Strategic Alliance for integrated Water management Actions

Adaptive Measure Database

Final Report WP 2 / 1

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Investing in the future by working together for a sustainable and competitive region

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1. Abstract

One of three main SAWA aims was to compile a Catalogue of Measures organized in a Database which should be able to support decision making process during flood risk management planning cycle. The database should summarize different adaptive measures like Flood Resilience Measures and Flood Probability Reduction Measures. It should consider synergetic measures which are referring to the demands of Flood directive as well as to the demands of Water Framework Directive and it should be accessible for everyone. Basis for the compilation of flood risk mitigation measures is a list of measures published in Pasche, Ashley, Lawson, Schertzer (2008): "Risk Assessment and Risk Management in Small Urban Catchments".

Sawa partnership decided to organize this database within the existing IWA Water Wiki. There are three main reasons why this decision was made.

1. Sawa was able to use and enrich an already existing and well visited database and communication network.
2. SAWA was able to establish project results on a platform that allows them to live beyond the end of SAWA project.
3. Sawa partnership recognized the benefits of a free accessible platform which allows an update of the entries by everyone, at any time and from all over the world.

2. Motivation

To support the change in paradigm from large scale mitigation measures to more adaptive local scale measures, SAWA is offering a holistic appraisal of adaptive measures so that they may be objectively considered by flood risk managers and planners. To achieve this, a transnational interdisciplinary team of experts, practitioners and scientists will form a solid foundation. Upon that the remainder of SAWA will be based by constructing a database for adaptive flood protection measures covering a wide range of scales from individual properties to whole developments. A number of relevant case studies on an EU wide level have been identified. Each case study will serve as reference for the development of new adaptive measures and became integrated within the database. Each measure is linked with key cost indicators, a DSS tool and a guidance document on cost-benefit analysis. The offered Catalogue of Measures is based on SAWA activities and aims for being considered during adaptive FRM-planning process.

3. Target Group

SAWA - Database on Adaptive measures delivers the experiences and outcomes of the three-year work on adaptive measures considered when developing FRMPs, DSS tools and Capacity Building activities in the SAWA pilot regions. It targets all parties involved in the design and conduction of the flood risk management planning process, mostly being the

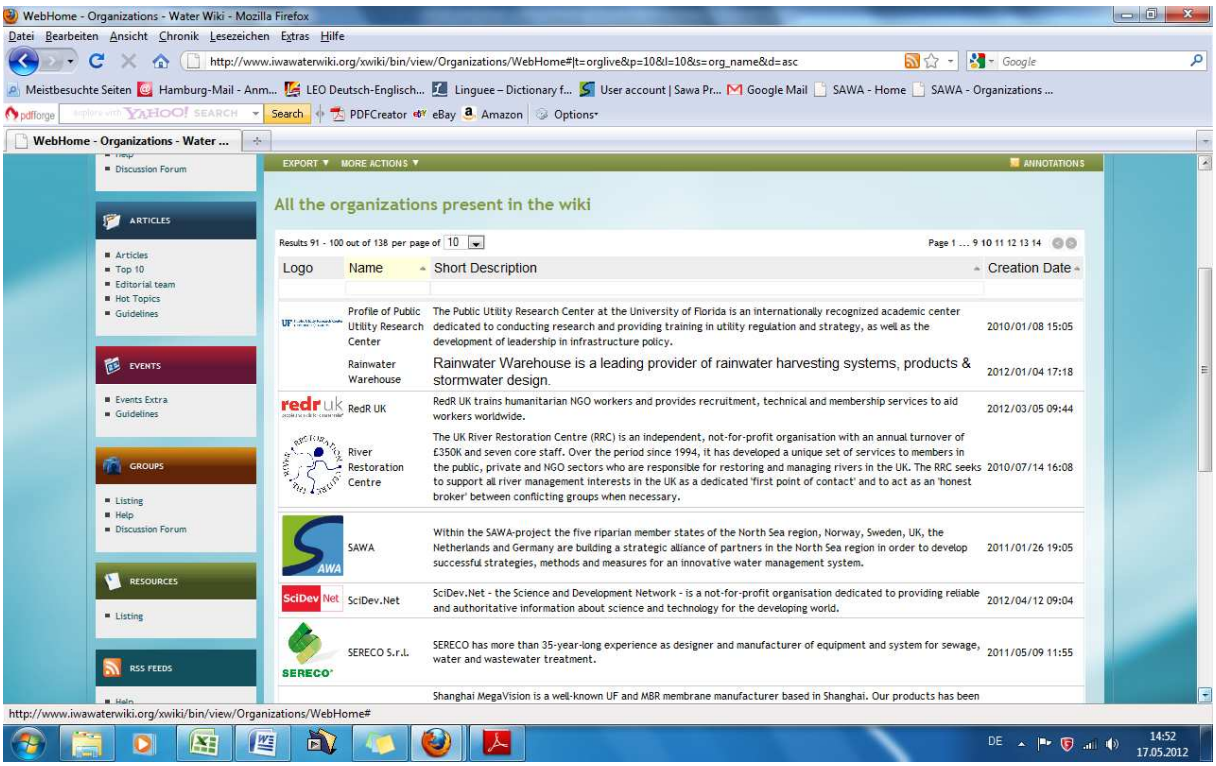
responsible authorities together with the decision makers, research institutions and consultants.

4. Introduction to IWA Water Wiki

The **IWA WaterWiki** aims to provide a platform for the global water community to interact and share knowledge online at http://www.iwawaterwiki.org.
The site will be a reference for all areas of water, wastewater and environmental science and management. This is the place for water professionals worldwide to interact, share knowledge and increase understanding.
This wiki is a collaborative website that everybody can read and anyone can edit. In order to edit the WaterWiki the user must first complete a simple registration process. The content of articles is contributed by the users themselves and appears live for everyone to see instantaneously. The IWA WaterWiki aims to be THE online reference point for water, wastewater and environmental science and management issues. Alongside this it provides a wider set of features that will enable community discussion and interaction:

- Articles
- Article Discussion
- Organization Profiles
- User Profiles
- Forum
- RSS Feeds

SAWA became one of 138 represented organizations from all over the world.
The SAWA Database on Adaptive Measures became integral part of IWA Water Wiki.



5. Structure of the Database

On the welcome page, the selected measures can be found after a short project description. The measures are clearly arranged whereas all measures concerning Flood Resilience are listed at first (in groups of six sub items: Capacity Building, Decision Support Tools, Land Use Control, Adapted Land Use, Contingency Measures, Flood Preparedness). Afterwards, Flood Probability Reduction Measures are presented (in groups of four sub items: Sustainable Urban Drainage Systems, Controlled Surface Conveyance, Watercourse Restoration, and Traditional Flood Defence Measures).

Table 1: Enumeration of adaptive measures contained in SAWA Database

Flood Resilience Measures	**Flood Probability Reduction Measures**
Capacity Building 1. Flood Maps and Plans • Flood Hazard Maps • Flood Risk Maps • Flood Risk Management Plans 2. Public Engagement (like Information Brochure "Flooding and Agriculture") Decision Support Tools 1. Decision Support in General - Decision support tools management/ operation - Decision support tools planning Land Use Control 1. Building Codes/ Regulation 2. Zoning Ordinance/ Zoning Maps Adapted Land Use 1. Afforestation 2. Conversion to extensive grassland (like Floodplain Management) 3. Land set aside 4. Managing Cultivation for Flood Risk Management 5. Depth Loosening 6. Green Corridors/ Strips Contingency Measures 1. Flood Protection, Evacuation and Rescue Plans (like Livestock Evacuation Plan) 2. Flood Forecasting and Warning Services (like Flood Warning Service Agriculture) 3. Flood Control Emergency Operation 4. Mobile/ Demountable Flood Defence Devices 5. Flood disaster Recovery Plans 6. Insuring Flood Risk 7. Reserve Fond for Flood Consequences Flood Preparedness 1. Flood Adaptive Architecture	Sustainable Urban Drainage Systems 1. Keeping / reconstituting groundwater (like Unsealing Measures, Permeable Paving) 2. Evaporation and retention structures (like Green Roofs, Rain Gardens) 3. Filtering and retention structures (like Constructed Wetlands, Soil Filters, Sedimentation Structures - ponds / basins) 4. Infiltration and retention structures (like Filter Strips and Swales, Infiltration Trenches, Filter Drains etc.) 5. Rainwater Harvesting Controlled Surface Conveyance 1. Conveyance Structures 2. Multi Functional Space Watercourse Restoration 1. Relocation of Dikes (like Impact Study "Dyke Relocation") 2. River/ Floodplain Maintenance 3. River / Floodplain Maintenance - measures influencing roughness (like Development of flood plain forests) or to manage debris (like Trash Screens). Traditional Flood Defense Measures 1. Flood Defence Wall/Embankments/dikes (Dykes) 2. Flood Safety Standard 3. Retention Structures 4. Optimizing the Operation of Retention Structures 5. Groundwater Defence

At the end of the welcome page you will find a link to the Cost benefit analysis (see chapter cost benefit analyses). Depending on interests and problems of the user, any different measure can be chosen by only a mouse click which opens a new page presenting data for more specialized questions.

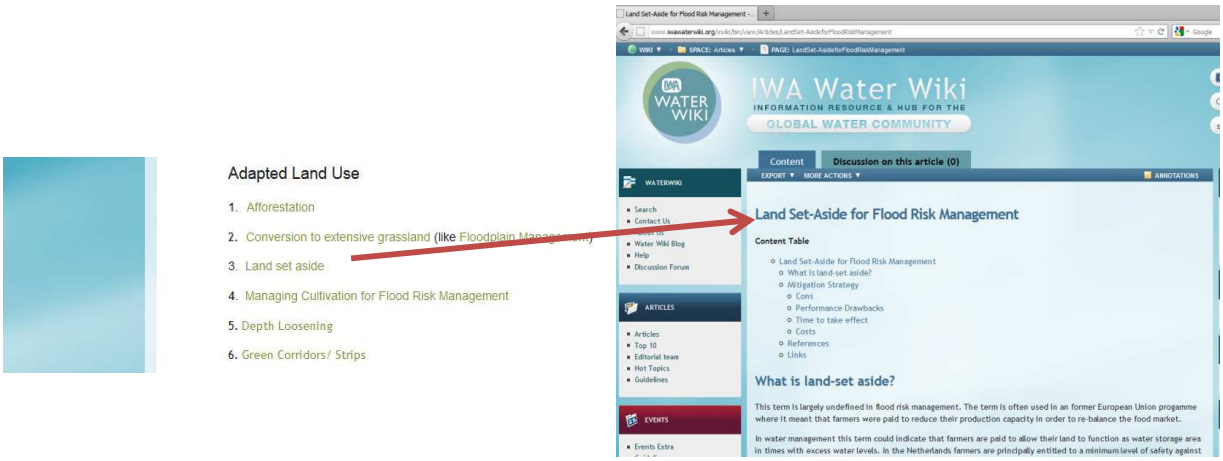


Figure 1: Selection of a measure to open a new page for specific application

The formal structure of the measure page will be retained. This will help the user to find its way. The pages are structured in:

- General description
- Pro and Con
- Literature and links
- Case studies

On each page, there is a back link (in case of very long pages even two) that guides you back to the welcome page, where you can select another measure. At the end of each created page within SAWA, the logos and the reference to the authors can be found (Figure 2).

Figure 2: Back link and presentation of Logos on the end of a measure page

6. Linkage

Many measures contain figures or pictures which contribute a better understanding and clearness of the measure. Besides, there are many links within the text showing:

Links within WaterWikis:

- to other measure described by SAWA (example Forecasting/ Decision Support)
- Towards detailed descriptions of SAWA case studies (Decision Support Systems/MDST Sweden)

Links to external websites:

- Links directly to online bibliography (e.g. Flood and Risk Mapping Sweden)
- Links to producers, organisations (e.g. Mall, European Soil Portal,FBR)
- Links to education platforms (e.g.ViWa)
- Links to videos (e.g. Deep Water)
- Links to presentations (e.g. Green roofs and Rain gardens)
- Links to further relevant websites (SAWA homepage)

The links are both located within the text and underneath figures. The most important links are also listed at “Literature and Links”.

7. Content of Measure Description

7.1. General

As mentioned above, measure characteristics start with a general description. Hereby, we started with the main aim of a measure (e.g. rainwater management, protection of soil erosion in agriculture). Subsequently, the contribution of the measure to flood protection is demonstrated. It is shown, how water can be retained and/or discharged decelerated. Also impacts on questions of the water frame work directive are pointed out, if existing. Besides, hints for the implementing are given, limitations are shown and if nameable costs are listed.

7.2. Pro and Con

The Pro and Contra link enlists advantages and disadvantages of measures. Thereby, the measures are evaluated regarding:

- Impact on water balance / flood protection (positive effect for e.g. infiltration, evaporation)
- Impact on eco systems (waters/ soils)
- Sustainability (long term effect, life span)
- Protection/impact of/on quality of resources (groundwater/ soil)
- Operating expense, practicability (acceptance, availability of area)
- Costs and required space (additional space necessary?)
- Maintenance expense (or upkeep)
- Impact on climate (e.g. CO2 reduction)
- Impact on characteristic landscape (recovery effect)

7.3. Literature and Links

“Literature and links” contains mainly all sources for the measure descriptions. Furthermore, links to relevant SAWA projects, examples and producers, organisations and unions are enlisted.

7.4. Case studies

“Case studies” primarily lists projects within SAWA. In the following description you can find short remarks to the project, a reference to the SAWA website and detailed information about the measures (extensive reports, presentations). Afterwards, further projects are shortly described and linked as well.

7.5. Examples

Two sites are exemplarily selected to illustrate the content.

7.5.1. Example „Public Engagement“

First of all, there is a short introduction about the meaning of Public Engagement. Afterwards, the three items information, education and participation are presented in more detail. The list of possible information shows already the tight connection to the SAWA project. It is linked towards flood animation studio (Figure3 point 1) and also flood walk (Figure 3 point 2) as example for possible information strategy. The figure of the booklet “Flooding and Agriculture“ (Figure 3 point 3) represents the results of the SAWA project. At the item “education”, the division into three sub items school, university and officials simplify the general view of the user. For each target group, the SAWA projects are already linked within the general list (e.g. dyke defence class (Figure 4 point 4), Master Course Integrated flood Risk Management (Figure 4 point 5)). At the third item “participation”, there is a direct linkage towards the site Flood Risk Management Plans (Figure 4 point 6), where you can find detailed descriptions of associating the public (e.g. FRMP Sweden Lake Vänern, FRMP Wandse Germany).

The next item points the brief explanation of the concept of Sustainable Education Centres, which have been mentioned within SAWA.

The seven case studies from the SAWA project show the wide range which is addressed by the item “Public Engagement”. Here you will find again links to more detailed information, which range from posters (Figure 7 point 7), to presentations (Figure 7 point 8) videos (Figure 8 point 10) and demonstrations (Figure 7 point 9). At the end of the page you will find the backlink to the welcome page of SAWA and EU/Interreg Logos (see Figure 2).

Figure 3: Screenshot of measure “Public Engagement” 1/6

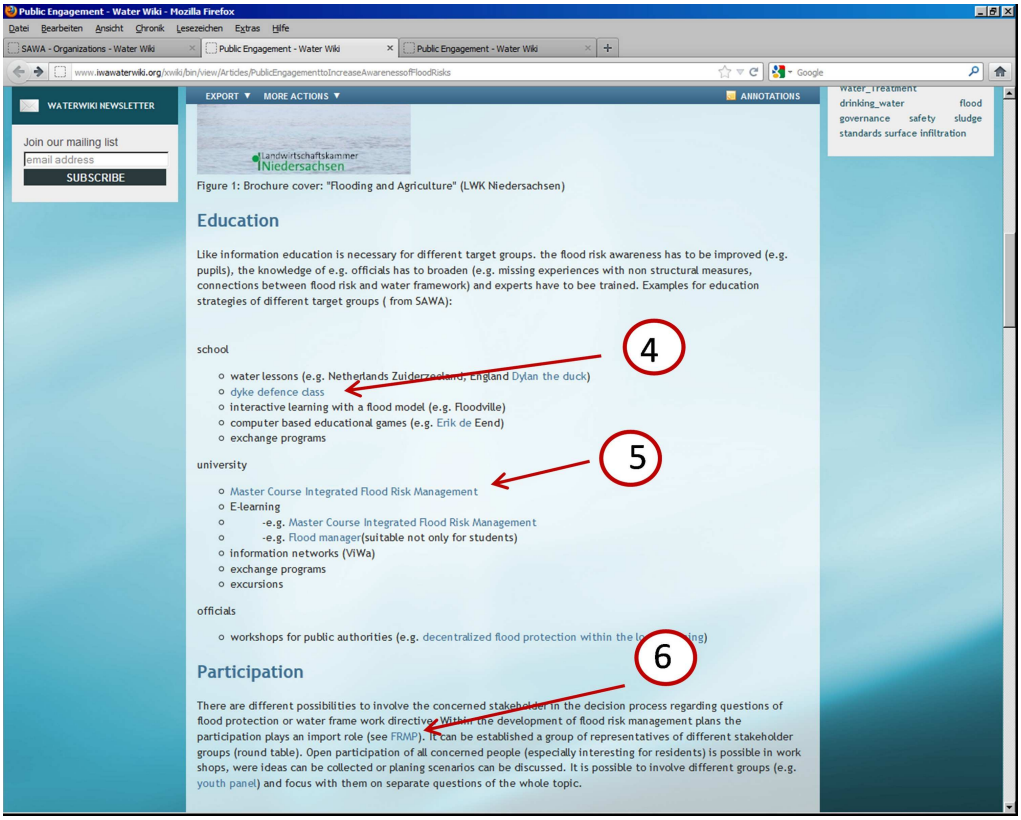


Figure 4: Screenshot of measure “Public Engagement” 2/6

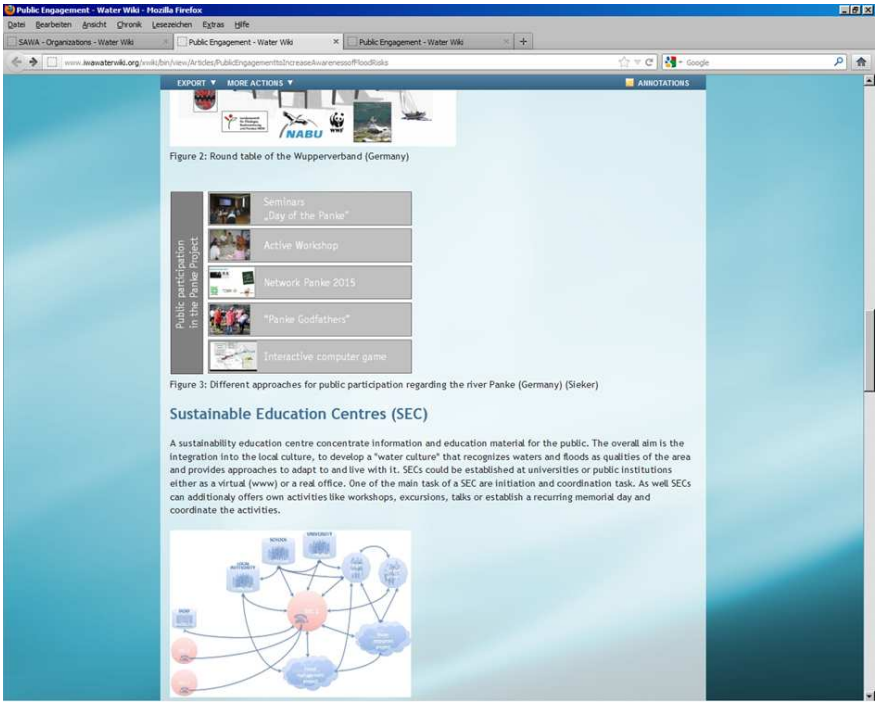


Figure 5: Screenshot of measure "Public Engagement" 3/6

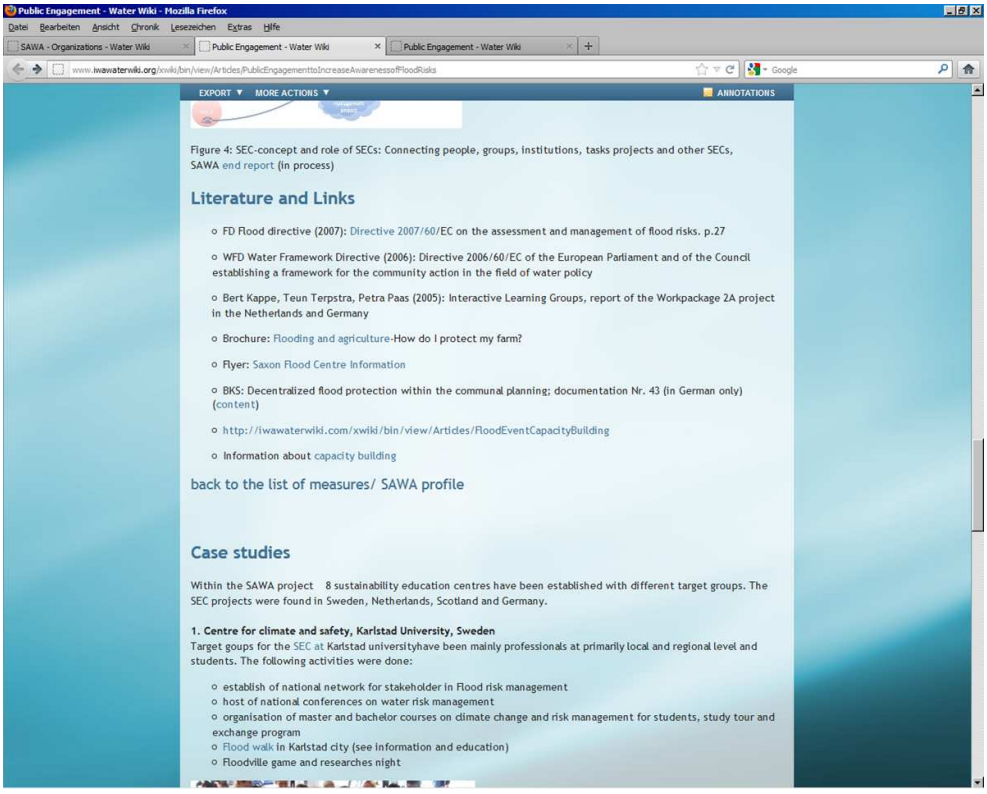


Figure 6: Screenshot of measure "Public Engagement" 4/6

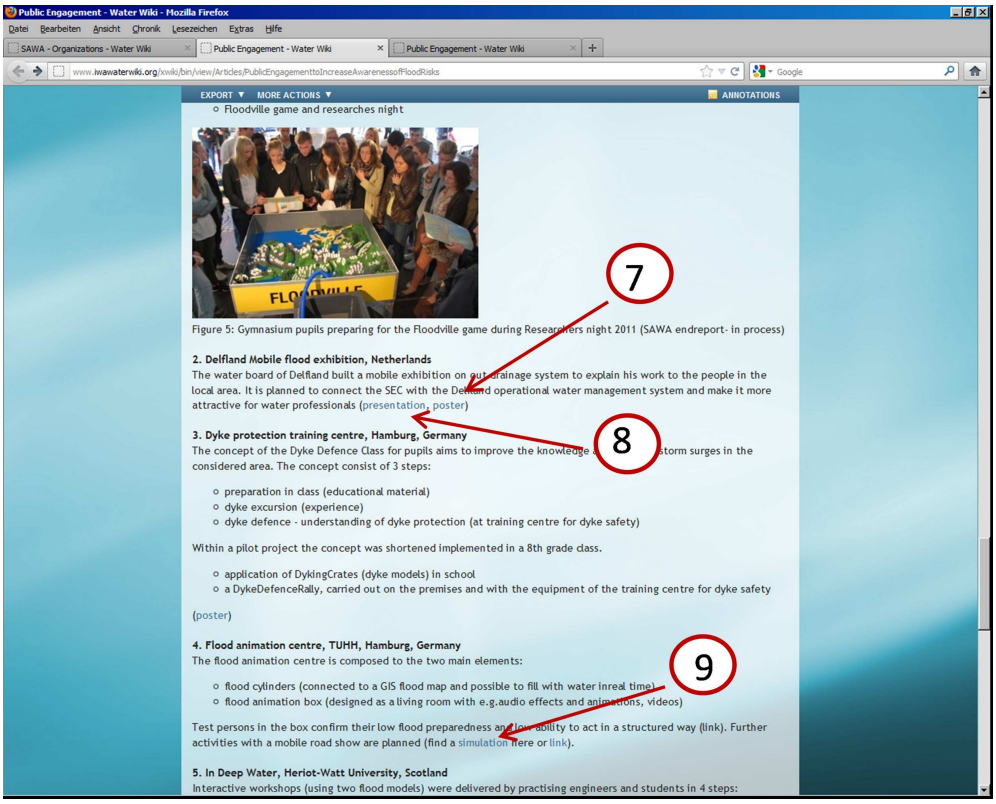


Figure 7: Screenshot of measure “Public Engagement” 5/6

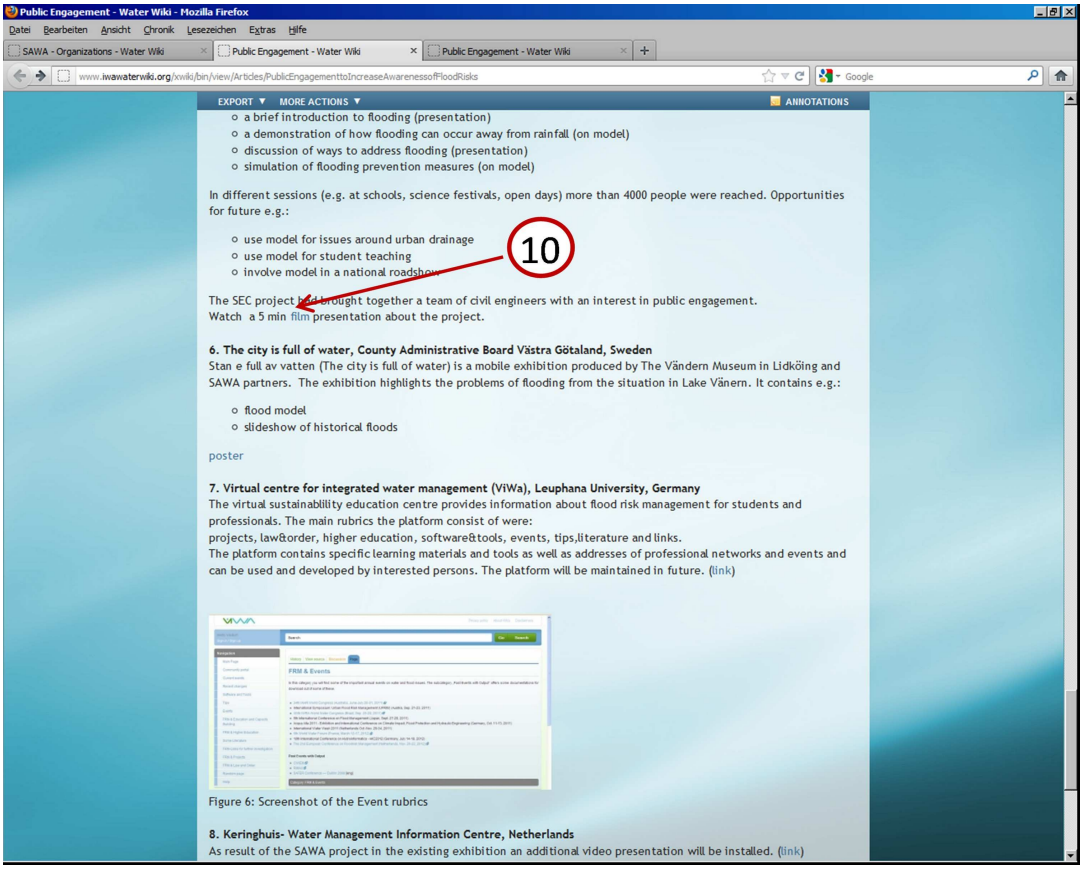


Figure 8: Screenshot of measure “Public Engagement” 6/6

7.5.2. Example “Conversion to Extensive Grassland”

After a short description of the measure, many advices are given for their implementation (Figure 9 point 1). Thus, different management opportunities were presented (Figure 10 point 2) and cost factors were revealed (Figure 10 point 3). Many positive effects can be found (e.g. reduction of water and nutrient flux) (Figure 11 point 4), whereas a clear disadvantage can be mentioned by the loss of the farmer`s income (Figure 11 point 5). The item “case study” shows a short description of a special SAWA project linked to a detailed project description (Figure 11 point 6).

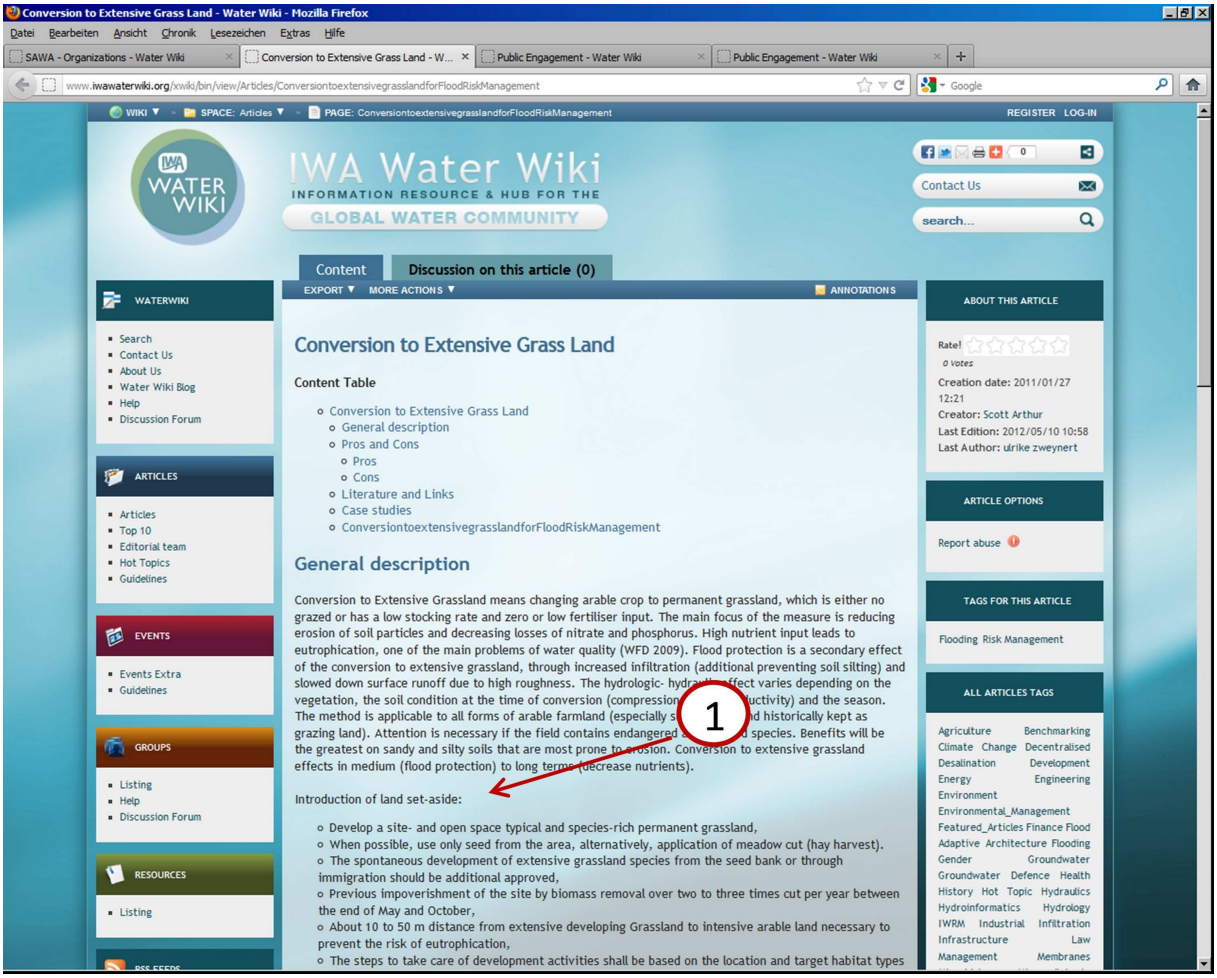


Figure 9: Screenshot of measure “Conversion to extensive grassland” 1/3

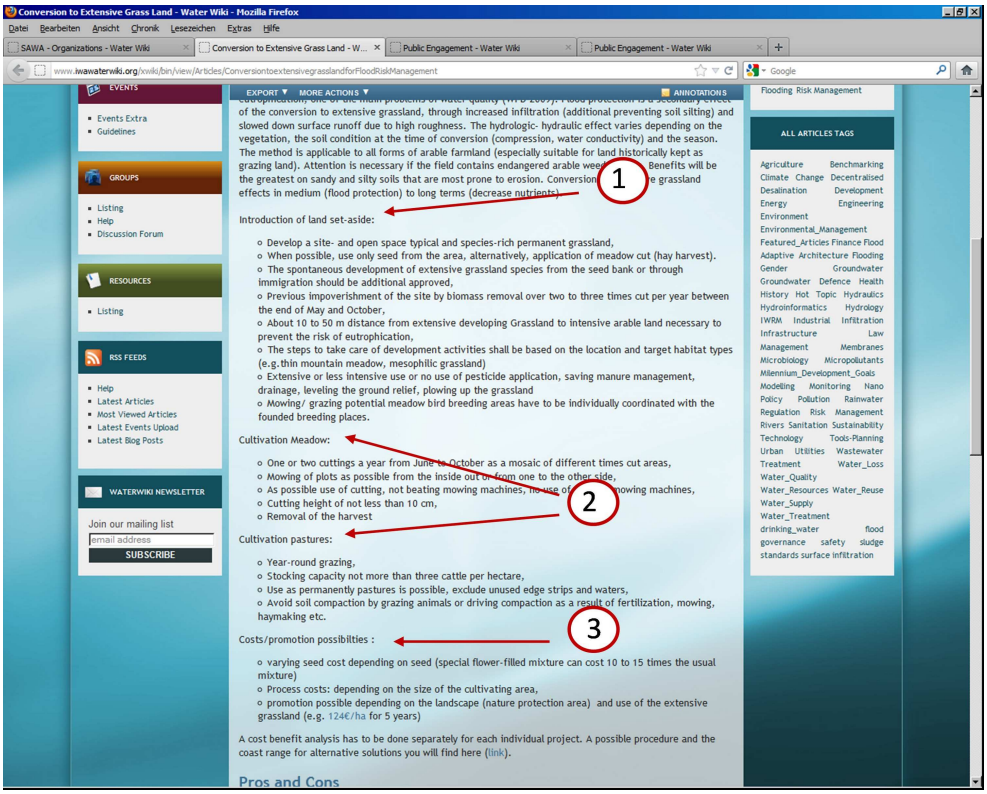


Figure 10: Screenshot of measure “Conversion to extensive grassland” 2/3

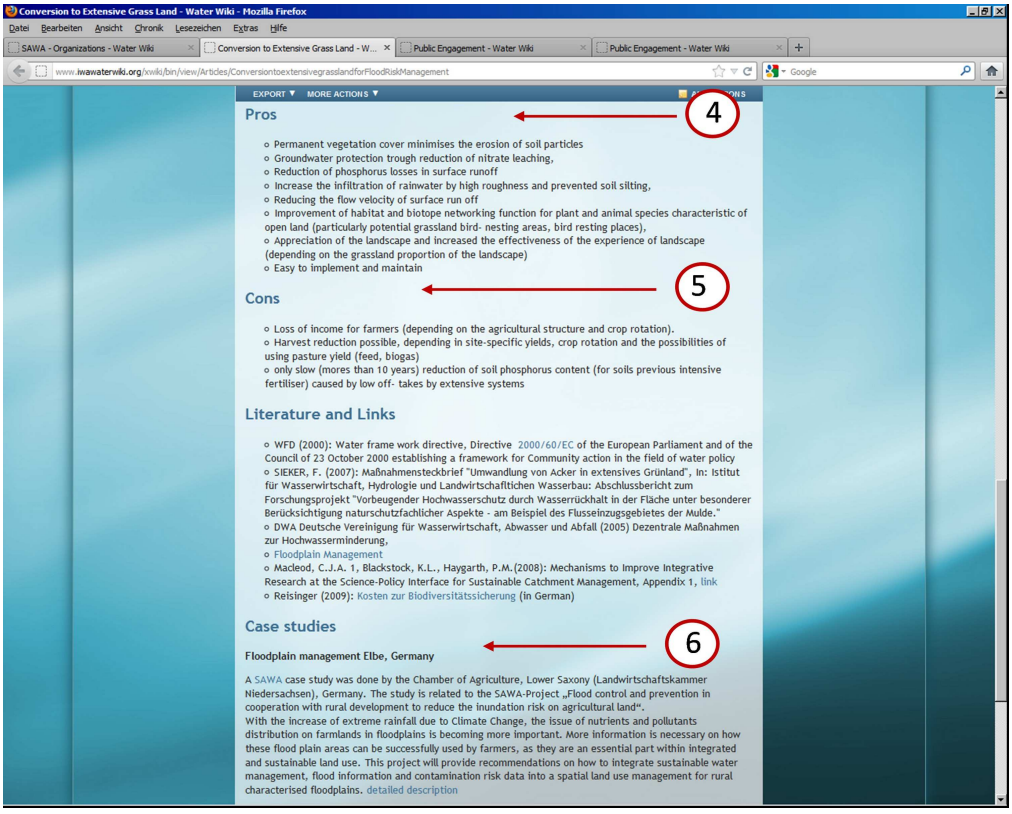


Figure 11: Screenshot of measure “Conversion to extensive grassland” 3/3

8. Cost -Benefit Analysis

The procedure of “Cost Benefit Analysis“ is illustrated by a defined example. The user opens the page “Infiltration and Retention structures“ (Figure 12 point 1) and scrolls to the item „costs“. Here, not only cost ranges will be presented but also information can be found indicating that a specific cost-benefit analysis for each separate project has to be accomplished. Pressing the related button (Figure 12 point 2), the user arrives at the “Cost-benefit analysis” page concerning the main aspects of such an analysis (Figure 13 point 3) as well as a possible approach for realisation (“Case Studies”) (Figure 14 point 4). Another link (Figure 14 point 5) presents an overview about cost of alternative project solutions which may be considered for own cost-benefit analysis (Figure 15 and 16).

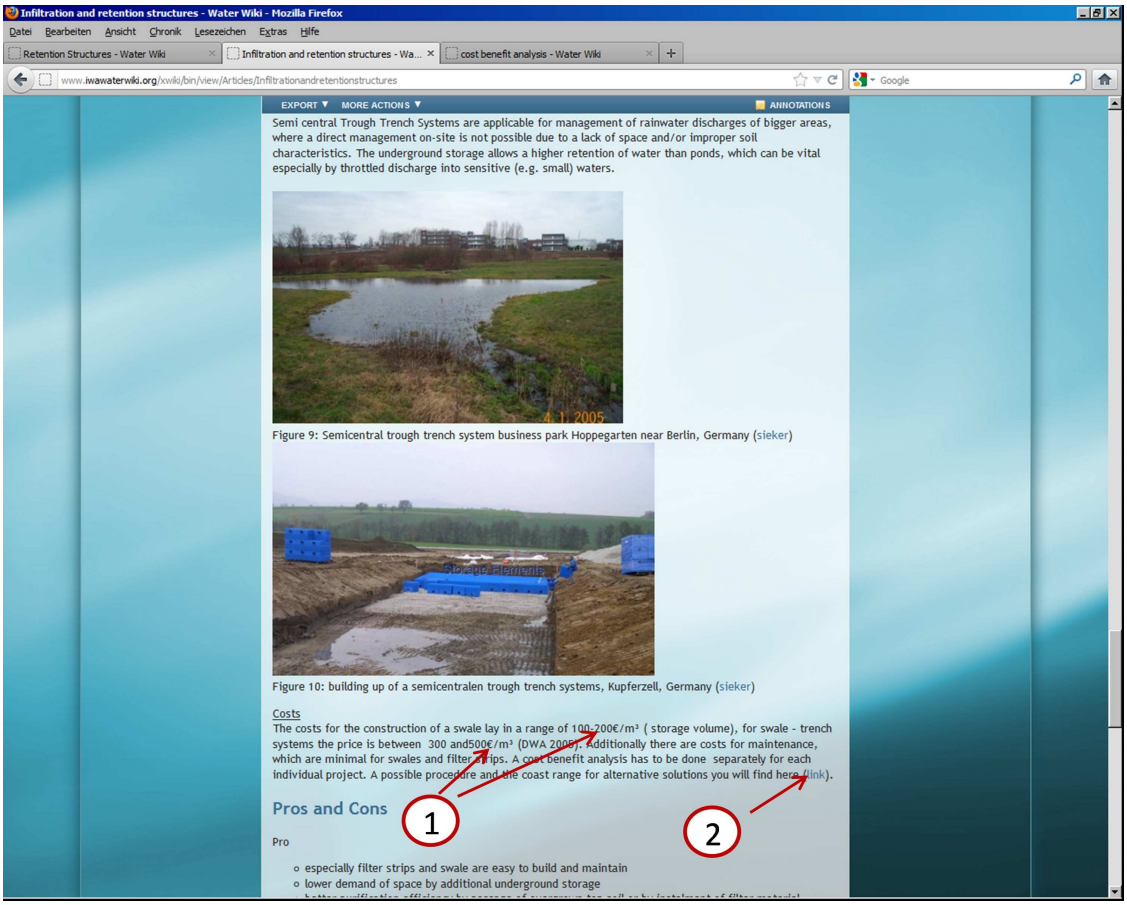


Figure 12: Screenshot of part measure description “Infiltration and retention structures”

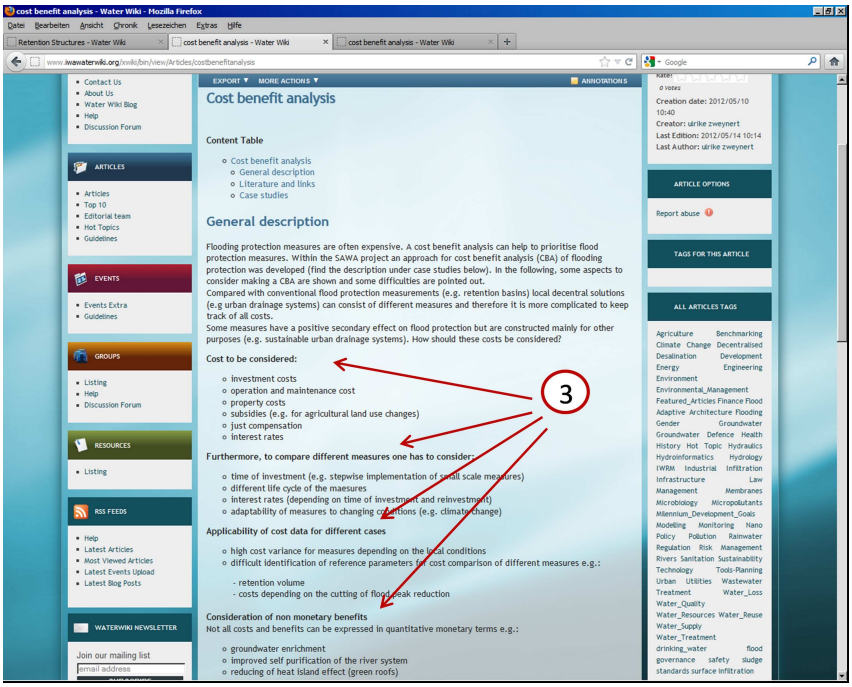


Figure 13: Screenshot of description of Cost benefit analysis 1/2

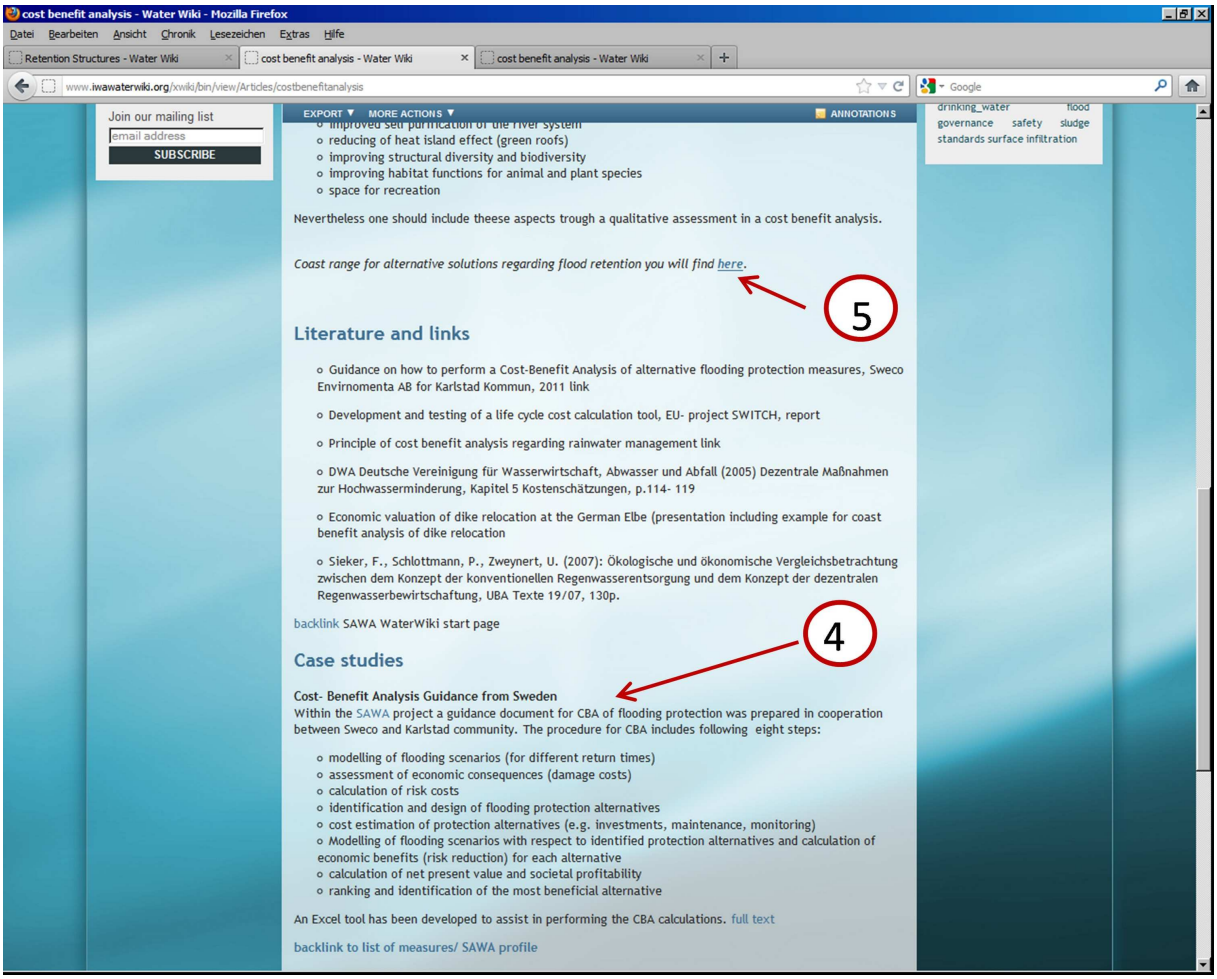
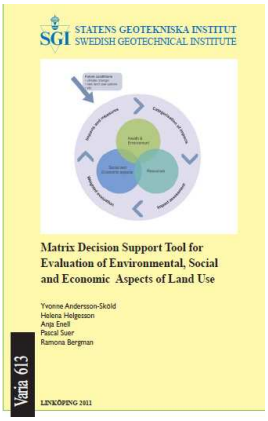


Figure 14: Screenshot of description of Cost benefit analysis 2/2



Within SAWA project a Decision Support Tool has been developed which is able to support the decision making process during flood risk management planning cycle (http://www.swedgeo.se/upload/publikationer/Varia/pdf/SGI-V613.pdf).

This tool is a matrix based guidance tool which leads the user through the decision making process.

When it comes to the decision upon the most appropriate adaptive measure or set of measures cost aspects do play an important role. Supported by precise key cost indicators, presented in figure 15 and 16, alternative measures for a specific problem can become evaluated and compared.

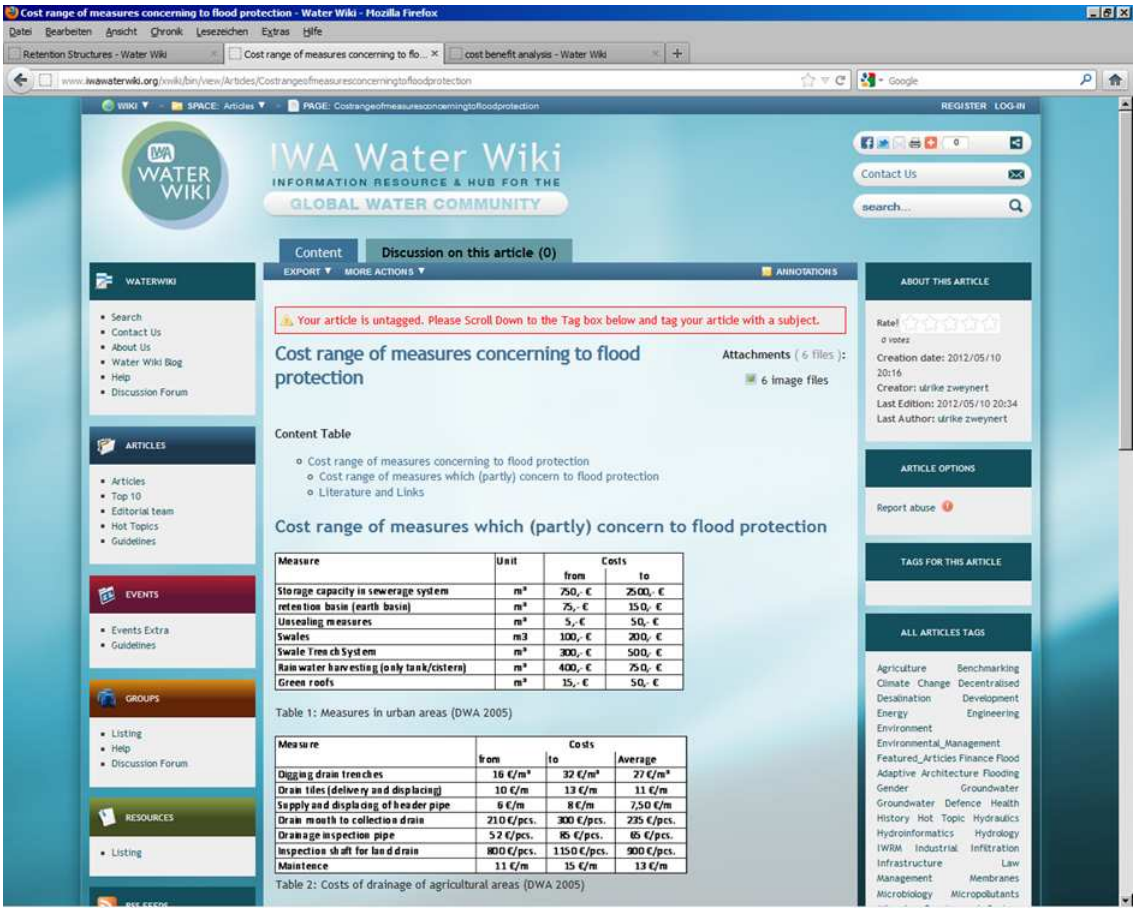


Figure 15: Screenshot of Cost range of measures concerning to flood protection 1/2

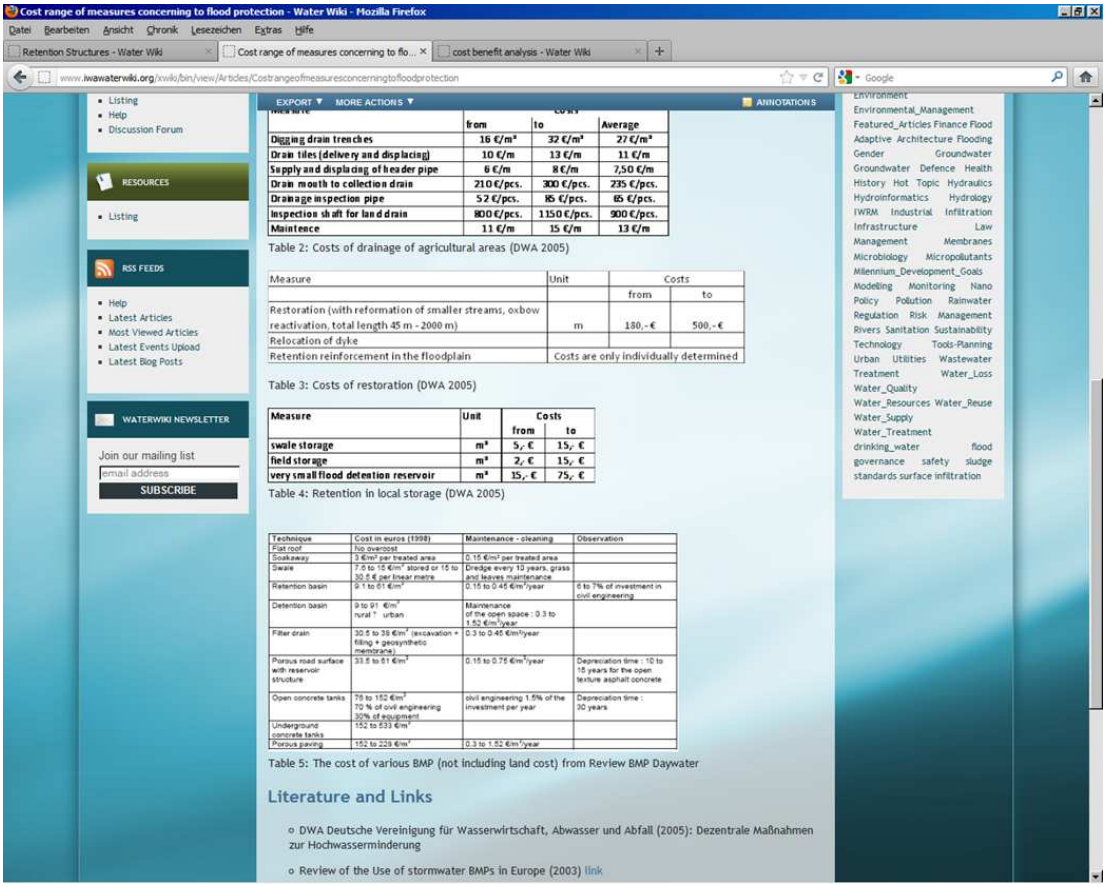


Figure 16: Screenshot of Cost range of measures concerning to flood protection 2/2