D3.2.2

Report on data included within database

Activity: *3.2*

Activity-Leader:

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Table of Contents

1. Introduction

Among all natural disasters, floods have the greatest damage potential worldwide (UNISDR 2015). In recent years, awareness was raised, leading to the development of new approaches in integrated flood risk management as demanded by the EU Floods Directive (2007/60/EC) by integrating non-structural and structural measures for flood protection. Such new methods of flood mitigation should especially focus on preserving and/or restoring floodplains (Habersack, Schober & Hauer 2015). Therefore, the Activity 3.2 of the Danube Floodplain project aims to identify and evaluate the still active floodplains as well as the reconnection potential along the whole Danube, from the spring in Germany to the Danube Delta in Romania.

A first step for this approach is to develop a methodology to identify the active and potential floodplains, find a consensus about it in the project team and then share this information with Activity 3.1 to display it in the Danube GIS and the Danube Floodplain GIS. Active floodplains are defined as all areas which are still flooded during an HQ_{100} and potential floodplains are areas which are currently not flooded, but have the potential to be reconnected to the river system again.

In the next step both floodplain types should be evaluated with the Floodplain Evaluation Matrix (FEM), which is a holistic, integrative tool for the assessment of hydrological, hydraulic, ecological and socio-economic effects of a floodplain. To serve the project needs best, the FEM parameters and FEM methodology was further developed and accepted by all project partners.

The last step will then be a ranking for all active and potential floodplains including a stakeholder consultation to identify priority areas for preservation and/or restoration.

2. Active and potential floodplains

2.1. Methodology for identification

Active floodplains:

According to the Danube Floodplain application form Activity 3.1 has to develop a Danube Floodplain Inventory (DFInv) of hydraulically predefined floodplain sections focusing on common agreed parameters and attributes enabling a standard multicriteria and multiscale assessment of floodplain functionality. As the identification is largely affecting the application of the FEM in Activity 3.2, especially the numerical modelling for the hydrological and hydraulic parameters, it was decided that the two Activities will develop a methodology for the identification and delineation of floodplains together.

In 2012 the Danube FLOODRISK project created hazard and risk maps for three different scenarios (frequent event HQ_{30}, medium event HQ_{100}, extreme event HQ_{1000}) for the whole Danube and publishes the results in the Danube Atlas. The hydrological processing was performed at different degrees of complexity, depending on the future utilization of the results. Synthetical hydrographs were generated, under the volume conservation hypothesis. For hydraulic simulations in steady state either a unique value of the maximum discharge corresponding to a probability of exceedance P% or an uncertainty interval of the maximum discharges was obtained if taking into account the hydrologic uncertainty. For unsteady state simulations, a family of hydrographs corresponding to the same probability of exceedance P% are obtained. The floods corresponding to the maximum discharges which could lead to the dyke overtopping was considered for hydraulic simulations. (Danube FLOODRISK 2012)

According to the DanubeFLOODRISK project the flood event with a return period of 100 is widely accepted as the design level for flood protection measures along the Danube River. Therefore, these inundation outlines were chosen as the data basis for the identification of the active floodplains in the Danube Floodplain project. If the countries could offer better national flood risk maps (e.g. more accurate, more recently developed), these maps were used for the identification.

To identify not only the inundation outlines of a given scenario but to identify the floodplains itself, a methodology was applied which consider three different criteria, which had to be fulfilled:

- **Ratio factor** of $width_{floodplain}/width_{river}$ (to identify the beginning and end of a floodplain)
- **Minimum size** of an active floodplain (to avoid too small floodplains for the evaluation)
- Current **hydraulic characteristics** of the floodplain, like flow paths and stages may not be altered by the delineation (identified floodplains should represent the natural flow characteristics)

These criteria cannot only be used at the Danube river, but are applicable at every river. In the Danube floodplain project the criteria were also applied at the selected tributaries in Activity 3.3. Only the values for the first two criteria have to be adjusted for the selected river. For the Danube river the following values were selected:

- A ratio factor of $width_{floodplain}/width_{river}$ > 1:1
- A minimum floodplain size of 500 ha
- Floodplain must be hydraulically connected and characteristic flow behaviour is given

This methodology was developed to identify floodplains at the Danube river which should be evaluated with the Floodplain Evaluation Matrix (FEM) and displayed in the Danube GIS. The methodology was then further developed to also take into account the floodplain areas which are not evaluated but nevertheless morphologically and ecologically valuable areas. Therefore, the floodplains were grouped in three groups:

- **1st group:** floodplains identified according to the methodology described before, bigger than 500ha, which will be evaluated and ranked by the FEM

- **2nd group:** floodplains smaller than 500ha but with a floodplain width bigger than the width of the river. These floodplains will be displayed in the Danube Floodplain GIS, which will be developed by Activity 3.1
- **3rd group:** riparian zones with a width smaller than the river width. These riparian zones will not be displayed or evaluated as the effect for flood risk management is minor, but are nevertheless important for the ecology and morphology.

The methodology was then applied to the Danube by BOKU and the resulting floodplains were sent to each partner for the final check-up. Proposed changes, like the splitting of floodplains if a major tributary had its confluence in the floodplain, were made and the final version of the floodplains were uploaded to the geodatabase of Activity 3.1.

Potential floodplains:

After the identification of all active floodplains along the Danube, BOKU developed a methodology for the identification of potential floodplains, which are floodplains that have the potential for reconnection to the river system but are currently not connected.

For the potential floodplains we again used the data from the Danube FLOODRISK project available at the Danube Atlas, but this time the $HQ_{extreme}$ was relevant for the delineation. For the identification it was suggested to the partners to also use historical maps if available.

In the context of the project, it was decided to differentiate between two types of potential floodplains, namely “realistic” potential and “operational” potential floodplains. The difference between these two types is that the “operational” potential floodplains are identified and discussed with stakeholders, technical experts and decision makers. In the following it is described how the identification of “realistic” potential floodplains is working:

Step 1: Identify former floodplains by using the $HQ_{extreme}$ inundation outline from the Danube Atlas or historical maps

Step 2: Exclude settlements, infrastructure and streets in the former floodplain

Step 3: Exclude agricultural land where no compensation is possible or too expensive. This can also be done after the modelling of the potential floodplains in WP4

Step 4: Define the Danube Floodplain scenario for this “realistic” potential floodplains. The scenario for the reconnection (e.g. cut of dams, removal of dams, land use change) will then be used for the modelling of the potential floodplains in WP4.

Step 5: Discuss with stakeholders to define the “operational” potential floodplain and the technical aspects of the reconnection. This is not done in the Danube Floodplain project.

Additionally, historical conditions could be analysed by modelling the whole river section without dams and power plants. The methodology was accepted by all partners and applied in each country individually.

2.2. Naming convention

To make the identification of the floodplains and thus the evaluation easier, each floodplain gets a unique code which will be used for communication and in the Danube Floodplain GIS as well as the FEM. The following code was proposed to the partners and accepted:

Country ISO code + River name (short) + floodplain type + number in the country

The name of the floodplain will consist of four parts. The first part is the country ISO code, the second part is the short name or code of the river, the third part is the type of the floodplain (AFP = active floodplain, PFP = potential floodplain) and the fourth part is the number of the floodplain in the country. For transboundary floodplains both country ISO codes will be at the beginning and the first floodplain in the country which is not transboundary will start again with the number 01.

Examples for the code are the following:
Hungary: HU_DU_PFP_01
Transboundary floodplain: HR_RS_DU_AFP_01

2.3. GIS data for geodatabase

The naming convention was applied for all identified active floodplains. The list can be found here:

Table 1: Floodplain Codes for identified active floodplains at the Danube

Number	Floodplain Code	Country	Area [m²]	Area [km²]
1	DE_DU_AFP01	Germany	9733428	9.73
2	DE_DU_AFP02	Germany	6341410	6.34
3	DE_DU_AFP03	Germany	155544164	155.54
4	DE_DU_AFP04	Germany	32293067	32.29
5	DE_DU_AFP05	Germany	21919980	21.92
6	DE_DU_AFP06	Germany	16446057	16.45
7	DE_DU_AFP07	Germany	7452942	7.45
8	DE_DU_AFP08	Germany	10614732	10.61
9	DE_DU_AFP09	Germany	67163551	67.16
10	DE_DU_AFP10	Germany	45311338	45.31
11	AT_DU_AFP01	Austria	56419212	56.42
12	AT_DU_AFP02	Austria	34799970	34.80
13	AT_DU_AFP03	Austria	72202509	72.20
14	AT_DU_AFP04	Austria	151919917	151.92
15	AT_DU_AFP05	Austria	85338005	85.34

16	AT_SK_DU_AFP01	Austria/ Slovakia	19848538	19.85
17	SK_HU_DU_AFP01	Slovakia/ Hungary	140723865	140.72
18	SK_HU_DU_AFP02	Slovakia/ Hungary	40568389	40.57
19	SK_HU_DU_AFP03	Slovakia/ Hungary	7769102	7.77
20	SK_HU_DU_AFP04	Slovakia/ Hungary	31288876	31.29
21	SK_HU_DU_AFP05	Slovakia/ Hungary	14926152	14.93
22	HU_DU_AFP01	Hungary	32308060	32.31
23	HU_DU_AFP02	Hungary	18170564	18.17
24	HU_DU_AFP03	Hungary	70777563	70.78
25	HU_DU_AFP04	Hungary	44721504	44.72
26	HU_DU_AFP05	Hungary	63776566	63.78
27	HU_DU_AFP06	Hungary	20348375	20.35
28	HU_DU_AFP07	Hungary	159040314	159.04
29	HU_DU_AFP08	Hungary	9010737	9.01
30	HU_HR_RS_DU_AFP01	Hungary/ Croatia/ Serbia	48220903	48.22
31	RS_HR_DU_AFP01	Serbia/ Croatia	280482286	280.48
32	RS_HR_DU_AFP02	Serbia/ Croatia	19611034	19.61
33	RS_HR_DU_AFP03	Serbia/ Croatia	24622685	24.62
34	RS_HR_DU_AFP04	Serbia/ Croatia	30000401	30.00
35	RS_HR_DU_AFP05	Serbia/ Croatia	48431147	48.43
36	RS_DU_AFP01	Serbia	34813368	34.81
37	RS_DU_AFP02	Serbia	74807213	74.81
38	RS_DU_AFP03	Serbia	27658060	27.66
39	RS_DU_AFP04	Serbia	18384260	18.38
40	RS_DU_AFP05	Serbia	43235057	43.24
41	RO_BG_DU_AFP01	Romania/ Bulgaria	60123579	60.12
42	RO_BG_DU_AFP02	Romania/ Bulgaria	32282003	32.28
43	RO_BG_DU_AFP03	Romania/ Bulgaria	29334390	29.33
44	RO_BG_DU_AFP04	Romania/ Bulgaria	81712312	81.71
45	RO_BG_DU_AFP05	Romania/ Bulgaria	25477912	25.48
46	RO_BG_DU_AFP06	Romania/ Bulgaria	33593207	33.59
47	RO_DU_AFP01	Romania	50341607	50.34
48	RO_DU_AFP02	Romania	79448929	79.45
49	RO_DU_AFP03	Romania	93584012	93.58
50	RO_DU_AFP04	Romania	298756341	298.76
51	RO_DU_AFP05	Romania	3151000000	3151.00

The first version of the floodplains was uploaded as a shape file to the geodatabase by BOKU. The partners then modified those files according to their internal decisions. A new version has to be uploaded after the evaluation of the floodplains took place. This version will then include additional fields for the FEM parameter values and the corresponding evaluation. The potential floodplains had to be uploaded directly by the partners and will also have an additional version after the FEM evaluation with the corresponding fields.

3. Floodplain Evaluation Matrix

3.1. Background

The Floodplain Evaluation Matrix (FEM) developed by the Institute of Hydraulic Engineering and River Research at the University of Natural Resources and Life Sciences, Vienna (BOKU) is a holistic tool to evaluate river floodplains by considering multiple parameters that effect and determined the processes within these floodplains (Habersack, Schober & Hauer 2015). The project PRO_Floodplain (Habersack et al. 2008) was carried out in ERA-NET CRUE in order to develop an evaluation method for the effectiveness of floodplains in hydrological/hydraulic, ecological and sociological terms, which was until then not available. The FEM should also serve as a tool for decision support for relevant stakeholders.

The FEM was already applied in different case studies in Austria and Germany and numerable parameters were identified and included based on literature research and questionnaires. Parameters for hydrology (e.g. peak reduction, flood wave translation) and hydraulics (e.g. water level change, flow velocity change) were calculated by using hydrodynamic-numerical models. The ecological parameters were based on GIS analysis (e.g. adapted land use), hydrodynamic-numerical modelling (e.g. Connectivity of water bodies) or with expert evaluation (e.g. potential for development of typical habitats). The sociological parameters (e.g. type of usage) were mainly based on questionnaires and surveys. (Habersack et al. 2008; Habersack, Schober & Hauer 2015)

With this methodology a valuable decision support tool is available for relevant stakeholders to assess the multiple benefits that floodplain restoration and preservation as a sustainable non-technical measure can offer as it is demanded by the EU Floods Directive (2007/60/EC). In general, it allows the evaluation of various river reaches by setting up a priority ranking which indicates where efforts of floodplain preservation / restoration should be spent first in order to obtain maximum benefits. The preservation of whole floodplains would stop the temporal floodplain losses, which were obtained over the last centuries.

3.2. Selected FEM-parameters

For the Danube Floodplain project the original FEM method was further developed to serve the project needs. Therefore, all possible parameters from previous application of the FEM were collected and explained to the partners. Additional parameters could also be suggested by partners and this list was then discussed with all partners. From the list of parameters, the partners then selected which ones they see as important for the evaluation of the floodplains and they would see possible and meaningful to calculate. BOKU suggested a minimum set of parameters which is mandatory for all partners to be calculated. A medium and extended set of parameters was also prepared, out of the favoured parameters by all partners which serve as additional information in the Danube Floodplain GIS but will not be taken into account for the ranking list. The results will nevertheless be a valuable information for decision makers and as such be shown in the factsheet of each floodplain. The matrix itself consists now of four sections: hydrology, hydraulics, ecology and socio-economics. For each sector one or two parameters were selected as minimum set and at least one parameter for the medium or extended set. The selected parameters and structure is presented hereafter:

Table 2: Floodplain Evaluation Matrix - Danube Floodplain project; in blue: minimum set, in green: medium set, in yellow: extended set

Hydrology	Hydraulics	Ecology	Socio-Economics
peak reduction ΔQ	water level Δh	connectivity of floodplain water bodies	Potentially affected buildings
flood wave translation Δt	flow velocity Δv	Existence of protected species	Land use
effects (pos./neg.) in case of extreme discharges	bottom shear stress	Existence of protected habitats	Precence of documented planning interests
		Vegetation naturalness	
		water level dynamics	
		Potential for typical habitats	
		ecological, chemical and ground water status	

Hydrology:

Flood peak reduction – ΔQ: The flood peak reduction considers the effect of a floodplain on the peak of a flood wave. In order to evaluate the peak reduction for a floodplain, the peak of an input hydrograph (e.g. HQ_{100}) at the beginning of the floodplain and the peak of the output hydrograph at the end of the floodplain will be determined. The difference between the peaks is the peak reduction ΔQ [m³/s] for the investigated floodplain.

Flood wave translation – Δt: The flood wave translation is the second parameter required for the investigation of the process of wave attenuation due to a floodplain. 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.

Effects in case of extreme discharge: Effects of floodplain areas on hydrological parameters (ΔQ, Δt) for scenarios with discharges larger (HQ_{1000}) than the design discharge (HQ_{100}) of flood protection measures are also incorporated in the FEM to account for remaining risk (higher discharges due to climate change). Hydrodynamic-numerical modelling of the higher discharge (HQ_{1000}) can highlight additional capacities of floodplains or increased risks for settlements behind the dykes (e.g. by overtopping of existing dykes). The evaluation considers the effects on peak reduction and flood wave translation in each floodplain for this higher discharge compared to HQ_{100}.

Hydraulics:

Water level change – Δh: A hydrodynamic-numerical model is used to determine the influence of changes in floodplain geometry (e.g. by dyke-shifting). Reducing or extending floodplain widths by modelling of fictive dykes exhibits how big changes in the water level surface of the scenarios (Δh) can be. The observed values can be calculated in a cross section at the middle or/and end of the floodplain or in the next settlement. In this project, we want to show the effects of a total loss of a floodplain on the water level. Hence, we compare the water levels of the two scenarios in the river channel at the middle of the floodplain.

Flow velocity – Δv: A hydrodynamic-numerical model is used to determine the influence of changes in floodplain geometry (e.g. by dyke-shifting). Reducing or extending floodplain widths by modelling of fictive dykes exhibits how big changes in the flow velocity of the scenarios (Δv) can be. The observed values can be calculated in a cross section at the middle or/and end of the floodplain or in the next settlement. With this parameter, we want to show the effects of a total loss of a floodplain on the flow velocity. Hence, we compare the velocities of the two scenarios in the river channel at the middle of the floodplain.

Bottom shear stress – Δτ: A hydrodynamic-numerical model is used to determine the influence of changes in floodplain geometry (e.g. by dyke-shifting). Reducing or extending floodplain widths by modelling of fictive dykes exhibits how big changes in the bottom shear stress of the scenarios (Δτ) can be. The observed values can be calculated in a cross section at the middle or/and end of the floodplain or in the next settlement. With this parameter, we want to show the effects of a total loss of a floodplain on the bottom shear stress. Hence, we compare the bottom shear stresses of the two scenarios in the river channel at the middle of the floodplain.

Ecology:

Connectivity of floodplain water bodies: Connectivity is crucial for the functionality of riverine ecosystems. The longitudinal connectivity describes the connectivity in the up- and downstream direction and is especially relevant for the exchange of populations of water organisms and their migration during their life cycle, the lateral connectivity refers to the connection of the river channel and the floodplain and the vertical connectivity is the connection of the river channel and the ground water table in the floodplain (which might be crucial for small temporary water bodies in the floodplain). For simplification, the connectivity of floodplain water bodies will be investigated only in the lateral direction.

Existence of protected species: A floodplain is valuable and should be preserved if red list species or species and habitats (recognized by Natura2000) are found on the area. Therefore, this parameter will evaluate how many protected species can be found at the floodplain according to Natura2000 or the Emerald Network.

Existence of protected habitats: This parameter shows what part of the floodplain area is designated as protected area according to the Natura 2000 or other documents about protected species or habitats like the Emerald Network. The higher the share of protected areas, the more valuable is the floodplain.

Vegetation naturalness: The landscape patterns of a floodplain can be a good indicator for the naturalness of vegetation. Therefore, it is possible to calculate patch-level landscape indices (like the class level landscape metric Area Weighted Mean Shape Index (AWMSI) for all land cover polygons of natural and semi natural areas (NSN) with the V-LATE extension of ArcGIS. NSN patches with a complex shape with irregular edges indicate a higher level of naturalness.

Water level dynamics: In order to restore floodplain habitats, rivers and floodplains must have a water level dynamic, almost like the one that exists in the natural floodplains. For this reason, the water level dynamics are used as a FEM parameter. If important changes have been made on the river, floodplain areas may have completely different water level dynamics. This can result in permanently (excessive) high water levels in dammed up parts of the river or in dry floodplain areas in deepened river segments. An uncontrolled retention is impossible where barrages have been built, which means that this is also a criterion for exclusion with a view to the implementation of non-technical floodplain enlargements. The parameters water level duration, frequency of the flood and amplitude of the water levels are summarized to describe the possible water level dynamics. The historical state before the development of the river serves as a point of reference.

Potential for typical habitats: The typical river and floodplain habitats should have the possibility to re-establish habitats if they are not already existing. 14 habitat types typical for floodplains are included in the Habitats Directive. Not every area must include all, but the more habitat types exist or can be redeveloped, the more valuable is this area. The parameter evaluates how many of the typical habitats are available at the floodplain or could be restored.

Ecological, chemical and ground water status: As part of the water framework directive, the countries should evaluate the ecological and chemical status of the water bodies as well as the chemical and quantitative status of groundwater bodies in the floodplain. If the river section of this floodplain is rated with a good or very good status, it should get a high ranking for this parameter.

Socio-Economics:

Potentially affected buildings: This parameter determines the number of buildings on each active floodplain. The more buildings are affected, the higher is the potential damage. To compare the results, the number of buildings will be divided by the total area of the floodplain.

Land use: Land use that is adapted to future inundation will minimize the socio-economical vulnerability of the floodplain. Therefore, flood-adapted land use gets the highest rating, non-adapted the lowest (crop farming, settlements). The different types of land uses are aggregated proportional to their areas to one evaluation value for the whole floodplain.

Presence of documented planning interests: This parameter evaluates the presence of infrastructure or spatial development plans/projects in the floodplain area or close to it. A presence would lead to a lower ranking of the floodplain. This can also include plans from other interest groups (agriculture, tourism, hunting, fishing, etc.)

3.3. Parameter structure for geodatabase

For all datasets, it was decided to use ESRI file Geodatabases in ETRS89 (European Terrestrial Reference System). For the geodatabase it is necessary to define for each FEM parameter the fieldname, the data type and the Unit. Together with the Activity 3.1 leader the parameter structure for the database was selected. This structure will be used for the shape files of the active and potential floodplains. Each floodplain polygon has to be filled with the results of the FEM calculation and evaluation and uploaded in the database. The following structure is proposed for the database:

Table 3: parameter structure for geodatabase of active and potential floodplains (blue colouring indicates minimum, green colouring medium, yellow colouring extended FEM-parameters)

Name of field	data type	Full name of the parameter	Unit
DFGIS_ID	text	ID of the floodplains	
FP_Type	text	Active, former, realistic potential	
Location	text	Name/location of the floodplain	
Transbound	text	?	
Area	numeric	Area (ha)	ha
delta_Q	numeric	peak reduction ΔQ	%
delta_t	numeric	flood wave translation Δt	%
delta_h	numeric	water level change Δh	cm
C_fp_wb	numeric	Connectivity of floodplain water bodies	no unit, direct FEM evaluation
Prot_spp	numeric	Existence of protected species	Nr
Building	numeric	potentially affected buildings	Nr/km²

Land_use	numeric	Land use	no unit, direct FEM evaluation
R_delta_Q	numeric	FEM Rating of peak reduction ΔQ	1 to 5
R_delta_t	numeric	FEM Rating of flood wave translation Δt	1 to 5
R_delta_h	numeric	FEM Rating of water level change Δh	1 to 5
R_C_fp_wb	numeric	FEM Rating of Connectivity	1 to 5
R_Prot_spp	numeric	FEM Rating of Existence of protected species	1 to 5
R_Building	numeric	FEM Rating of potentially affected buildings	1 to 5
R_Land_use	numeric	FEM of Rating of Land use	1.00 to 5.00
Hyd_eff	numeric	effects in case of extreme discharge	% for dQ and dt
delta_v	numeric	flow velocity Δv	cm/s
prot_hab	numeric	Existence of protected habitats	%
veg_nat	numeric	Vegetation naturalness	no unit, direct FEM evaluation
WL_dyn	numeric	water level dynamics	no unit, direct FEM evaluation
p_int	numeric	Presence of documented planning interests	no unit, direct FEM evaluation
R_Hyd_eff	numeric	FEM Rating of effects in case of extreme discharge	1 to 5
R_delta_v	numeric	FEM Rating of flow velocity Δv	1 to 5
R_prot_hab	numeric	FEM Rating of Existence of protected habitats	1 to 5
R_veg_nat	numeric	FEM Rating of Vegetation naturalness	1 to 5
R_WL_dyn	numeric	FEM Rating of water level dynamics	1 to 5
R_pl_int	numeric	FEM Rating of Presence of documented planning interests	1 to 5
delt_Tau	numeric	bottom shear stress Δτ	N/m^2
p_tp_hab	numeric	potential for typical habitats	Nr out of 14
wb_stat	text	ecological, chemical, ground water status	very good, good, moderate, bad, very bad
R_delt_Tau	numeric	FEM Rating of bottom shear stress Δτ	1 to 5
R_p_tp_hab	numeric	FEM Rating of potential for typical habitats	1 to 5
R_wb_stat	numeric	FEM Rating of ecological, chemical, ground water status	1 to 5

4. Floodplain factsheet

4.1. Content

In the Danube Floodplain GIS, which will be developed in Activity 3.1, the user should be able to see all relevant data for each active and potential floodplain along the Danube. This includes some general data, like the name and code of the floodplain, the type, location and the area, but also the evaluation of the floodplains. To show this data in a user friendly way, the idea is to allow the user to select each floodplain separately and then get a “factsheet” about it. The factsheet shows all relevant data in a structured way. At the top it will display the general information about the floodplain and a graphic of it, at the bottom the user can find the evaluation of the floodplains for each sector and parameter. At this overview only the minimum set of parameters are visible, which also offer the basis for the floodplain ranking, but if the user selects the button “additional information” all evaluated medium and extended parameters are displayed as well.

4.2. Design

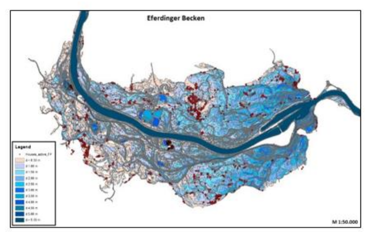
A first draft version of the design was developed by BOKU to discuss it with the project partners and give the partners of Activity 3.1, which are responsible for the development of the geodatabase, an impression about how it should look at the end. The functionality was already described in chapter 4.1, the graphic of the factsheet is presented here:

AT-DU-AFP-01 Eferdinger Becken

Austria
48.323520 14.057468
RKM 2162 – 2144

LENGTH: 18 km　　AREA: 67 km²

MAX. FLOODPLAIN WIDTH: 3 km　　CHANNEL WIDTH: 450 m



FEM-EVALUATION:

Hydrology	Hydraulics	Ecology	Socio-Economics
Peak reduction	Water level change	Connectivity of floodplain water bodies	Potentially affected buildings
Flood wave translation		Existence of protected species	Land use

FEM-Ranking
High performance = 5
Medium performance = 3
Low performance = 1

ADDITIONAL INFORMATION

Figure 1: Example of Danube Floodplain factsheet

5. Literature

Danube FLOODRISK. 2012. *Danube Floodrisk Project Summary Report*. Bucharest.

Habersack, H, C Hauer, B Schober, E Dister, I Quick, O Harms, M Wintz, E Piquette & U Schwarz. 2008. *Flood risk reduction by preserving and restoring river floodplains (PRO_Floodplain)-Final Report*. *Era-Net CRUE 1st Call. Era-Net CRUE, EU*. Oxford.

Habersack, Helmut, Bernhard Schober & Christoph Hauer. 2015. Floodplain evaluation matrix (FEM): An interdisciplinary method for evaluating river floodplains in the context of integrated flood risk management. *Natural Hazards* 75.1. 5–32. doi:10.1007/s11069-013-0842-4.