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AquaStress Newsletter

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In this issue:

Editorial

This number is focussing on the mitigation of water scarcity in the Mediterranean and on use of SWAT model in AquaStress Case Studies. "Projects news in brief" refer to main events have been carried out since January 2008 while "Upcoming events" announce the activities for the last six months of the project.

Opinion of Tunisian stakeholders on

"Mitigation of water scarcity in the Mediterranean basin"

by Christian Leduc (IRD) and Zohra Lili Chabaane (INAT)

The AquaStress Workshop on "Mitigation of water scarcity in the Mediterranean basin" was held in Monastir on May 2008, 5-7, and it was organized by INAT in collaboration with CIHEAM and IRD. The Workshop represents an important step in the discussion of options proposed by the AquaStress teams involved in the Tunisian case study. Participants were very numerous (104), most of them came from Tunisia but a few others came from abroad. Tunisian participants were mostly involved in the water management at the national level and/or at the regional level (in Kairouan and in other arid and semi-arid areas). Some participants belonged to other national departments as the Meteorological Office or to international projects interested in water management.
The first two days of the Workshop were dedicated to presentations of various case studies and experiences from the Mediterranean region and discussions and the third one was a field trip in the Merguellil catchment. A Round Table with local stakeholders and water experts was held in the afternoon of May 6th, and it was dedicated to the mitigation of water scarcity in Tunisia. The discussion can be summarized in several following points.

Relation farmers-Ministry of Agriculture

1. The Civil Services seem always one step behind the ever increasing water demand from farmers. They should better define the real amount of available resources and then contribute to an active management.
2. Water is not managed and not seen on the same way by private farmers and by farmers in public irrigation schemes. It is in fact quite impossible to get an idea of the water withdrawals by private farmers. On the opposite, a control or at least a management attempt exists in public irrigation schemes: farmers will not get water without water saving effort ; moreover, they are strongly encouraged to irrigate for winter crops instead of summer crops (winter crops will be "protected"). In public schemes, whatever the climate, the State will provide at least 50% of the water demand for fruit trees (in order to survive a drought year).

Crops and agricultural methods

1. In most cases, olive tree fields were planted according to traditional rules that were pertinent for rainfed agriculture (distance between trees directly linked with the annual rainfall). In such a case, the interest of bringing drip irrigation is not obvious. Irrigation and higher density of trees are relevant in a new plantation but, in an old one, trees will not be moved closer and there is a risk of overwatering trees...
2. Selection of adequate species that consumes less water and have the autumn-winter growing cycle is important for sustainable agriculture. However, this should be done in agreement with all factors relevant for agro-ecological characterization and development of agricultural maps over the whole country.

Training and dissemination

1. Even if there is already a lot of information given by technicians of the Ministry of Agriculture at the local

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level, information should be better shared, explained and disseminated and should also come quickly. This need concerns technical considerations (e.g. for optimizing the irrigation schedule and other parameters in order to reach international standards, as the production of 2 T/ha for Tunisian olives vs. 5 T/ha in Spain) but also more general information.

2. Information is spread much more easily during crisis (=drought) years than during rainy years.
3. In the north of Tunisia, the Meteorological Service has developed a participatory process with farmers for convincing them to pay for a reliable weather forecast that saves water and pesticides.
4. There is an obvious need to find a place/institution for dialogue between the farmers and the State because they all have to negotiate.

Other sources of water

1. The Tunisian State thinks about transferring water from the north to the centre by a network of channels interconnecting the largest dams of the country. This could bring some 50 Mm3/year. This input is obviously dependant on climatic conditions (deficit or excess) that could be the identical or different over the whole country... in case of a drought lasting several years, this input could amount to nil.
2. Water transferred from the north could be mixed with salted water (as in the Zeroud catchment, the southern neighbour of the Merguellil catchment) that is presently difficult to use. This benefit in water could then be even beyond the transferred amount.
3. As everywhere, water losses in the distribution network (drinking water or irrigation) should be investigated.
4. Drainage water and runoff water should not be mixed because their quality and possible further uses differ.

Water management

1. A more precise quantification of water uses is absolutely required. For instance, the Sidi Saad dam over Wadi Zeroud, to the south of the Merguellil catchment, releases about 30 Mm3/year when only 4 Mm3 are effectively charged to farmers. This is not enough for building a real integrated water management but this is a first compulsory step.
2. Turning from oil engines to electric engines for the pump supply should be a good solution for estimating the total withdrawal and also to progressively give an economic value to water.
3. An integrated water management should also include qualitative aspects.
4. Environmental changes are fundamental: the possible climate change, the progressive silting up of dams could lead to catastrophes before the expected time.
5. The possibility of "sacrificing" some areas should be studied: their regional interest would be to produce water to be used in other areas.

Synthesis of other important issues

1. Because of the links of most participants with the rural world, it was logical that most debates dealt with agricultural considerations. The water demand for environmental purposes was never evoked. More surprising, the competition between drinking water and irrigation (and then between the export to coastal cities and local consumption) was not mentioned: the national priority given in any case to the domestic supply cannot be questioned, even if it includes the dimension local vs external.
2. The difference between private farmers (badly known, without any real control by authorities) and public irrigated schemes (well known, under the influence) is obvious. There is a risk of considering the whole rural world in the image of public schemes that cover only a small part of the irrigated area.
3. Social and political parameters are seldom evoked when they are a fundamental component of all behaviours (individuals and authorities).
4. Until now, the Water Code not enforced and new laws would not change anything to the present overexploitation state. On the opposite, subsidies (e.g. for drip irrigation) have had rapid and deep impact on farmers.

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Focus on...

SWAT model as an AQUASTRESS tool

by A. Lo Porto, A. M. De Girolamo and A. Abouabdillah (CNR-IRSA, Bari, Italy)

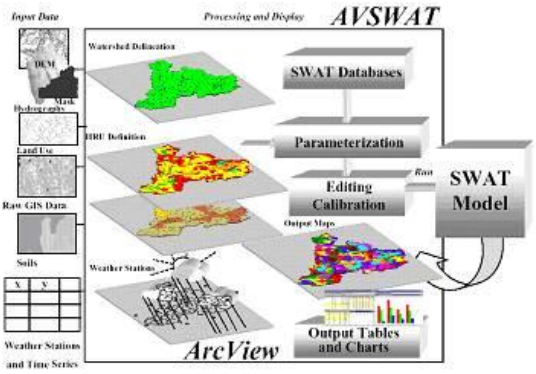
About the model

SWAT (Soil and Water Assessment Tool) is a basin scale, continuous time model that operates on a daily time step and is designed to predict the impact of management on water, sediment, and agricultural chemical yields in ungauged basins (Arnold et al., 1998). This model was developed by USDA-ARS to assist water resource managers in assessing water supplies and non-point source pollution on watersheds and large river basins (Arnold et al., 1996). It is currently being utilized in several large projects by government agencies and private consultancies as well as in research at university level.

SWAT is based on several previously developed models such as Simulator for Water Resources in Rural Basins (SWRRB) (Williams et al., 1985) and Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) (Leonard et al., 1987). The model operates on a daily time step and simulates eight major components: hydrology, weather, sedimentation, soil temperature, crop growth, nutrients, pesticides, and agricultural management (Neitsch et al., 2002). Major hydrologic processes that can be simulated by the model include ET, surface runoff, infiltration, percolation, shallow aquifer and deep aquifer flow, and channel routing (Arnold et al., 1998). Simulation of the processes is accomplished in four subsystems: surface soil, intermediate zone, shallow and deep aquifers, and open channels. Streamflow in a main channel is determined by three sources: surface runoff, lateral flow, and base flow from shallow aquifers. In SWAT, the impacts of spatial variations in topography, land use, soil, and other watershed characteristics on hydrology are considered in subdivisions. Watersheds are divided into subwatersheds based upon drainage areas of the tributaries, and each subwatershed is divided into HRUs based on land cover and soil type. Each HRU is assumed to be spatially uniform in land use, soil, topography, and climate. A daily water budget is established for each HRU based on precipitation, runoff, ET, percolation, base flow, and soil moisture change. Two options are available for partitioning surface runoff and infiltration: the SCS runoff curve number method, and the Green and Ampt method (Green and Ampt, 1911). In the SCS method, a curve numbers is determined by land use, soil hydrologic group, and soil moisture condition for each HRU within a watershed. The SWAT model offers three methods for estimating potential ET (PET): the Penman-Monteith model (Monteith, 1965); Priestley-Taylor model (Priestley and Taylor, 1972); and Hargreaves model (Hargreaves and Samani, 1985).

The SWAT allows the evaluation of scenarios depending of the objectives of the user. It is a free and open code model, this tolerates to identify and evaluate some scenarios modifying some parameters.

The SWAT model is a very complex product, and demand highly professional knowledge to ensure reliable output. While such sophisticated system is needed for certain watershed studies, a watershed management tool using simpler models and PC-based GIS software such as ArcView is in greater demand.



Use of SWAT in AQUASTRESS

In AquaStress, the SWAT model has been applied for two watersheds, Meguellil catchment in Tunisia and Flumendosa one in Italy. The water and nutrient balance have been simulated, and some scenarios have been evaluated in order to improve the availability of high quality water at catchment scale.

Evaluation of Alternative Management Practices

For both catchments SWAT model has been

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used to simulate the environmental impacts of the reductions in fertilizer use by 20%. The reduction of the fertilizer dosage was applied to the most important crops cultivated in these watersheds. SWAT model has been run considering actual land use, management practices and amount and type of fertilizers adopted in the study area. Where necessary, further adjustments in SWAT parameters were made until the average simulated crop yields were close to the average actual yield. Finally, a comparison analysis of yields/profits of the crops post and pre-fertilizer reduction has been evaluated.
SWAT model allows us to conclude a better use of the fertilizer, such as not over-application, could substantially reduce the amount of nutrients flowing down river without compromising crop yields. The results of this analysis will make good discussions on the impact of nitrogen control policies and will be of interest to government, farmers, fertilizer producers and environmental stakeholders.

Evaluation of alternative land use scenario

In the case of Flumendosa Case Study and activity on "Introduction of rapeseed and sunflower" crops, the model has been used for analysis of alternative land uses changing the cropping pattern and switching crops from one to another across. This has been done with the aim to define a modelling framework to assess sustainability of land uses in water limited environments and to formulate a list of alternative land uses allowing the attainment of water quality goals.

Impact of soil and water conservation works

For the Merguellil catchment in Tunisia, SWAT model has been applied to create a perceptual model of the baseline situation and to evaluate the impact of the conservation works on the availability of the water in the downstream reservoir. With other words, the SWAT model has been used to evaluate the impact of removing some reservoirs from the watershed.
The results of this scenario have clearly shown that removing some important reservoirs will result in an increase of the surface runoff of about 2.2 Mm3/year in the profile of the watershed outlet.

Climate change Scenario

SWAT model has been used to assess the effects of potential future climate change on the hydrology, sediment and nutrients balances in the Merguellil catchement. A scenario has been simulated using climatic data (precipitation and temperature for 2020, 2050, and 2080) predicted from the general circulation model HadCM3, developed by UK Hadley Center for climatic prediction and research.
Climate change has been simulated with SWAT by manipulating the climatic input that is read into model. SWAT allows the adjustment terms to vary from month to month so that the user is able to simulate seasonal changes in climatic conditions.
The results of this scenario have shown that the climate change would have an impact on the quantity and quality of the surface runoff. In a yearly scale, all the components of the water and nutrient balance are foreseen to decrease.

El Houareb dam (Tunisia) in May 2008

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Project news in brief

4th AquaStress General Assembly

Montpellier, 6th March 2008

by Alberto Puddu (Project Coordinator)

The 4th AquaStress General Assembly was held at the Campus Agropolis La Vallette, Montpellier on March 6th, 2008. The event was hosted by CEMAGREF. The GA followed the Joint Assembly organized by the Work Block 1. Thirty-three out of thirty-five members attended the meeting or were represented. The EC Project Officer, Mr. Avelino Gonzales-Gonzales, honoured the Project events with his participation.

The GA members discussed and approved the draft of the 3rd annual activity and management reports and the planning for the last year activity. The plan of the AquaStress final outcomes was proposed by the PSG and extensively discussed by the partners community.

The forthcoming major events will include the participation to the 13 World Water Congress (Montpellier, 1-4 September 2008) and the organization of the Final AquaStress Event that will involve key representatives of the European Commission and high profile stakeholders at both EU and national level.

International Workshop on "Mitigation of Water Scarcity in the Mediterranean Basin"

Sousse-Monastir (Tunisia), 5 –7 May 2008

by Mladen Todorovic (CIHEAM-IAMB)

3rd AquaStress Workshop was held on 5-7 May 2008 in Tunisia, in Skanes Serail Hotel, located between Sousse and Monastir. The workshop was focussed on the "Mitigation of Water Scarcity in the Mediterranean Basin" and it was followed by more than 100 participants from Tunisia and other countries (Italy, France, Germany, Morocco and UK). Most of participants were local water managers and stakeholders from the Merguellil catchment, and researchers and decision makers from Tunisian national Institutions and governmental bodies.

The main objective of the Workshop was to disseminate the results of AquaStress, achieved in the Mediterranean Case Study areas, dealing with water stress in agriculture and, especially in the area of Merguellil watershed in Tunisia. The opening session includes the intervention of the representatives from national and regional Mediterranean Institutions (CIHEAM – Centre for Advanced Agronomic Studies in the Mediterranean, IME – Mediterranean Water Institute). A key note speech on mitigation of water scarcity in the Mediterranean Basin was given by Prof. Mohammed Ennabli, President of IME.

The program of the Workshop included the presentations of different technical and non-technical options for water saving and mitigation of water shortage problems and experiences from other case study areas of AquaStress project and other locations in the Mediterranean. A whole day was dedicated to a detailed presentation of the

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Tunisian Case Study outputs and a round-table discussion with local stakeholders. Technical visit was held on 7th May in the Case Study area of Kairouan and El Houareb dam, located in Merguellil watershed.

By strengthening the capacity building and the dialogue between stakeholders, water managers, researchers and decision makers, this event supported the preparation of a draft of Water Stress Mitigation Plan for the Merguellil watershed in Tunisia.

Training of Trainers on "Gender Aspects of Water Resources Management"

Kairouan (Tunisia), 7- 9 May 2008.

by Cecilia Mosca (Hydrodata) and Zohra Lili Chabaane (INAT)

AquaStress Partners HYDRODATA, INAT, CIHEAM-IAMB and IRD organised, a Training of Trainers (ToT) course on "Gender Aspects of Water Resources Management" in Merguellil Valley, the Tunisian case study area. The course was held in Kairouan at the Regional Center for Agriculture Development (CRDA) on 7-9 May 2008. with the aim to improve the gender role in decision making processes and water management in agriculture.

The ToT course was organized on the request of local stakeholders as a result of survey of the actual situation regarding gender issues in Merguelli Valley. The study was carried out by INAT within the Case Study activity on "Methods for fostering the integration of women in agricultural water management".

The ToT course, foreseen mainly as a "raising awareness and exchange of experiences" event, has been attended by 20 participant, both woman and man representing local stakeholders and managers in the water sector.

The course was organised in collaboration with EU GEWAMED PROJECT, through interactive lectures, working groups activities and participatory discussion sessions. The lectures were given by local and foreign experts from CIHEAM-IAMB, CATWAR, INAT, IRD and GR/MARH. Most of presentations and exercises were given in Arabic that allowed very active and vivid discussions with the participants.

The main topics covered during the course were:

- The present practice of gender mainstreaming
- Water resources in Merguellil Valley
- The gender concept and analysis, Gender indicators
- Gender and water resources management: needs and issues involved
- Importance of information and communication in water sector
- How to mainstream gender in IWRM: Case Study from Tunisia
- Familiarization with some of the existing training tools and materials
- Gender mainstreaming in the project cycle
- PRA - Participatory Rapid Appraisal: techniques and tools
- Lessons learnt in integrating the gender dimensions in agriculture water management.

The evaluation made by the participants underlined that they understood that involving women, as well as men, in water resources management is not only important for improving women's situation, but also is an essential factor for effective development, use and management of water resources in Tunisia.

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4th AquaStress Summer School
Bystra (Przemsza), Poland, 27-30 May 2008.

by Anna Balzarini (ID Consulting)

The fourth Aquastress Summer School on water stress was held in Bystra (Przemsza site), within the frame of AQS WB6.4 activities (IDC), in collaboration with the AQS Polish partner (CUT) with the participation of Gaja Club (Polish ONG).

The "Przemsza's Summer School" was organised with half a day preparatory field visit+ one session of 4 days with 50 students coming from Katowice (Przemzsa case study area). The preparatory field visit was on 13th May and the Summer school event started on Tuesday 27th May it ended on Friday 30th May.

The entire event was held in Bystra at the Magnus Hotel, which is a mountain and sport-rehabilitation resort, located in a valley of Przemsza's tributary.

All the activities were guided by 2 teachers and 1 assistant for each group; the school language was Polish to facilitate the understanding for the students and to assure an easier approach to the local behaviour.

The lectures were in a big meeting room of the hotel, and the practical activities were organized in different spaces as terraces or in some of the several halls available in the same building. Every afternoon, from 5:30 till 7, all the participants were swimming or playing outside (football, hockey and basket). The students were sometimes split in 3 groups, mainly for sport activities or games.

At the beginning of the school every student received a "school set" containing a folder with the School Handbook, block for notes, pen and a strip-cartoon book (subject: water saving, water pollution) see picture below.

Strip-cartoon book within the "school set"

Each group was guided by one trainer and one assistant (their school teachers). The summer school trainers (from CUT and GAJA Club) were prepared during a training session on 21st April by A.Balzarini (IDC).

The main goal of this event was to introduce in the school context, the concept of sustainability, the significance of local water problems and knowledge and options to cope with water stress in the south Poland, more specifically in the Przemzsa River basin.

Accordingly, the school was structured in 4 days themes: the first day was devoted to the case study area, the second the main scientific and technical backgrounds with an excursiont to the water capitation not far from the hotel, the third were on awareness campaign with a visit to a Komorowice WWTP. The last day was dedicated to the sustainable water management practices and all the students participated to debates and games related to the water quantity and quality problems and options for their solutions.

The summer school officially ended with the Certificate distribution but the final act was a visit to a dam created for energy production.

Students with their T-shirt made in the workshop "Art for the water"

The overall perception was that most of youths was very sensible to the problem of water quality and not prepared to afford problems of water scarcity, probably because they are living with modern comforts, without the feeling of works needed to distribute water into the area. Therefore, the school was a great occasion to emphasise the importance of water issues and necessity to apply water saving practices also in Poland.

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5th AquaStress Summer School

Episkopi (Limassol), Cyprus, 30 June – 3 July 2008

by Anna Balzarini (ID Consulting)

The fifth Aquastress Summer School on water stress was held in Episkopi (Limassol site), within the frame of AQS WB6.4 activities extension (IDC), in collaboration with the AQS Cypriote partner (AF). This was the second edition of the Limassol's Summer School held last year in Cyprus.

The Summer School was organized in 4 days with 65 students coming from Episkopi, Ypsonas and Trahoni schools (area of Limassol Case Study). The entire event was held in Episkopi at the Episkopiana Hotel, close to the Episkopi's Gymnasium classrooms.

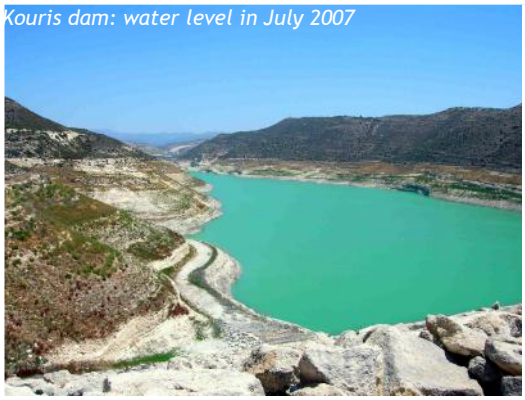
The students were divided in 3 groups and the activities were guided by 2 teachers/trainers for each group. The school language was Greek to facilitate the understanding for the students and to assure an easier approach to the local behavior.

The lectures were in the morning at the Gymnasium and the practical activities were organized in different spaces in the hotel, during the late-afternoon and evening.

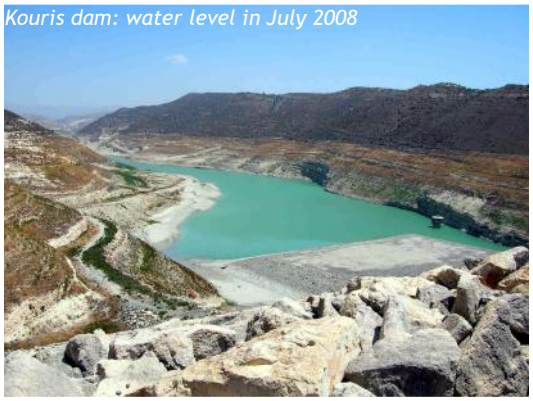
The main goal of this event was to introduce new culture on water and the concept of sustainability, therefore also the significance of local water problems and options to cope with water stress in arid and semi-arid Mediterranean climate conditions.

Accordingly, the school was structured in the following themes and activities: a) AquaStress project and the concept of water stress including main technical, environmental and socio-economic aspects; b) water quality and quantity interaction (water pollution and climate changes), c) water saving and sustainable water management practices, and d) technical visits to the "water museum" of Limassol and to the Kouris dam.

Visit to the Kouris dam was particularly interesting since it allows the comparison of water levels in 2007 and 2008 (see photos) indicating an impressive reduction of water availability in 2008.



Kouris dam: water level in July 2007



Kouris dam: water level in July 2008

Practical activities include the games and drawing of posters motivated by the water stress problems and options for their mitigation. At the end of the school were distributed the AquaStress Certificates to all participants.

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Upcoming events

AquaStress Project Stand at the 13th World Water Congress

Montpellier, France, 1-4 September 2008

During the 13th World Water Congress, to be held in Montpellier from 1 to 4 September 2008, under the auspices of the International Water Resources Association (IWRA), a stand on the AquaStress project will be hosted at Le Corum Congresse Palace; both CIHEAM-IAMB and Cemagref personnel will be present.

On this stand dissemination material (brochures, posters) as well as folder with leaflets on the activities at 8 Case Study areas will be available to the participants of the Congress. More than 800 water experts from Europe and other continents are expected to participate in the Congress.

For more information visit:

http://wwc2008.msem.univ-montp2.fr/

AquaStress Internal Meeting

Montpellier, France, 4th September 2008

The project Internal Meeting will be held in Montpellier on September 4th at CIHEAM-IAM, Montpellier, (Campus Agropolis La Vallette).

The aim of meeting is to make a checkpoint on the completion of project activities, along with all AQS partners, with special reference to Case Studies and Final Outputs of the project.

For more information visit:

http://www.aquastress.net/

AquaStress Side Event "Public Participation in Water Management"

Montpellier, France, 5th September 2008

An important AquaStress side event will be held in Montpellier on September 5th at "Le Corum" within the frame of the XIIIth World Water Congress, organized under the auspices of the International Water Resources Association (IWRA).

This will be an opportunity to provide to the international community feedbacks about the achievements of the project presenting and discussing the main results obtained through the activities at the eight test site areas.

For more information visit:

http://wwc2008.msem.univ-montp2.fr/index.php?page=sideevent

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International Expo 2008 "Water and Sustainable Development"

Zaragoza, Spain 14th June – 14th September 2008

Expo Zaragoza (Spain), "the biggest water festival on hearth" is taking place from 14 June to 14 September 2008 and addresses the issue of "Water and Sustainable Development". The Expo will feature more tan 100 different countries, international organizations, NGOs and enterprises. During the three-month event all the participant Countries will have the opportunity to show their culture, beauties and know-how.

Particularly the Water Tribune and Platform, who represent the intellectual vehicle for Expo Zaragoza 2008, will stimulate reflection, debate and a search for solutions in relation to water and sustainable development.

AquaStress Project will be presented on 8 September 2008 in the occasion of the European water research day organized by the European Commission's Directorate General for Research.

For more information visit:
Website: http://www.expozaragoza2008.es/

AquaStress Final Conference and 4th International Workshop on "Water Stress and its mitigation in Europe and neighbouring countries"

Lisbon, Portugal, 22-23 January 2009

The AquaStress Final Conference and 4th International Workshop will be held in Lisbon (Portugal) on 22-23 January 2009. The event will follow the stakeholder driven holistic approach of the Project, and will focus on "Water stress and its mitigation in Europe and neighbouring countries". In addition to the AquaStress partners and stakeholders from the eight Case Study regions, the event participants will also include water experts, representatives of the European Commission and several national and international water agencies, institutions and organizations.

The event aims at disseminating the final outputs of the project, and at discussing and establishing a stakeholder driven Network on water stress mitigation.

For more information visit:
http://www.aquastress.net/

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