



CIHEAM

International Centre for Advanced
Mediterranean Agronomic Studies
Mediterranean Agronomic Institutes of Zaragoza and Bari



ICARDA
Science for Better Livelihoods in Dry Areas



Food and Agriculture Organization
of the United Nations
Regional Office for Near East
and North Africa



حوار 5+5 المتوسط
Dialogue de la Méditerranée Occidentale
Western Mediterranean Dialogue

Advanced Course

WATER AND ENERGY IN MEDITERRANEAN RURAL ENVIRONMENTS: THE NEXUS IN IRRIGATED AGRICULTURE

Zaragoza (Spain), 7-12 May 2018

1. Objective of the course

Mediterranean rural environments are at the crossroads of the water-energy nexus. On one hand, the region offers great scope for the generation of renewable energy, given the intensity of solar radiation, wind speed and water flows. At the same time, pressurized irrigation is leading to sharp increases in energy demand. A paradigmatic example is modernization from surface to sprinkler/micro irrigation. Whilst major investments have targeted improving water efficiency, irrigation control and automation, this has led to a much greater dependence on energy, with significant implications for rural development, economic growth and sustainability. In many parts of the Mediterranean region, water and energy availability are key societal concerns. Innovative solutions in both technology and policy are thus needed to ensure future water, energy and food security. Renewable energies, micro grids and alternate sources of water offer new opportunities for tackling the trade-offs between water and energy use in agriculture.

This course will critically review a broad spectrum of water-energy nexus issues, including technical and management solutions, tools to support decision-making, sustainability assessment methodologies and pathways for improved policy and governance.

By the end of the course participants will:

- Gain deep insights into the complex challenges surrounding the water-energy nexus in Mediterranean rural environments, and its implications for agricultural production and food security.
- Analyze the energy implications of changes in water use in irrigated agriculture, and apply sustainability criteria to optimize water and energy requirements in project development.
- Understand cost-effective alternatives for small-scale renewable energy generation and management adapted to Mediterranean environments.
- Consider regional policies for energy and current approaches to governance that include stakeholder engagement in decision-making.
- Apply sustainability assessments, considering technical, economic and environmental issues to improve water, energy and food security.
- Improve their skills in the use of modelling tools and benefit from experiences gained through case studies and a technical field visit.

2. Organization

The course is jointly organized by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institutes of Zaragoza (IAMZ) and Bari (IAMB), the International Center for Agricultural Research in the Dry Areas (ICARDA), and the Food and Agriculture Organization of the United Nations (FAO), through its Regional Office for Near East and North Africa, with the collaboration of the Action Plan for the Water Strategy of the 5+5 Dialogue.

The course will take place at the Mediterranean Agronomic Institute of Zaragoza and will be given by well qualified lecturers from international organizations, and from universities, research centres, government departments, NGOs and associations in different countries.

The course will be held over a period of one week, from 7 to 12 May 2018, in morning and afternoon sessions.

3. Admission

The course is designed for 25 participants with a university degree, and is aimed at professionals from public or private organisations, such as decision makers, technical advisors, agronomists, engineers and R&D specialists, dealing with or interested in the sustainable use of energy for water/irrigation planning and management.

Given the diverse nationalities of the lecturers, knowledge of English, French or Spanish will be valued in the selection of candidates, since they will be the working languages of the course. The Organization will provide simultaneous interpretation of the lectures in these three languages.

4. Registration

Candidates must apply online at the following address:
<http://www.admission.iamz.ciheam.org/en/>

Applications must include the *curriculum vitae* and copy of the supporting documents most related to the subject of the course.

The deadline for the submission of applications is 16 February 2018.

Please display on a notice board if possible



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See updated information at

www.iamz.ciheam.org

INFORMATION
CONTINUES
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Applications from those candidates requiring authorization to attend the course, may be accepted provisionally.

Registration fees for the course amount to 500 euro. This sum covers tuition fees only.

5. Scholarships

Candidates from Mediterranean CIHEAM member countries, from ICARDA Middle East and North Africa partners, and from FAO Near East and North Africa member countries, may apply for scholarships covering registration fees and for scholarships covering the cost of travel and full board accommodation in the Hall of Residence on the Aula Dei Campus.

Candidates from other countries who require financial support should apply directly to other national or international institutions.

6. Insurance

It is compulsory for participants to have medical insurance valid for Spain. Proof of insurance cover must be given at the beginning of the course. Those who so wish may participate in a collective insurance policy taken out by the IAMZ, upon payment of the stipulated sum.

7. Teaching organization

The course requires personal work and interaction among participants and with lecturers. The international characteristics of the course favour the exchange of experiences and points of view.

Formal lectures are illustrated by applied examples, real case studies in various Mediterranean contexts and group discussions. Practical sessions will be devoted to improve the skills of participants on the use of modelling tools for decision support and the application of life cycle analysis for sustainability assessment.

Participants will be invited to contribute their own professional experiences providing a one page summary about water-energy nexus in their specific regions/countries. These will be distributed to all participants and lecturers.

A technical trip to the Monegros area is envisaged for Saturday 12 May, to give participants the opportunity to discuss on problem-solving and management strategies with local stakeholders. The visit will cover: mini-turbine electricity generation in canals; demonstration site for low-pressure irrigation; and conventional and solar powered pumping systems for collective and on-farm irrigation.

8. Programme

1. **Introduction (3 hours)**
 - 1.1. Unravelling the complexity of the water-energy nexus in Mediterranean agriculture
 - 1.2. Group discussion on the issues in the participants' countries
2. **Technical and management solutions for the use of surface and groundwater resources at different scales (17 hours)**
 - 2.1. Reducing water and energy requirements
 - 2.2. ICT, modelling and decision-making tools for design and management of water-energy systems
 - 2.3. Practical work: use of models for water-energy management
 - 2.4. Alternative water sources and its energy implications
 - 2.5. Small and large-scale renewable energy adapted to Mediterranean rural environments and its implications for water use
 - 2.6. Case studies
 - 2.6.1. Demonstration of large scale photovoltaic systems for irrigation: MASLOWATEN Horizon 2020 project
 - 2.6.2. Small-scale photovoltaic irrigation in orchards
 - 2.6.3. Rural development activities for water and energy in irrigation within the European Innovation Partnership on Productive and Sustainable Agriculture
3. **Policy and governance innovation to address the water-energy nexus (7 hours)**
 - 3.1. Coordinated policy development and implementation of water, energy, food security and land use
 - 3.2. Water-energy accounting and auditing for policy support
 - 3.3. Financing and operational models in water and energy management
 - 3.4. Water and energy governance approaches
 - 3.4.1. Solar cooperatives in Jordan
 - 3.4.2. Consortium of Capitanata in Italy
 - 3.4.3. "Contrat de nappe" in Morocco
 - 3.4.4. Water user associations in Spain
 - 3.4.5. Policy models in France
4. **Sustainability assessment and trade-off analyses (8 hours)**
 - 4.1. Sustainability assessment and critical evaluation of contemporary approaches: ecological foot-printing, life cycle analysis (LCA) and impact assessments
 - 4.2. Practical work: linking water, energy and greenhouse gas emissions using LCA
 - 4.3. Case study: irrigation modernization projects in Spain. Characterizing the trade-offs between water and energy use
5. **Round table discussion: Management models under current and future changes in water and energy regulations**
6. **Technical visit to the irrigated area of Monegros (Zaragoza-Huesca)**

GUEST LECTURERS

U.K. AWAN, ICARDA, Cairo (Egypt)
B. DHEHIBI, ICARDA, Amman (Jordan)
L. GARROTE, Univ. Politécnica Madrid (Spain)
E. HERNÁNDEZ HERRERO, WWF, Madrid (Spain)
J. HOOGVEEN, FAO, Roma (Italy)
R. KHADRA, CIHEAM-IAMB, Bari (Italy)
J. KNOX, Univ. Cranfield, Bedfordshire (United Kingdom)
N. LAMADDALENA, CIHEAM-IAMB, Bari (Italy)
F. MOLLE, IRD, Montpellier (France)

M.A. MORENO, Univ. Castilla la Mancha, Albacete (Spain)
L. NARVARTE, Univ. Politécnica Madrid (Spain)
M. OMEDAS, CHE, Zaragoza (Spain)
E. PLAYAN, CSIC-EEAD, Zaragoza (Spain)
L. PLUSCHKE, FAO, Roma (Italy)
J.A. RODRÍGUEZ-DÍAZ, Univ. Córdoba (Spain)
C. TRILLO, FEREBRO, Zaragoza (Spain)
N. ZAPATA, CSIC-EEAD, Zaragoza (Spain)