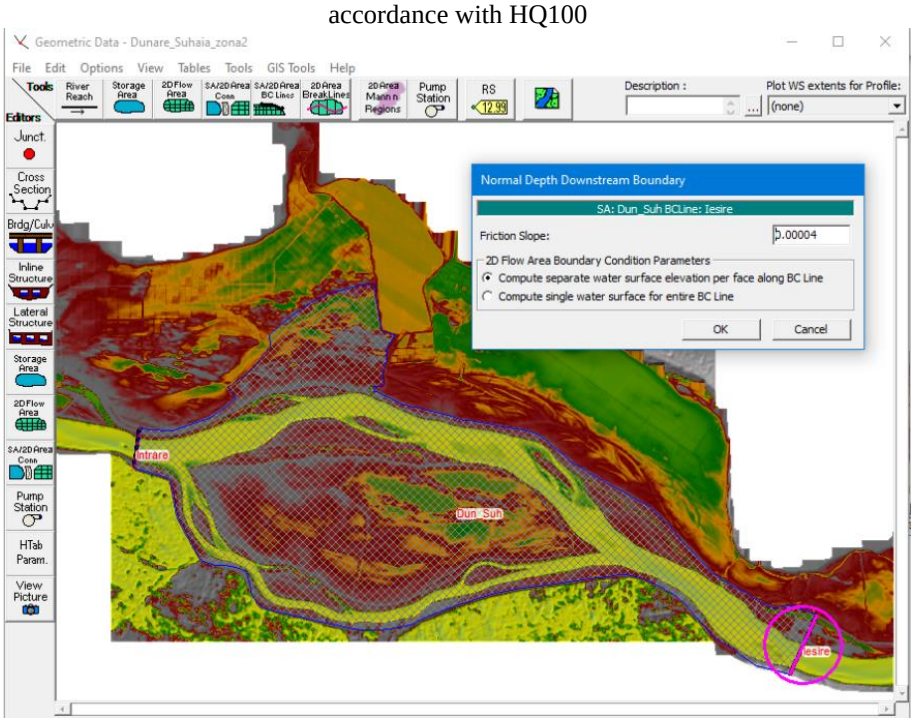



Figure 6: The downstream limit condition was the general slope of the respective riverbed 0.0004.

The discretization of the analyzed domain was performed by rectangular calculation cells with the size of 50 m x 50 m. Where there are infrastructures that can significantly influence the flow of water, the network has been detailed through rectangular cells measuring 5 m x 5 m.

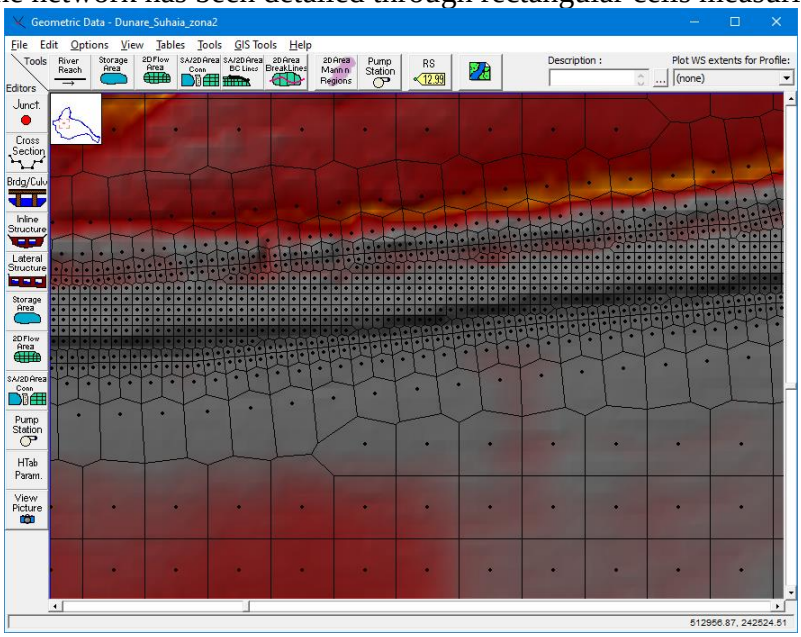



Figure 7: The discretization of the analyzed domain

The calculation step used to perform the simulations was 1 minute.

# A. Calculating minimum Floodplain Evaluation Matrix (FEM) parameters for current and after restoration state – Suhaia Zimnicea pilot area

## 1. Hydrology

## 1.1. Flood peak reduction – ΔQ

### 1.1.1 Description

To evaluate the peak reduction for a floodplain, the peak of an input hydrograph at the beginning of the floodplain and the peak of the output hydrograph at the end of the floodplain were determined. The difference between the two peaks is the peak reduction $\Delta Q_{tot}$ [$m^3/s$] for the investigated floodplain.

### 1.1.2 Source

For the determination of the peak reduction, results of unsteady hydrodynamic-numerical simulations were used.

### 1.1.3 Workflow

The following graphs show details from the peak area of the corresponding HQ100 flow hydrographs in the upstream and downstream sections of the area analyzed for renaturation. These were the basis for the determination of ΔQ in accordance with the requirements of the FEM.

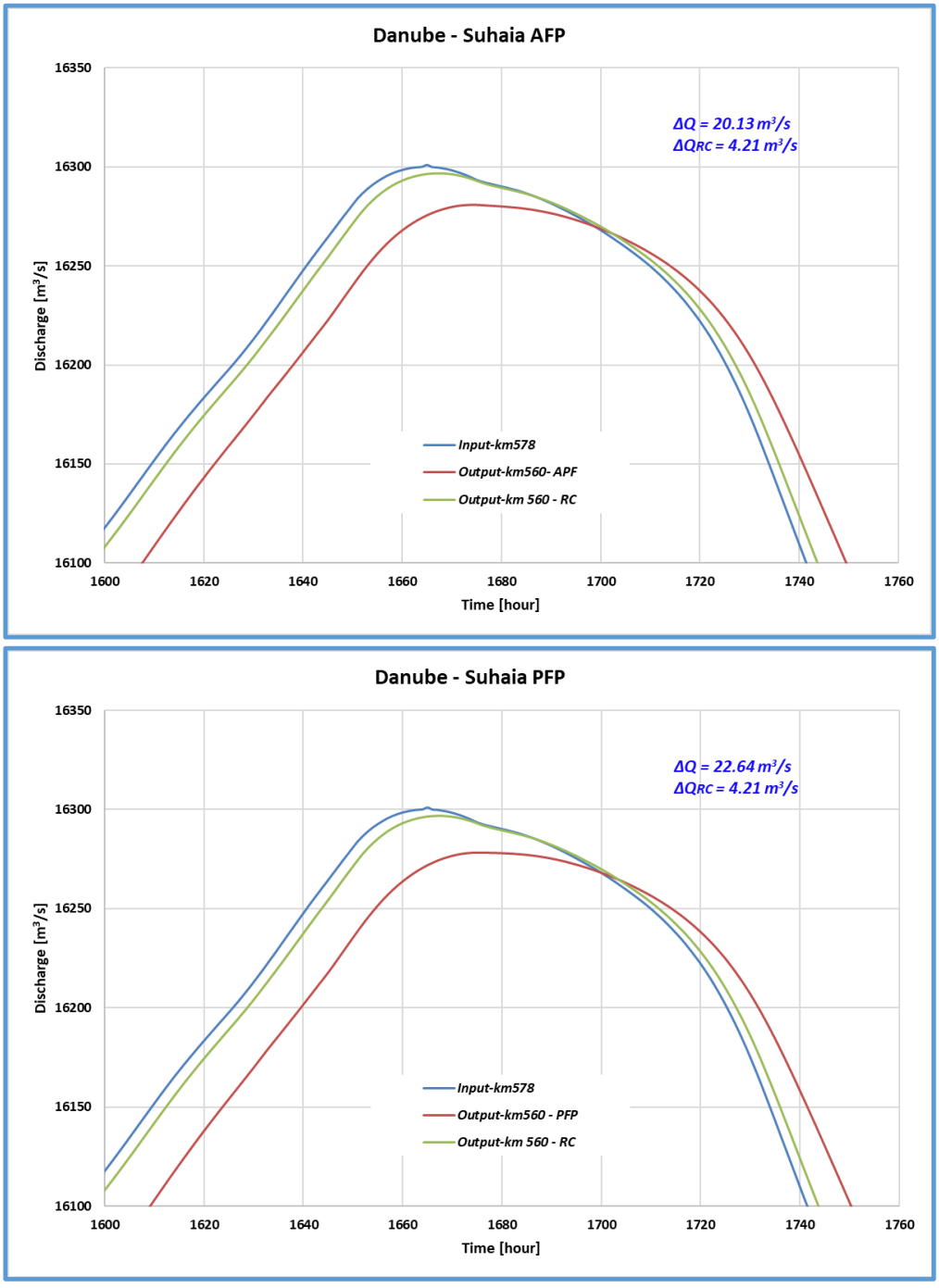



Figure 8: The results of the analysis for the *Flood peak reduction* ($\Delta Q$) parameter for the active and potential floodplain

### 1.1.4 Results

In table 1, the results of the peak reduction for the active and potential floodplain are presented. The ΔQ for the active floodplain is around 16 m³/s resulting in a relative peak reduction of 0.19%. The ΔQ for the potential floodplain slightly increased approximately to 18 m³/s and a relative reduction of 0.22%. For both floodplain scenarios, the performance for the flood peak reduction parameter is low.

*Table 1: Flood peak reduction parameter on Suhaia-Zimnicea pilot area - FEM evaluation (for current and potential situation)*

| Potential floodplain | Hydrology | | | | |
|---|---|---|---|---|---|
| | Peak reduction ($m^3/s$) | | | | |
| | $\Delta Q_{tot}$ | $\Delta Q_{RC}$ | $\Delta Q$ | $\Delta Q_{rel}$ | FEM Evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 22.64 | 4.21 | 18.43 | 0.22% | 1 |
| **RO_Suhaia-Zimnicea_aFP** | 20.13 | 4.21 | 15.92 | 0.19% | 1 |

## 1.2. Flood wave translation – Δt

### 1.2.1 Description

This parameter is determined in a similar way as the peak reduction, namely by calculating the time difference Δt [h] between the occurrence of the output/input hydrograph peak.

### 1.2.2 Source

For the determination of the flood wave translation results of unsteady hydrodynamic-numerical simulations were used.

### 1.2.3 Workflow

The following graphs show details from the peak area of the corresponding HQ100 flow hydrographs in the upstream and downstream sections of the area analyzed for renaturation. These were the basis for the determination of ΔT in accordance with the requirements of the FEM.

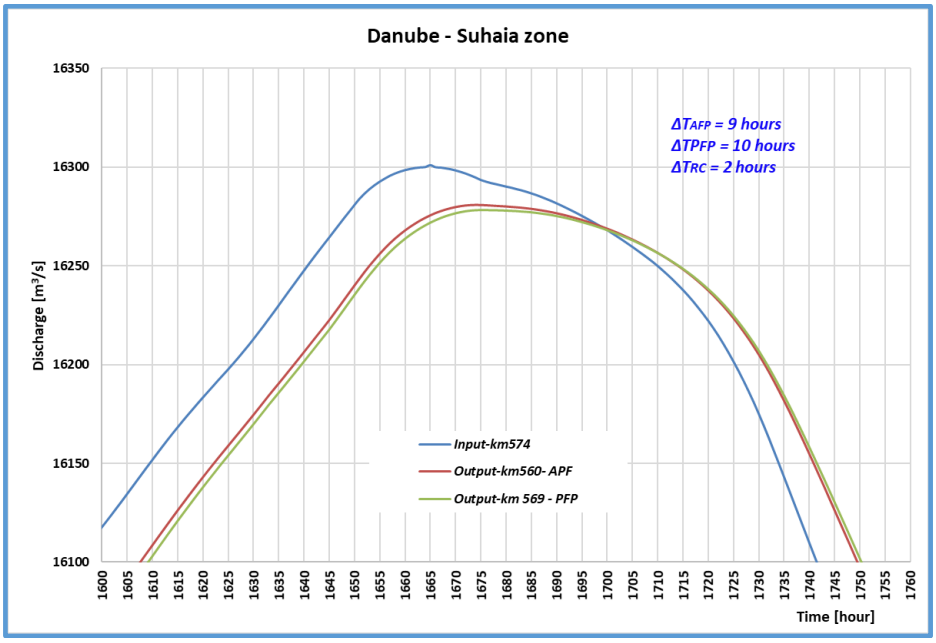



Figure 9: Flood wave translation analysis results

#### 1.2.4 Results

In table 2, the results of the flood wave translation for the active and potential floodplain are shown. The Δt for the active floodplain is 7 h and for the potential floodplain 8 h resulting in a high performance in the FEM-evaluation.

*Table 2: Flood wave translation parameter on Suhaia-Zimnicea pilot area - FEM evaluation (for current situation and potential situation)*

| **Potential floodplain** | **Hydrology** | | | |
|---|---|---|---|---|
| | **Flood wave translation** (h) | | | |
| | $\Delta_{tot}$ | $\Delta t_{RC}$ | $\Delta t$ | FEM Evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 10 | 2 | 8 | 5 |
| **RO_Suhaia-Zimnicea_aFP_01** | 9 | 2 | 7 | 5 |

# 2. Hydraulics

## 2.1. Water level change – Δh

### 2.1.1. Description

Calculating this parameter demonstrate the effects of a total loss of a floodplain on the water level.

The values are calculated in a cross section chosen in the middle of the floodplain.

### 2.1.2. Source

Comparison of water surface level in the current scenario and in the analyzed renaturation scenario using the results of the unsteady hydrodynamic model.

### 2.1.3. Workflow

**Step 1: Calculating water level for a $HQ_{100}$ coresponding current situation ($h_{tot}$ – active floodplain) and the renaturation status ($h_{tot}$ – potential floodplain)**

Using the same hydrodynamic-numerical calculation which was used to determine the hydrological parameters ($\Delta Q_{tot}$ and $\Delta t_{tot}$). At a defined cross-section in the middle of the floodplain, the water level $h_{tot}$ was determined.

**Step 2: Calculating water level for a $HQ_{100}$ without floodplain($h_{RC}$)**

Using the same hydrodynamic-numerical calculation, which was used to determine the hydrological parameters ($\Delta Q_{RC}$ and $\Delta t_{RC}$) and determined the calculated water level ($h_{RC}$) on the same place as in step 1.

**Step 3: Calculating the Δh**

The Δh was calculated for both scenarios (active and potential floodplain) by subtracting the calculated water levels ($h_{tot}$) from the water levels of the river channel model ($h_{RC}$)

### 2.1.4. Results

Table 3 shows the results of the water level change for the active and potential situation. The water level would slightly decrease after the restoration measure by 3 cm in the river channel at the investigated cross-section.

*Table 3: Water level change parameter on Suhaia-Zimnicea pilot area - FEM evaluation (for current situation and restoration situation)*

| Potential floodplain | Hydraulics | | | |
|---|---|---|---|---|
| | Water level (m) | | | |
| | $h_{tot}$ | $h_{RC}$ | Δh | Evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 25.62 | 26.71 | 1.06 | 5 |
| **RO_Suhaia-Zimnicea_aFP_01** | 25.65 | 26.71 | 1.09 | 5 |

The distributions of the maximum depths resulting from the corresponding HQ100 simulations in the Suhaia area in the existing situation and proposed for renaturation are presented in the figure 9.

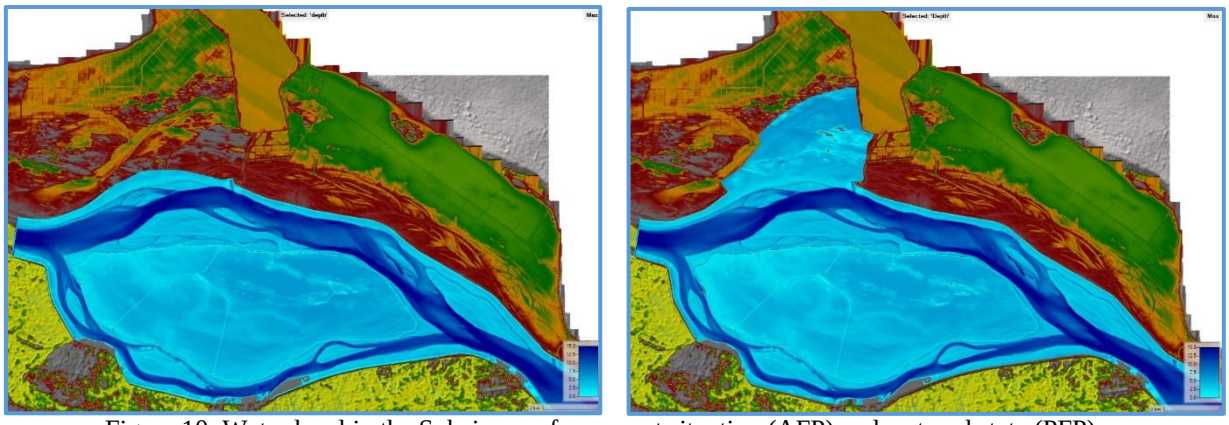


Figure 10: Water level in the Suhaia area for current situation (AFP) and restored state (PFP)

# 3. Ecology

## 3.1. Connectivity of floodplain water bodies

For restoration state the selected scenario was Scenario 2 (Water bodies are connected at mean water level up to bankfull discharge) for the Suhaia area. According to the considered scenario, for the Suhaia floodplain, the results are shown in the table below.

*Table 4: Connectivity of floodplain water bodies – FEM evaluation (for current and restoration state)*

| Potential floodplain | Ecology | |
|---|---|---|
| | Conectivity of floodplain water bodies | |
| | *) Q for bankfull | FEM evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 8000 mc/s | **3** |
| **RO_Suhaia-Zimnicea_aFP** | 8000 mc/s | **3** |

## 3.2. Existence of protected species

By applying the steps from FEM-handbook the results for this parameter shows that no change will occur within Suhaia-Zimnicea pilot area for the restored situation (see table below).

*Table 5: Protected species on Suhaia-Zimnicea pilot area - FEM evaluation (for current and restored situation)*

| Potential floodplain | Ecology | |
|---|---|---|
| | Existence of protected species | |
| | No. of species and habitats | Evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 1 natural habitat and 125 species: 1 mammal, 17 fish, 107 species of birds | 5 |
| **RO_Suhaia-Zimnicea_aFP** | 1 natural habitat and 125 species: 1 mammal, 17 fish, 107 species of birds | 5 |

# 4. Socio-economics

## 4.1. Potential affected buildins

For the Suhaia-Zimnicea the number of buildings affected are the same with the current state (see table 7).

## 4.2. Land use

The land use parameter proves from a medium performance (3) at the current status to a high performance (5) after the restoration (see table 6).

*Table 6: Result of evaluation for land use parameter on Suhaia-Zimnicea pilot area - FEM evaluation (for current and restoration state)*

| | code_18 | Label 3 category | RGB | S (ha) | FEM-evaluation | |
|---|---|---|---|---|---|---|
| **RO_Suhaia-Zimnicea_pFP** | 512 | Water bodies | 128-242-230 | 1473.33 | 5 | 5 |
| | **TOTAL** | | | **1473.33** | | **5** |
| **RO_Suhaia-Zimnicea_aFP** | **code_18** | **Label 3 category** | **RGB** | **S (ha)** | **FEM-evaluation** | |
| | 512 | Water bodies | 128-242-230 | 410.62 | 5 | 5 |
| | **TOTAL** | | | **410.62** | | **5** |

# B. Calculating additional Floodplain Evaluation Matrix (FEM) parameters for current and after restoration state – Suhaia Zimnicea pilot area

## 5. Hydraulics

## 5.1. Flow velocity – Δv

The influence on the water flow velocities was determined in a similar way to the variation of the free surface of the water.

*Table 7: Flow velocity parameter on potential floodplain Suhaia-Zimnicea pilot area - FEM evaluation (restoration state)*

| Potential floodplain | Hydraulics | | | |
|---|---|---|---|---|
| | Flow velocity (m/s) | | | |
| | v tot | vRC | Δv | FEM evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 0.36 | 1.16 | 0.75 | 5 |
| **RO_Suhaia-Zimnicea_aFP** | 0.41 | 1.16 | 0.80 | 5 |

Table 7 shows the results of the flow velocity change for the active and potential situation. The velocity would slightly decrease after the restoration measure by 0.05 m/s in the river channel at the investigated cross-section.

The distributions of the maximum speeds resulting from the corresponding HQ100 simulations in the Suhaia area in the existing situation AFP and proposed for renaturation PFP (2D model) are presented in the following figures:

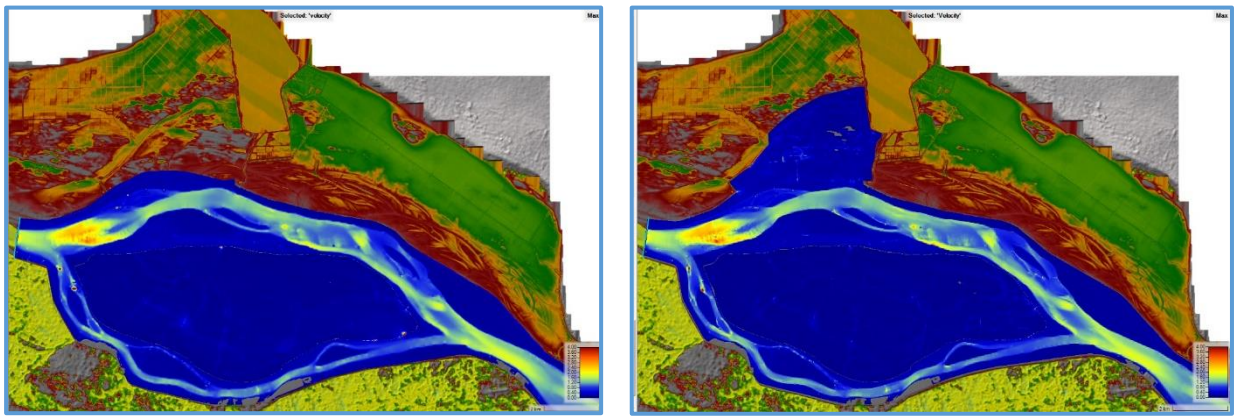


Figure 11: Flow velocity in the Suhaia area for the current state and the restored state

## 5.2. Bottom shear stress – Δτ

The assessment of this parameter was done similarly to the assessment of flow velocity parameter by comparing of the bottom shear stress of different scenarios using the results of unsteady hydrodynamic 1D model (table 8).

*Table 8: Bottom shear stress parameter on potential floodplain Suhaia-Zimnicea pilot area - FEM evaluation (restoration state)*

| Potential floodplain | Hydraulics | | | |
|---|---|---|---|---|
| | Bottom shear stress (N/m²) | | | |
| | $\tau_{tot}$ | $\tau_{RN}$ | $\Delta\tau$ | FEM evaluation |
| **RO_Suhaia-Zimnicea_pFP** | 1.62 | 9.8 | 8.18 | 5 |
| **RO_Suhaia-Zimnicea_aFP** | 1.25 | 9.8 | 8.55 | 5 |

Table 8 shows the results of the bottom shear stress change for the active and potential situation. The shear stress would slightly increase after the restoration measure by 0.37 N/m² in the river channel at the investigated cross-section.

The maximum distributions of the shear strees parameter, resulting from the corresponding HQ100 simulations in the Suhaia area (2D model) in the existing situation AFP and proposed for renaturation PFP are presented in the following figures:

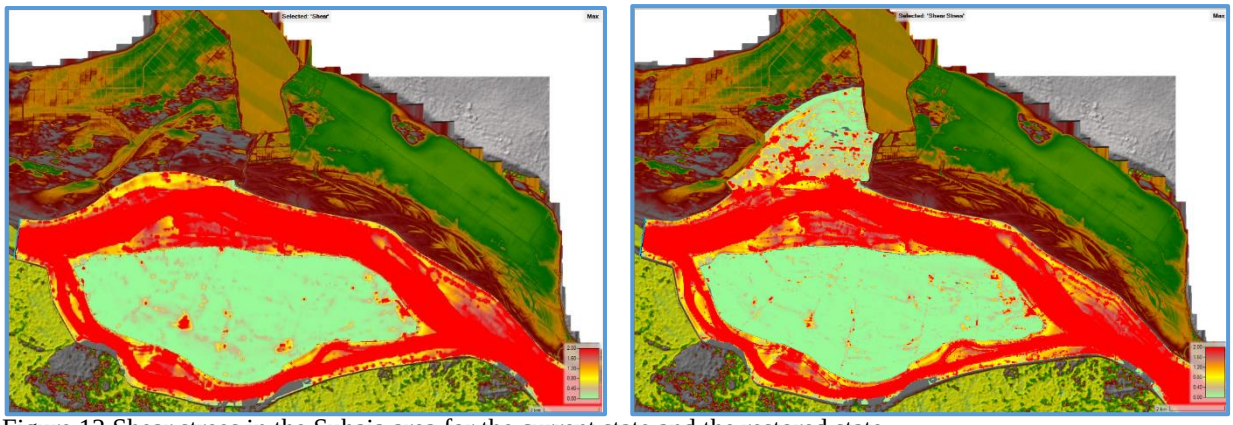


Figure 12 Shear strees in the Suhaia area for the current state and the restored state

# 6. Ecology

## 6.1. Protected habitats

In the restored state, the area designated as protected area according to the Natura 2000 or other documents about protected species or habitats will be the same as in the current state.

## 6.2. Potential for typical habitats

In the restored state, from the 14 habitats specific to floodplain areas initial identified, one may be present in the Suhaia area. The only habitat, from preliminary estimation, that could be present in the Suhaia area is 3130 *Oligotrophic to mesotrophic standing waters*. The results are presented in the following table.

*Table 9: Potential for typical habitats on Suhaia-Zimnicea pilot area - FEM evaluation (for current and restored state)*

| Potential floodplain | Ecology | | | |
|---|---|---|---|---|
| | Potential for tipical habitats | | | |
| | Code | Name | No. | Evaluation |
| RO_Suhaia_pFP | 3130 | *Oligotrophic to mesotrophic standing waters* | 1 | 1 |
| RO_Suhaia_aFP | - | - | 1 | 1 |

Considering also, the experince and studies for floodplain restoration in the Lower Danube floodplain and Danube Delta, other potential habitats could be develop in time. The bellow table is shoing the list of habitats estiamted after an extensive study on the restored area in Mahmudia / Danube delta on around 1000 ha from agriculture area to open water land cover.

| **Nr.** | **Types of habitats** | **Habitats cod for Romania** | **Natura 2000 cod** | **Flora species associated** |
|---|---|---|---|---|
| 1. | *Phragmites australis şi Schoenoplectus lacustris* | R5309 | - | *Scirpo-Phragmitetum Schoenoplectetum lacustris* |
| 2. | *Typha angustifolia şi Typha latifolia* | R5305 | - | *Typhetum angustifoliae Typhetum latifoliae* |
| 3. | *Oenanthe aquatica şi Rorippa amphibia* | R5303 | - | *Oenantho-Rorippetum* |
| 4. | *Sparganium erectum, Berula erecta şi Sium latifolium* | R5304 | **3150** | *Sparganietum erecti Mentho aquatice-Beruletum erecti* |
| 5. | *Typha laxmanni şi Epilobium hirsutum* | R5306 | - | *Typhetum laxmanni* |
| 6. | *Glyceria maxima şi Schoenoplectus lacustris* | R5307 | - | *Glycerietum maximae* |
| 7. | *Eleocharis palustris* | R5302 | - | *Eleocharitetum palustris* |
| 8. | *Bidens tripartita, Echinochloa crus-galli şi Polygonum hidropiper* | R5312 | **3270** | *Bidenti-Polygonetum hydropiperis Polygono lapathifolio-Bidentetum Echinochloo-Polygonetum lapathifolii* |
| 9. | *Carex elata, C. rostrata, C. riparia şi Carex acutiformis* | R5310 | - | *Caricetum elatae Caricetum rostratae Caricetum acutiformis Caricetum ripariae* |

| | | | | |
|---|---|---|---|---|
| 10. | *Salvinia natans, Marsilea quadrifolia, Azolla caroliniana şi Azolla filiculoides* | R2203 | **3150** | *Spirodelo-Salvinietum natantis Lemno-Azolletum carolinianae* |
| 11. | *Ricia fluitans şi Ricciocarpus natans* | R2204 | **3150** | *Riccietum fluitantis* |
| 12. | *Hydrocharis morsus-ranae, Stratiotes aloides şi Utricularia vulgaris* | R2205 | **3150** | *Hydrocharitetum morsus-ranae Stratiotetum aloidis Lemno-Utricularietum vulgaris* |
| 13. | *Potamogetom perfoliatus, Potamogeton gramineus, Potamogeton lucens, Elodea canadensis şi Najas marina* | R2206 | **3150** | *Potamogetonetum lucentis Potamogetonetum perfoliati Potamogetonetum graminei Elodeetum Canadensis Potamo-Ceratophylletum submersi* |
| 14 | *Lemna minor, Lemna trisulca, Spirodela polyrhiza şi Wolffia arrhiza* | R2202 | **3150** | *Lemnetum minoris Lemnetum gibbae Lemnetum trisulcae Lemno-Spirodeletum Wolffietum arrhizae Spirodelo-Aldrovandetum* |
| 15. | *Nymphaea alba, Trapa natans, Nuphar luteum şi Potamogeton natans* | R2207 | **3160** | *Myriophyllo verticillati-Nupharetum luteae Nymphaeetum albae Nymphoidetum peltatae Trapetum natantis Potametum natantis* |
| 16. | *Ranunculus aquatilis şi Hottonia palustris* | R2208 | **3260** | *Ranunculetum aquatilis Hottonietum palustris* |
| 17. | *Eleocharis acicularis şi Littorella uniflora* | R2213 | **3130** | *Eleocharidetum acicularis* |
| 18. | (*Salix alba*) cu *Lycopus exaltatus* | R4409 | **92A0** | *Salicetum albae-fragilis* |

## 6.3. Ecological, chemical and ground water status

In the Suhaia area, the status of the three waterbodies (1 surface water body and 2 groundwater bodies) will be the same in the restored state as in the current state.

### Analysing Ecosystem Services

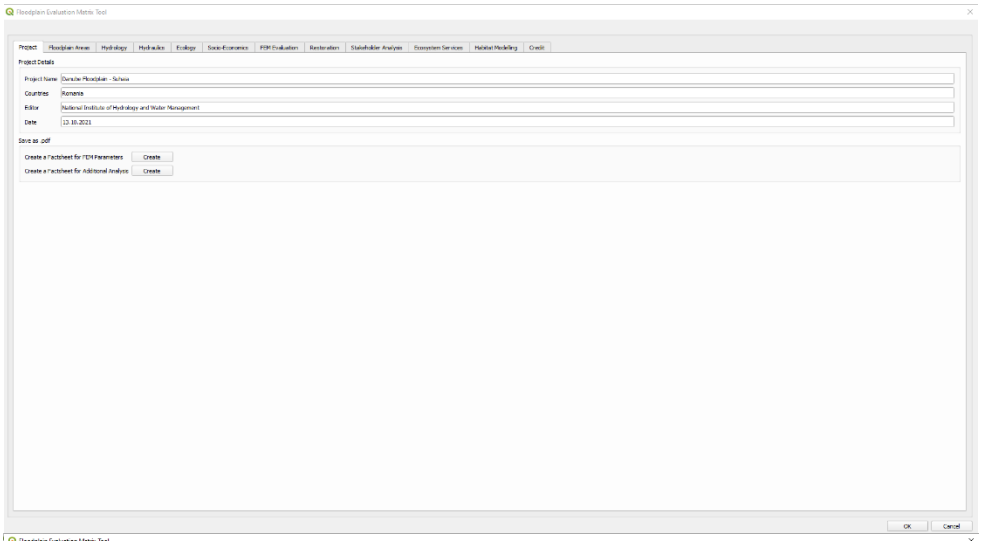
The ecosystem services provided by the Suhaia area were cuantified with the help of the local stakeholders (Suhaia City Hall). The result for the current state and for the restored state are presented in the following table.

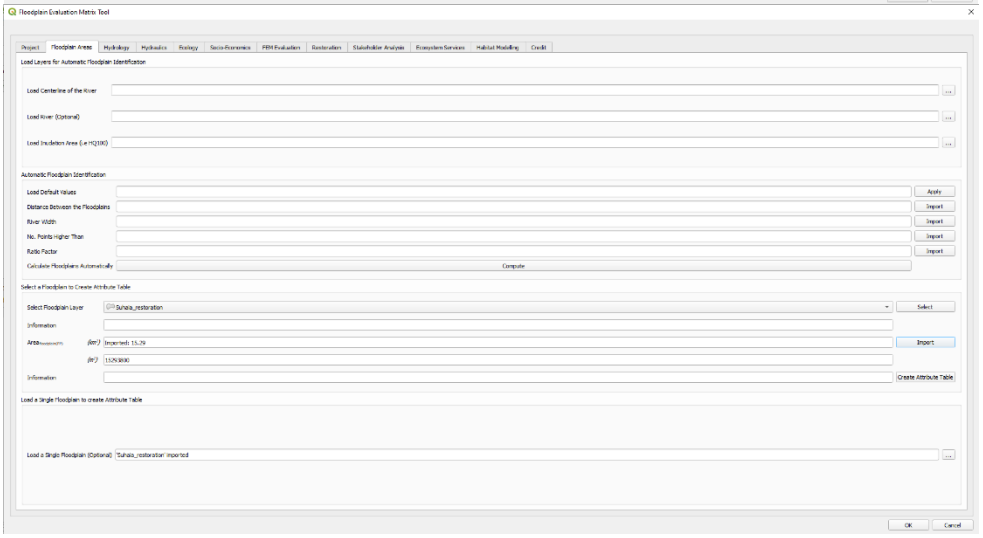
*Table 10: Results of the ecosystem services assessment for Suhaia pilot area (for curent and for restoration state)*

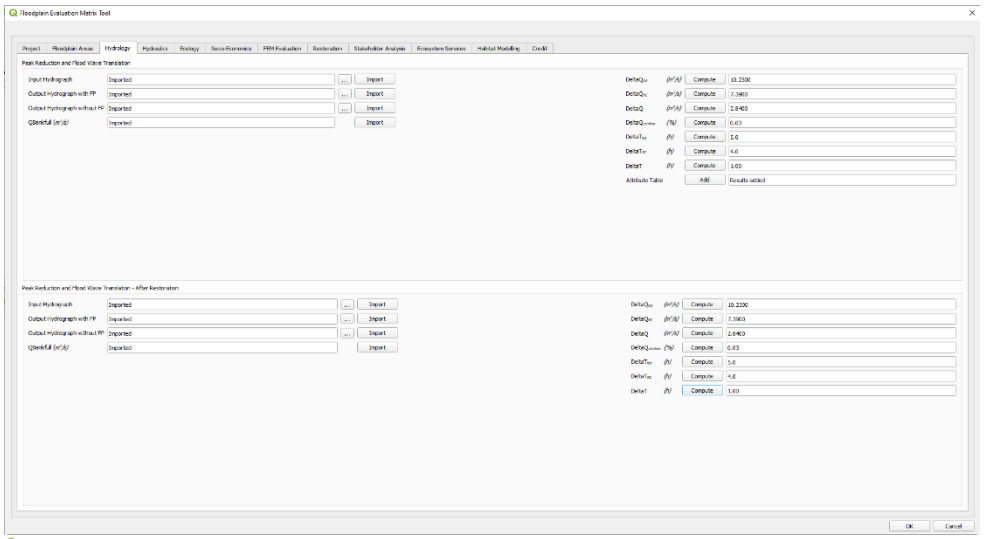
| Ecosystem services | | | | | |
|---|---|---|---|---|---|
| Category | ESS | Intensity | Percentage of total Area | Intensity (Restoration) | % of area (Restoration) |
| Provisioning ESS | agricultural product | High | 90% | Missing | 0% |
| | wood | Very Low | 5% | Very Low | 5% |
| | animal product | Medium | 30% | Medium | 30% |
| | game meat | Medium | 30% | Medium | 30% |
| | honey; beehive products | Low | 10% | Medium | 30% |
| | fish or fish products | Missing | 0% | High | 70% |
| | water (drinking, irrigation) | Very Low | 5% | Medium | 30% |
| Regulating ESS | local climate regulation | Very Low | 10% | Medium | 30% |
| | air purification | Very Low | 10% | Medium | 30% |
| | low water regulation | Very Low | 10% | High | 60% |
| | flood retention | Very Low | 10% | Medium | 40% |
| | nutrient retention | Missing | 0% | Medium | 40% |
| | noise regulation | Missing | 0% | Missing | 0% |
| | provision of habitats | Missing | 0% | Very High | 100% |
| Cultural ESS | recreational activity | Missing | 0% | High | 60% |
| | water related activity | Missing | 0% | High | 60% |
| | tourism | Missing | 0% | High | 60% |
| | education | Very Low | 10% | Medium | 50% |

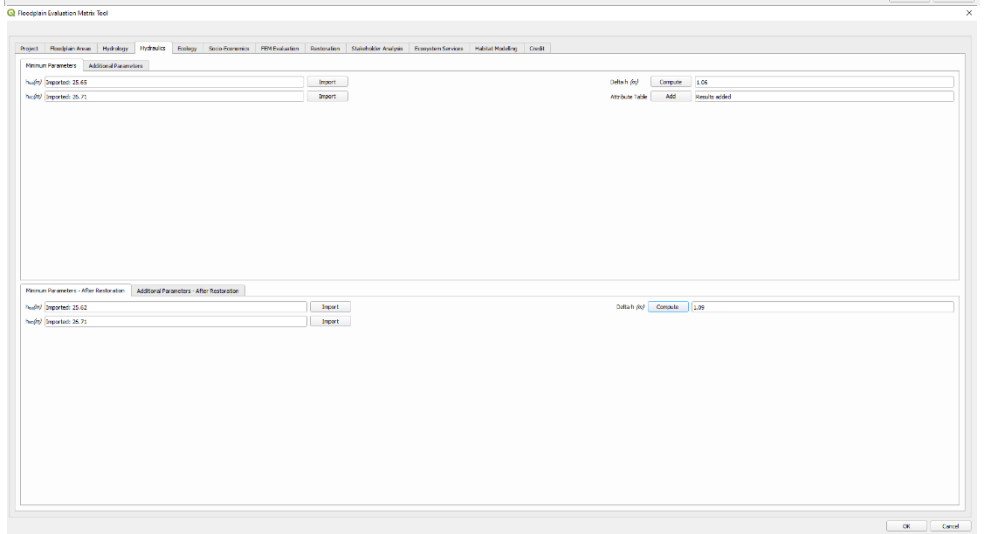
## C. Results of applying the FEM-Tool using input from the previous tasks (FEM, CBA, ESS, stakeholder) – Suhaia Zimnicea pilot area

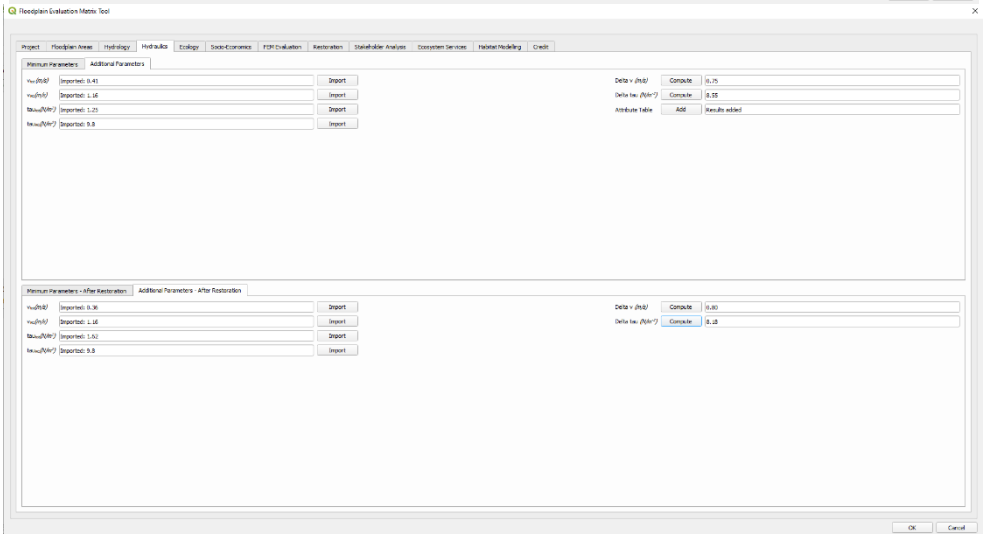
In order to apply FEM-Tool the input data set has been prepared. All the data were used to calculate the FEM parameters (FEM minimum and additional parameters) for both current and restored state according to FEM-parameters handbooks.
In order to install and use the FEM-Tool the open-source QGIS software has been used. The FEM-Tool have been successfully applied for Suhaia-Zimnicea pilot area (see the screenshots presented below).

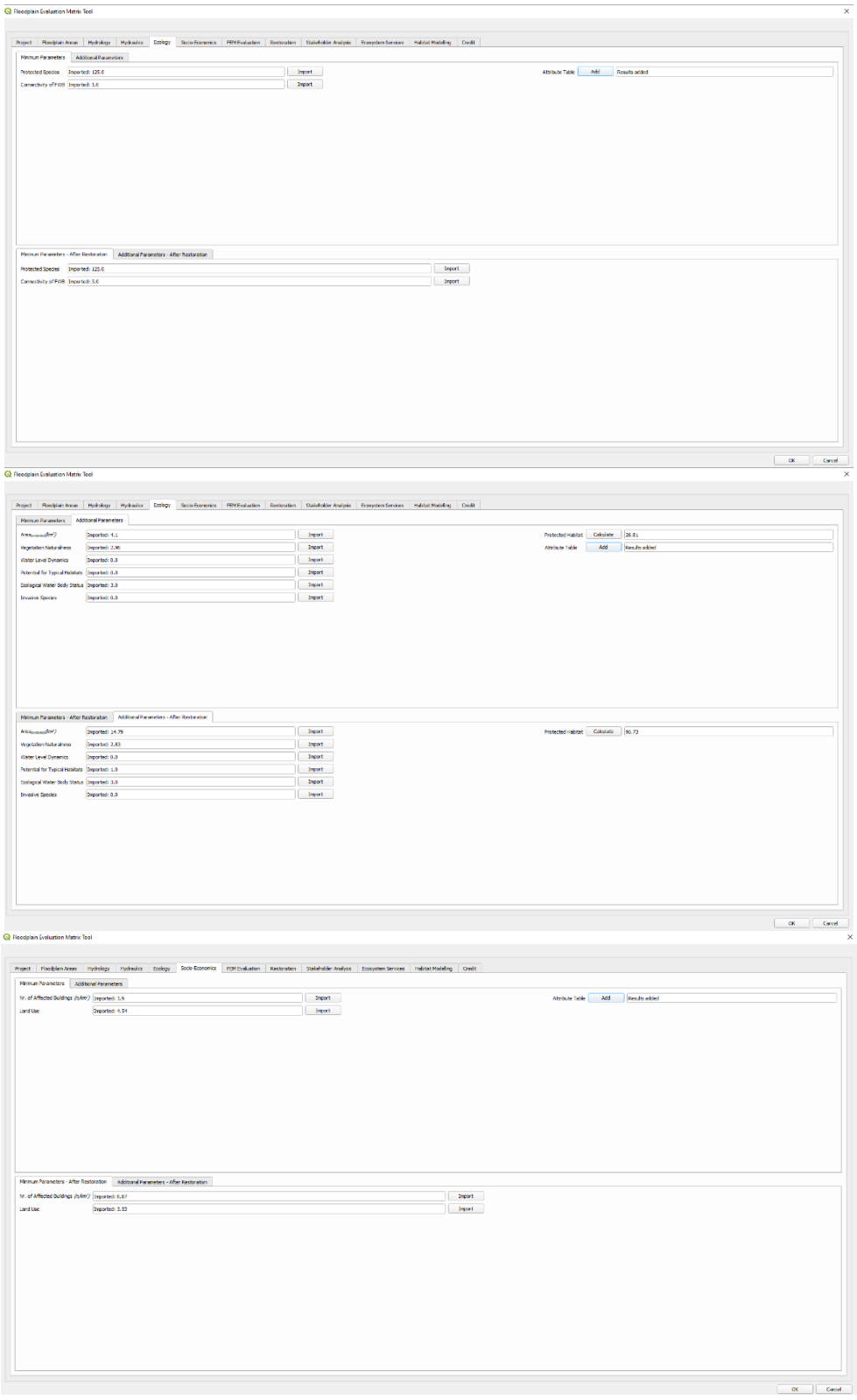


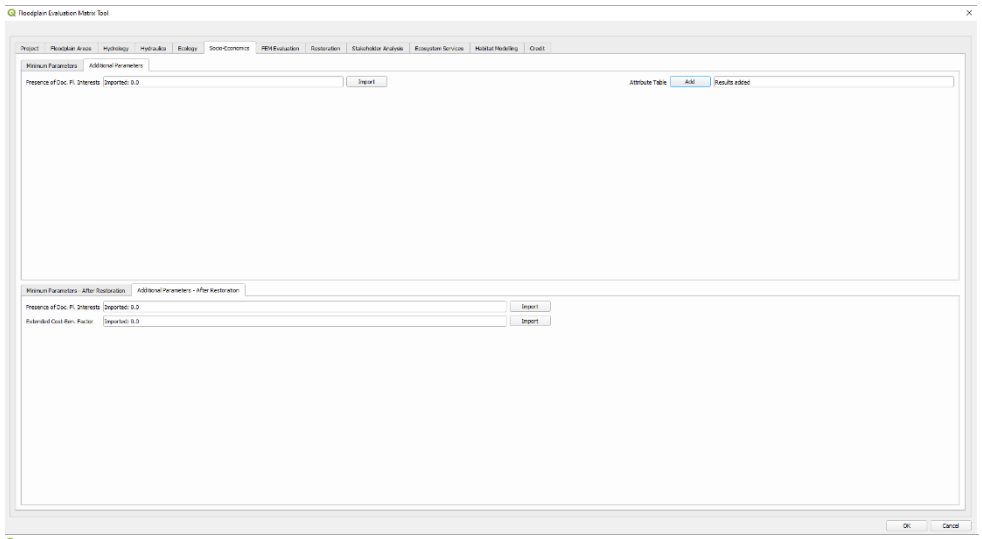


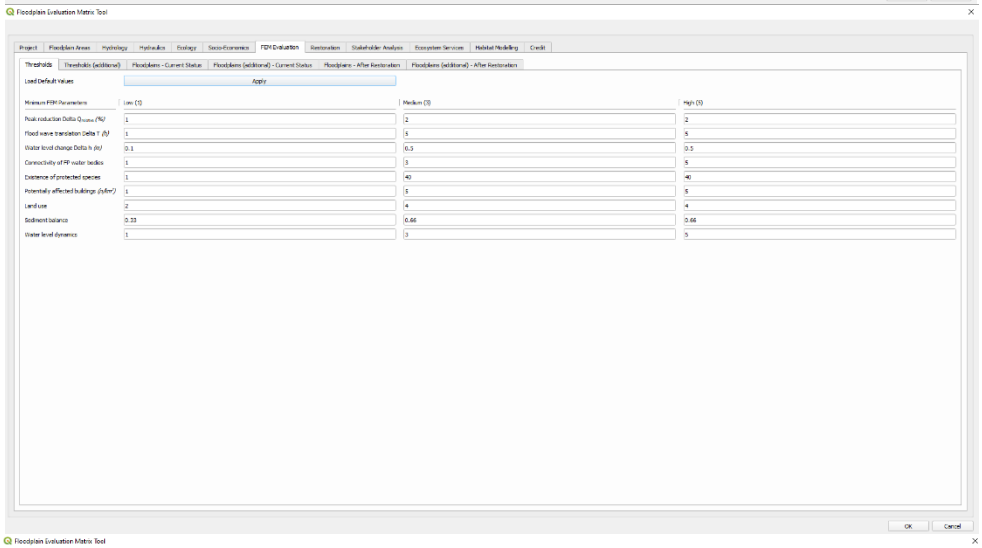

Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FRM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Peak Reduction and Flood Wave Translation
Input Hydrograph
Output Hydrograph with FP
Output Hydrograph without FP
Qbankfull (m³/s)
Imported
Import
Compute
Add
Attribute Table
Results added
Peak Reduction and Flood Wave Translation - After Restoration
OK
Cancel

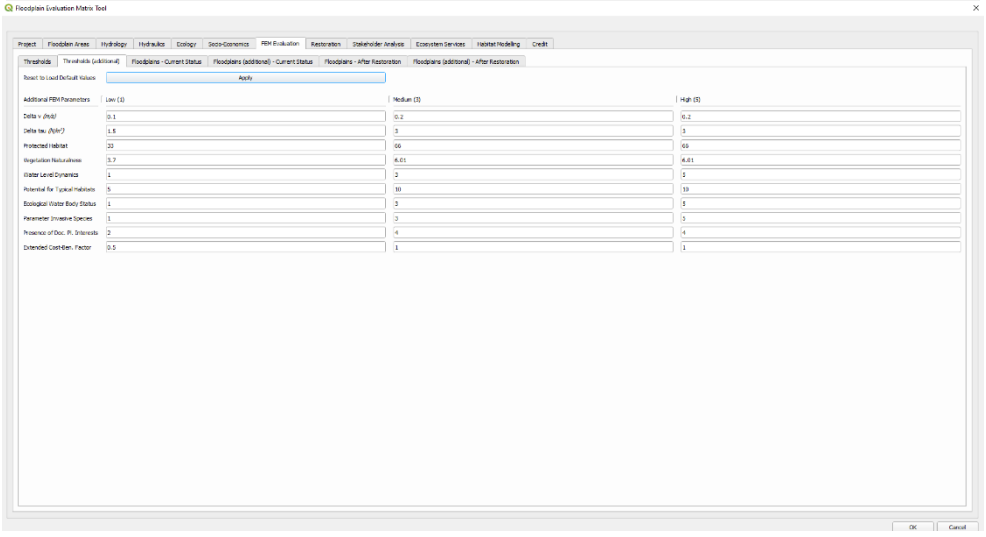

Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FRM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Import
Compute
Add
Attribute Table
Results added
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FRM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Import
Compute
Add
Attribute Table
Results added
OK
Cancel




Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Presence of Doc. Pl. Interests
Import
Attribute Table
Add
Results added
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Extended Cost-Ben. Factor
OK
Cancel


Floodplain Evaluation Matrix Tool
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Load Default Values
Apply
Minimum FEM Parameters
Low (1)
Medium (3)
High (5)
Peak reduction Delta Q
Flood wave translation Delta T
Water level change Delta h
Connectivity of FP water bodies
Existence of protected species
Potentially affected buildings
Land use
Sediment balance
Water level dynamics
OK
Cancel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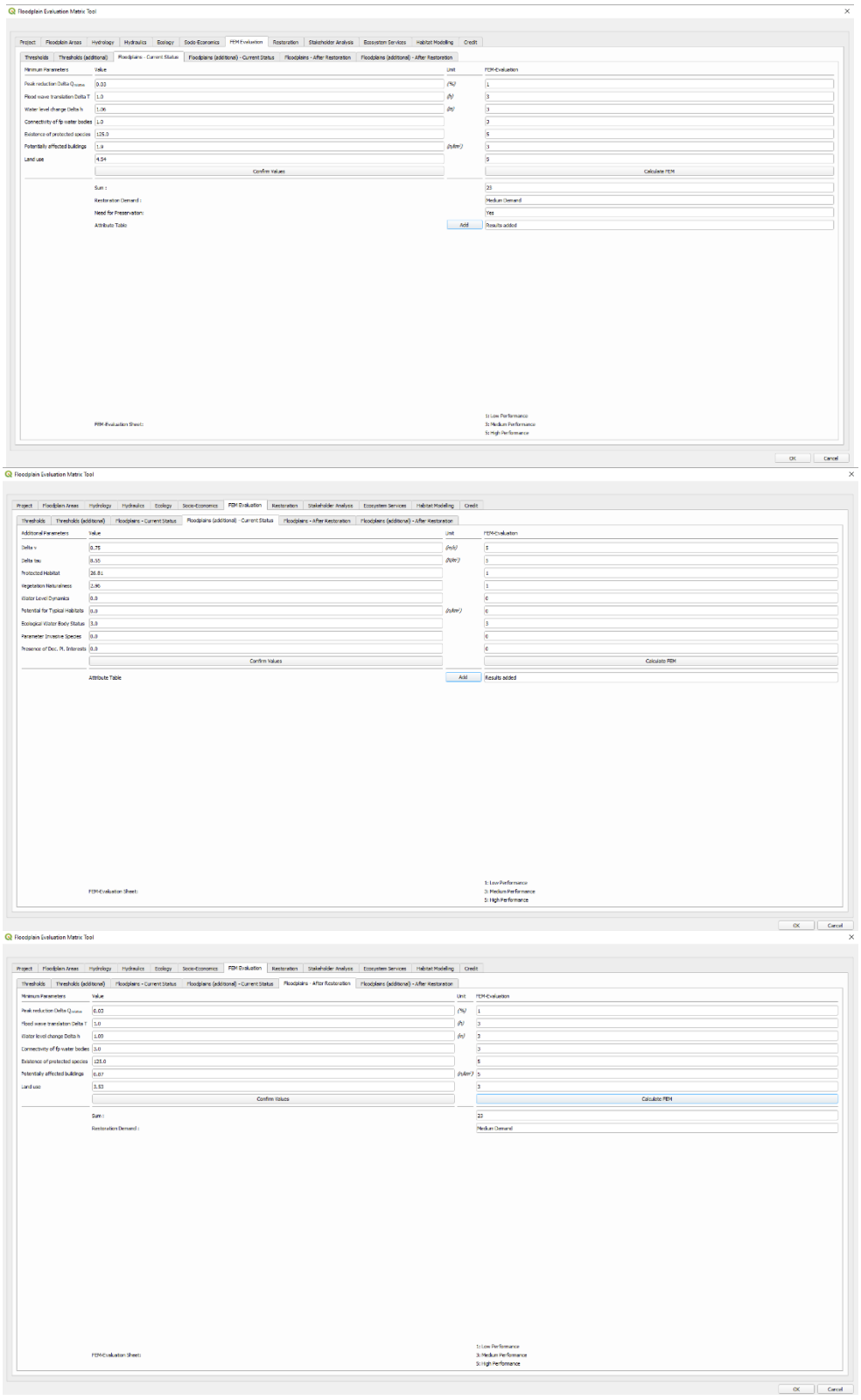
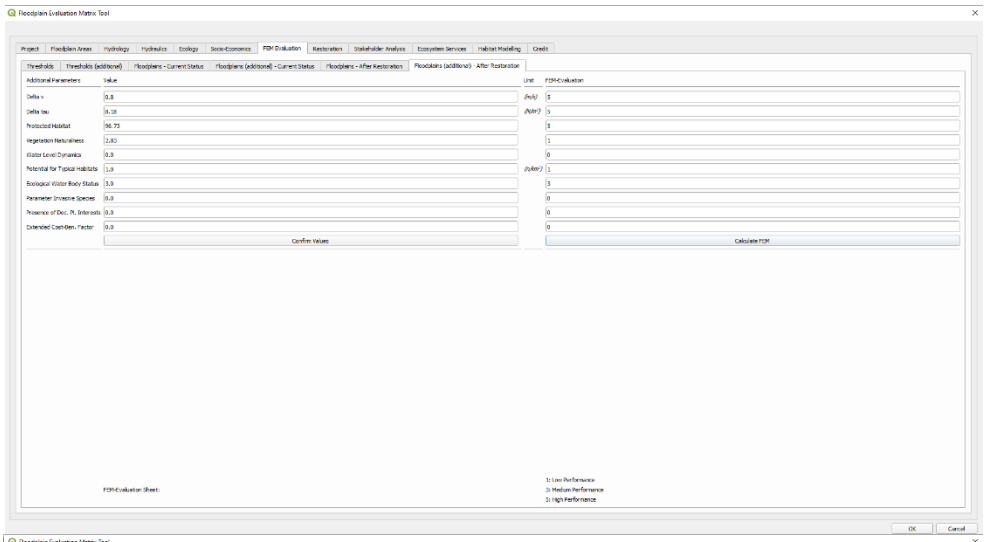
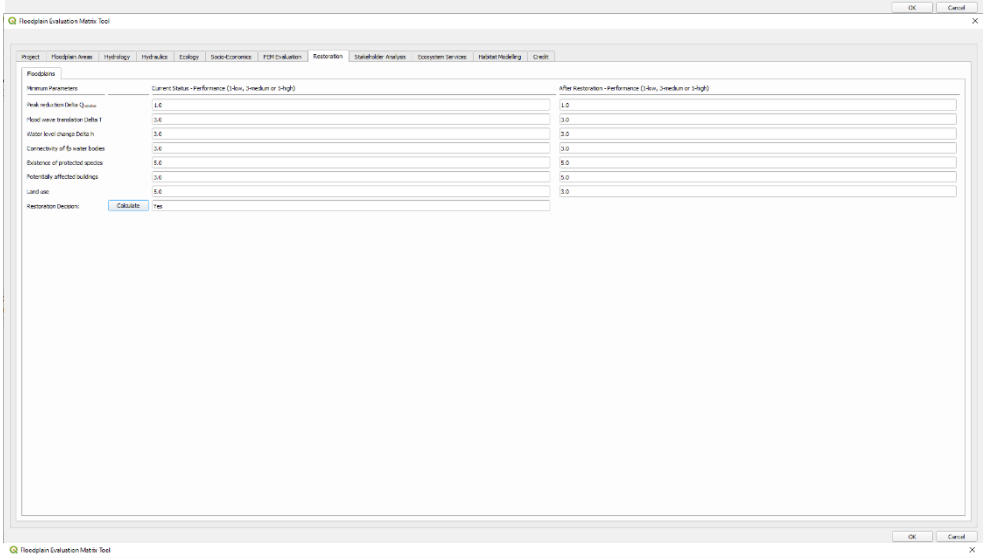
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Reset to Load Default Values
Apply
Additional FEM Parameters
Low (1)
Medium (3)
High (5)
Delta v
Delta tau
Protected Habitat
Vegetation Naturalness
Water Level Dynamics
Potential for Typical Habitats
Ecological Water Body Status
Parameter Invasive Species
Presence of Doc. Pl. Interests
Extended Cost-Ben. Factor
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM-Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Confirm Values
Calculate FEM
Add
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Additional Parameters
Value
Unit
FEM-Evaluation
Confirm Values
Calculate FEM
OK
Cancel


Floodplain Evaluation Matrix Tool
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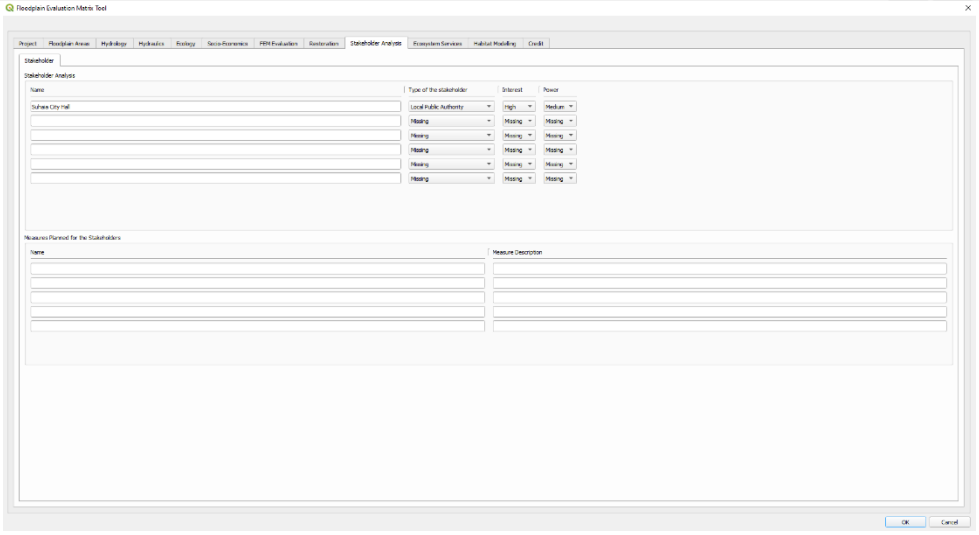
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Floodplains
Minimum Parameters
Current Status - Performance (1=low, 3=medium or 5=high)
After Restoration - Performance (1=low, 3=medium or 5=high)
Calculate
Restoration Decision:
OK
Cancel


Floodplain Evaluation Matrix Tool
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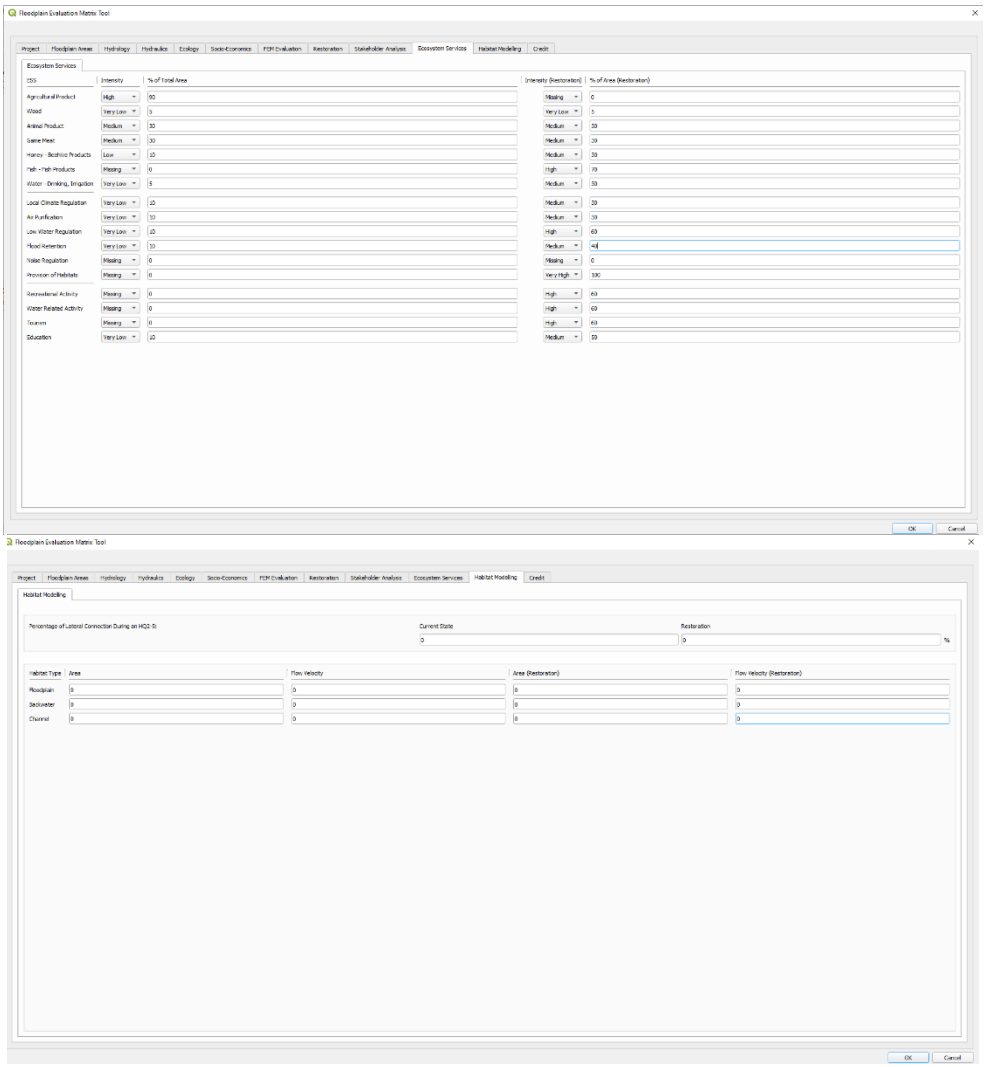
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Stakeholder
Stakeholder Analysis
Name
Type of the stakeholder
Interest
Power
Measures Planned for the Stakeholders
Measure Description
OK
Cancel



Also, the results of applying the FEM-Tool are generated in a synthetic way within two factsheets, presented below.

## Danube Floodplain - Suhaia Fact Sheet

Countries: Romania
Editor: National Institute of Hydrology and Water Management
Date: 13.10.2021

| Need For Preservation | Restoration Demand |
|---|---|
| Yes | Medium Demand |

| Hydrology | |
|---|---|
| Peak Reduction | 1 |
| Flood Wave Translation | 3 |

| Hydraulics | |
|---|---|
| Water Level Change | 3 |
| Flow Velocity Change | 5 |
| Bed Shear Stress Change | 5 |

| Ecology | |
|---|---|
| Connectivity of FWB | 3 |
| Protected Species | 5 |
| Protected Habitat | 1 |
| Vegetation Naturalness | 1 |
| Water Level Dynamics | 0 |
| Potential for Typ. Habitats | 0 |
| Ecological Water Body Status | 3 |
| Invasive Species | 0 |

| Socio-Economics | |
|---|---|
| Affected Buildings | 3 |
| Land Use | 5 |
| Presence of Doc. Pl. Int. | 0 |

| FEM Rating Performance | Ranking |
|---|---|
| High | 5 |
| Medium | 3 |
| Low | 1 |

## Danube Floodplain - Suhaia Fact Sheet

Countries: Romania
Editor: National Institute of Hydrology and Water Management
Date: 13.10.2021

Stakeholder Analysis

| Name | Type of Stakeholder | Interest | Power |
|---|---|---|---|
| Suhaia City Hall | Local Public Authority | High | Medium |
| | Missing | Missing | Missing |
| | Missing | Missing | Missing |
| | Missing | Missing | Missing |
| | Missing | Missing | Missing |
| | Missing | Missing | Missing |

Measures Planned for the Stakeholders

| Name | Measure Description |
|---|---|
| | |
| | |
| | |
| | |
| | |

Restoration

| Minimum Parameters | Current Status - Perf. | After Rest. - Perf. |
|---|---|---|
| Delta Q relative | 1.0 | 1.0 |
| Delta T | 3.0 | 3.0 |
| Delta h | 3.0 | 3.0 |
| Conn. of fp Water Bodies | 3.0 | 3.0 |
| Existence of proct. species | 5.0 | 5.0 |
| Potentially affected buildings | 3.0 | 5.0 |
| Land use | 5.0 | 3.0 |
| Restoration Decision | Yes | |

Habitat Modelling

| | Current State | Restoration | |
|---|---|---|---|
| Perc. of Lateral Con. during HQ 2-5 | 0 | 0 | % |

| Habitat Type | Area | Flow Velocity | Area Res. | Flow Velocity Res. |
|---|---|---|---|---|
| Floodplain | 0 | 0 | 0 | 0 |
| Backwater | 0 | 0 | 0 | 0 |

Ecosystem Services

| ESS | Intensity | Per. Total Area | Intensity Res. | Per. Total Area Res. |
|---|---|---|---|---|
| Agricultural Prod. | High | 90 | Missing | 0 |
| Wood | Very Low | 5 | Very Low | 5 |
| Animal Prod. | Medium | 30 | Medium | 30 |
| Game Meat | Medium | 30 | Medium | 30 |
| Honey | Low | 10 | Medium | 30 |
| Fish | Missing | 0 | High | 70 |
| Water | Very Low | 5 | Medium | 30 |
| Local Cli. Reg. | Very Low | 10 | Medium | 30 |
| Air Purification | Very Low | 10 | Medium | 30 |
| Low Water Reg. | Very Low | 10 | High | 60 |
| Flood Retention | Very Low | 10 | Medium | 40 |
| Noise Reg. | Missing | 0 | Missing | 0 |
| Provision of Hab. | Missing | 0 | Very High | 100 |
| Recreational Act. | Missing | 0 | High | 60 |
| Water Related Act. | Missing | 0 | High | 60 |
| Tourism | Missing | 0 | High | 60 |
| Education | Very Low | 10 | Medium | 50 |

Figure 13 Factsheets from the FEM Tool for the Suhaia-Zimnicea pilot area

## D. Evaluation of Cost – Suhaia Zimnicea pilot area

Lake Suhaia is delimited by the western dike (L=11.5 km) and the eastern dike (L=7 km). The western protective dike is destroyed on about 70% of the length, towards the lake, up to the crest. Although it was protected by a wall of concrete slabs, it fell, thus favouring the erosion of the dike body.

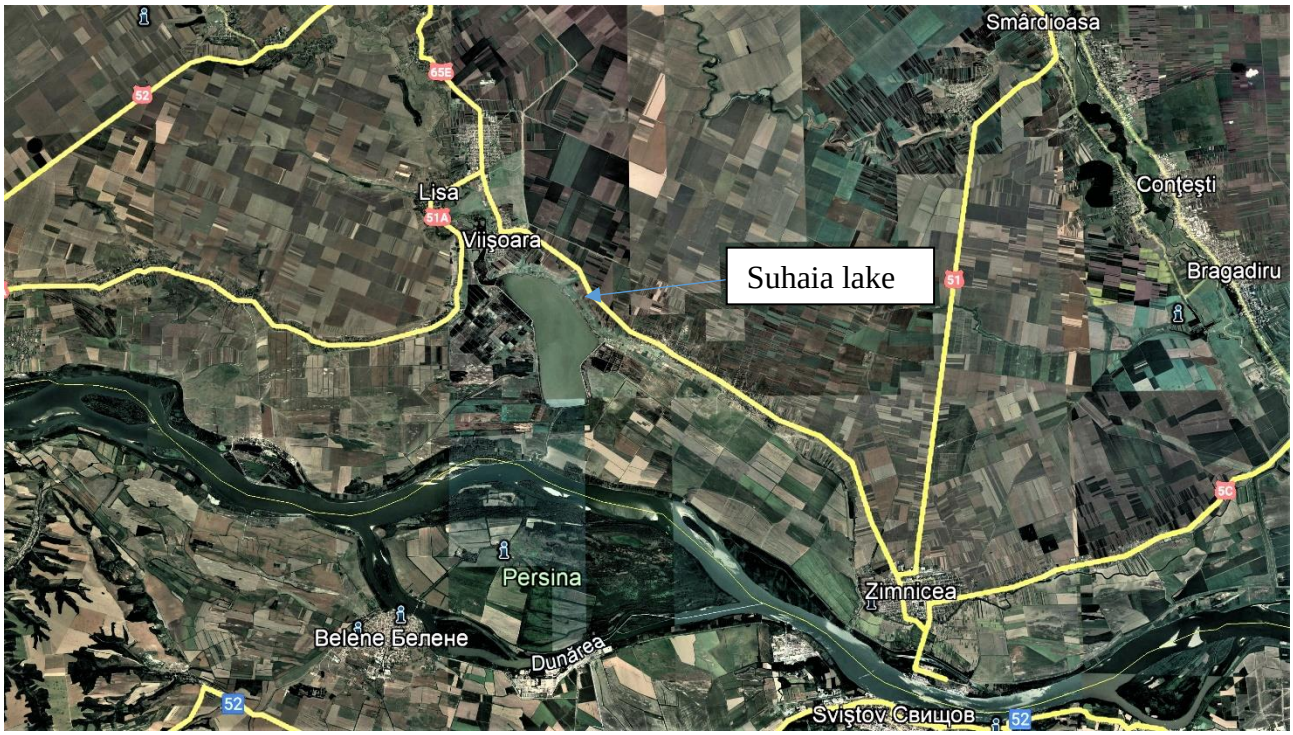



Figure 14 Suhaia Lake

At Garla Iancului pump station, which is located at the intersection of the western dike of Lake Suhaia with the longitudinal dike on the Danube, the contour dike of the suction basin is exposed to waves and is damaged. 130 m is the length on which consolidation is required.
The area analyzed from the point of view of renaturation is on the left bank of the Danube, in the western part of Lake Suhaia. The main works that will contribute to the renaturation of these areas are:

a. Achieving lateral connectivity with the Danube river by relocating the left bank dikes
b. Construction of a new dike
c. Rehabilitation and heightening of a sector from western Suhaia contour lake dike
d. Rehabilitating the rest of both western and eastern dike;
e. Creating a forest curtain along the dikes;
f. Rehabilitation of existing structures – pumping station and weir

The renaturation of the area on the left bank of the Danube upstream of Lake Suhaia will be done by relocating the existing dike on a length of about 4,580 m and building a new dike along the existing drainage channel that continues on the ridge area up to the middle of the contour dike on the western side of Lake Suhaia. By renaturation of the area in westernpart of Lake Suhaia, the existing drainage system will not be significantly affected.

The new dike will have a length of 6400 m, average height of 4.00 m, a crown width of 5.00 m and slopes of 1: 2.5. The slopes will be protected by grass and a bicycle track will be arranged on the dike crest. The dike crest elevation was set according to the 1% level on the Danube to which a safety guard of 0.5 m was added. The floodplain restoration will have a surface of 1063 ha.

The condition of the contour dams requires rehabilitation in order to operate them safely. The works consist of earth filling at the dike body, rehabilitation of the slopes protection. The project proposed rehabilitating and heightening of the contour dikes of Lake Suhaia, at levels corresponding to 1% levels on the Danube. On the contour of Lake Suhaia were provided to be made wooden pontoons.

According to the conclusions and recommendations of the technical expertise the project includes the rehabilitation of the degraded concrete structures and the replacement of the hydro-mechanical equipment.

Along the dikes that follow area proposed for renaturation, it is envisaged to build a forest curtain with of 100 m width, made of species adapted to the local climate and soil conditions. The total area of afforestation is about 85 ha.

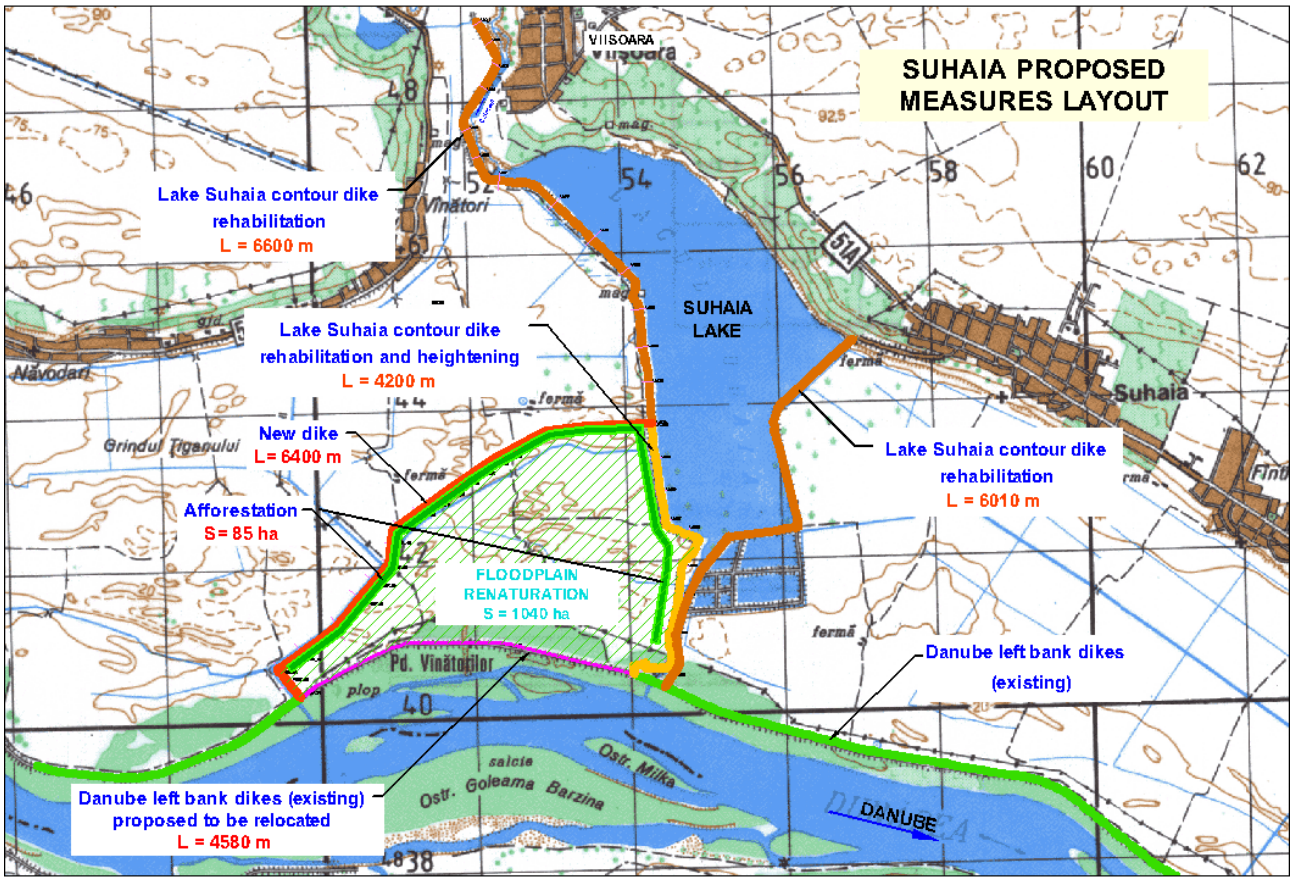



Figure 15 Suhaia proposed measures layout

**Project capabilities:**
Dikes rehabilitated and heighted – L=4.20 km
Dikes rehabilitated – L = 12.610 km
New dikes – L= 6.40 km
Afforestation – S = 85 ha
Floodplain renaturation – S = 1040 ha

**Project costs:**

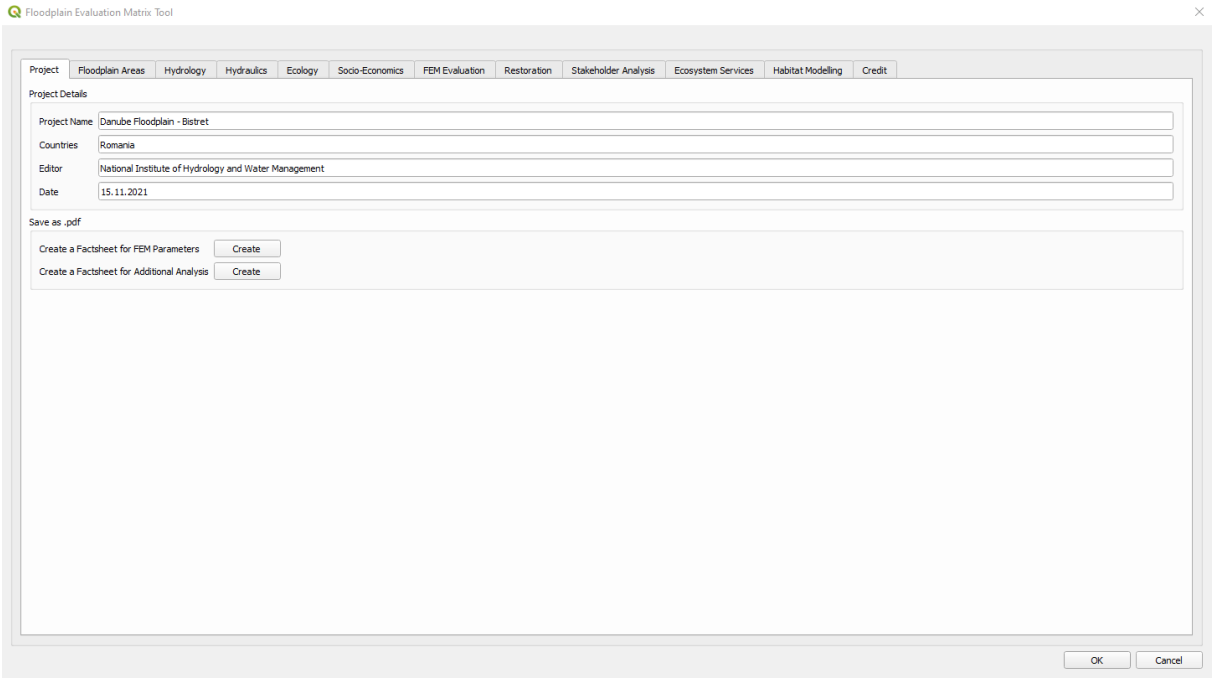
- Total investment: 21,100,000 € (including VAT)

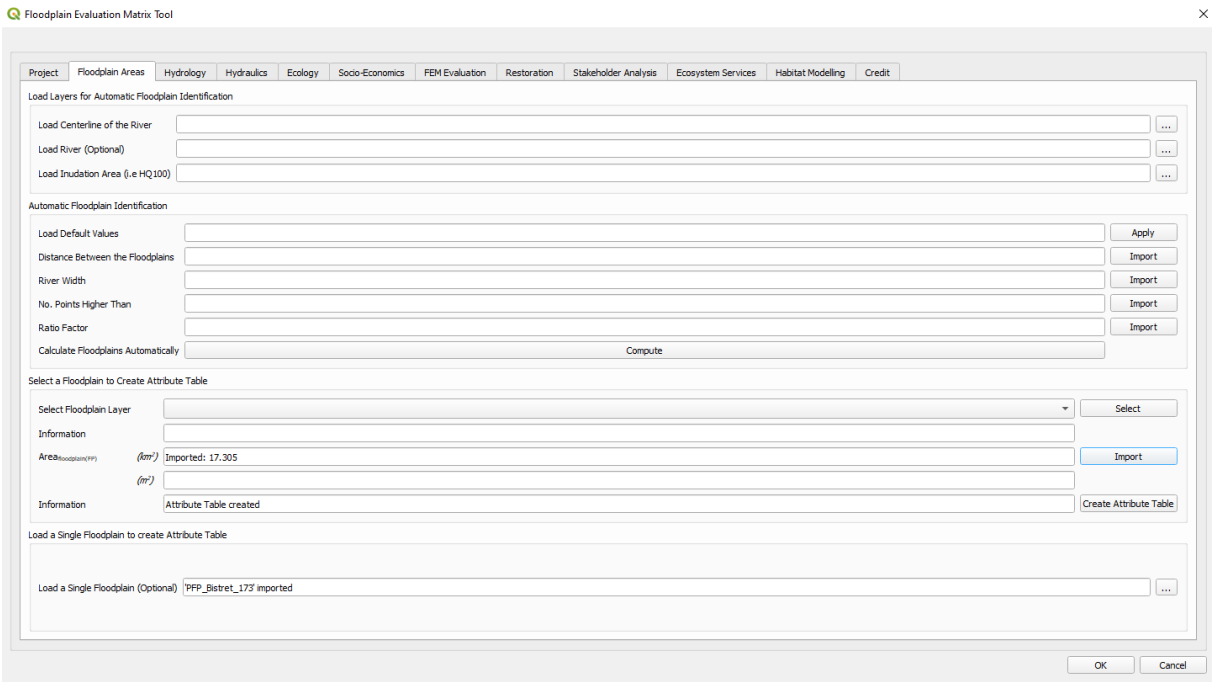
from which:

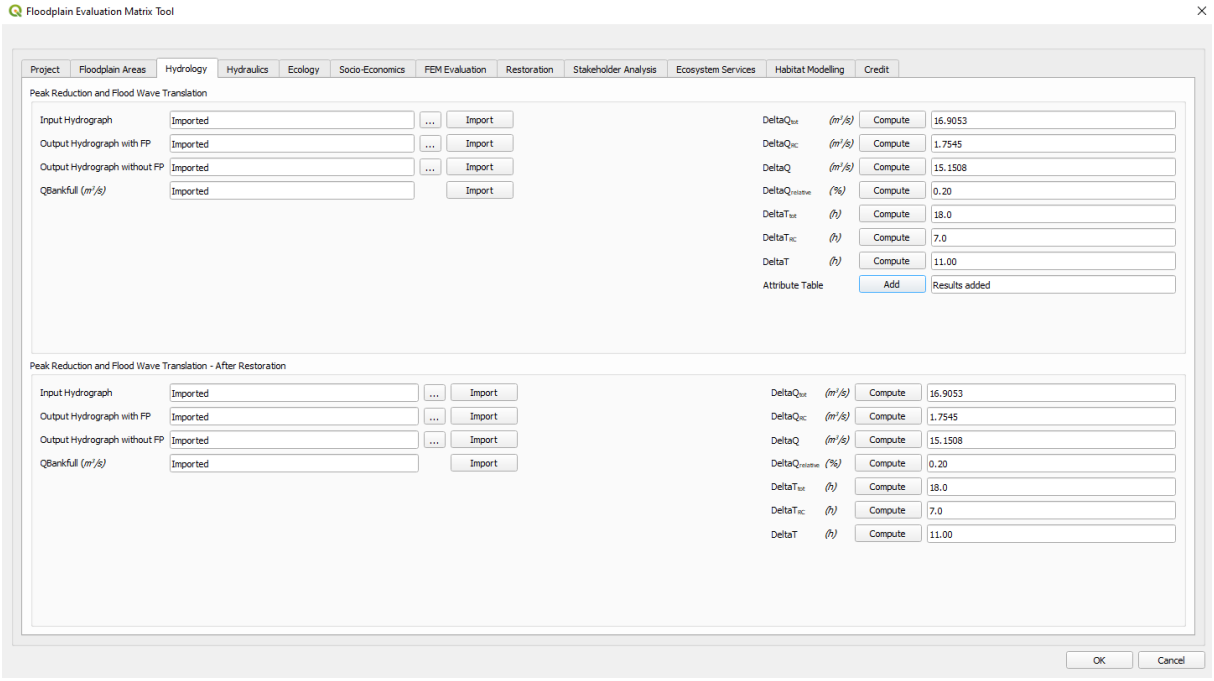
- Construction works. 16,200,000 € (including VAT)

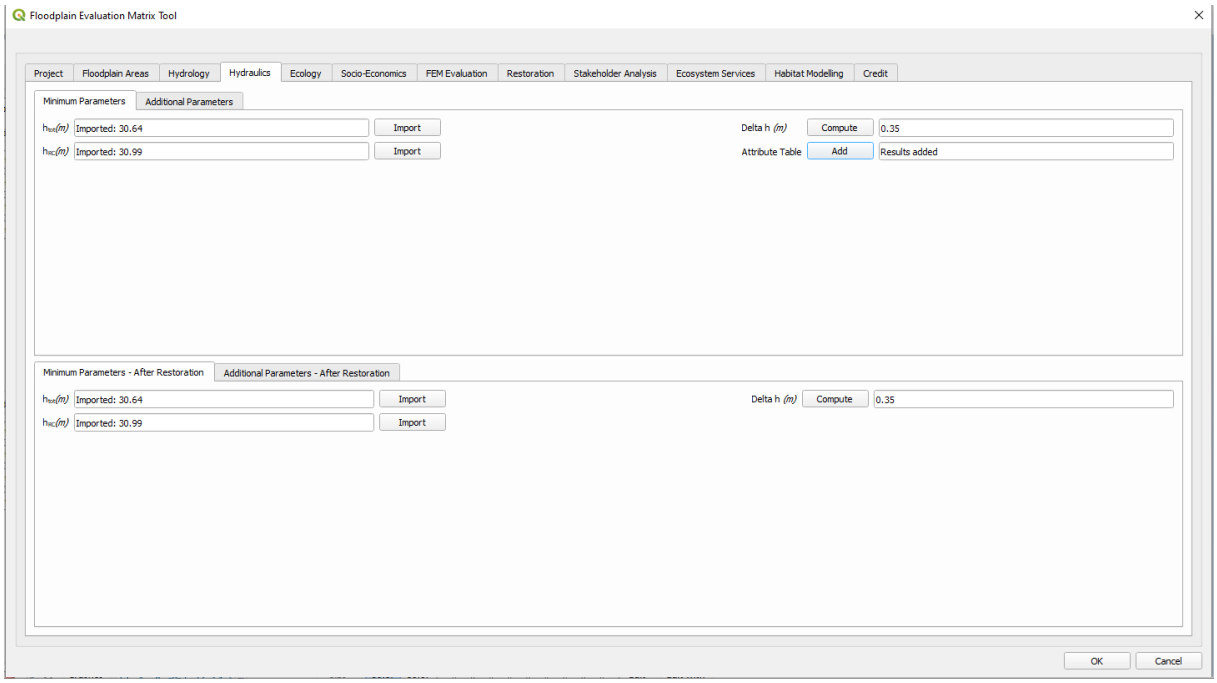
## E. Results of applying the FEM-Tool using input from the previous tasks (FEM, CBA, ESS, stakeholder) – Bistret pilot area

In order to apply FEM-Tool the input data set has been prepared.
The FEM-Tool have been successfully applied for Bistret pilot area (see the screenshots presented below).




Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Load Layers for Automatic Floodplain Identification
Load Centerline of the River
Load River (Optional)
Load Inudation Area (i.e HQ100)
Automatic Floodplain Identification
Load Default Values
Apply
Distance Between the Floodplains
Import
River Width
Import
No. Points Higher Than
Import
Ratio Factor
Import
Calculate Floodplains Automatically
Compute
Select a Floodplain to Create Attribute Table
Select Floodplain Layer
Select
Information
Area
(km²)
Imported: 17.305
Import
(m²)
Information
Attribute Table created
Create Attribute Table
Load a Single Floodplain to create Attribute Table
Load a Single Floodplain (Optional)
'PFP_Bistret_173' imported
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Peak Reduction and Flood Wave Translation
Input Hydrograph
Imported
Import
Output Hydrograph with FP
Imported
Import
Output Hydrograph without FP
Imported
Import
QBankfull (m³/s)
Imported
Import
DeltaQtot (m³/s)
Compute
16.9053
DeltaQRC (m³/s)
Compute
1.7545
DeltaQ (m³/s)
Compute
15.1508
DeltaQrelative (%)
Compute
0.20
DeltaTtot (h)
Compute
18.0
DeltaTRC (h)
Compute
7.0
DeltaT (h)
Compute
11.00
Attribute Table
Add
Results added
Peak Reduction and Flood Wave Translation - After Restoration
Input Hydrograph
Imported
Import
Output Hydrograph with FP
Imported
Import
Output Hydrograph without FP
Imported
Import
QBankfull (m³/s)
Imported
Import
DeltaQtot (m³/s)
Compute
16.9053
DeltaQRC (m³/s)
Compute
1.7545
DeltaQ (m³/s)
Compute
15.1508
DeltaQrelative (%)
Compute
0.20
DeltaTtot (h)
Compute
18.0
DeltaTRC (h)
Compute
7.0
DeltaT (h)
Compute
11.00
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Imported: 30.64
Import
Imported: 30.99
Import
Delta h (m)
Compute
0.35
Attribute Table
Add
Results added
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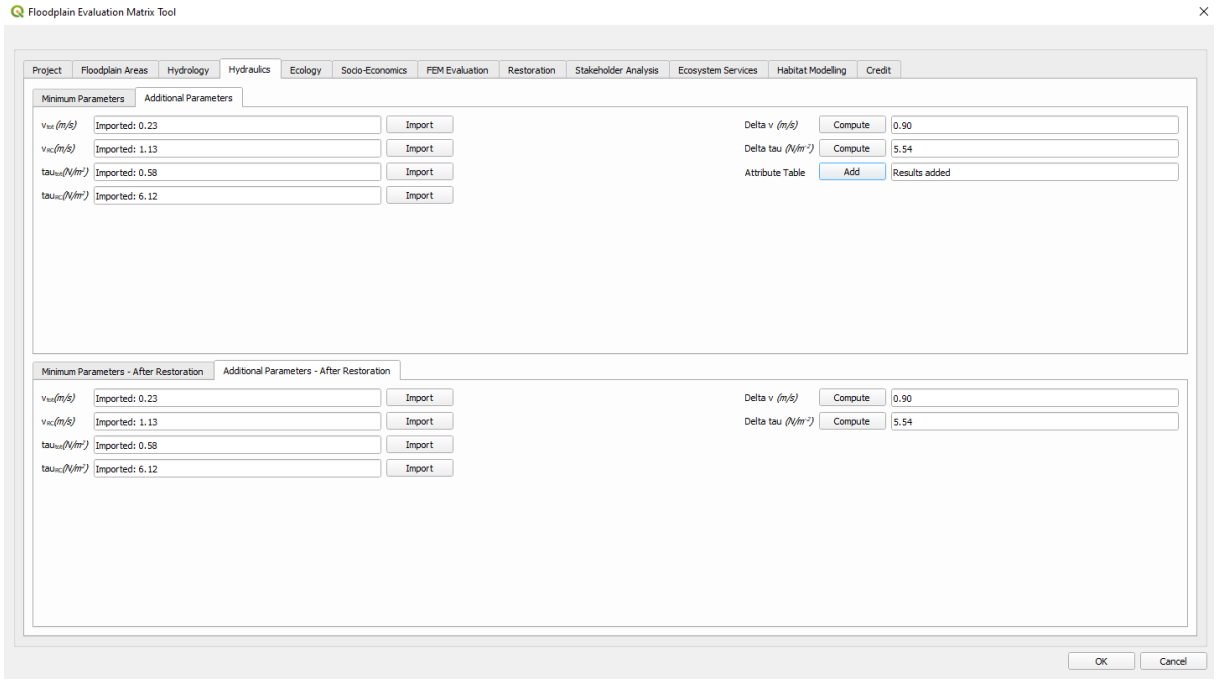
Additional Parameters - After Restoration
Imported: 30.64
Import
Imported: 30.99
Import
Delta h (m)
Compute
0.35
OK
Cancel


Floodplain Evaluation Matrix Tool
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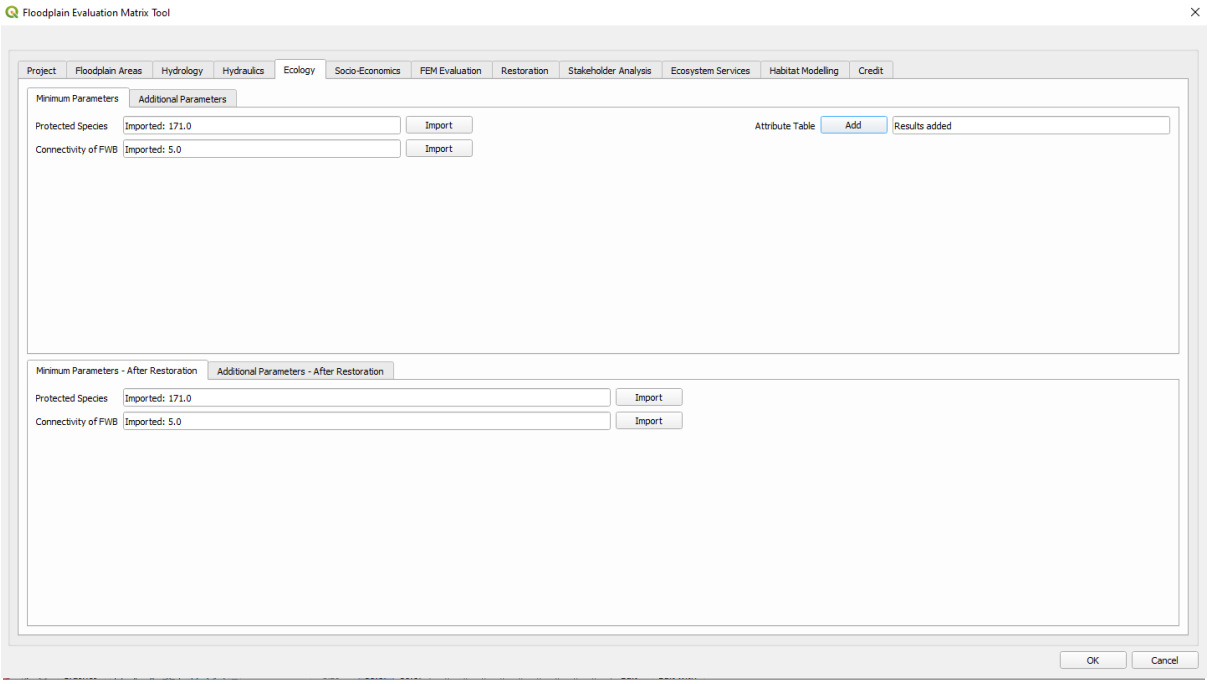
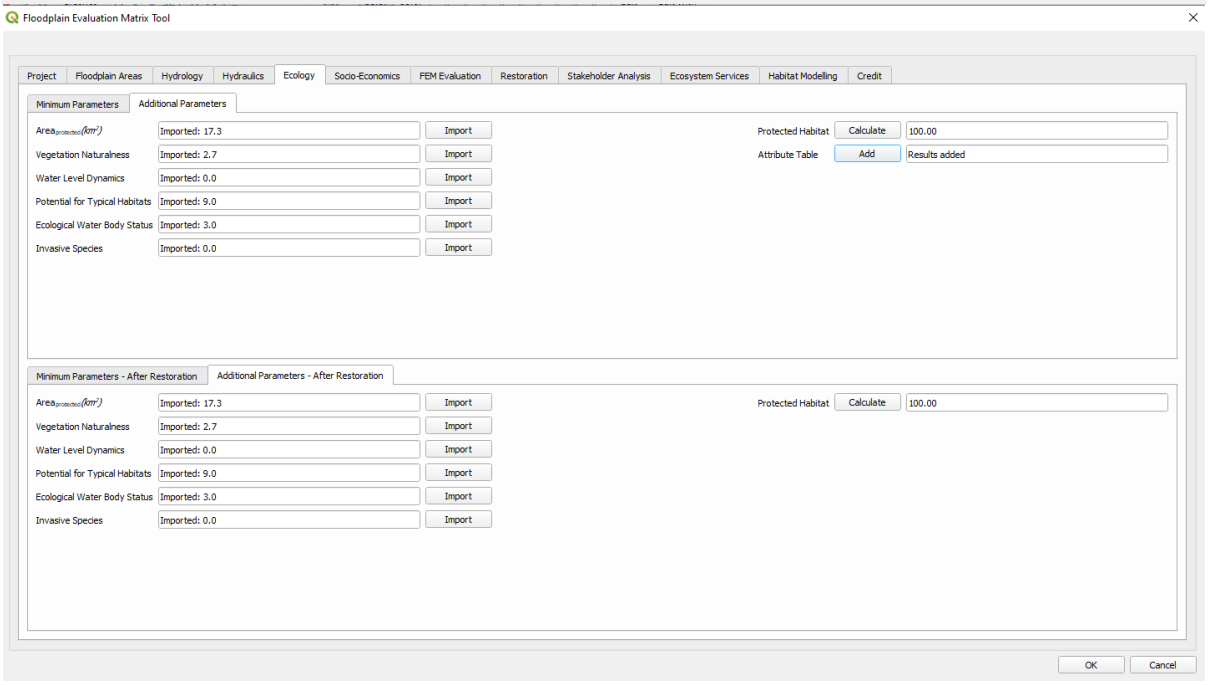
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Imported: 0.23
Import
Imported: 1.13
Import
Imported: 0.58
Import
Imported: 6.12
Import
Delta v (m/s)
Compute
0.90
Delta tau (N/m-2)
Compute
5.54
Attribute Table
Add
Results added
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Imported: 0.23
Import
Imported: 1.13
Import
Imported: 0.58
Import
Imported: 6.12
Import
Delta v (m/s)
Compute
0.90
Delta tau (N/m-2)
Compute
5.54
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Protected Species
Imported: 171.0
Import
Connectivity of FWB
Imported: 5.0
Import
Attribute Table
Add
Results added
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Protected Species
Imported: 171.0
Import
Connectivity of FWB
Imported: 5.0
Import
OK
Cancel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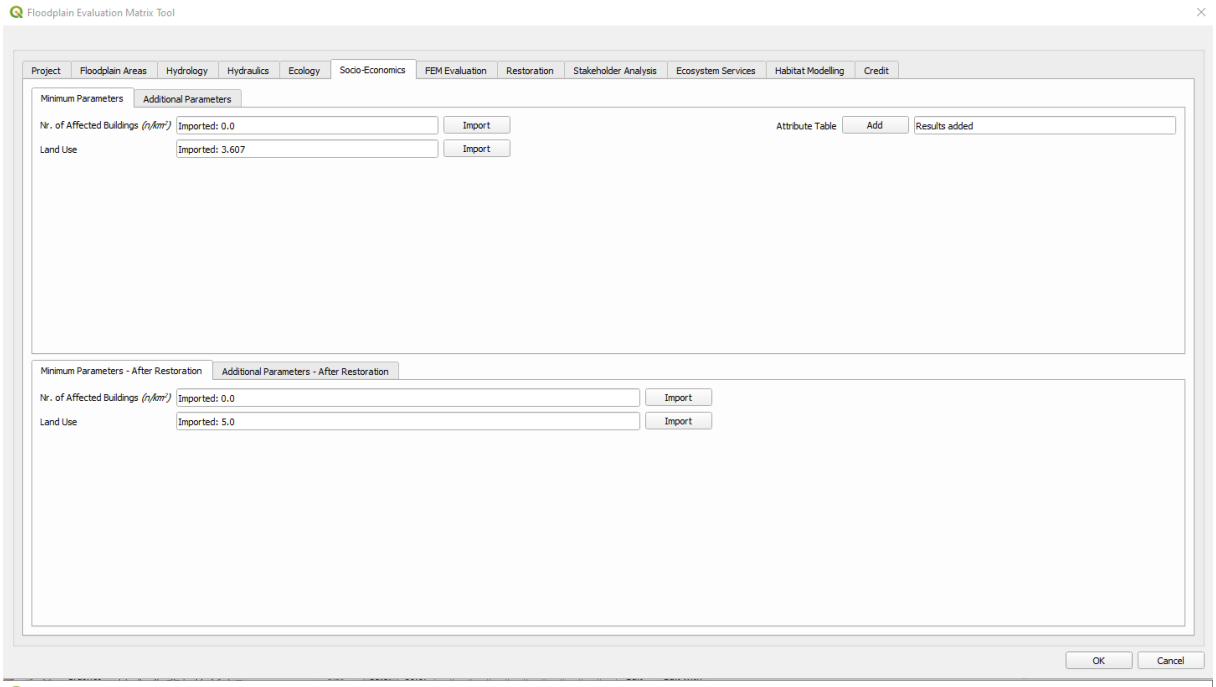
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Area
Imported: 17.3
Import
Vegetation Naturalness
Imported: 2.7
Import
Water Level Dynamics
Imported: 0.0
Import
Potential for Typical Habitats
Imported: 9.0
Import
Ecological Water Body Status
Imported: 3.0
Import
Invasive Species
Imported: 0.0
Import
Protected Habitat
Calculate
100.00
Attribute Table
Add
Results added
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
OK
Cancel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Project
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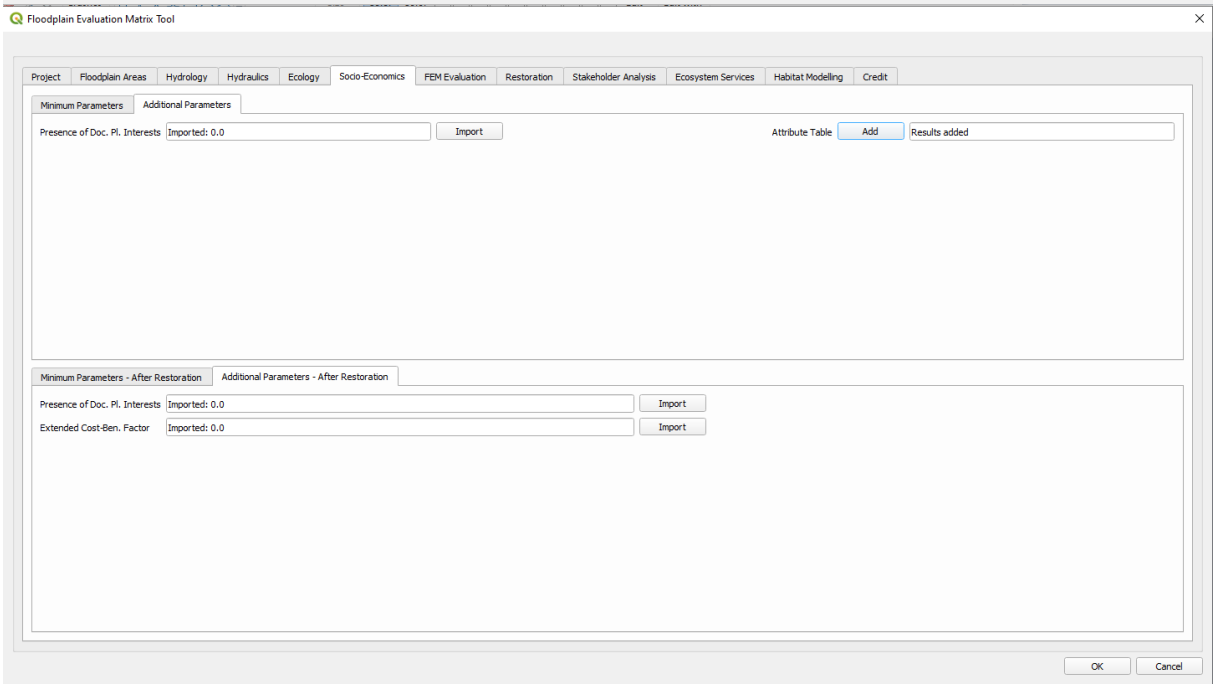
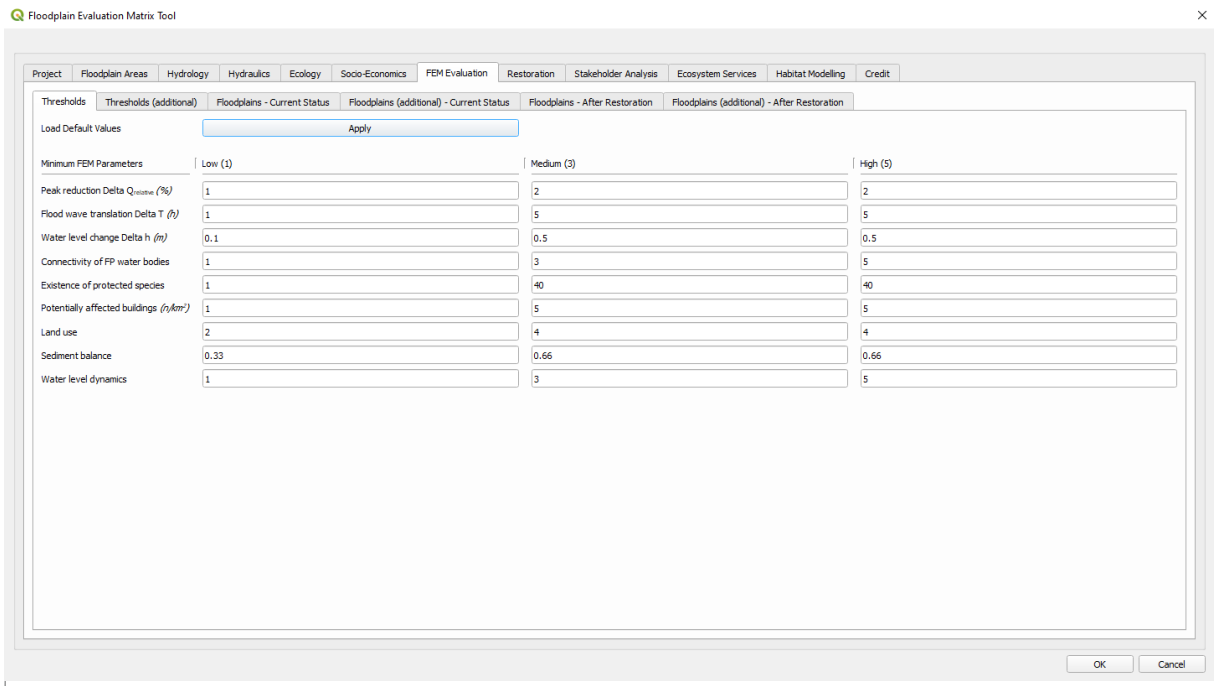
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Nr. of Affected Buildings (n/km²)
Imported: 0.0
Import
Attribute Table
Add
Results added
Land Use
Imported: 3.607
Import
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Nr. of Affected Buildings (n/km²)
Imported: 0.0
Import
Land Use
Imported: 5.0
Import
OK
Cancel


Floodplain Evaluation Matrix Tool
Project
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Minimum Parameters
Additional Parameters
Presence of Doc. Pl. Interests
Imported: 0.0
Import
Attribute Table
Add
Results added
Minimum Parameters - After Restoration
Additional Parameters - After Restoration
Presence of Doc. Pl. Interests
Imported: 0.0
Import
Extended Cost-Ben. Factor
Imported: 0.0
Import
OK
Cancel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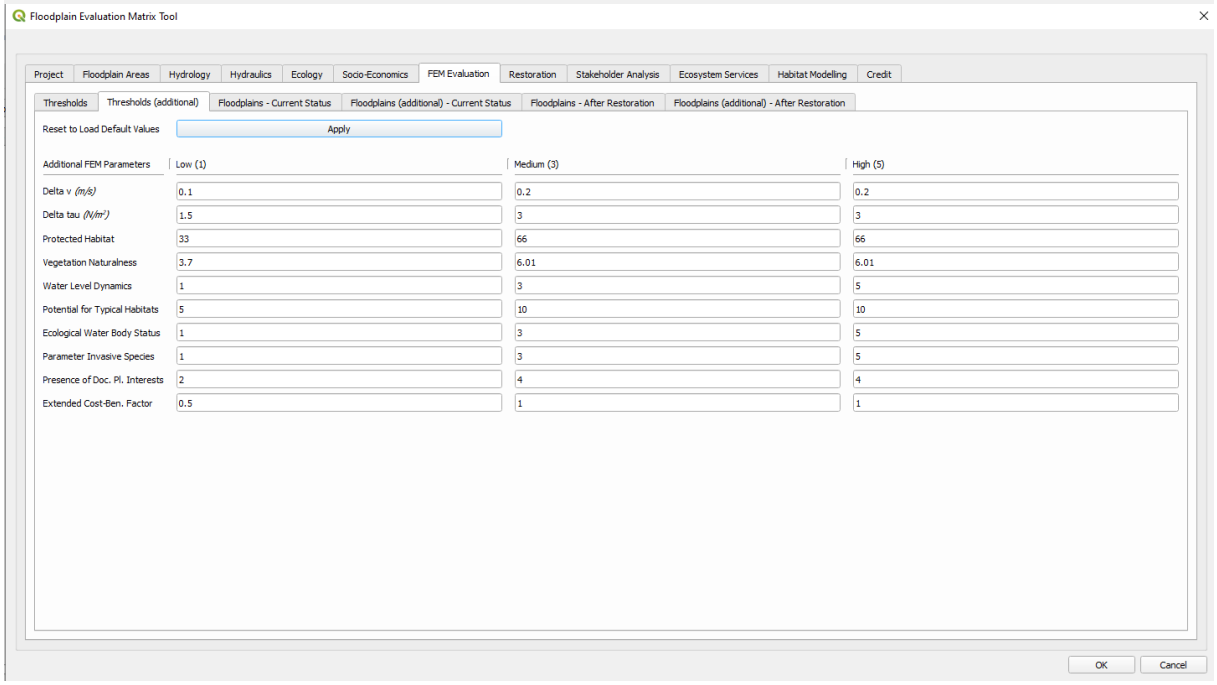
Credit
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Load Default Values
Apply
Minimum FEM Parameters
Low (1)
Medium (3)
High (5)
Peak reduction Delta Q relative (%)
1
2
2
Flood wave translation Delta T (h)
1
5
5
Water level change Delta h (m)
0.1
0.5
0.5
Connectivity of FP water bodies
1
3
5
Existence of protected species
1
40
40
Potentially affected buildings (n/km²)
1
5
5
Land use
2
4
4
Sediment balance
0.33
0.66
0.66
Water level dynamics
1
3
5
OK
Cancel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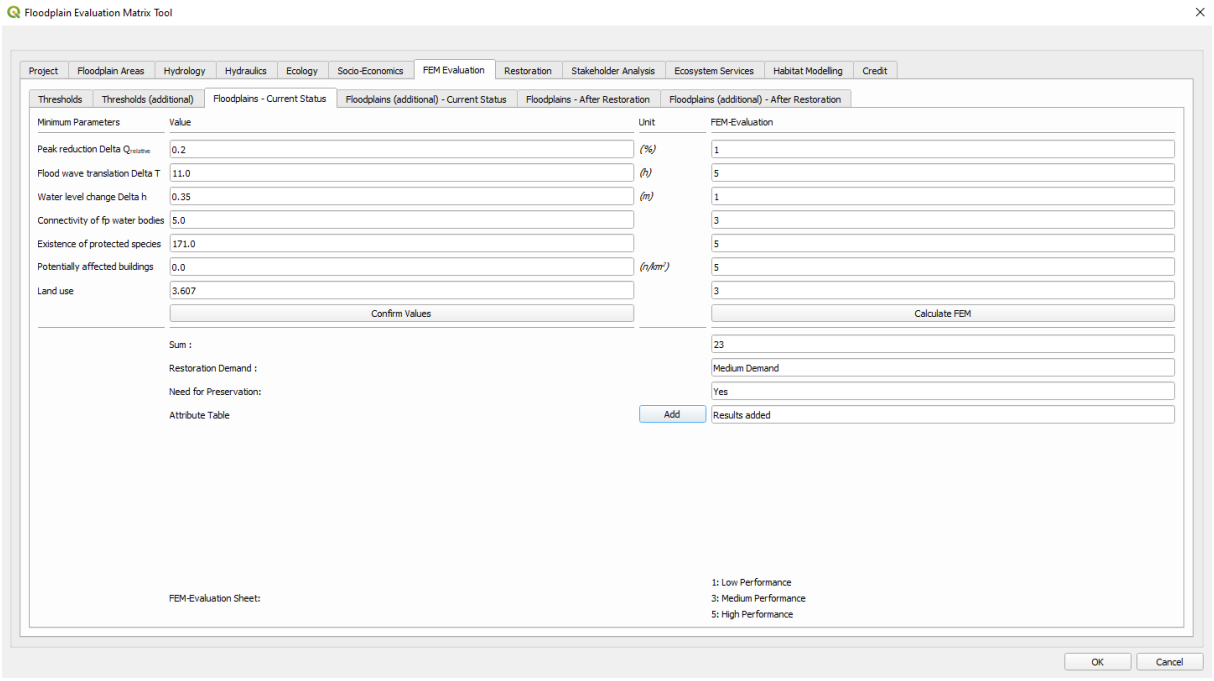
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Reset to Load Default Values
Apply
Additional FEM Parameters
Low (1)
Medium (3)
High (5)
Delta v (m/s)
0.1
0.2
0.2
Delta tau (N/m²)
1.5
3
3
Protected Habitat
33
66
66
Vegetation Naturalness
3.7
6.01
6.01
Water Level Dynamics
1
3
5
Potential for Typical Habitats
5
10
10
Ecological Water Body Status
1
3
5
Parameter Invasive Species
1
3
5
Presence of Doc. Pl. Interests
2
4
4
Extended Cost-Ben. Factor
0.5
1
1
OK
Cancel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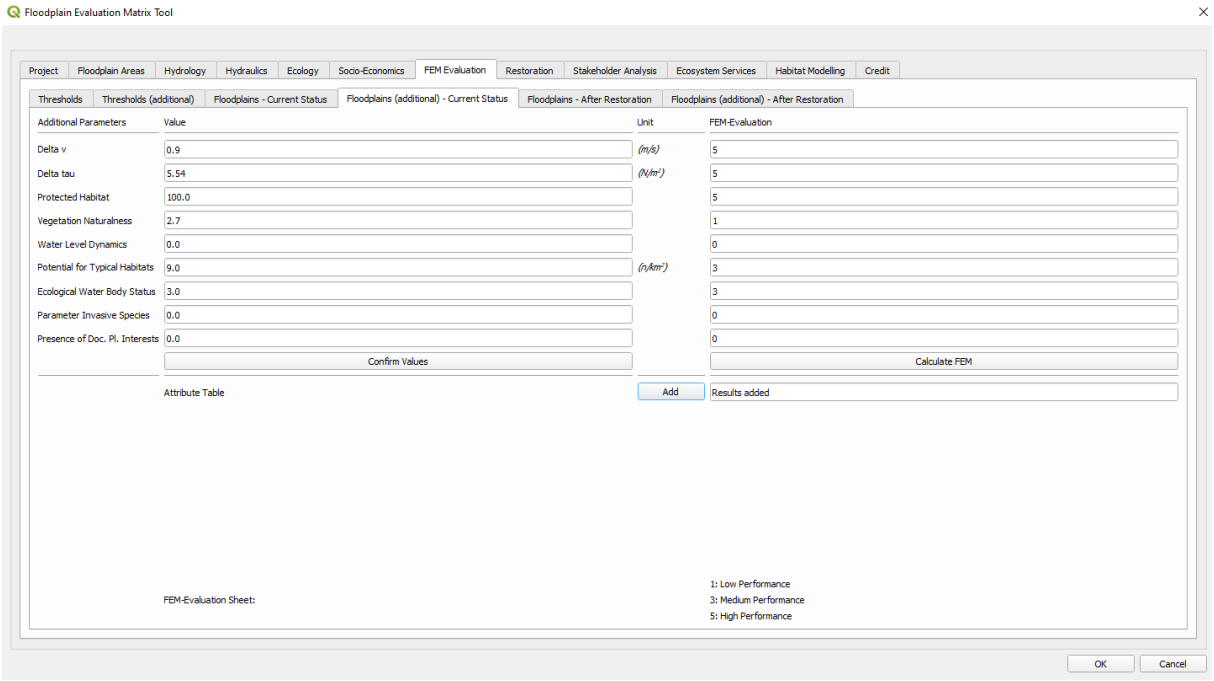
Habitat Modelling
Credit
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Minimum Parameters
Value
Unit
FEM-Evaluation
Peak reduction Delta Q
0.2
(%)
1
Flood wave translation Delta T
11.0
(h)
5
Water level change Delta h
0.35
(m)
1
Connectivity of fp water bodies
5.0
3
Existence of protected species
171.0
5
Potentially affected buildings
0.0
(n/km²)
5
Land use
3.607
3
Confirm Values
Calculate FEM
Sum :
23
Restoration Demand :
Medium Demand
Need for Preservation:
Yes
Attribute Table
Add
Results added
FEM-Evaluation Sheet:
1: Low Performance
3: Medium Performance
5: High Performance
OK
Cancel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Ecosystem Services
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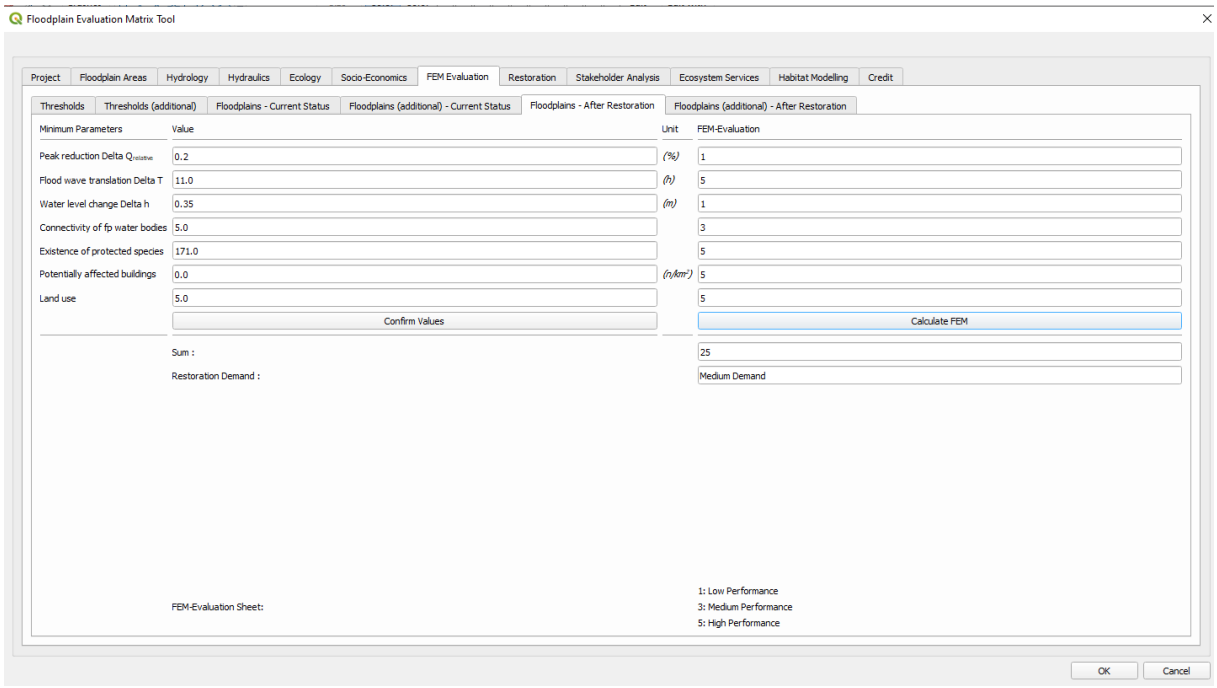
Credit
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Additional Parameters
Value
Unit
FEM-Evaluation
Delta v
0.9
(m/s)
5
Delta tau
5.54
(N/m²)
5
Protected Habitat
100.0
5
Vegetation Naturalness
2.7
1
Water Level Dynamics
0.0
0
Potential for Typical Habitats
9.0
(n/km²)
3
Ecological Water Body Status
3.0
3
Parameter Invasive Species
0.0
0
Presence of Doc. Pl. Interests
0.0
0
Confirm Values
Calculate FEM
Attribute Table
Add
Results added
FEM-Evaluation Sheet:
1: Low Performance
3: Medium Performance
5: High Performance
OK
Cancel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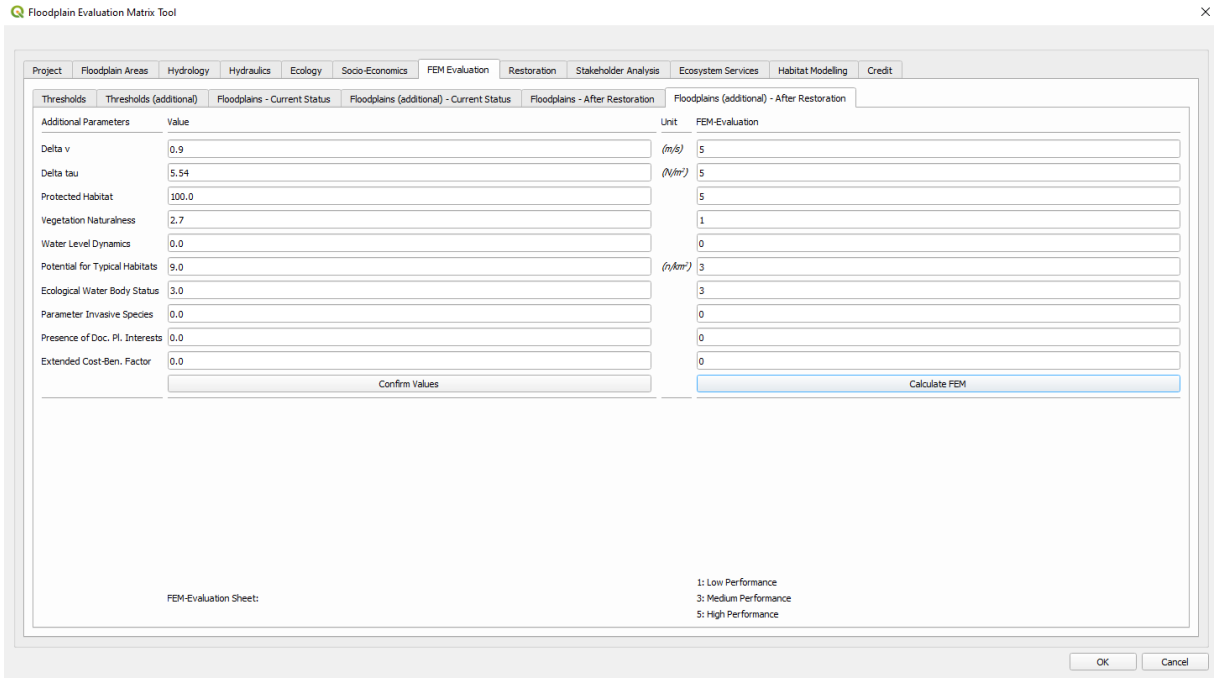
Credit
Thresholds
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Minimum Parameters
Value
Unit
FEM-Evaluation
Peak reduction Delta Q relative
0.2
(%)
1
Flood wave translation Delta T
11.0
(h)
5
Water level change Delta h
0.35
(m)
1
Connectivity of fp water bodies
5.0
3
Existence of protected species
171.0
5
Potentially affected buildings
0.0
(n/km²)
5
Land use
5.0
5
Confirm Values
Calculate FEM
Sum :
25
Restoration Demand :
Medium Demand
FEM-Evaluation Sheet:
1: Low Performance
3: Medium Performance
5: High Performance
OK
Cancel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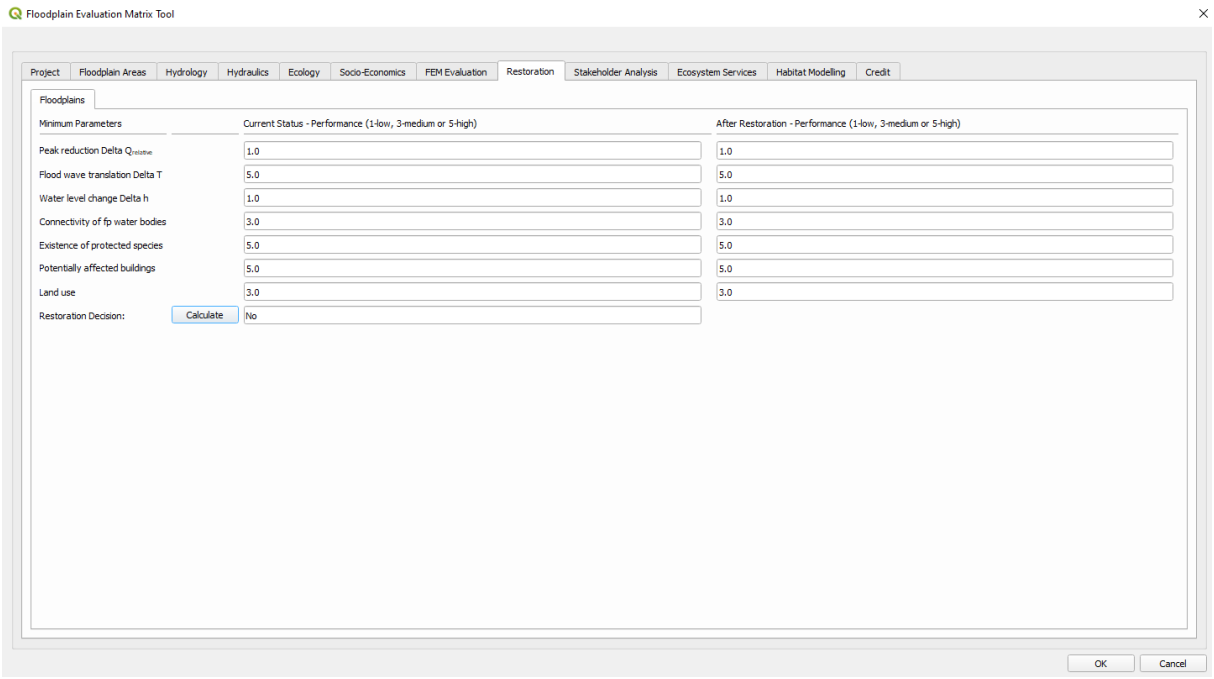
Thresholds (additional)
Floodplains - Current Status
Floodplains (additional) - Current Status
Floodplains - After Restoration
Floodplains (additional) - After Restoration
Additional Parameters
Value
Unit
FEM-Evaluation
Delta v
0.9
(m/s)
5
Delta tau
5.54
(N/m²)
5
Protected Habitat
100.0
5
Vegetation Naturalness
2.7
1
Water Level Dynamics
0.0
0
Potential for Typical Habitats
9.0
(n/km²)
3
Ecological Water Body Status
3.0
3
Parameter Invasive Species
0.0
0
Presence of Doc. Pl. Interests
0.0
0
Extended Cost-Ben. Factor
0.0
0
Confirm Values
Calculate FEM
FEM-Evaluation Sheet:
1: Low Performance
3: Medium Performance
5: High Performance
OK
Cancel


Floodplain Evaluation Matrix Tool
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Floodplain Areas
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Hydraulics
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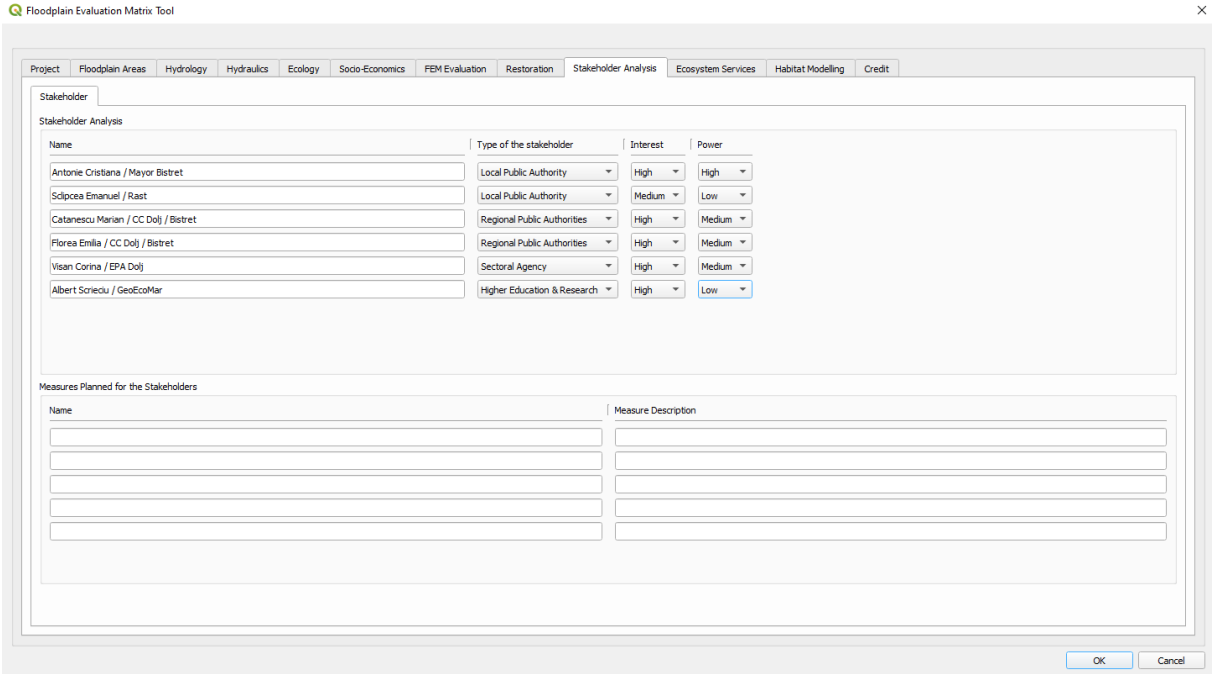
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Floodplains
Minimum Parameters
Current Status - Performance (1-low, 3-medium or 5-high)
After Restoration - Performance (1-low, 3-medium or 5-high)
Peak reduction Delta Q
Flood wave translation Delta T
Water level change Delta h
Connectivity of fp water bodies
Existence of protected species
Potentially affected buildings
Land use
Restoration Decision:
Calculate
No
OK
Cancel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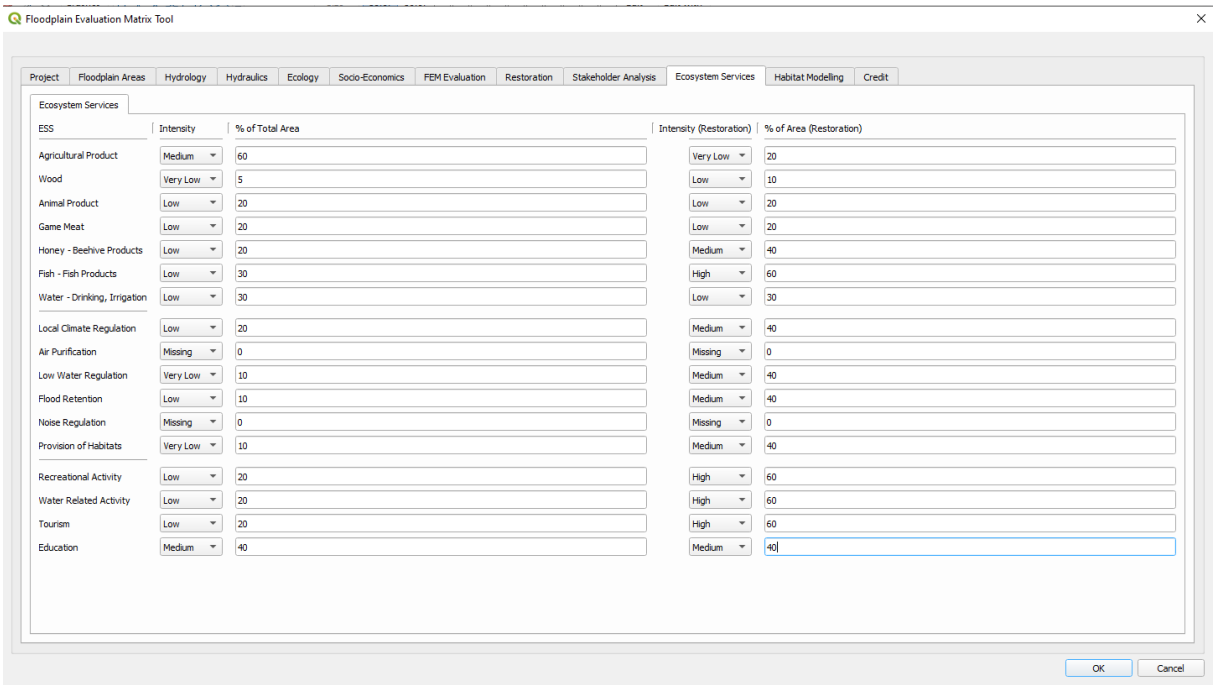
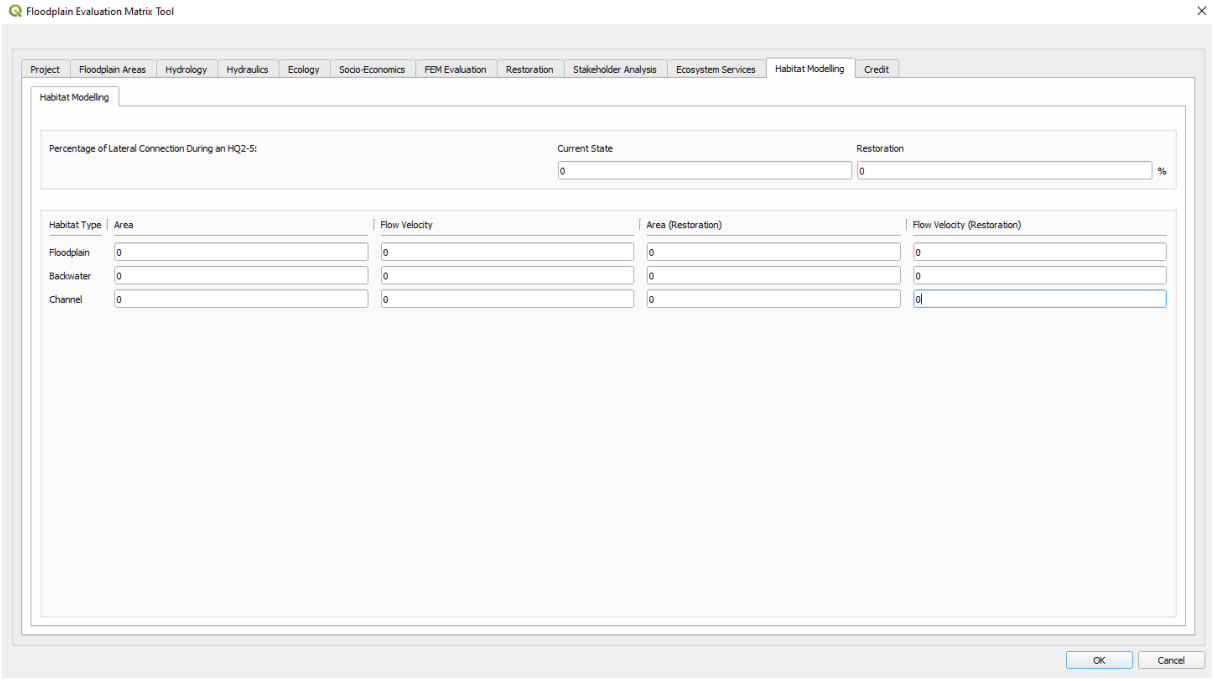
Floodplain Areas
Hydrology
Hydraulics
Ecology
Socio-Economics
FEM Evaluation
Restoration
Stakeholder Analysis
Ecosystem Services
Habitat Modelling
Credit
Stakeholder
Stakeholder Analysis
Name
Type of the stakeholder
Interest
Power
Antonie Cristiana / Mayor Bistret
Local Public Authority
Sclipcea Emanuel / Rast
Catanescu Marian / CC Dolj / Bistret
Regional Public Authorities
Florea Emilia / CC Dolj / Bistret
Visan Corina / EPA Dolj
Sectoral Agency
Albert Scrieciu / GeoEcoMar
Higher Education & Research
Measures Planned for the Stakeholders
Measure Description
OK
Cancel




Also, the results of applying the FEM-Tool are generated in a synthetic way within two factsheets, presented below.

# Danube Floodplain - Bistret Fact Sheet

Countries: Romania
Editor: National Institute of Hydrology and Water Management
Date: 15.11.2021

| Need For Preservation | Restoration Demand |
|---|---|
| Yes | Medium Demand |

| Hydrology | |
|---|---|
| Peak Reduction | 1 |
| Flood Wave Translation | 5 |

| Hydraulics | |
|---|---|
| Water Level Change | 1 |
| Flow Velocity Change | 5 |
| Bed Shear Stress Change | 5 |

| Ecology | |
|---|---|
| Connectivity of FWB | 3 |
| Protected Species | 5 |
| Protected Habitat | 5 |
| Vegetation Naturalness | 1 |
| Water Level Dynamics | 0 |
| Potential for Typ. Habitats | 3 |
| Ecological Water Body Status | 3 |
| Invasive Species | 0 |

| Socio-Economics | |
|---|---|
| Affected Buildings | 5 |
| Land Use | 3 |
| Presence of Doc. Pl. Int. | 0 |

| FEM Rating Performance | Ranking |
|---|---|
| High | 5 |
| Medium | 3 |
| Low | 1 |

# Danube Floodplain - Bistret Fact Sheet

Countries: Romania
Editor: National Institute of Hydrology and Water Management
Date: 15.11.2021

Stakeholder Analysis

| Name | Type of Stakeholder | Interest | Power |
|---|---|---|---|
| Antonie Cristiana / Mayor Bistret | Local Public Authority | High | High |
| Sclipcea Emanuel / Rast | Local Public Authority | Medium | Low |
| Catanescu Marian / CC Dolj / Bistret | Regional Public Authorities | High | Medium |
| Florea Emilia / CC Dolj / Bistret | Regional Public Authorities | High | Medium |
| Visan Corina / EPA Dolj | Sectoral Agency | High | Medium |
| Albert Scrieciu / GeoEcoMar | Higher Education & Research | High | Low |

Habitat Modelling

| | Current State | Restoration | |
|---|---|---|---|
| ateral Con. during HQ 2-5 | 0 | 0 | % |

| pe | Area | Flow Velocity | Area Res. | Flow Velocity Res. |
|---|---|---|---|---|
| | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 |

Measures Planned for the Stakeholders

| Name | Measure Description |
|---|---|
| | |
| | |
| | |
| | |
| | |

Restoration

| Minimum Parameters | Current Status - Perf. | After Rest. - Perf. |
|---|---|---|
| Delta Q relative | 1.0 | 1.0 |
| Delta T | 5.0 | 5.0 |
| Delta h | 1.0 | 1.0 |
| Conn. of fp Water Bodies | 3.0 | 3.0 |
| Existence of proct. species | 5.0 | 5.0 |
| Potentially affected buildings | 5.0 | 5.0 |
| Land use | 3.0 | 3.0 |
| Restoration Decision | No | |

Ecosystem Services

| ESS | Intensity | Per. Total Area | Intensity Res. | Per. Total Area Res. |
|---|---|---|---|---|
| Agricultural Prod. | Medium | 60 | Very Low | 20 |
| Wood | Very Low | 5 | Low | 10 |
| Animal Prod. | Low | 20 | Low | 20 |
| Game Meat | Low | 20 | Low | 20 |
| Honey | Low | 20 | Medium | 40 |
| Fish | Low | 30 | High | 60 |
| Water | Low | 30 | Low | 30 |
| Local Cli. Reg. | Low | 20 | Medium | 40 |
| Air Purification | Missing | 0 | Missing | 0 |
| Low Water Reg. | Very Low | 10 | Medium | 40 |
| Flood Retention | Low | 10 | Medium | 40 |
| Noise Reg. | Missing | 0 | Missing | 0 |
| Provision of Hab. | Very Low | 10 | Medium | 40 |
| Recreational Act. | Low | 20 | High | 60 |
| Water Related Act. | Low | 20 | High | 60 |
| Tourism | Low | 20 | High | 60 |
| Education | Medium | 40 | Medium | 40 |