LIFE 03
ENV/E/000164

OPTIMIZAGUA: UN MODELO EUROPEO DE REFERENCIA PARA LA GESTION EFICIENTE DEL AGUA

Informe "Layman" para la difusión final de resultados

OPTIMIZAGUA: A EUROPEAN REFERENCE MODEL FOR EFFICIENT WATER MANAGEMENT

"Layman" Report for the dissemination of results

optimizagua

PROMOTOR:

fundación SAN VALERO

SOCIOS:

Zaragoza AYUNTAMIENTO

ASAJA ARAGÓN

Gobierno de La Rioja
Turismo, Medio Ambiente y Política Territorial.

INAR

DELRIO COMUNICACIÓN AUDIOVISUAL, S.L.

SoriaNatural

Presentation

The pilot activities that have been carried in the framework of the European Project, "OPTIMIZAGUA", approved as part of the European Union's LIFE Programme, have shown how important it is to apply efficient irrigation devices, methodologies and technologies to obtain the greatest savings in water for various irrigation purposes. The basis of this demonstration has been various activities carried out in two public parks in Zaragoza, in private gardens on a residential estate in Logroño and in two crops (wheat and corn) of two farms in Huesca and Soria.

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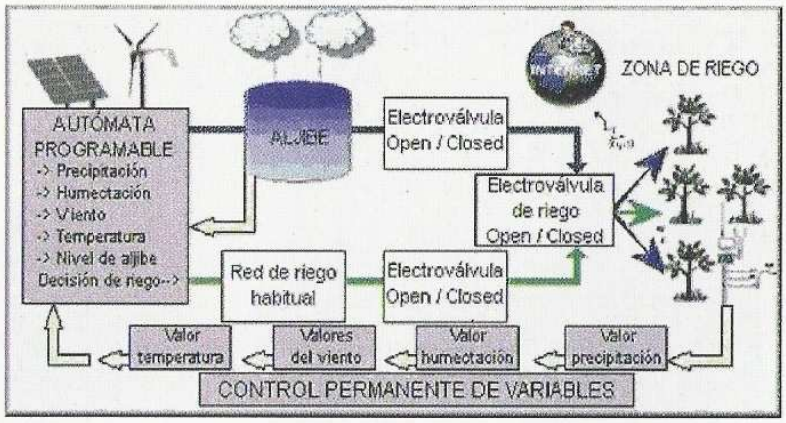
The philosophy of the project is to combine traditional systems for collecting rainwater and regulating the water supply wherever possible depending on the characteristics of the area and type of terrain, together with the incorporation of specialised systems based on emerging technologies that allow to irrigate if plants need it and always under efficient climate conditions exclusively.

In short, the purpose of the project is to **demonstrate and measure the savings in water derived from the application of innovative, traditional and methodological techniques aimed at watering only where necessary and where climate conditions are suitable for efficient irrigation,** avoiding irrigations tasks if it is raining or/and it is windy and/or temperatures are extreme.

Technology and methodology

As can be seen in the following diagram, the prototype used for the experiment combines an innovative technology based on programmable automatic machines, data communication and transmission devices using GPRS, sensors for detecting the moisture in the soil, the time of year, the incorporation of renewable energies in the prototype itself and the integration of the set of traditional systems for the collection and storage of rainwater (tanks, lakes or ponds) for their subsequent reuse for irrigation purposes.

The operational logic of the system takes into consideration the specific needs of a specific crop and type of soil (composition and drainage conditions) for applying or interrupting decisions taken with respect to irrigation in accordance with existing levels of water reserves in the soil through humidity probes, which will enable to know the level of water in soil on line and depending on the specific needs of the plant.



Such decisions concerning irrigation have been supplemented by programming the system so as to inhibit or stop the water supply when the data provided by the weather station advise against irrigation, on the basis of strict efficiency parameters (excessive wind speed, presence of rain, above-normal levels of moisture in the soil...).

At the same time, with respect to issuing an order for irrigation, the system gives priority to using rainwater whenever this is available in the well, and only on occasions when no water has been stored to use that of the general water supply.

The prototype has also made it possible to validate the technology for receiving SMS messages or emails as a means of providing a warning or alarm linked to the efficient use of the irrigation system, as well as the possibility of interacting with the system via Internet, by controlling a specific farm or parkland (with the appropriate codes giving authorised access) when ordering or preventing irrigation by remote control, or quite simply, by displaying the state and decisions of the system, historic graphics, weather conditions, and consumption records, amongst the large range of information that can be provided on-line by the system. (For further details, see www.life-optimizagua.org).

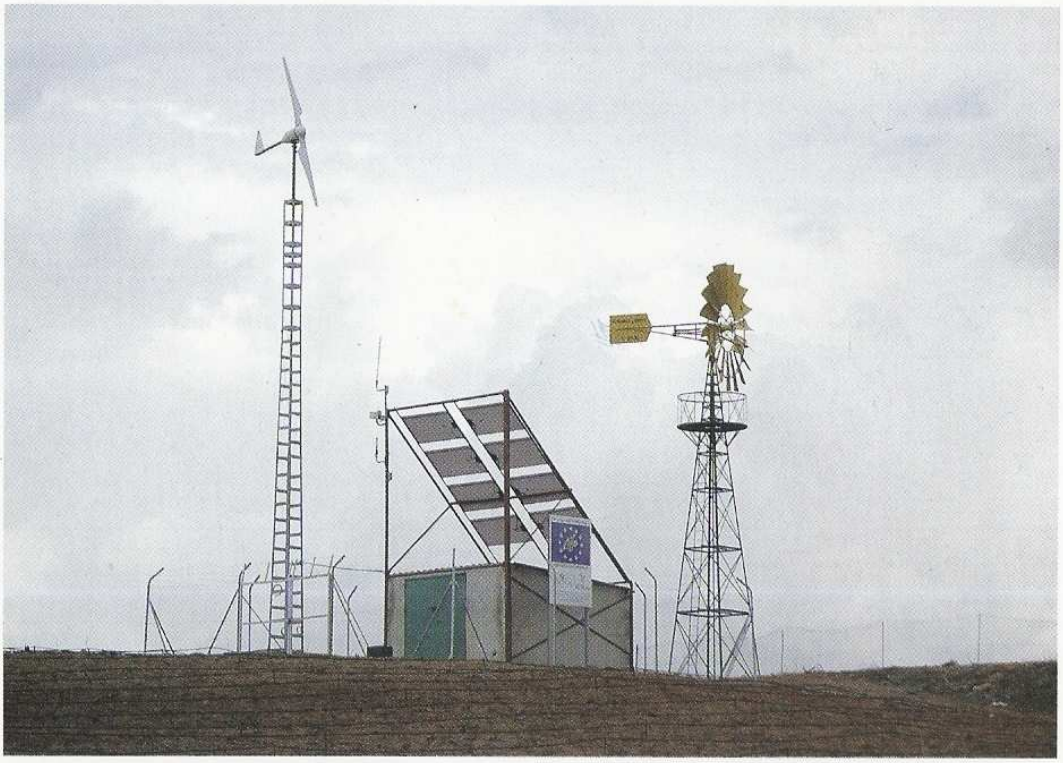
The partnership and pilot activities performed

The various pilot activities have been conducted in two parks in Zaragoza (Parque Oliver and Parque Castillo de Palomar) with a total surface area of 1.5 hectares of lawn, the partner responsible for such activity being **ZARAGOZA CITY COUNCIL** through the Department of the Environment –Local Office for Agenda 21– and the Department of Parks and Public Gardens.

In La Rioja, the pilot activity was aimed at demonstrating how to save water in privately-owned green spaces, with the prototype being implanted in the green area belonging to the estate known as "Residencial El Avión" in Logroño, promoted by **INGENIERÍA Y ARQUITECTURA, S.A**. –INAR, S.A.–, another partner in the Optimizagua project.

The other two pilot activities linked to farming were carried out on the "Monte Julia" farm in Belver del Cinca (Huesca) promoted by the partner, **ASAJA ARAGÓN** and in Garray (Soria) promoted by the partner, **SORIA NATURAL, S.A.,** who took one hectare of wheat and one hectare of corn as their basis for trying out the pilot activity, with similar areas subjected to traditional irrigation, with the same periods of time and crops, serving as a contrast, for the purpose of analysing and recording the water savings with the appropriate meters.

The partnership for the OPTIMIZAGUA Project, promoted and directed by **THE FUNDACIÓN SAN VALERO**, is completed by "**DEL RIO, COMUNICACIÓN AUDIOVISUAL, S.L.**" as the partner together with the **GOVERNMENT OF LA RIOJA** through its Department of Tourism, Environment and Territorial Policy, that is responsible for promoting the diffusion strategy for publicising the results of the project in Europe in line with the transfer objectives sought by the European Commission's Life Programme.



Specific results of the experiment

1. Water savings in the experiment as a whole

Results of data recorded on a surface area of approximately 4 hectares of tested ground using different crops: lawn, wheat and corn

TYPE OF IRRIGATION	Area of ground tested	Total m^3	Savings in m^3	Rain-water (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	4 ha.	**39,492**	**21,361**	**1,620**	**58,2%**	**54,1%**	**8.9**	**4.1**
Smart	4 ha.	**18,131**						

2. Water savings in the "Parque Oliver", Zaragoza: LAWN

Results of data recorded on a surface area of approximately 1 hectare of tested ground

TYPE OF IRRIGATION Lawn	Area of ground tested	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	1 ha.	365	4.82	**17,592**	**11,074**	**687**	**66.9%**	**62.9%**	**10.5**	**3.9**
Smart	1 ha.	365	1.79	**6,518**						

3. Water savings in the "Parque Castillo Palomar", Zaragoza: LAWN

Results of data recorded on a surface area of approximately 0.5 hectares of tested ground

TYPE OF IRRIGATION Lawn	Area of ground tested (m^2)	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	5,000	366	4.57	**8,363**	**4,423**	**315**	**56.7%**	**52.9%**	**8**	**3.8**
Smart	5,000	366	2.15	**3,940**						

4. Water savings on the "Residencial El Avión", Logroño: LAWN

Results of data recorded on a surface area of 0.125 hectares of tested ground

TYPE OF IRRIGATION Lawn	Area of ground tested (m^2)	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	1,250	346	6.39	**3,024**	**1,537**	**86**	**53.7%**	**50.8%**	**5.78**	**2.84**
Smart	1,250	346	3.43	**1,487**						

5. Water savings on the "Monte Julia", Belver del Cinca: WHEAT

Results of data recorded on a surface area of 0.5 hectares of tested ground

TYPE OF IRRIGATION Wheat	Area of ground tested (m^2)	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	5,000	226	1.09	**1,240**	**491**	**107**	**48.2%**	**39.6%**	**14.3**	**8.6**
Smart	5,000	226	0.66	**749**						

6. Water savings on the "Monte Julia", Belver del Cinca: CORN

Results of data recorded on a surface area of 0.5 hectares of tested ground

TYPE OF IRRIGATION Corn	Area of ground tested (m^2)	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	5,000	189	4.17	**3,943**	**1,638**	**217**	**47%**	**41.5%**	**9.4**	**5.5**
Smart	5,000	189	2.44	**2,305**						

7. Water savings in "SORIA NATURAL", Garray (Soria): WHEAT

Results of data recorded on a surface area of 0.5 hectares of tested ground

TYPE OF IRRIGATION Wheat	Area of ground tested (m^2)	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	5,000	235	1.21	**1,426**	**552**	**153**	**48%**	**38.7%**	**17.5**	**10.7**
Smart	5,000	235	0.74	**874**						

8. Water savings in "SORIA NATURAL", Garray (Soria): CORN

Results of data recorded on a surface area of 0.5 hectares of tested ground

TYPE OF IRRIGATION Wheat	Area of ground tested (m^2)	Days in cycle	l/m^2/day	Total m^3	Savings in m^3	Rainwater (m^3)	Savings with rainwater	Savings without rainwater	% of rainwater over efficient irrigation	% of rainwater over conventional irrigation
Contrast	5,000	184	4.24	**3,904**	**1,646**	**55**	**43.6%**	**42.2%**	**2.4**	**1.4**
Smart	5,000	184	2.45	**2,258**						

Conclusions based on results obtained

The main conclusions to be reached from the results obtained in the project are as follows:

1. The savings of over 22,000 cubic metres (22 million litres) of water colleted on only 4 hectares of land, to which the experiment was restricted in a maximum

period of one year. This gives a significant ratio of the great potential for transfer and of the important economic and environmental savings that can be generated by implanting the model used in the test.

2. It is worth drawing attention to the exemplary nature of the institutions and organisations that were partners in the project, who have made a firm commitment to extrapolate and apply the technology and methodology to other areas and environments as listed in the final publication of the project, which is available in three languages.

3. The significant reduction in the amount of energy required to "move the water", using pumps with a high level of hydrocarbon consumption, in terms of cost and environmental impact associated with irrigation, and not always taken into sufficient consideration. However, the environmental and economic savings here have turned out to be more important in one of the pilot activities than the actual savings in the cost of the water itself.

4. The enormous economic saving involved if to the figure for cubic metres we apply the objective price of the water in accordance with the guiding principles of the Framework Agreement for Water.

5. The possibility of extending the radius of action to much wider areas using the same prototype, with a minimal increase in the financial investment, which will be of great benefit to the environment.

6. Having an exact knowledge of how much water is consumed offers a great deal of added value as a starting point for measuring its rational use and being able to contrast this with widespread examples of over-irrigation.

7. The quality of the crop does not deteriorate, but in fact can be influenced so as to obtain positive results such as greater levels of concentration of active principles which are of interest to the farmer (degree of water stress in the plant) or so as to reduce the number of times the lawn needs to be mown each year, with its vegetative growth being curbed, without in any way diminishing its photosynthetic function for maintaining its landscape qualities.

8. In hydrological years of extreme drought, efficient irrigation improves crop yields and may prevent the loss of crops on farmlands.

9. It is worth analysing the water requirements of a specific crop or its variety with regard to the climate of the area and the specific amount of water available for irrigation purposes (proper management with respect to supply and demand).

10. With regard to the landscape, a certain variety of lawn may consume an average of 8 litres of water a day per cubic metre, whereas other varieties of lawn that are more appropriate for the Mediterranean climate reduce their requirements to half this amount, an aspect that is not always taken into account when selecting the design for green spaces.

11. Citizens mainly tend to identify green spaces with a large or exclusive area of lawn. The logic applied to efficiency in the consumption of a limited natural resource like water indicates that such a theory should be shifted in countries such as Spain, making way for endogenous trees and ornamental shrubs with fewer water requirements, with xerogardening being a technique that is on the rise, responding to more rational criteria with respect to water consumption, and allowing for landscaping that combines varieties of lawn with plants and crops such as olive trees or certain aromatic and medicinal plants.

12. The greater the water requirements of a plant, the greater the potential for saving demonstrated by the experimental technology (values of around 40% in wheat, greater than 40% in corn and in all cases above 50% in all varieties of lawn and associated activities).

13. The greatest percentage of savings demonstrated by the prototype always occurs when this technology is applied, with the percentage of water saving being reduced using rainwater when the requirements of the plant are very high, the rainfall in the area is low, or the irrigation area is very large.

14. The collection and re-use of rainwater for irrigation purposes proves to be attractive when combined with landscaping elements for ornamental effect (large surfaces of water, lakes for irrigation control...), spaces that are created for the purposes of biodiversity (wetlands, artificial lakes...), irrigation of small areas or irrigation of crops with low-level water requirements, since the proportion of savings is directly related not only to the specific amount of rainfall in each area, but also to the seasonal calendar, plant cycle, collecting area and storage capacity of the system, aspects requiring each activity to be submitted to a specific analysis so that its cost/environmental benefit ratio can be analysed correctly.

15. The fact that the experimental period coincides with the year of greatest drought recorded during the last fifty years in Spain is a circumstance that needs to be taken into account but also one which in any case reinforces the excellent results shown by the project, which would increase in a year with normal rainfall or by transferring its application to other areas with greater rainfall.

Diffusion, assessment and transfer

One of the most relevant factors in the project was its significant diffusion impact, together with its great potential for transfer, which has been put to effect in the application and effective incorporation of its principles, technology and methodology in other environments and areas of application.

Furthermore, it is worth noting the significant institutional presence in this project at more than 20 national and international events that lend themselves to promoting the idea of transfer, as well as the excellent treatment afforded its members by the media, the huge acceptance given the project by the general public and the presence of indicators showing the much greater level of diffusion than is normally the case for a project of this kind. This has all contributed to the current validation of this technology and to making the project itself a reference model at national and international level through its effective transfer activities in:

- New parks.
- Landscaping of river banks (linked to the Zaragoza 2008 International Expo).
- Incorporation of the principles for efficiency in future local by-laws. (The new by-law currently being drawn up by Zaragoza City Council).
- Incorporation of the principles for efficiency in regional regulations. (Amendments in the regulations relating to water sanitation and purification currently going through the Regional Parliament of La Rioja.)
- Implantation of the model in new buildings.
- Transfer of the technology to privately-owned green spaces on new industrial grounds. (Industrial Estates).
- Green spaces for sports purposes (Golf courses).
- Future theme parks (Ciudad del Medio Ambiente).
- Improvement and modernisation of farms and agricultural estates.

During the final six months of its development, the project concentrated its efforts on specific activities relating to national and international diffusion, including important events in Brussels, La Rioja, Castilla y León, Aragon, the presentation of results to various representatives from the European Parliament, Committee of the Regions, Economic and Social Committee, European sectorial organisations, an active presence at the National Conference on the Environment, the Spanish Network for Environmental Authorities, Green Week, participation in various international fairs (SMAGUA, FIMA, International Cereal and Bread Congress in Paris...) and the drafting of publications and specific audiovisual materials for the project disseminated by different television channels, radio stations and specialised publications. This can all be accessed via OPTIMIZAGUA's own webpage, which has now received more than 100,000 hits.

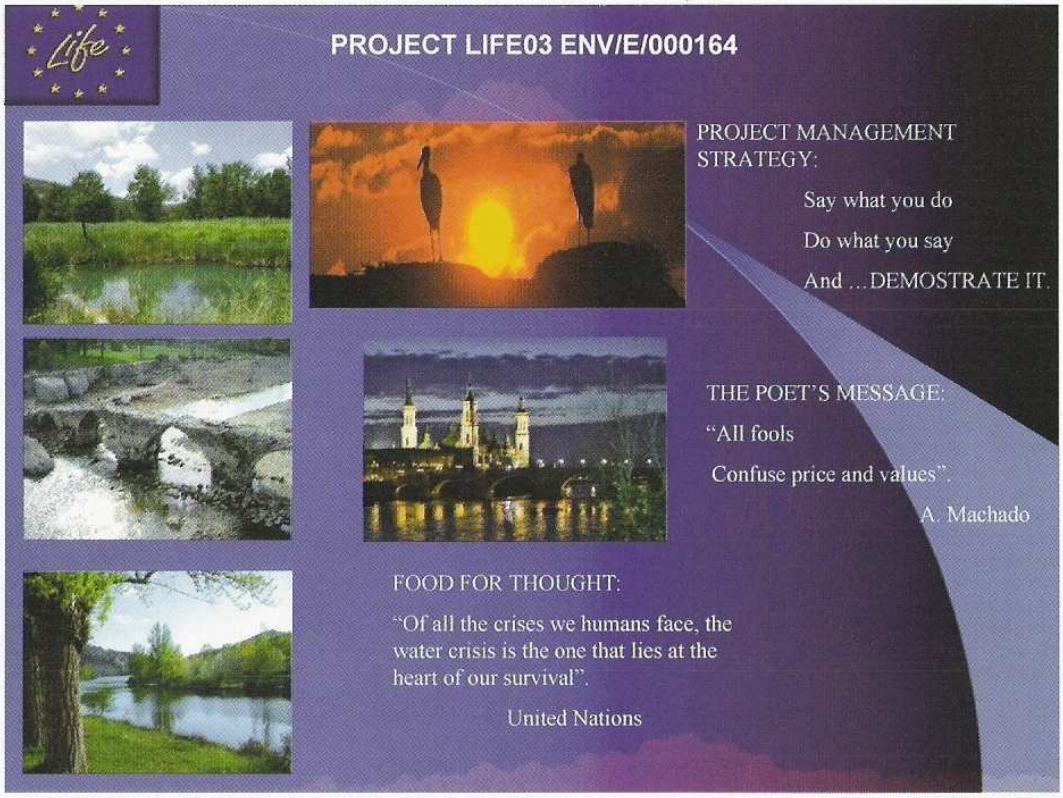
Main tools and specific dissemination products of the project:

- Brochures and leaflets in three languages.
- Publicity hoardings in the main thoroughfares of the City staging the International Exposition in 2008 with the theme of "Water and sustainable development".
- Specific website for the project (www.life-optimizagua.org) with access possible in three languages.
- Video of the Project in professional standard Betacam SP format in Spanish and English and diffusion to a large number of television channels.
- Press conferences, and presentation of results to the media.
- Technical monographic studies.
- Institutional presence of the project (Stand, communications, papers on the subject...) in national and international meetings and events.
- Collaboration agreement for joint diffusion between the project director and "Expo Zaragoza 2008".
- Insertions in specialised newspapers and journals.
- "Mailing" in national and international specialised Networks, professional associations, European sectorial organisations, international organisations, and in Ministries of Agriculture and the Environment of the 25 Member States.
- DVD: "institutional presence at 20 events, 100 pictures of a Project and 1,000 diffusion impacts."

Budget and programme

The Optimizagua Project with a total budget amounting to 1,451,994 euros is 49% co-financed by the European Union's Life Programme and was carried out between the month of October 2003 and September 2006.

Strategy, message and reflection



"POST-LIFE" Commitment

"Both in the execution of the Project and in the direct responsibility for the excellent results obtained, a significant role was played by the partners of the OPTIMIZAGUA project, corresponding with institutions or companies that are reference models that promote excellence in their respective fields of specialisation or levels of intervention, but always under the common denominator of displaying an attitude that shows respect for the environment and of being true references in the promotion of what we term *sustainable development*[1].

In this respect, following the conclusion of this European Project, both Fundación San Valero and all the partners of the OPTIMIZAGUA Project have committed themselves to:

— Promoting the model tested in an exemplary fashion in their specific field of intervention in benefit of the environment.

[1] Introductory paragraph in the publication: Optimizagua: A referente model for efficient water management.

— Keeping the Project Website up to date for a period of at least one year after the conclusion of the Project, so as to promote the dissemination and transfer of its results.

— Promoting the institutional presence of the Project at future meetings at both national and international levels.

— Facilitating any technical assistance requested for implanting the transfer of the model.

— Organising two follow-up meetings a year to evaluate the effective transfer of the model to other levels and scales of territory.

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