

AquaStress' i3S

How to populate and edit the AQS-KB: Indicator (1.1)

Part 5 of the i3S-series *How to ...*

Huub Scholten¹, Ayalew Kassahun, Kees Oomen

Wageningen University

1 Introduction

AquaStress' toolbox i3S is a collection of tightly coupled and standalone software tools, knowledge bases and associated data that should be helpful to mitigate water stress.

This document aims at helping domain experts populate and edit the AquaStress knowledge base (AQS-KB). This knowledge base is the backbone of the i3S toolbox and consists of several parts. This document focuses on the *AQS-KB part* related to (water stress) *indicators*.

Table 1 gives an overview of the tools, the knowledge base parts and the database that are part of i3S. The remainder of this document gives an overview of relevant concepts (terms), introduces the *KB-editor* (i.e. the web-based tool to populate and edit the *AQS-KB*) and ends with a guidance part, how to work in the AQS-KB (create/delete *AQS-KB items*, edit *AQS-KB items* and read/comment *AQS-KB items*).

The web-based tool to work in the AQS-KB is called KB-editor (see section 3). A more complete and profound description of this tool is found in Kassahun *et al.*, 2008.

Table 1. Overview of i3S components, based on Kassahun *et al.*, 2008 and Blind *et al.*, 2007.

Component	Explanation
Software tool	
QPT	Query and Processing Tool: uses knowledge from the AQS-KB to calculate actual values of water stress indicators and the effect of implemented options on these indicators. Furthermore this tool presents results to the i3S portal.
AquaDT	AquaStress Decision Taking (AquaDT) Tool is a web-based Multi-Criteria Decision Analysis (MCDA) application, which supports stakeholders in participatory complex decision making processes.
Questionnaire tool	Helps organising questionnaires.
ProST	Process Support Tool, aiming guidance in the water stress mitigation process, keeping records of this process in case studie at test sides and helps managing water stress mitigation projects.
Dashboard Manager	Collect, test, present data
Fuzzy Cognitive Maps	Conceptual (qualitative) modelling.
HydroSplash!	Water management game at test site level.

¹ Huub.Scholten@wur.nl.





DUE	Date Uncertainty Engine: UA/DA-Tools is a software framework for: <ul style="list-style-type: none"> • specifying uncertainties in environmental data (uncertainty assessment) • generating realisations of uncertain data for use in modelling studies (uncertainty propagation analysis) • deploying ensemble model runs to propagate uncertainty into model outputs • combining observations and model data with data assimilation techniques to update model status and improve forecasting capabilities
Cased Based Reasoning	Advising based on previous, similar projects.
Models	Computational simulation model.
Integrated assessment model	A computational simulation model that represents a coupled natural system and a socio-economic system, modelling one or more cause-effect chains including feedback loops, and explicitly designed to serve as a tool to analyse policies in order to guide and inform the policy process, mostly by means of scenario analysis.
Resource flow model	A computational model that represents the flow of matter in a system within a defined time period of a spatial unit. It is not geographically explicit.
Integrated, complex model	Within systems analysis, process simulation models are often applied to simulate system behaviour (bio-physical or socio-economical) in one domain over time and space. Integrated complex modelling refers (within AquaStress) to the combination of process simulation models, in a way that accommodates process interaction and feedback between the various model components.
System dynamics models	System dynamics is an approach to understanding the behavior of complex systems over time. It deals with stocks and flows, internal feedback loops and time delays that affect the behavior of the entire system.. A System dynamics model (SDM) is a model that is based on this approach.
Agent Based Modelling	Computational model for simulating the actions and interactions of autonomous individuals in a network, with a view to assessing their effects on the system as a whole. In AquaStress it combines physical processes with individuals with different roles.
Mini-models	Rule based modelling to calculate indicators and effects of options, e.g. to calculate indicators and to calculate effects of options on indicators.
Knowledge and data	
AQS-KB	
Option-KB	AQS-KB part on options.
Site-KB	AQS-KB part on test site specific knowledge.
Process	AQS-KB part on water stress mitigation process, in general or at test site level.
Indicator-KB	AQS-KB part on water stress indicators.
e-Glossary	AQS-KB part on terminology.
Database	
Model specific data	Data for a specific (mathematical) model.
Test site data	Data for a specific test site, related to indicators and/or models.
Dashboard data	Data to be used by the Dashboard Manager.

2 Concepts

Table 2. Concepts used in the AQS-KB.

Term	Explanation
Alphabetical menu	Hyperlinks in the top of the <i>main panel</i> to items in a <i>list view</i> that are filled (populated). Clicking on a character shows the list starting from that character on.
AQS	AquaStress, i.e. an Integrated Project, partly funded by the European Commission (Contract FP6 511231), aiming at Mitigation of Water Stress through new Approaches to Integrating Management, Technical, Economic and Institutional Instruments.
AQS toolbox	i3S.
AQS-KB	Synonym for the <i>AquaStress Knowledge Base</i> .
AQS-KB item	Single AQS-KB element of an <i>AQS-KB part</i> . Examples: <ul style="list-style-type: none"> • Guadiana – Portugal (item in <i>Site specific</i>, i.e. test site information; • Desalination (item in <i>Generic/Option definitions</i>)

AQS-KB item property	Property of an <i>AQS-KB item</i> , i.e. a part of the content of an <i>AQS_KB item</i> with an identifier, which are listed and explained in Table 3.
AQS-KB item property type	There are AQS-KB item properties of the following types: <ul style="list-style-type: none"> • <i>text</i>, e.g. description of problem, etc.); • <i>lists</i>, i.e. a list of hyperlinks (e.g. <i>owner (author)</i>, sub location, available options, figures, attachments, etc.); clicking on this type of <i>AQS-KB item property</i> will invoke a new <i>main panel</i> with other <i>AQS-KB items</i>, each with their own <i>AQS-KB item property types</i>; • <i>check boxes</i> (e.g. verified); • <i>automatic</i> (filled by the <i>KB-editor</i>); • <i>structure</i> (relevant for <i>processes</i> only), i.e. a numbered lists of <i>AQS-KB items</i> (e.g. <i>steps, tasks, activities</i>), in which the numbers indicate the order of the <i>AQS-KB items</i> and, in case of <i>tasks</i>, feedbacks can be added to previous tasks in order to redo <i>tasks</i> and feedforwards to jump to following <i>tasks</i>, both within the present <i>step</i>.
AQS-KB parts	See <i>AquaStress Knowledge Base</i> . Examples: <ul style="list-style-type: none"> • Processes; • Site specific, i.e. test site information.
AQS-KB structure	Structure of the <i>AQS-KB</i> with: <ul style="list-style-type: none"> • at the top surface the <i>AQS-parts</i> (e.g. <i>sites, options, processes, indicators</i>); • deeper layers within each <i>AQS-KB part</i> with <i>AQS-KB items</i> of the type <i>list</i>.
AquaStress Knowledge Base	A collection of facts and knowledge to mitigate water stress. The knowledge base has the following parts: <ol style="list-style-type: none"> 1. site-KB with AQS-site specific knowledge; 2. process-KB with process knowledge, i.e. with knowledge on the water stress mitigation process; 3. tools with an overview of the i3S tools; 4. case studies-KB with definitions of case studies (each within a test site); 5. indicator and variable definitions-KB definitions of all water stress indicators and associated variables necessary to calculate the indicators; 6. option-KB with water stress mitigation option definitions; 7. glossary-KB with glossary terms from AquaStress and other projects; 8. (indicator values); 9. (option implementations); 10. functionalities of the i3S components.
AquaStress tools portal	Web-based tool to access i3S.
Breadcrumb bar	Bar below the <i>menu bar</i> , showing a <i>breadcrumb trail</i> , consisting of hyperlinks to previously visited <i>AQS-KB parts</i> .
Breadcrumb trail	Navigation technique used in <i>GUI</i> . Its purpose is to give users a way to keep track of their location within the <i>AQS-KB</i> . The term is taken from the trail of breadcrumbs left by Hansel and Gretel in the popular fairytale.
Browse menu	Hyperlinks to <i>first, previous, next</i> and <i>last</i> set of elements of the list shown in the <i>list view</i> in the <i>main panel</i> . The number of items shown is determined in the <i>drop down list</i> at the top right. By default this number is 10.
Case study	In-depth plans covering selected issues and possibly selected regions within the Test-Site by implementing specific options or combinations of options in all or part of a Test Site and offering integrated solutions coupling technical, economic, institutional, educational and social assets. Test sites will serve as learning platforms to understand responses and impacts of different types and conditions of water stress and to refine the guidelines for water stress mitigation.

Context menu	<p>The <i>context menu</i> is an extra menu, visible only for registered users after logging in and after selecting one of the <i>AQS-KB parts</i>. If a user is <i>authorized</i> for some actions, the <i>context menu</i> options will be visible at the right hand side of the <i>AQS-KB item</i> or of the <i>AQS-KB item property</i>. The icons have the following meaning:</p> <ul style="list-style-type: none"> •  = edit icon: editing of the <i>AQS-KB item</i> is allowed •  = delete icon: deleting of the <i>AQS-KB item</i> is allowed •  = ProST icon: exchanging a process definition with ProST (only relevant for processes) •  = XML icon: collecting knowledge from the <i>AQS-KB</i> and passing it over to a tool, e.g. to QPT
Detail view	List of all <i>AQS-KB item properties</i> in an <i>AQS-KB part</i> .
Drop down list	User interface control (<i>GUI</i> element) similar to a list box which allows the user to choose one value from a list
Glossary	List of terms.
Glossary-KB	Part of the <i>AQS-KB</i> with a list of terms.
Graphical user interface	A type of user interface which allows people to interact with software tools. A <i>GUI</i> offers graphical icons, and visual indicators as opposed to text-based interfaces, typed command labels or textual navigation to fully represent the information and actions available to a user.
GUI	Graphical User Interface.
i3S	Integrated Solution Support System, i.e. <i>AQS</i> toolbox consisting of tightly coupled and standalone software tools (including models), knowledge bases and data.
KB	Synonym for the <i>AquaStress Knowledge Base</i> .
KB-editor	Software tool to use (browse/inspect, edit add, check) the <i>AquaStress Knowledge Base</i> .
Knowledge Base	Synonym for the <i>AquaStress Knowledge Base</i> .
List view	List of all <i>AQS-KB items</i> in an <i>AQS-KB part</i> or of the <i>AQS-KB parts</i> .
Menu	A list of commands presented to a user by a software tool. They may be thought of as <i>shortcuts</i> to frequently used commands that avoid the operator having to have a detailed knowledge or recall of syntax. A computer using a <i>graphical user interface</i> presents menus with a combination of text and symbols to represent choices. By <i>clicking</i> on one of the symbols, the operator is selecting the instruction that the symbol represents.
Menu bar	Top line of the software tool <i>menu</i> , just below the browser bars.
Option	Measure to combat water stress and interventions for water stress mitigation, including policy mechanisms, economic tools, administrative initiatives, participatory processes & education and cost-effective broadly supported decisions for sustainable water management.
Process	Water stress mitigation (in general or for a <i>site</i> or <i>case study</i>)
Registering	Enrol as <i>AQS-KB</i> user. The <i>administrator</i> (see <i>user type</i>) will assign a user a <i>user type</i> with associated <i>user authorization</i> .
Shortcut menu	<i>Menu</i> to get direct access to a <i>AQS-KB part</i> .
Site	Synonym for <i>test site</i> .
Test site	The entire set of regions pronounced in the <i>AquaStress Description of Work</i> , illustrating the common denominators of the full range of water stress problems occurring in Europe, in which well defined <i>case studies</i> are developed.
Tree menu	A software tool <i>menu</i> in the left side of the tool window with a tree like structure as Windows Explorer. The '+' sign indicates that a tree item can be <i>expanded</i> and a '-' sign allows to <i>collapse</i> the item.
User authorization	Allowing access to <i>AQS-KB parts</i> to different <i>user types</i> and permitted them to use parts at levels (reading, editing and creating/deleting). More formally, <i>user authorization</i> is a process that protects the <i>AQS-KB</i> by only allowing those <i>AQS-KB parts</i> to be used by users of different <i>user types</i> that have been granted authority to use them.
User type	<ul style="list-style-type: none"> • <i>Unregistered users</i> • <i>Registered</i> <ul style="list-style-type: none"> ○ <i>Commenter</i>: user who is <i>authorized</i> to writes comments in the <i>AQS-KB</i>. ○ <i>Editor</i>: user who is <i>authorized</i> to change (parts of) the <i>AQS-KB</i>. ○ <i>Administrator</i>: user has all right in the <i>AQS-KB</i>, including assigning <i>user types</i> to <i>registered</i> users and granting <i>user authorization</i>.

Web-based tool	A software tool that can be used with a normal web browser (e.g. Internet Explorer).
----------------	--

3 KB-editor

There are two ways to get access to the AQS-KB: (indirectly) through i3S's tool, QPT and (directly) using the KB-editor, a web-based tool to populate, edit and browse the AQS-KB.

The KB editor has a *menu bar* on the top, *breadcrumb trail* below the *menu bar*, a *tree menu* on the left, *main panel* in the middle and the *shortcut menu* on the bottom (see Figure 1). The *menu bar* contains links to the Home page and the Login page. The contents of the *menu bar* changes after logging in, depending on the *user authorisation*. Most of the *AQS-KB items* are accessible via links in the *tree menu*. The *breadcrumb bar* contains links to previously visited AQS-parts. The *shortcut menu* contains important links, links that you find on the home page.

If the *main panel* shows items in a *list view* the top of the *main panel* has several menu elements (see Table 2):

1. *alphabetical menu*: allows to reposition the top of the list to a specific first character;
2. *browse menu*: allows to browse the list one set of items forward (*next >*), back (*< previous*) or to the beginning (*<< begin*) or end (*end >>*) of the list;
3. *drop down list*: allows to select how one items are show in one main panel at a time.

Editing or commenting on the content of the *AQS-KB* requires *registration* to get an account. Browsing and reading without commenting is possible without *registration*.

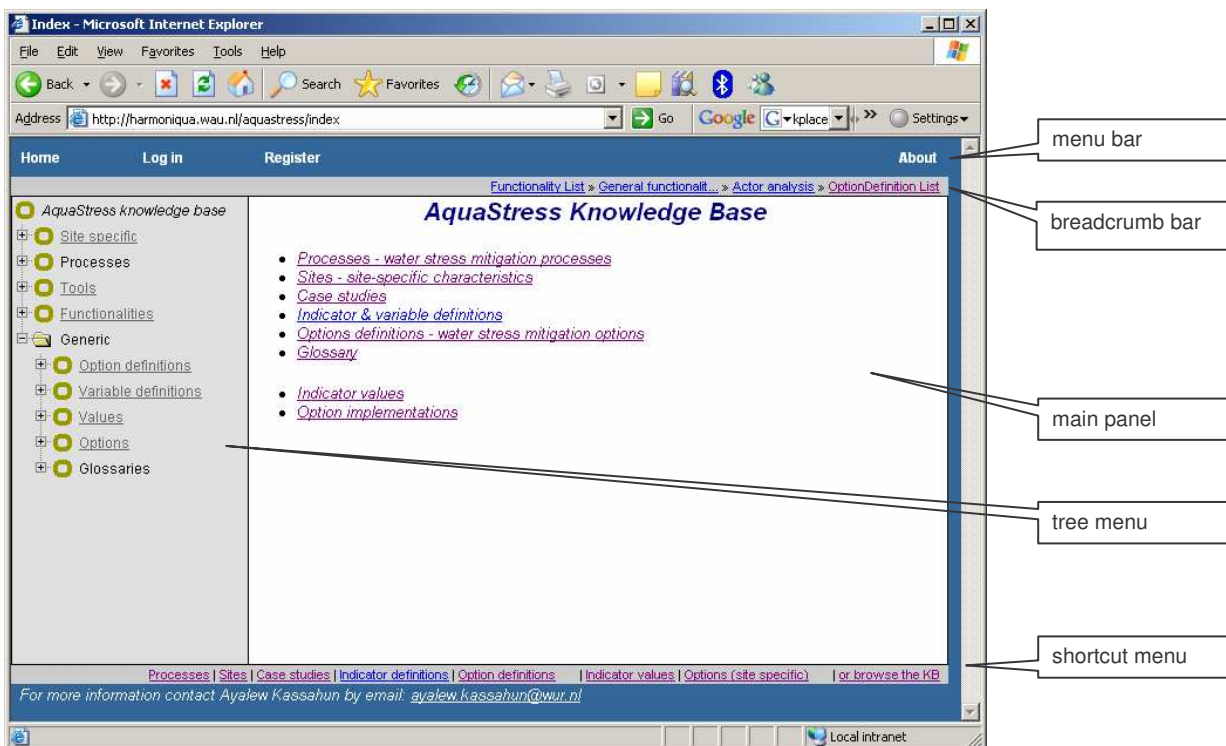


Figure 1. KB-editor with layout of panels, i.e. *menu bar*, *tree menu*, *breadcrumb bar*, *shortcut menu* and *main panel*. The *main panel* shows a *list view* on the *AQS-KB parts*.

The *KB editor* allows entering only text or numerical data as values of properties. All other information should be added as attachments. Typical attachments are images, formatted documents and software applications. For instance, if an activity of a mitigation process requires an Excel template to be made available for use in *ProST*, the Excel sheet should be uploaded as an attachment to the activity. See also section 4.3.4.

4 How to populate and edit the AQS-KB part on indicators

4.1 Registering, user types and user authorizations

There are three levels of authorisation: *comment*, *edit*, and *administrator*. All *registered users* may provide comments and feedbacks. To edit *AQS-KB items*, users should first be *authorised* by the *administrator*. Which items they can edit, depends on the rights they are authorized for. The basic edit right is that users are allowed to edit the item they created themselves. *Administrators* have all rights. Presently their main responsible is in administering users.

Only *owners (authors)* of an *AQS-KB item* are *authorized* to edit its content (which is in the *AQS-KB item properties*). If someone else has to edit its content, the *owner (author)* or an *administrator* can add new *owners (authors)*.

Users that want to register have to provide a valid email address and a password of at least 6 characters. After registering, a confirmation email will be received. To complete registration, click on the link provided in the email. If an email program does not accept HTML, copy and paste the entire hyperlink address into the address bar of an internet browser.

4.2 Start the AQS-KB

Start a (Internet) browser, e.g. Internet Explorer, using the following URL:

<http://harmoniqua.wau.nl/aquastress/>. There are two modes to work:

1. *Without logging in*: this allows user to browse through all elements of the AQS-KB without adding anything to it or changing its content.
2. *With logging in*: (only possible for registered users) this allows user to use the knowledge according to the *authorization* of their *user type*.

Log in by providing:

- a. Email address;
- b. Password.

4.3 AQS-KB part on indicators (top surface layer)

4.3.1 AQS-KB item properties of AQS-KB part on indicators

Table 3. *AQS-KB item properties* with explanations for the *AQS-KB part on indicators*.


AQS-KB item property	Explanation	Property type
Name	Name of the <i>indicator / variable</i>	text
Verified	Checked and approved by an(other) expert.	check box
Date	Last updated.	automatic
The other AQS-KB item properties in alphabetical order		
Description	Longer description of this <i>AQS-KB item</i> than in the <i>name</i> property, here of the <i>indicator / variable</i> .	text
Indicator type	Application domains to which the indicator belongs, i.e. <i>domestic, agriculture, production industry, tourism industry, environment</i> and <i>general</i> .	list
Owners (Authors)	Author of the content of the <i>AQS-KB item</i> within the <i>AQS-KB part on indicators</i> . Only the <i>owner (author)</i> can edit the content of a specific <i>AQS-KB item</i> . If someone else has to do this, he/she should be added to the list of <i>owners (authors)</i> by an <i>owner (author)</i> or by an <i>administrator</i> .	list
Reference (internal reference)	References to internal (i.e. AquaStress) reports.	text
References (external or scientific references)	References to reports, papers, books and other publications, which are not products of AquaStress.	list

Rule (formula)	Formula to calculate the value of an indicator. <i>Indicators</i> can best be seen as mini-models that are calculated according to the rule (formula). In this formula other <i>indicators</i> and (sub) <i>variables</i> may be used and the (sub) <i>variables</i> are based on data. (sub) Variables can also be <i>indicators</i> themselves.	text
Sub variable	Quantities based on data and to be used to calculate <i>indicators</i> .	list
Symbol	Symbolic identifier of the present <i>indicator</i> .	text
Type	Automatically filled in, here <i>site</i> , i.e. <i>test site</i> . For other <i>AQS-KB parts</i> it will be <i>option, indicator, etc.</i>	automatic
Unit	A unit like meter, kilogram, m/s, etc. belonging to the SI-units, other or even self-defined.	text
User comment(s)	Comments on this <i>AQS-KB item</i> by a <i>registered</i> user; this will be part of the <i>AQS-KB</i> .	text + automatic

4.3.2 Start AQS-KB part on indicators

1. (If not already done) open the *AQS-KB* at the following URL:
<http://harmoniqua.wau.nl/aquastress/Index>
2. (If not already done) go to the *AQS-KB part on indicators* by one of the following ways:
 - Use the *tree menu* (left hand panel) and click on the + before generic, then on the + before *variable definitions* and then on *IndicatorDefinition*;
 - Use the *shortcut menu* (bottom line) and click on *indicator definitions*;
 - Use the hyperlink in the *main panel* and click on *indicator & variable definitions*.
3. In all cases you will see a *list view* on all available *indicators & variables* in the *main panel*. By default the *KB-editor* will show the first 10 items in a *list view*. This can be changed in the *drop down list* in the right hand top of the *main panel*.

4.3.3 Reading knowledge items of indicators and variables

1. Start *AQS-KB part on indicators* following the instructions in section 4.3.2.
2. Select an *indicator* or *variable* from the ones shown in the *list view* by clicking on its hyperlink; the *KB-editor* will show a screen as in Figure 2.
3. Use your browser (Internet Explorer, etc.) controls to browse through all *AQS-KB item properties* to read the content.
4. *Comments* on the content can be given in the *AQS-KB item property* called *user comment(s)*. If you are a registered user of the *AQS-KB* you will see an edit icon () at the right hand side. Clicking on this sign will pop-up a new window as is shown in Figure 3.

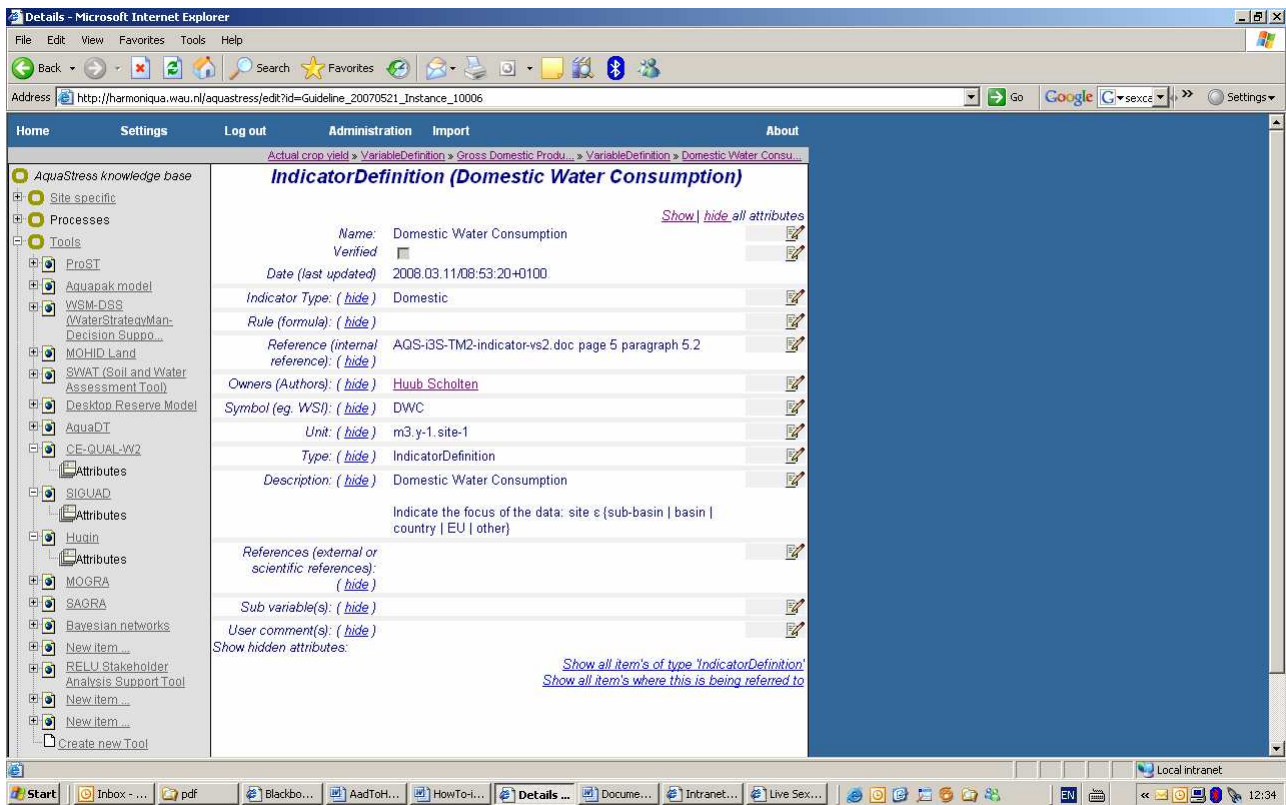


Figure 2. Main layout when a *indicator/variable* is selected with left the *tree menu*, left in the *main panel* the *AQS-KB item properties* presented in Table 3 and what is filled in per *AQS-KB item property* for that *indicator/variable*.

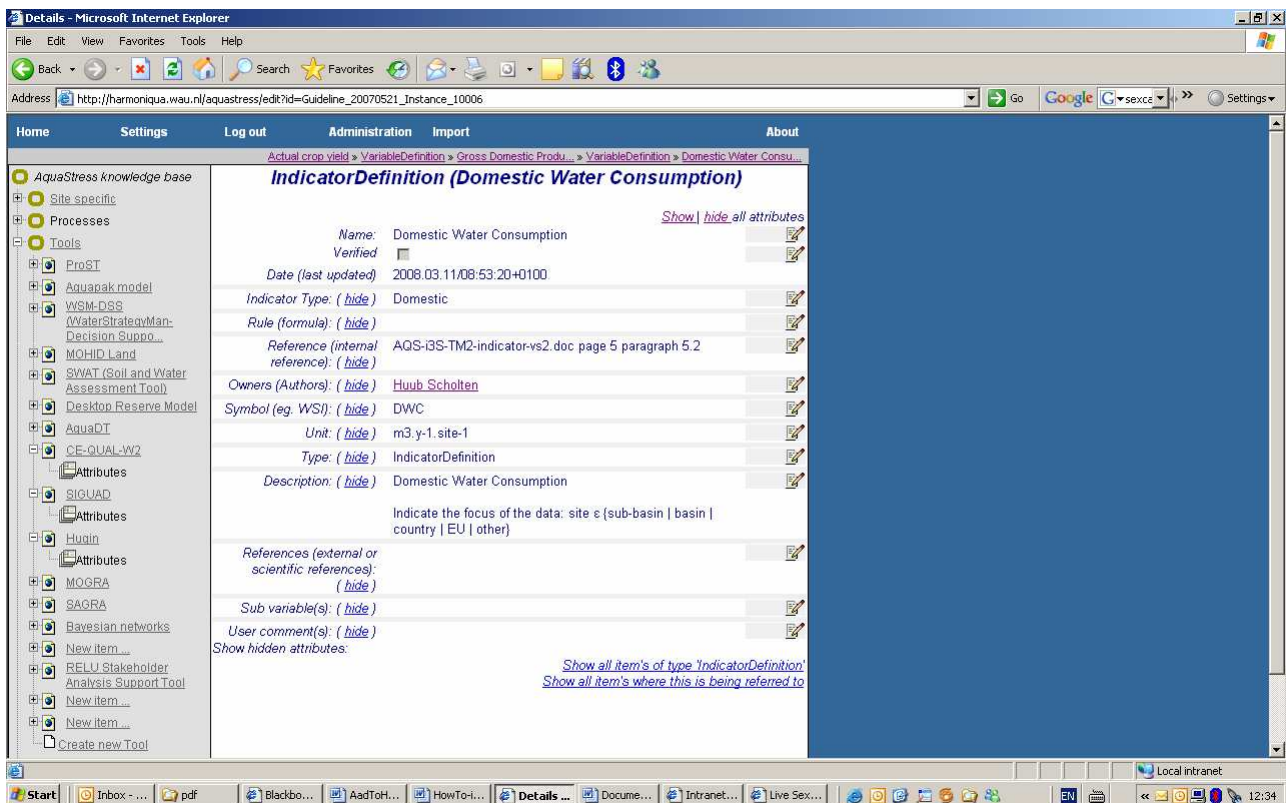







Figure 3. Comment window to comment on the content of an AQS-KB item.

4.3.4 Editing knowledge items of indicators and variables

1. Start *AQS-KB part on indicators* following the instructions in section 4.3.2.
2. Select an *indicator* or *variable* from the ones shown in the *list view* by clicking on its hyperlink; the *KB-editor* will show a screen as in Figure 2.

3. If you have the *authorization* to edit and you are *owner (author)* of that *AQS-KB item*, you will see one or more icons of the *context menu* (on the right hand side) for each of the *AQS-KB item properties*, e.g.  indicating the *authorization* to edit this *AQS-KB item*.
4. Each type of *AQS-KB item property* (see Table 3) requires a different approach:
 - *text*: click on  and edit or include the text in the window.
 - *lists*: click on  gives 3 options (see **Error! Reference source not found.**):
 - *delete / remove*: delete will permanently delete the property and remove will remove the property from the *hyperlink list*;
 - *add*: add an existing instance of a property of the *hyperlink list*;
 - *create an instances of*: create an instance of a property that can be subsequently be added to the *hyperlink list*;
 - *check boxes*: (only *administrators* can do this, which is a bug²) click on  allows you to select the *check box*.
 - *automatic*: no action should be takes as the *KB-editor* will fill it in.

4.3.5 Creating and deleting knowledge items of indicators and variables

1. Start *AQS-KB part* on *indicators* following the instructions in section 4.3.2.
2. To **create** a new *indicator* or *variable* click on the hyperlink *create a new instance* and fill in the field.
3. To **delete** an existing *indicator* or *variable* click on the delete icon ().

4.4 AQS-KB part on sub variables (deeper layer 1)

4.4.1 AQS-KB item properties of AQS-KB part on sub variables

Table 4. *AQS-KB item properties* with explanations for the *AQS-KB part on sub variables*.

AQS-KB item property	Explanation	Property type
Name	Name of the <i>sub variable</i> .	text
Verified	Checked and approved by an(other) expert.	check box
Date	Last updated.	automatic
The other AQS-KB item properties in alphabetical order		
Description	Longer description of this <i>AQS-KB item</i> than in the <i>name</i> property, here of the <i>sub variable</i> .	text
Indicator type	Application domains to which the indicator belongs, i.e. <i>domestic, agriculture, production industry, tourism industry, environment</i> and <i>general</i> .	list
Owners (Authors)	Author of the content of the <i>AQS-KB item</i> within the <i>AQS-KB part on indicators</i> . Only the <i>owner (author)</i> can edit the content of a specific <i>AQS-KB item</i> . If someone else has to do this, he/she should be added to the list of <i>owners (authors)</i> by an <i>owner (author)</i> or by an <i>administrator</i> .	list
References (external or scientific references)	References to reports, papers, books and other publications, which are not products of AquaStress.	list
Rule (formula)	Formula to calculate the value of an indicator. <i>Indicators</i> can best be seen as mini-models that are calculated according to the rule (formula). In this formula other <i>indicators</i> and (sub) <i>variables</i> may be used and the (sub) <i>variables</i> are based on data. (sub) <i>Variables</i> can also be <i>indicators</i> themselves.	text
Sub variable	Quantities based on data and to be used to calculate <i>indicators</i> .	list
Symbol	Symbolic identifier of the present <i>indicator</i> .	text
Type	Automatically filled in, here <i>site</i> , i.e. <i>test site</i> . For other <i>AQS-KB parts</i> it will be <i>option, indicator</i> , etc.	automatic

² A workaround for this bug is: email one of the *Administrators* to do this, i.e. to click the check box. Please indicate which *check box(es)* has/have to be clicked. If you are not an administrator yourself, ask Ayalew Kassahun (Ayalew.kassahun@wur.nl) or Huub Scholten (huub.scholten@wur.nl).

Unit	A unit like meter, kilogram, m/s, etc. belonging to the SI-units, other or even self-defined.	text
User comment(s)	Comments on this <i>AQS-KB item</i> by a <i>registered</i> user; this will be part of the <i>AQS-KB</i> .	text + automatic

4.4.2 Reading knowledge items of sub variables

1. Start *AQS-KB part* on *indicators* following the instructions in section 4.3.2.
2. Select an *indicator* or *variable* from the ones shown in the *list view* by clicking on its hyperlink; the *KB-editor* will show a screen as in Figure 2.
3. To read *sub variables* click on the hyperlink in the *AQS-KB item property*, called *sub variable* in the *main panel* of a *indicator* with *sub variables* (e.g. *Crop Water Stress* with the *sub variables* ‘Crop Water Requirement’ and ‘Crop Water Supply’). A new main panel will appear (see Figure 4). The *properties* of this main panel are shown in Table 4.
4. Use your browser (Internet Explorer, etc.) controls to browse through all *AQS-KB item properties* to read the content.
5. *Comments* on the content can be given in the *AQS-KB item property* called *user comment(s)*. If you are a registered user of the *AQS-KB* you will see an edit icon (✎) at the right hand side. Clicking on this sign will pop-up a new window as is shown in Figure 3.

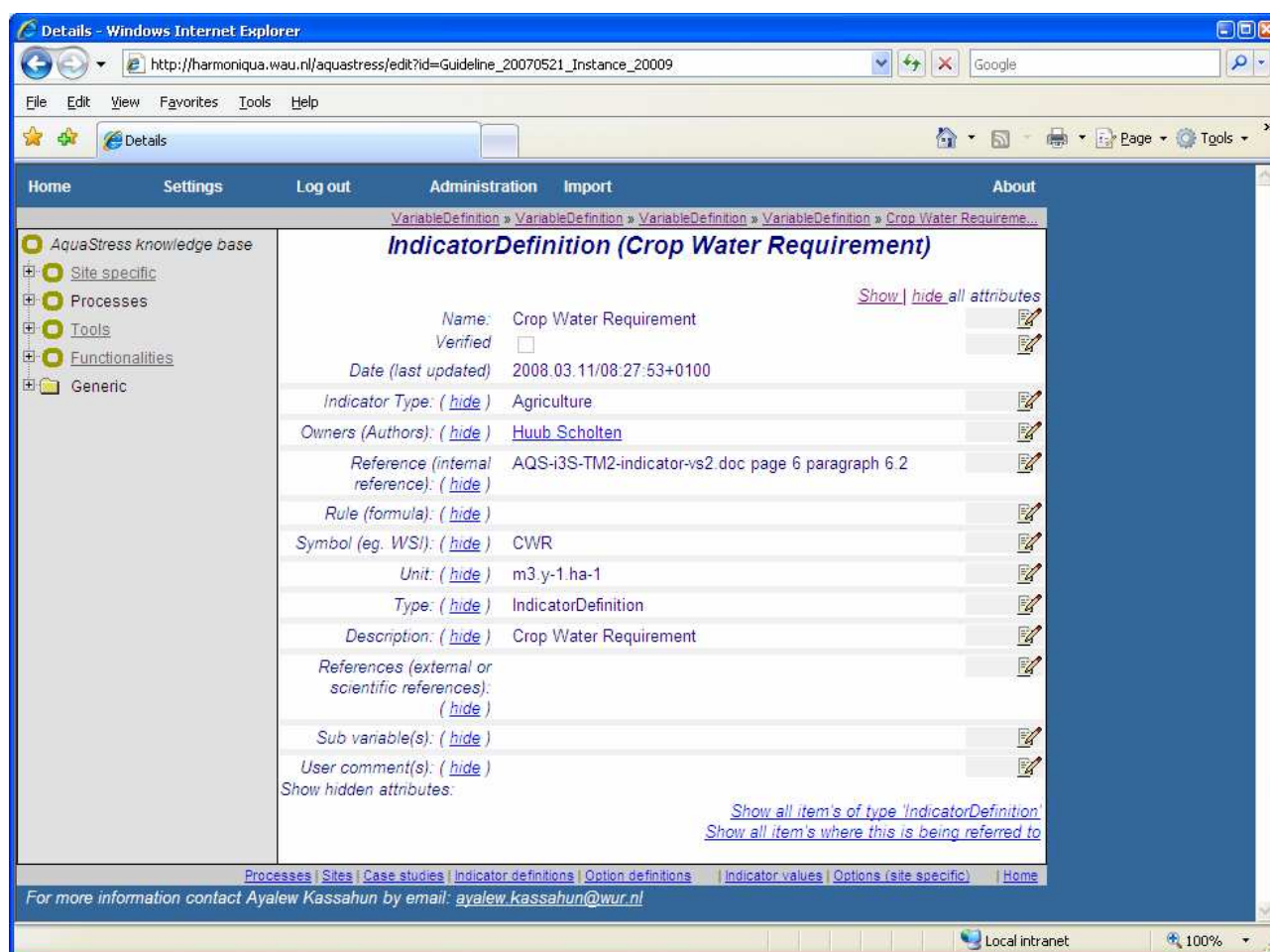






Figure 4. Main panel to edit the *AQS-KB item property* of the type *sub variable*.


4.4.3 Editing knowledge items of sub variables

1. Start *AQS-KB part* on *indicators* following the instructions in section 4.3.2.
2. Select an *indicator* or *variable* from the ones shown in the *list view* by clicking on its hyperlink; the *KB-editor* will show a screen as in Figure 2.
3. To edit *sub variables* click on the hyperlink in the *AQS-KB item property*, called *sub variable* in the *main panel* of a *indicator* with *sub variables* (e.g. *Crop Water Stress* with the *sub variables*

‘Crop Water Requirement’ and ‘Crop Water Supply’)). A new main panel will appear (see Figure 4). The *properties* of this main panel are shown in Table 4.

4. If you have the *authorization* to edit and you are *owner (author)* of that *AQS-KB item*, you will see one or more icons of the *context menu* (on the right hand side) for each of the *AQS-KB item properties*, e.g.  indicating the *authorization* to edit this *AQS-KB item*.
5. Each type of *AQS-KB item property* (listed in Table 4) requires a different approach:
 - *text*: click on  and edit or include the text in the window.
 - *lists*: click on  gives 3 options:
 - *delete / remove*: delete will permanently delete the property and remove will remove the property from the *hyperlink list*;
 - *add*: add an existing instance of a property of the *hyperlink list*;
 - *create an instances of*: create an instance of a property that can be subsequently be added to the *hyperlink list*;
 - *check boxes*: (only *administrators* can do this, which is a bug³) click on  allows you to select the *check box*.
 - *automatic*: no action should be takes as the *KB-editor* will fill it in.

4.4.4 Creating and deleting knowledge items of sub variables

1. Start *AQS-KB part* on *indicators* following the instructions in section 4.3.2.
2. To **create** a new *sub variable* click on the hyperlink *create a new instance* and fill in the field.
3. To **delete** an existing *sub variable* click on the delete icon ().

4. Responsibility procedures

The *authorization* feature as is included in the *AQS-KB* and associated *KB-editor* assures that responsibilities for the content of the *AQS-KB* are properly assured. Only one or a few persons are responsible and can change or delete parts. All can *read* and (if registered) *comment*, but the *editing* procedure is transparent.

5. References

- Blind, M., F. Dirksen and P. Sahota (Eds.), 2007. D4.2-4, Report: Functionality Fact Sheets, Unplanned AquaStress Deliverable. AquaStress project, Contract FP6 511231, Lelystad, 55 pp.
- Kassahun, A., 2008. Knowledge Base Editor, User Guide for the i3S (Version 1.0), draft, AquaStress, Wageningen, draft, 18 pp.
- Kassahun, A., M. Blind, A. Krause and O. Roosenschoon, 2008, Integrated Solution Support System for Water Management, iEMSs 2008, International Congress on Environmental Modelling and Software, Integrating Sciences and Information Technology for Environmental Assessment and Decision Making, Barcelona, Catalonia, <http://www.iemss.org/iemss2008/uploads/W6/PositionPaper.pdf>.

³ A workaround for this bug is: email one of the *Administrators* to do this, i.e. to click the check box. Please indicate which *check box(es)* has/have to be clicked. If you are not an administrator yourself, ask Ayalew Kassahun (Ayalew.kassahun@wur.nl) or Huub Scholten (huub.scholten@wur.nl).