

**Technologies for Water Recycling and Reuse in Latin American
Context:**

**Assessment, Decision Tools and Implementable Strategies under
an Uncertain Future**



FP7 - ENV.2011.3.1.1-1

**Final publishable summary report
Figures and Tables**

December 2015

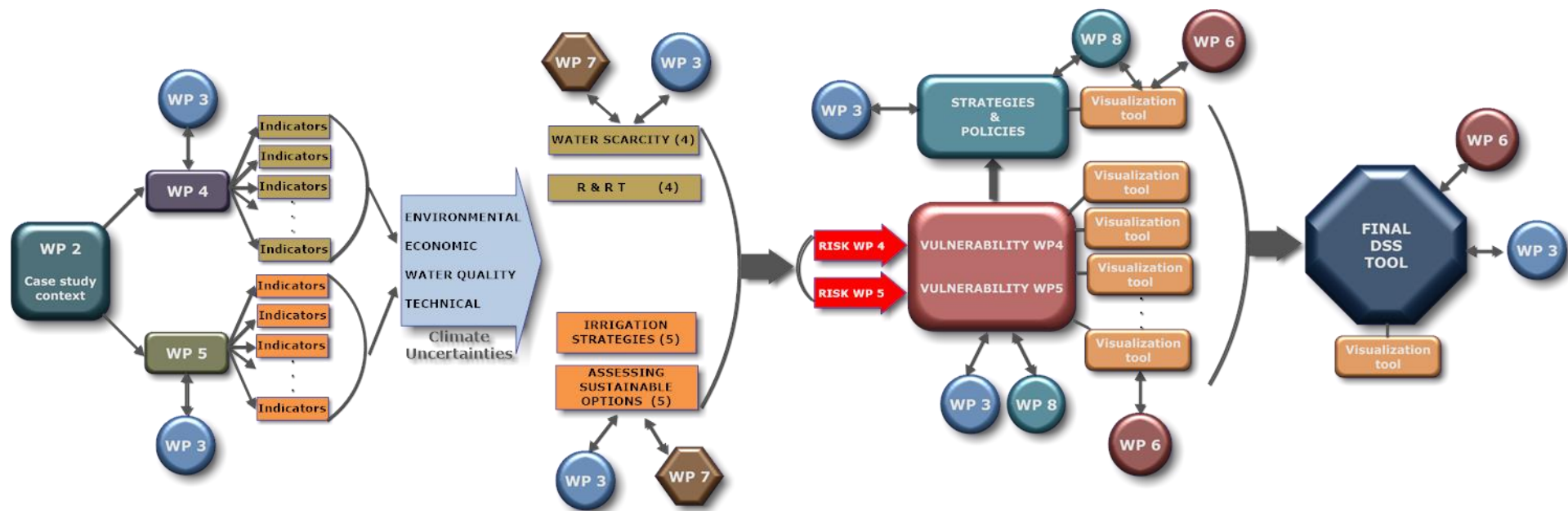


Figure 1. Interrelationship between the Project WPs leading to the Conceptual representation of the work plan.

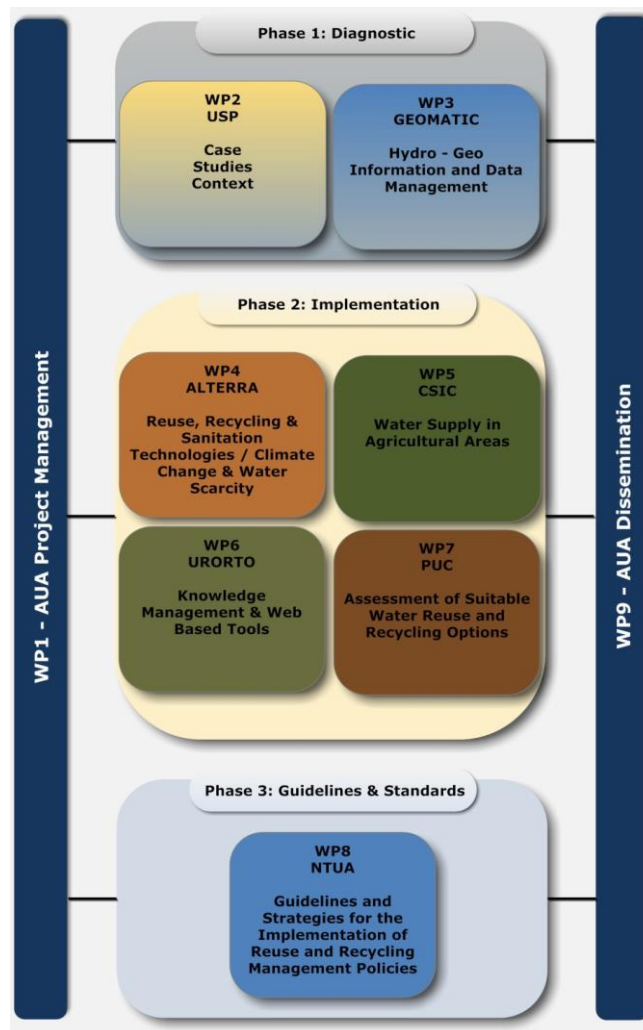


Figure 2. Interrelationship between the Project WPs including WP coordinators and participating partners.

Table 1. The main results of the COROADO project and their components

Main Results	
Web – Service Toolbox	D1.2 and D9.2
Scientific Workshops	D2.1, D2.3, D1.3 and D9.3
Design and development of the web-based DSS	D6.2
Components	
Geographical database design and Web GIS system development	D3.3
Development and application of a web-based geographical tool	D4.2
Report on a tool for assessing change of irrigation practices due to water scarcity and climate change	D5.3
Tools and instruments for supporting decision-making for water R&R scenarios and strategies	D7.2
Guidelines of Management Strategies and Policies on Reuse and	D8.3

Recycling Technologies	
Project Web portal	MS2
Manual of Indicators	Internal Report (WP4, WP5 and WP1)
Vulnerability Indices	Internal Report AUA and D8.1

Table 2. Dates of the workshops

Case Studies (Beneficiary)	First Series of Workshops	Second Series of Workshops
Brazil (USP)	June 27, 2012	September 26, 2014
Chile (PUC)	August 8, 2012	October 27, 2014
Argentina (UC)	August 31, 2012	October 27, 2014
Mexico (TDC)	July 5, 2012	October 16, 2014

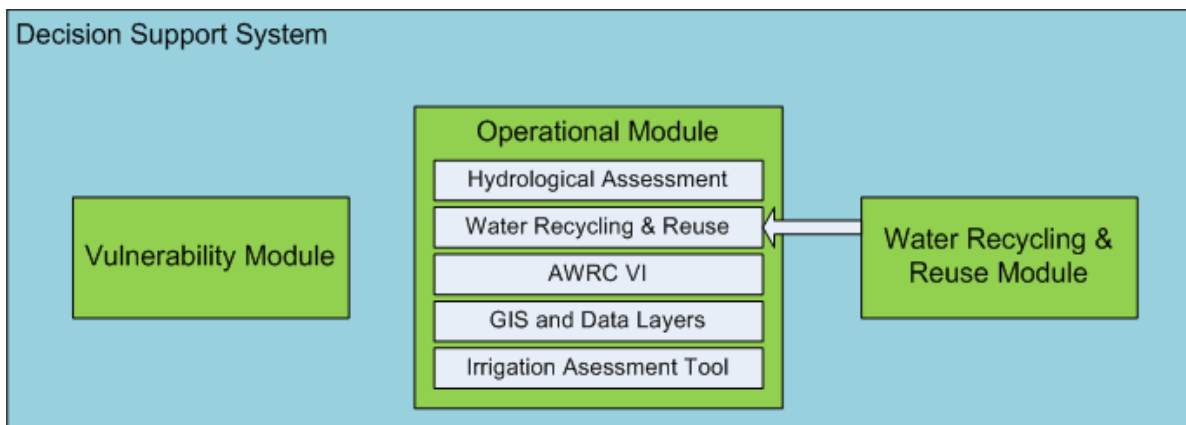
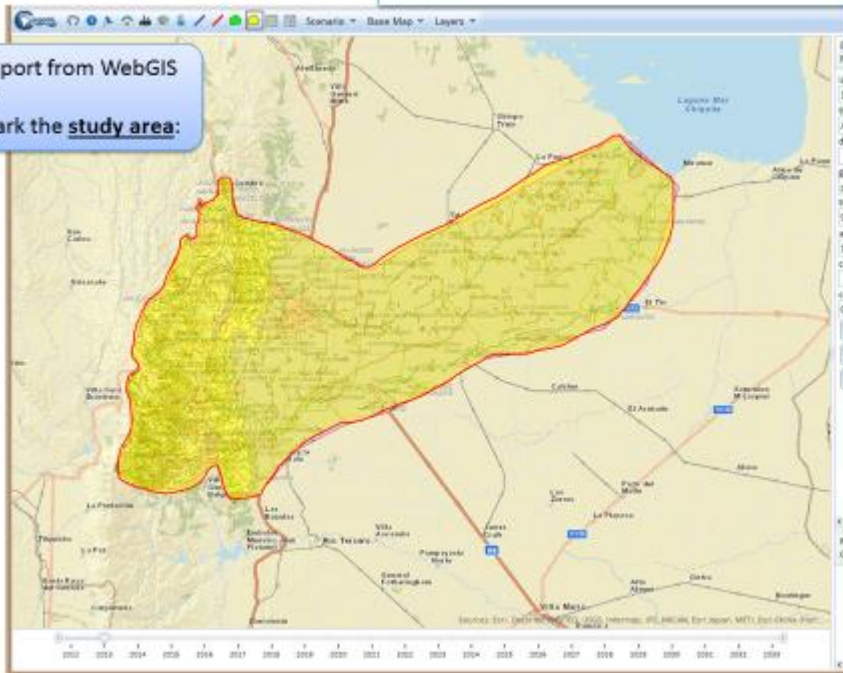


Figure 3. COROADO DSS structure

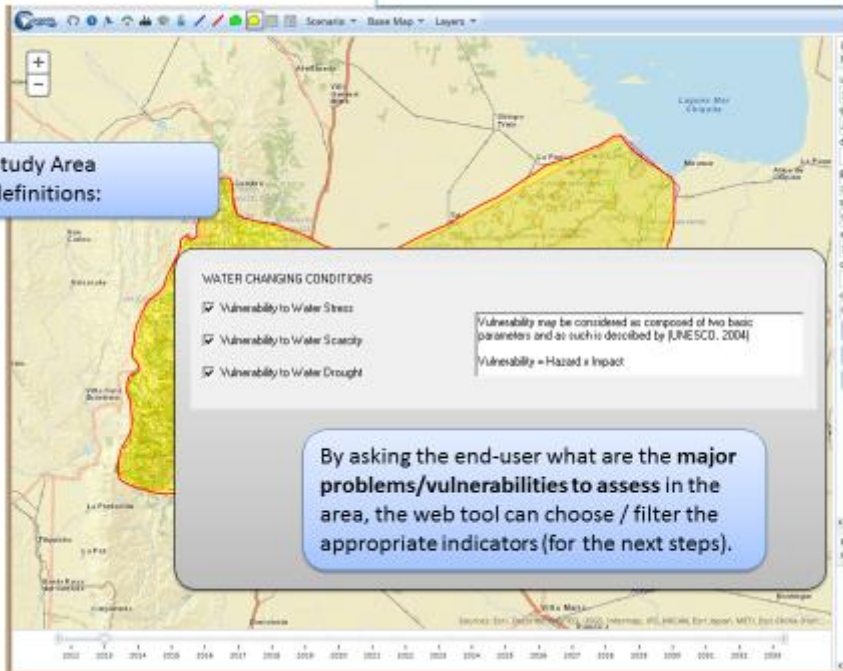
1.1 - Study Area Definition + Characterization

Import from WebGIS
or
mark the study area:



1.1 - Study Area Definition + Characterization

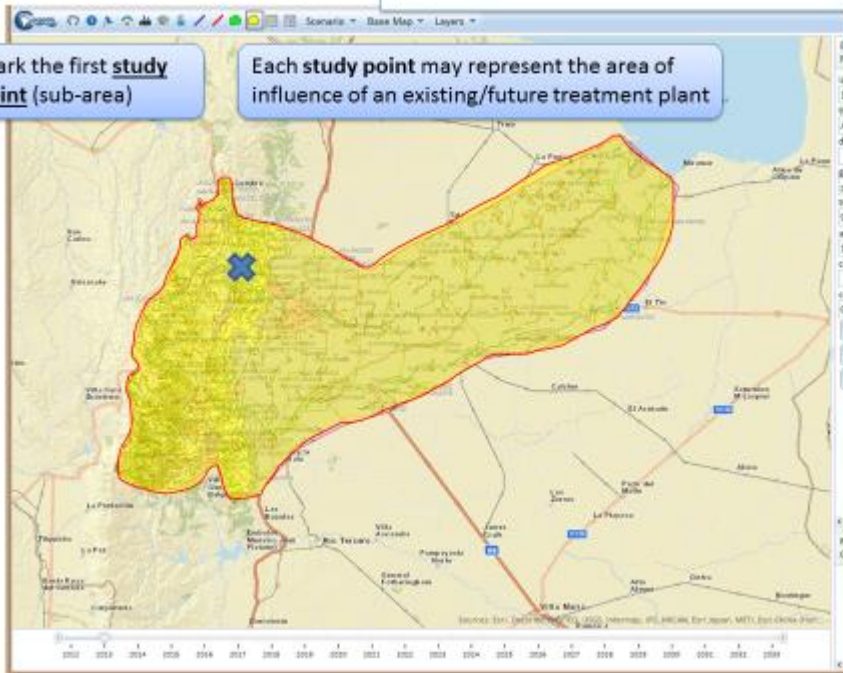
Study Area
definitions:



1.2 - Sub-Areas Indicator Characterization

Mark the first **study point** (sub-area)

Each study point may represent the area of influence of an existing/future treatment plant



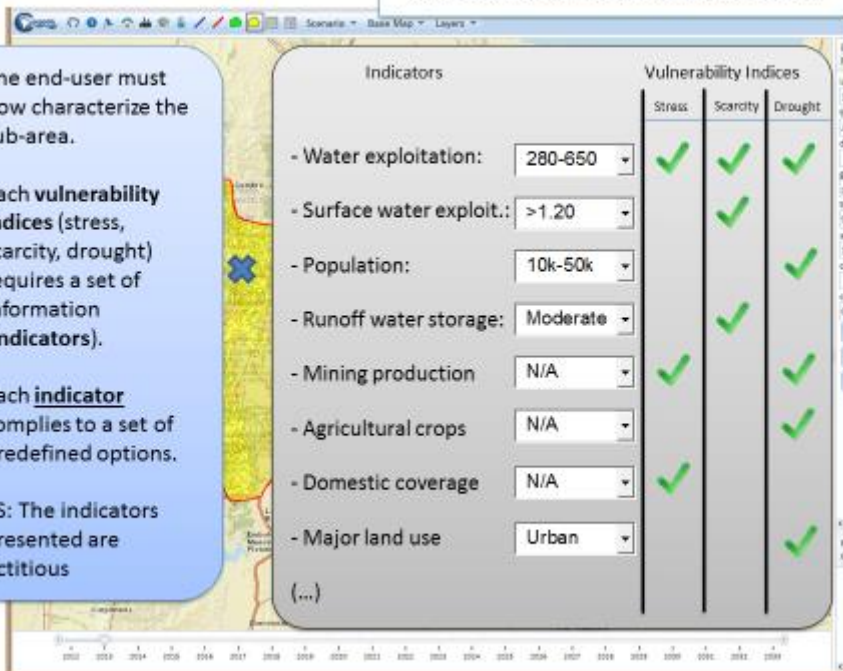
1.2 - Sub-Areas Indicator Characterization

The end-user must now characterize the sub-area.

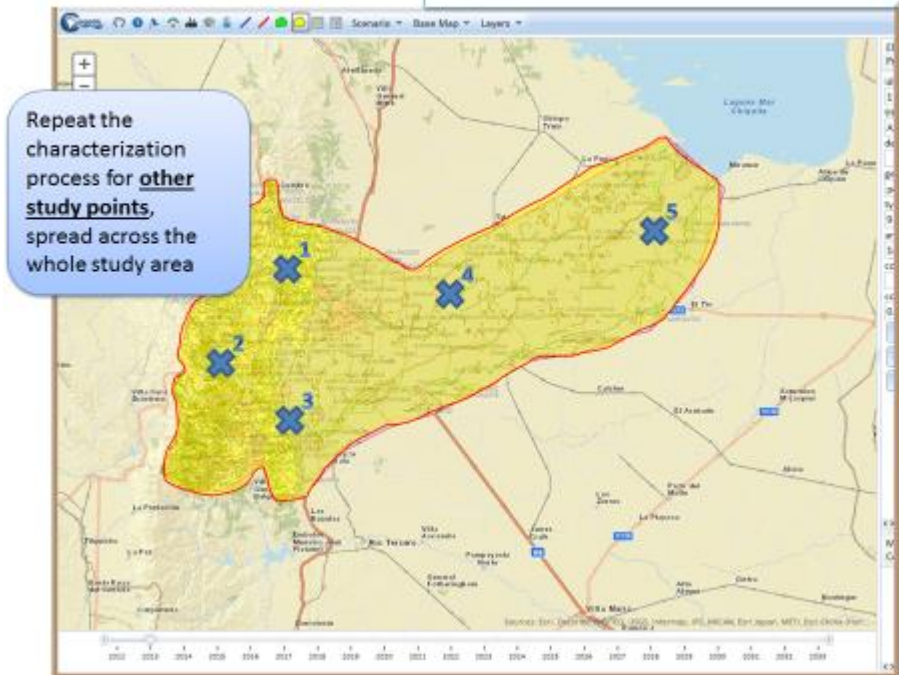
Each **vulnerability indices** (stress, scarcity, drought) requires a set of information (**indicators**).

Each **indicator** complies to a set of predefined options.

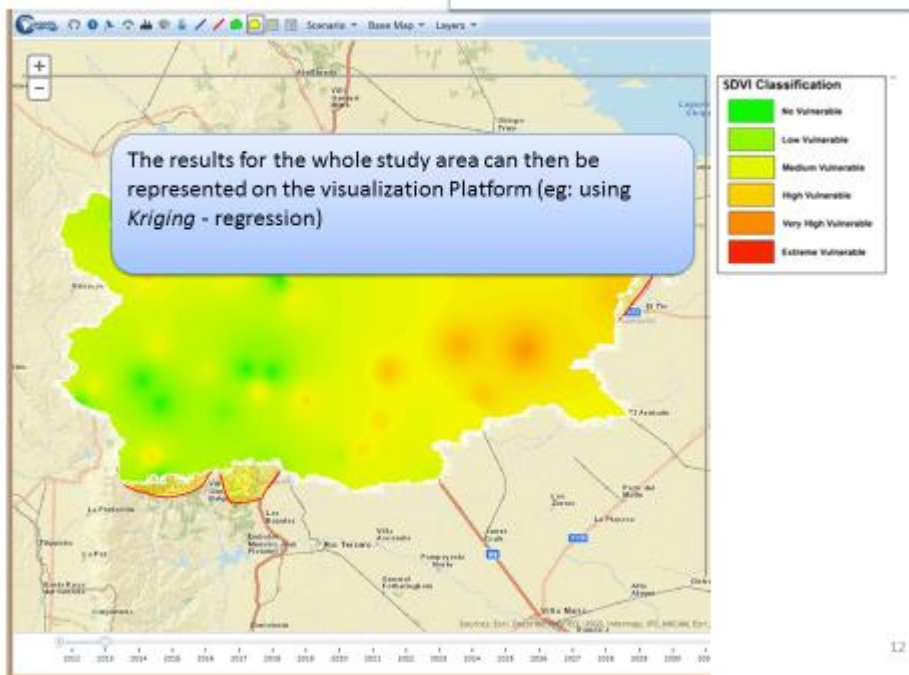
PS: The indicators presented are fictitious



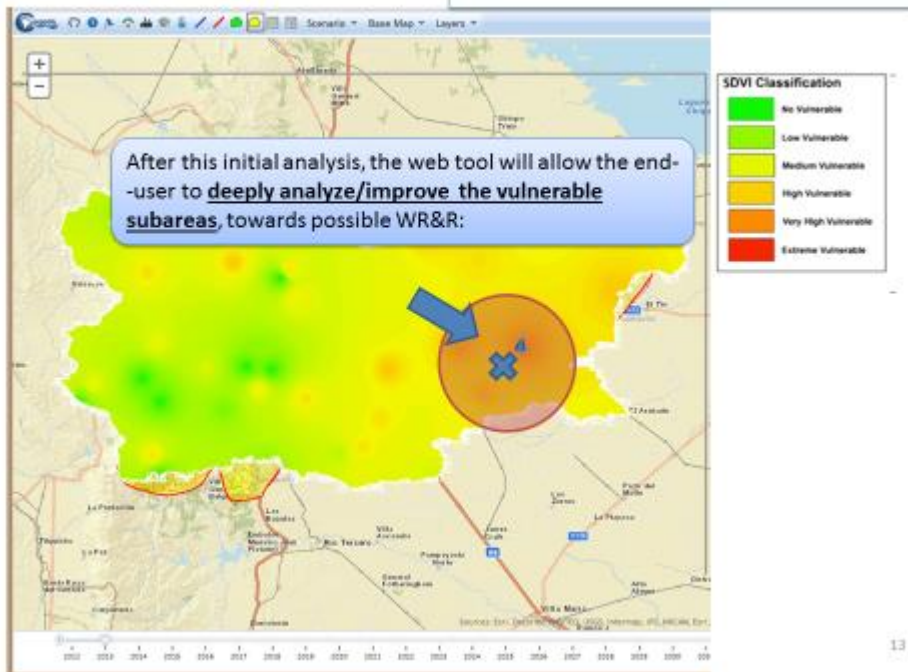
1.2 - Sub-Areas Indicator Characterization



1.3 - Calculation + Visualization

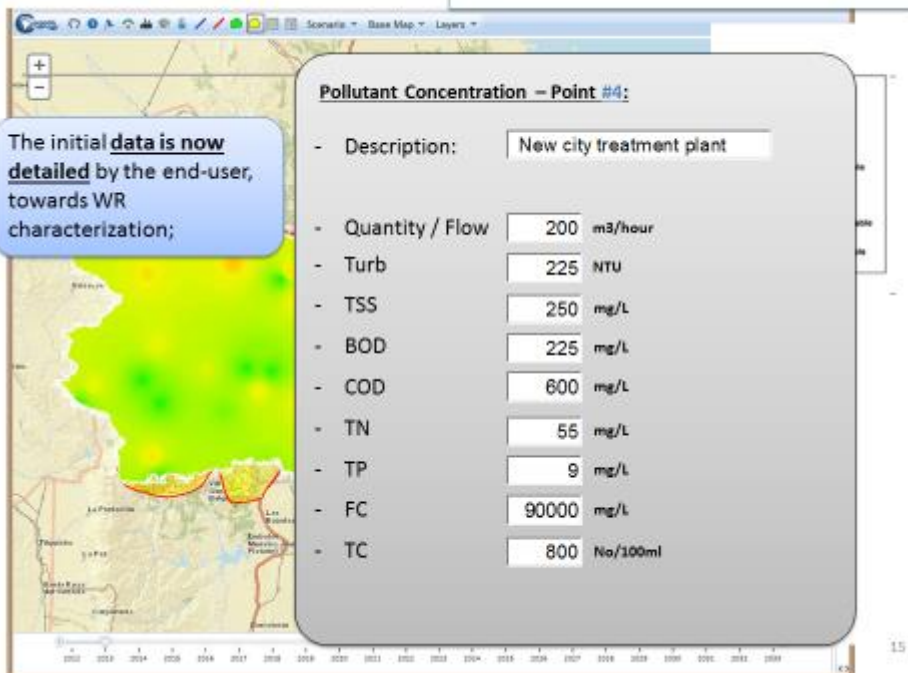


2 - WR&R Evaluation and Policy options



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2.1 - Pollutant data collection



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2.2 - Treatment Train selection/simulation

Existing Typical train Custom train Optimal train for this case

Preliminary Treatment:
 Unit 1: P1 - Bar screen
 Unit 2: None

Primary Treatment:
 Unit 3: None
 Unit 4: None

Secondary Treatment:
 Unit 5: None
 Unit 6: None

Tertiary/Advanced Treatment:
 Unit 7: None
 Unit 8: None
 Unit 9: None

Disinfection Treatment:
 Unit 10: None

The end-user is invited to start by characterizing the **existent situation**; if no water treatment exists, all processes can simply be defined as "None".

Other trains can be further added, allowing simulation and comparison capabilities.

Ease of O & M	3,00
Ease of construction	3,00
Ease of demonstration	3,00
Power demand	1,00
Chemical demand	0,00
Odor generation	3,00
Impact on ground water	0,00
Land requirement	0,00
Cost of treatment	0,00
Quantity of sludge production	0,00

Improvement from existent train:	Regulation Compliance:					
N/A	Irrigation	Industrial	G.Recharge	Env&Recr	Urban	Potable
	YES	NO	NO	YES	NO	NO

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2.2 - Treatment Train selection/simulation

Existing Typical train Custom train Optimal train for this case

Results are calculated instantly (based on formulation and criteria provided by WP4);

Regulation compliance will be met if final pollutant concentration is lower than the chosen requirements.

Results - Removal efficiency:

Turb	225,00
TSS	250,00
BOD	234,50
COD	591,00
TN	55,00
TP	9,00
PC	1000000,00
TC	850,00

Results - Evaluation criteria, requirements and impacts:

Reliability	3,00
Ease to upgrade	1,00
Adaptability to varying flow	3,00
Adaptability to varying quality	3,00
Ease of O & M	3,00
Ease of construction	3,00
Ease of demonstration	3,00
Power demand	1,00
Chemical demand	0,00
Odor generation	3,00
Impact on ground water	0,00
Land requirement	0,00
Cost of treatment	0,00
Quantity of sludge production	0,00

Improvement from existent train: N/A

Regulation Compliance: U.S. EPA

	Irrigation	Industrial	G.Recharge	Env&Recr	Urban	Potable
	YES	NO	NO	YES	NO	NO

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The end-user is invited to start by characterizing the **existent situation**; if no water treatment exists, all processes can simply be defined as "None".

Other trains can be further added, allowing simulation and comparison capabilities.

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Improvement from existent train:	Regulation Compliance:					
N/A	Irrigation	Industrial	G.Recharge	Ena&Recr	Urban	Potable
	YES	NO	NO	YES	NO	NO

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2.2 - Treatment Train selection/simulation

Existing Typical train Custom train Optimal train for this case

Results are calculated instantly (based on formulation and criteria provided by WP4);

Regulation compliance will be met if final pollutant concentration is lower than the chosen requirements.

Results - Removal efficiency:

Turb	225,00
TSS	250,00
BOD	284,50
COD	592,00
TN	55,00
TP	9,00
FC	1000000,00
TC	800,00

Results - Evaluation criteria, requirements and impacts:

Reliability	3,00
Ease to upgrade	1,00
Adaptability to varying flow	3,00
Adaptability to varying quality	3,00
Ease of O & M	3,00
Ease of construction	3,00
Ease of demonstration	3,00
Power demand	1,00
Chemical demand	0,00
Odor generation	3,00
Impact on ground water	0,00
Land requirement	0,00
Cost of treatment	0,00
Quantity of sludge production	0,00

Improvement from existent train: N/A

Regulation Compliance: U.S. EPA

	Irrigation	Industrial	G.Recharge	Ena&Recr	Urban	Potable
	YES	NO	NO	YES	NO	NO

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2.2 - Treatment Train selection/simulation

After definition of the existent treatment train, the end-user can now start simulating possible alternatives towards WR&R evaluation;

A list of several **typical trains** (provided by WP4) can be available, allowing comparison and study baselines;

Ease of demonstration	2.71
Power demand	1.57
Chemical demand	0.71
Odor generation	1.57
Impact on ground water	0.29
Land requirement	0.71
Cost of treatment	0.29
Quantity of sludge production	0.43

Improvement from existent train: x %

Regulation Compliance:

	Irrigation	Industrial	G. Recharge	Ena&Recr	Urban	Potable
	YES	NO	NO	YES	NO	NO

Figure 3.1.DSS screens progressively portraying the procedure of the application.

2.2 - Treatment Train selection/simulation

Results also include the **overall improvement** (when compared to the existing train). This improvement calculation can be expressed as a weighted average of all results.

Turb	1.96
TSS	0.38
BOD	1.93
COD	3.55
TN	0.06
TP	0.00
	70000.00
	86.00

Results - Evaluation criteria, requirements and impacts:

Liability	2.71
Cost to upgrade	2.00
Adaptability to varying flow	2.71
Adaptability to varying quality	2.57
Cost of O & M	2.29
Cost of construction	2.43
Ease of demonstration	2.71
Power demand	1.57
Chemical demand	0.71
Odor generation	1.57
Impact on ground water	0.29
Land requirement	0.71
Cost of treatment	0.29
Quantity of sludge production	0.43

Improvement from existent train: x %

Regulation Compliance: U.S. EPA

	Irrigation	Industrial	G. Recharge	Ena&Recr	Urban	Potable
	YES	NO	NO	YES	NO	NO

Figure 3.2.DSS screen portraying results for a typical (basic) application.

2.2 - Treatment Train selection/simulation

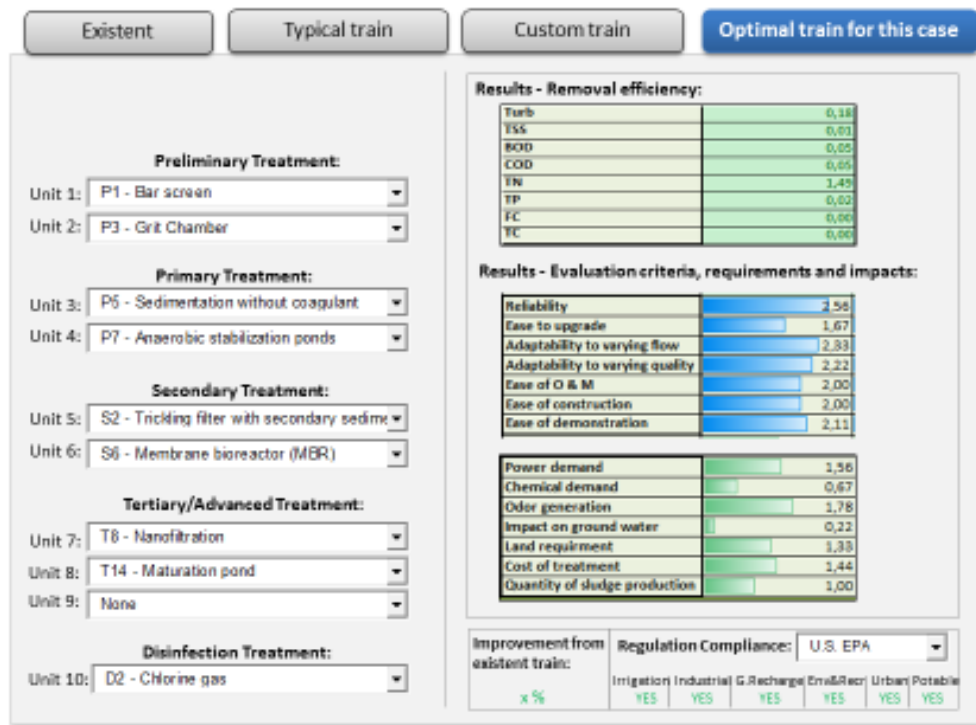


Figure 3.3. DSS screen portraying results for the optimum (most appropriate) application.

Comparison - Results for the different Treatment Trains:

- Existent
- Custom: Own TT N°1
- Typical: High Quality
- Typical: Only disinfection
- Typical: Soil Treatment
- Typical: Local MBR
- Typical: Wetlands
- Optimal

2.3 - Results

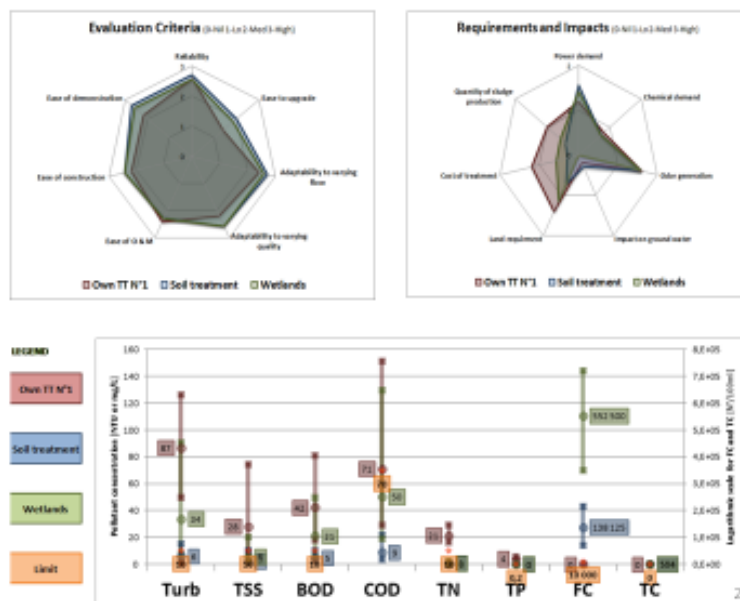


Figure 3.4. DSS screen portraying comparative results for the various treatments application.

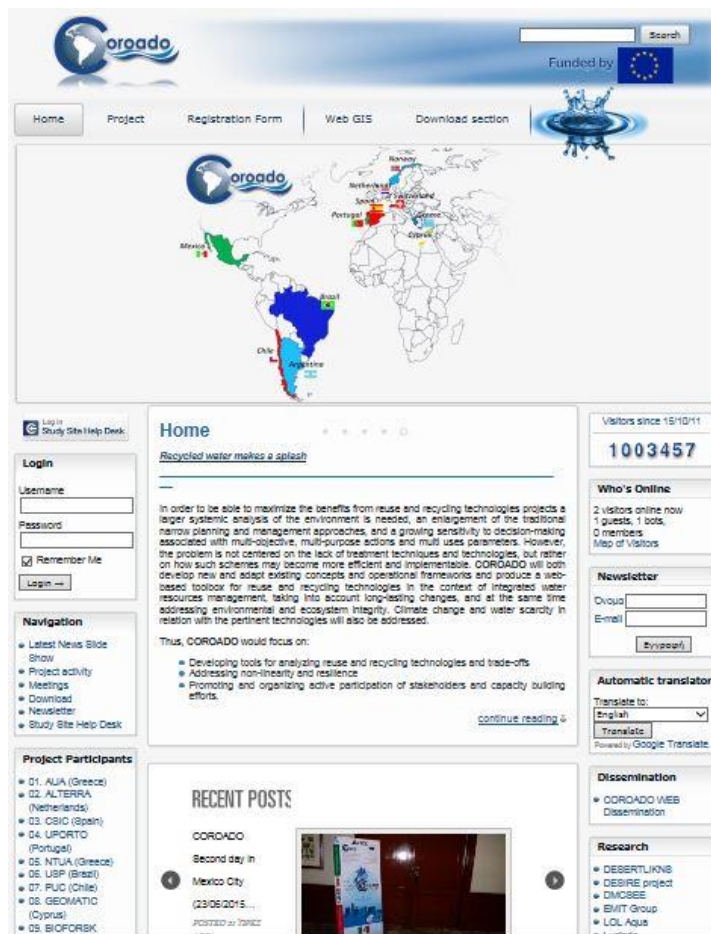


Figure 4. The COROADO Website

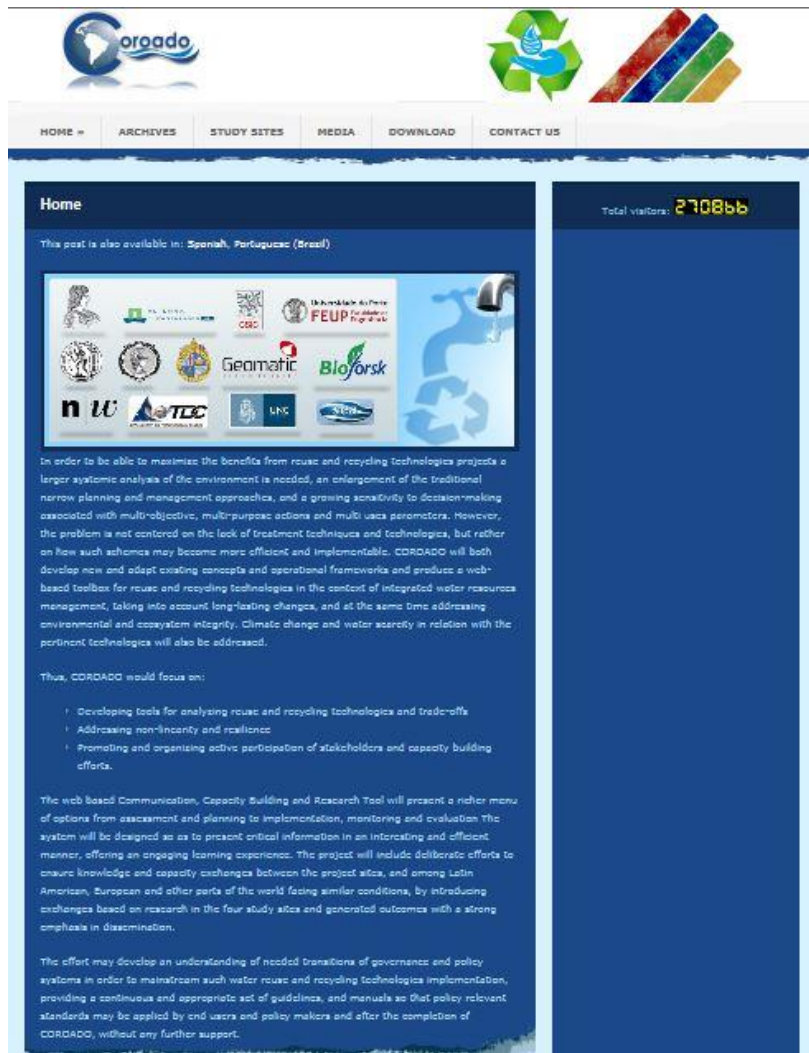


Figure 5. The COROADO Dissemination Site

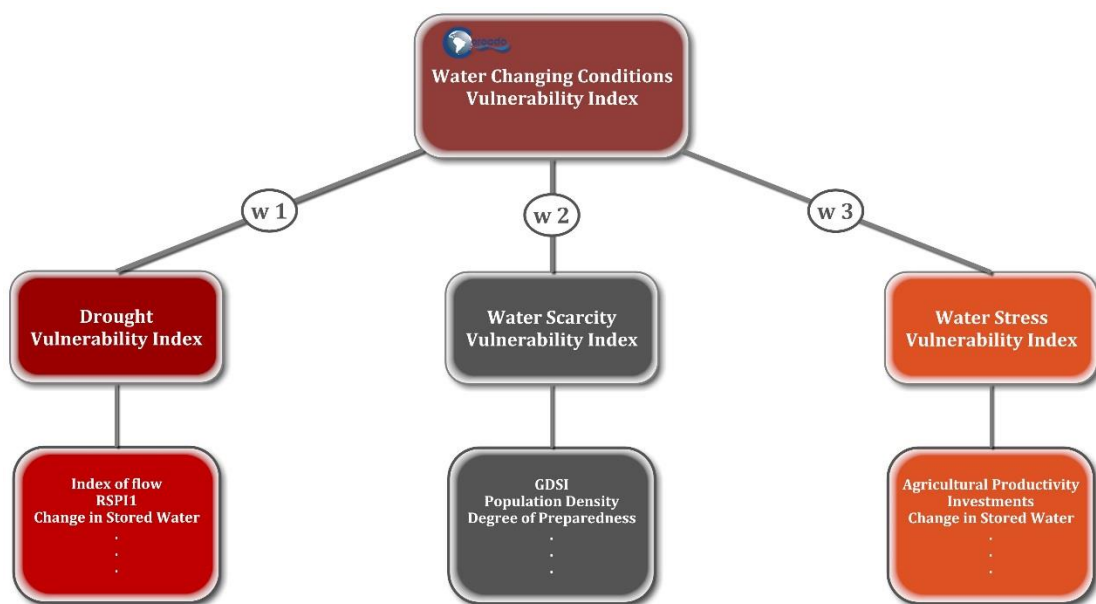


Figure 6. Schematic Procedure of the development of the Indices