



INTERNATIONAL CONFERENCE ON
WATER, ENVIRONMENT, ENERGY, AND SOCIETY
ICWEES'2018

Laboratoire d'Érémologie et Lutte Contre la Désertification
(LR16IRA01)



INTERNATIONAL CONFERENCE

ON WATER, ENVIRONMENT, ENERGY, AND SOCIETY

ICWEES'2018

08th-10th May 2018, Zarzis - Tunisia

PROGRAM



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OVERVIEW

The International Conference on Water, Environment, Energy and Society is being organized jointly by the Institut des Regions Arides, Tunisia, AISECT University, India, and Texas A&M University, USA, from 08 to 10 May 2018 in Zarzis, Tunisia.

The objective of the ICWEES-2018 is to integrate research, technology and practice, in the fields of Water, Environment, Energy, Sustainability, Health, Management and Society; and bring together Scientists, Academicians, Researchers, Practicing Engineers, Consultants, Planners, Policy Makers, Economists and Social Scientists, Managers, and Leaders from around the world to share their knowledge, skills, experience, and expertise through research papers, case studies, and keynote addresses on, but not limited to, water resources, climate change, ecosystems implications for human health, sustainable land use and eco-cities, integrated resources management, green economy, green energy, cleaner production, planning, disaster management, environmental management, etc. The proposed major themes of the conference will be discussed in parallel sessions to provide opportunities for the delegates from around the world to share their knowledge, skills, experiences, and expertise with focus on water, environmental, energy, and societal challenges facing our planet and the future of our generation. Environmental problems, such as desertification processes, land degradation and rehabilitation, land cover and land use change, climate change, droughts, early warning, and more, are of utmost importance in arid environments where natural resources are scarce and vulnerable.

The conference will include paper presentations describing original work on the current state of research and practices in technologies and systems for characterization, mitigation, soil, water resources, and climate change and prevention, preparation, and response and recovery of disasters. The themes include (but not limited to): water resources, land degradation and management, energy resources and use, environmental issues, related social and economic development, geo-information and space technologies, multi-sensor data collection, information dissemination, and early warning and standardization. Studies in all scales are welcome, a special emphasis will be given to large scale, watershed studies.

Objectives

Bring together leading experts, policy makers and organizations, and share latest developments in water, soil and energy resources management under climate

change

Review modern technologies and innovative approaches to be directed in fragile regions for identification, adaptation and mitigation of climate change phenomenon.

Strengthen exchanges and cooperation in research, development and socio-economic sector for participatory management of soil and water resources and energy

The ICWEES'2018 will cover the following themes and sub-themes:

1. Water resources

- Surface and groundwater mobilization
- Non-conventional resources (desalinated, treated wastewater, grey water, etc.)
- Water use efficiency/productivity and irrigation methods
- Water resources modelling
- Extremes: drought, flooding, etc.
- Climate change impacts on water resources
- Desalination of water without energy
- Isotope hydrology/hydrogeology

2. Environment

- Global Environmental Change and Ecosystems Management
- Environmental Restoration and Ecological Engineering
- Monitoring and Analysis of Environmental Contaminant
- Water resources pollution and remediation
- Water and wind erosion
- Land degradation and rehabilitation
- Solid waste management

3. Energy

- Hydro- Power applications
- Solar and photovoltaic Technology and applications
- Geothermal Applications
- Wind Energy Application
- Hybrid systems

4. Societies and Development

- Valuation of land degradation and water resources
- Land degradation impacts on livelihood
- Cost benefit analysis of remediation practices
- Mainstreaming CC in planning strategies
- Integrated participatory approaches for sustainable development

5. Geo-Information and Remote Sensing Technologies

- Change detection of land degradation
- Land Use/ land Cover mapping
- Databases and information sharing
- Telemetry
- Geo-information based decision making systems
- Heritage inventory and assessment

- INTERNATIONAL SCIENTIFIC COMMITTEE

Prof. S.Q. YANG, University of Wollongong, Australia

Dr. D. DAY, The International Centre of Excellence in Water Resources Management, Australia

Dr. R. HOPKINS, The International Centre of Excellence in Water Resources Management (ICE WaRM),

Australia

Dr. L. CZARAN, UN Office for Outer Space Affairs (UNOOSA), Austria

Prof. W. CORNELIS, Ghent University, Belgium

Prof. D.GABRIELS, Ghent University, Belgium

Dr. T. GUMBO, United Nations Development Program (UNDP), Brazil

Prof. S. NARAYAN, Seridon College, Canada

Prof. R. RUDRA, School of Engineering, University of Guelph, Canada

Dr. R. TOUZI, Natural Resources Canada (NRCan), Canada

Prof. W. TAO, Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI),

China

Prof. Q. ZHANG, Sun Yat-sen University, China

Dr. W. WU, East China University of Technology, China

Dr. A. BRUGGEMAN, Cyprus Institute (CESE), Cyprus

Dr. A. NEGM, Zagazig University, Egypt

Prof. Y. CALLOT, Lyon University, France

Prof. R. MOUSSA, French National Institute for Agricultural Research, France

Dr. P. PODWOJEWSKI, Institut de Recherche pour le Développement (IRD),
France

Dr. R. ESCADAFAL, Comité Scientifique Français de la Désertification (CSFD), France

Dr. B. MOUGENOT, Centre d'Etudes Spatiales de la Biosphère (CESBIO-IRD), France

Prof. J. HILL, Trier University, Germany

Dr. D. TSEGAI, United Nations Convention to Combat Desertification (UNC-CD), Germany

Prof. Y. D. CHEN, The Chinese University of Hong Kong, Hong Kong

THE INTERNATIONAL CONFERENCE ON WATER, ENVIRONMENT, ENERGY AND SOCIETY
ICWEES-2018

- Prof. V. K. VERMA, Core Research Group, AISECT, India
- Prof. S. YADAV, AISECT University, Madhya Pradesh, India
- Prof. R. N. YADAVA, AiSECT University, Jharkhand, India
- Prof. A. KOWSAR, Fars Research Center for Natural Resources and Animal Husbandry, Shiraz
Iran
- Prof. G. GHIGLIERI, Cagliari University, Italy
- Prof. P. P. ROGGERO, Nucleo Ricerca Desertificazione (Desertification Research Centre, NRD),
Italy
- Dr. S. PALOSCIA, CNR-IFAC – Dept. of Earth Observation, Italy
- Prof. A. TSUNEKAWA, Tottori University, Japan
- Prof. K. UNAMI, Kyoto University, Japan
- Dr. B. Dhhibi, ICARDA-Amman, Jordan
- Dr. T. OWEIS, International Center for Agricultural Research in the Dry Areas (ICARDA), Jordan
- Dr. R. THOMAS, International Center for Agricultural Research in the Dry Areas (ICARDA), Jordan
- Prof. J. KIBIYI, Moi University, Kenya
- Eng. W. NDIRANGU, Water Cap – United Nations Development Program (UNDP), Kenya
- Dr. R. ELFITHRI, University Kebangsaan, Malaysia
- Prof. A. HARRADJI, Oujda University, Morocco
- Prof. K. LABBASSI, Chouaib Doukkali University, Morocco
- Dr. M. SEELY, Desert Research Foundation of Namibia, Namibia
- Dr. M. BOUCHAHMA, Ministry of Higher Education, Oman
- Prof. W. G. STRUPCZEWSKI, Institute of Geophysics, Poland
- Prof. L. MOLDOVAN, Petru Maior University of Tirgu Mures, Romania
- Prof. H. KHEMIRA, Jazan Univ. Saudi Arabia
- Prof. K. J. DU PLESSIS, Stellenbosch University (IWEESU), South Africa
- Prof. Y. CANTON CASTILLA, Almeria University, Spain
- Prof. A. SOLE, Estación Experimental de Zonas Áridas (CSIC-EEZA), Spain

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Dr. G. DEL BARRIO, Estación Experimental de Zonas Áridas (CSIC-EEZA), Spain

Dr. M. MIRGHANI, Institute of Space Research and Aerospace (ISRA), Sudan

Dr. H. LINIGER, Bern University, Switzerland

Dr. T. ABDELKEBIR, The Arab Center for the Studies of Arid zones and Dry lands (ACSAD), Syria

Dr. R. SALAH, The Arab Center for the Studies of Arid zones and Dry lands (ACSAD), Syria

Prof. C. RITSEMA, Wageningen University, The Netherlands

Dr. G. A. CORZO PEREZ, IHE Delft Institute for Water Education, The Netherlands

Dr. C. MANNAERTS, Faculty of Geo-Information Science and Earth Observation (ITC), The Netherlands

Prof. F. BEN JEDDI, Institut National Agronomique de Tunisie (INAT), Tunisia

Prof. N. BEN MECHLIA, Institut National Agronomique de Tunisie (INAT), Tunisia

Prof. N. GAALOUL, Institut National des Recherches en Génie Rural, Eaux et Forêts (INRGREF), Tunisia

Prof. B. HAMROUNI, Tunisian Desalination Association / Faculté des Sciences de Tunis (FST), Tunisia

Prof. E. HAMZA, Institut National Agronomique de Tunisie (INAT), Tunisia

Prof. A. HANNACHI, Ecole Nationale des Ingénieurs de Gabes (ENIG), Tunisia

Prof. H. HBAIEB, Institut National des Recherches en Génie Rural, Eaux et Forêts (INRGREF), Tunisia

Prof. A. HTIRA, Faculté des Sciences de Tunis (FST), Tunisia

Prof. H. KHATTELI, Institut des Regions Arides (IRA), Tunisia

Prof. Z. LILI CHABAANE, Institut National Agronomique de Tunisie (INAT), Tunisia

Prof. M. NEFFATI, Institut des Regions Arides (IRA), Tunisia

Prof. H. REJEB, Institut Supérieur Agronomique de Chott-Mariem (ISACM), Tunisia

Prof. M. SGHAIER, Institut des Regions Arides (IRA), Tunisia

Prof. H. DAGHARI, Institut National Agronomique de Tunisie (INAT), Tunisia

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- Dr. R. BOUKCHINA, Institut des Regions Arides (IRA), Tunisia
- Dr. H. BOUSNINA, Institut National Agronomique de Tunisie (INAT), Tunisia
- Dr. H. CHAKROUN, Ecole Nationale des Ingénieurs de Tunis (ENIT), Tunisia
- Dr. M. EL MOURID, International Center for Agricultural Research in the Dry Areas (ICARDA), Tunisia
- Dr.H. GASHOUT, Centre Régional de Télédétection des Etats d’Afrique du Nord (CRTEAN), Tunisia
- Dr. N. HAMDI, Institut Supérieur des Sciences et Techniques des Eaux de Gabès (ISSTEG), Tunisia
- Dr. O. MAHJOUR, Institut National des Recherches en Génie Rural, Eaux et Forêts (INRGREF), Tunisia
- Dr. M. MOUSSA, Institut des Regions Arides (IRA), Tunisia
- Dr. K. NAGAZ, Institut des Regions Arides (IRA), Tunisia
- Dr. M. OUESSAR, Institut des Regions Arides (IRA), Tunisia
- Dr. M. ZAMMOURI, Faculté des Sciences de Tunis (FST), Tunisia
- Dr. A. MTIMET, Independent Expert, Tunisia
- Dr. S. KHLIFI, ESIER, Tunisia
- Prof. S. Sayadi, CBS – Sfax, Tunisia
- Dr. G. ERPUL, Ankara University, Turkey
- Dr. A. OULED BELGACEM, International Center for Agricultural Research in the Dry Areas (ICARDA), UAE
- Prof. F. A. MEMON, University of Exeter, UK
- Dr. C. KING, International Institute of Environment and Development (IIED), UK
- Prof. V. P. SINGH, Texas A & M University, USA
- Dr. X. CHU, North Dakota State University, USA
- Dr. K. DIDAN, Arizona Univ. USA
- Dr. S. EVETT, Agricultural Research Service (ARS-USDA) Texas, USA
- Dr. R. MOHTAR, Texas A&M University, USA
- Dr. M. NEARING, USDA-ARS Arizona, USA

Scientific Program

DAY 0: 07 MAY 2018 Arrival

Day1: 08 May 2018

08:00 am Registration

9:00 am - 10:30 am **OPENING CEREMONY**
SChair: Prof. Houcine Khatteli, IRA (Tunisia)
Speeches: AISECT
Presentation of ICWEES2018 program
Official Opening (IRESA)

10:30 am - 11:00 am **COFFEE BREAK**

Session 1: Theme 3. Energy

Chair: Prof. R. N. Yadava, AISECT University, India/ Co-Chair: Prof. Nejjib Ben Rjeb, Tunisia/ Rapporteur: Dr Habib Bousnina, INAT, Tunisia

11:00 am - 11:25 am **Keynote; Prof Ahmed Hannachi, ENIG, Tunisia**

11:25 am - 13:00 am **Papers**

Improving thermal performance of curved photovoltaic panel linked with phase change material

Mohamed Lamine Benlekkam, Driss Nehari

Analysis of the impact of sprinkler irrigation performance on energy requirements under semi-arid conditions

Samir Yacoubi, Adel Slatni, Béchir Ben Nouna

Hybrid membrane processes for better performances of desalination operations

Ahmed Hannachi, Khaoula Minyaoui

A Sliding-Neural Network Based MPPT Technique Controller for Photovoltaic Pumping System

Hamdi hichem, Abderrahmen Zaafouri

Numerical study of heat transfer and entropy generation of magnetoconvection of nanofluids

Soufien Belhaj, Brahim Ben-Beya

Revisiting a Rapid assessment of the water–energy–food–climate nexus in watersheds undergoing water stress and energy transitions

Caroline King-Okumu, Hadi Jaafar

Feasibility of Seawater Desalination in the case of small and medium farms

Issam Daghari, Ali Gharbi, Hédi Daghari

Solar-driven wastewater treatment using Silver-Titanium Dioxide
GHORAB Mohammed Fouzi, MEZBOUR Samira

Discussion

01:00 pm -2:30pm **LUNCH BREAK**

Session 2: Theme 1. Water resources

Chair: Prof. Abdelazim Negm, Zagazig Univ., Egypt/ Co-Chair: Prof Y. Callot, Université de Lyon, France/ Rapporteur: Dr Hanen Dhaou, IRA, Tunisia

02:30 pm - 02:50 pm **Keynote : Prof. J. A. du Plessis, University of Stellenbosch, South Africa**

02:50 pm - 04:00 pm **Papers**

Contribution to the modeling in Algeria : using the Discharge -Rainfall relationship

Asma Dahak, Boutaghane Hamouda

Modeling of rainfall- discharge relationship by tank model, coupled with kalman filter. Application to the Bouchegouf watershed (Wilaya of Guelma)

Mohamed Amireche, Abdelmalek bermad ; Abdelkader Izerroukyene

Pressions anthropiques dans le bassin de la retenue d'eau de la Lobo a Daloa (Centre-Ouest de la Côte d'Ivoire)

Koukougnon Wilfried Gautier, Guede Cataud Marius, Loba Akou Don Franck Valéry

Water Demand Management as, a Solution to Water Resources Challenges in Rwanda

Bizuhoraho Theobald, Icyimpaye Gisele; Nadia Badr El-Sayd

Combination of hydrochemical, isotopic and geoelectrical approaches to investigate salinization process and seawater intrusion in the coastal aquifer of Lebna Plain in Northeastern of Cap Bon, Tunisia

Amira Ziadi, Nejla Hariga-Tlatli, Jamila Tarhouni, Fethi Lachaal, Emna Trabelsi

Water and Environmental Sustainability in Langkawi UNESCO Global Geopark, Malaysia: Issues and Challenges towards Sustainable Development

Rahmah Elfithri, Mazlin Bin Mokhtar & Md Pauzi Abdullah

DISCUSSIONS

04:15 pm - 04:30 pm **COFFEE BREAK**

04:30 pm - 06:00 pm **Papers**

Groundwater flow and salt transport in Zeuss-Koutine and Jeffara Mio-Plio-Quaternary aquifers (Tunisia)

Hanen Jarray, Mounira Zammouri, Mohamed Ouessar, Samir Sahal

Conception and sizing of an industrial waste water treatment station equipped with biogas digester, UV reactor and reverse osmosis unit

Missaoui Samia, Sellami Mohamed Habib & Tahar Othmen

Smartphone application for vegetable irrigation scheduling

Boutheina Douh M'Hamdi, Gaarraoui Afraa, Mejri Abbes, Hammami Amal, Mguidich Amel & Boujelben Abdelhamid

Flood forecasting of ungauged area: Case study of Tessa catchment

Taoufik HERMASSI, Habiba Ferchichi & Hechmi Belaid

Coupling 3d hydrogeological modelling for an interdisciplinary methodology to understand f enrichment in groundwater: nakuru area (kenya)

Pistis Marco, Habibi .H, Da Pelo S., Melis MT., Dessì F., Ucakuwun E. K., Ghiglieri, G.

Present Scenario of drinking water in India: Review

Manish Upadhyay

Variabilité climatique dans la dorsale Tunisienne

Kawther Hamrouni, Abdelmajid Hamrouni

DISCUSSIONS

DAY 2: 09 MAY 2018

Session 3: Theme 2. Environment

Chair: Prof. Abdelaziz Mougou, Tunisia/ Co-Chair: Prof. Habib Amamou, Tunisia/ Rapporteur: Prof. Omran Bel Haj, Tunisia

08:30 am -- 08:55 am **Keynote: Prof. P. Podwojewski, Institut de Recherche pour le Développement (IRD), France**

08:55 am - 10:15am **Papers**

Modelling of reactive pollutants dispersion in a street canyon

Merah Aissa, Noureddine Abdelkader, Aidaoui Lakhdar

Studying the evolution of gully erosion in southern Tunisia through aerial photography and sedimentological analyses. The case of Matmata region

Ninon Blond, Nicolas Jacob-Rousseau, Dalel Ouerchefani and Yann Callot

Development of an estimation method by image analysis of soil covered by clods

Bouthaina Khalfallah, Jean Louis Rajot, Mohamed Labiadh, Saad Sekrafi, Thierry Henry Des Tureaux

How to preserve groundwater in arid lands? Case study: Analyzing the water management policies implemented in Yazd province to preserve its groundwater resources

Ali Asghar, Semsar Yazdi, Mohammad Saleh Semsar Yazdi

Evaluating of Simple Performance Tests on Soil Mix with Coffee for Transportation Application

Khouloud Al.Sadrani, Osama Ibrahim

High contribution of crop rooting to soil carbon in a semi-arid mediterranean profile: evidence from stable isotopes and modelling

Jamel Jaouadi, Abdessatar Hatiraa, Jérôme Balesdent, Hamouda Aichi, Habib Ben Hassine

DISCUSSIONS

10:15 am- 10:45 am

COFFEE BREAK

10:45 am- 01:00 pm

Papers

Influence de la variation des écarts-types sur la dispersion atmosphérique. Comparaison avec les prédictions de modèles gaussiens (Doury, Smith–Hosker, CFD)

Mehdi Menaouer, Panin Mikhail Petrovich

Long-term effects of soil and water conservation on selected ecosystem services in Minchet catchment Ethiopian Highlands

Alemtsehay Subhatu

Fluctuations of the piezometric level and wind accumulations during the Quaternary period in the maritime Jeffara (Southern-East of Tunisia)

Amira Essid, Mohamed Ouaja, Mohamed Taieb Labiadh et Kamel Regaya

Effect of the major air pollutants on olive pollen performances

Sahar Hadj Hamda, Helena Ribeiro, Ali Ben Dhiab, Monji Msallem, Juan de Dios Alché and Ilda Abreu

What is the impact of atmospheric temperature and land use on soil organic carbon stock during the last 90 years in Tunisia ?

Haithem Bahri, Mohamed Annabi, Hatem Cheikh M'hamed, Roukaya Chibani, Taoufik Hermassi, Amir Souissi, Fakhher Kenbi

Effect of Combined application of organic/mineral fertilizer in soil hydraulic properties

Nissaf Karbout, Mohamed Moussa, Habib Bousnina

The artesian mounds, structuring elements of the Nefzaoua (Tunisia), a threatened ancient landscape heritage

Afef Raddadi, Dalel Ouerchefani , Maël Crépy , Yann Callot

Mesocosm scale study on fluoride mitigation measures in cropping systems- Rizzu Margherita, Ara Angelo, Cappai Chiara, Demurtas Clara, Melito Sara, Mshanga John, Patteri Giacomo, Pinna Maurizio, Piredda Agostino, Roggero Pier Paolo, Seddaiu Giovanna

DISCUSSIONS

01:10 pm - 02:30 pm **LUNCH BREAK**

Session 4: Theme 5. GEO-INFORMATION AND RS TECHNOLOGIES

**Chair: Dr. Rahmah Elfithri, Universiti Kebangsaan, Malaysia/
Co-Chair: Prof. Abderrazek Daaloul, Tunisia/ Rapporteur: Co. Zouhaier Ben
Rabah, Tunisia**

02:30 pm - 02:55 pm **Keynote : Prof. G. A. Corzo, IHE-Delft for Water Education,
Netherlands**

02:55 pm- 04:14 pm **Papers**

**Carbon emissions caused by woodland fires in the African tropical
savannas**

Weicheng Wu, Eddy De Pauw, Claudio Zucca, and Minqiang Zhu

**Mapping and spatiotemporal assessment of changes in land use
and their impact on erosion: case study of El Ogla catchment**

Baccari N., Ben Khelifa W., Cherni Nh., Chaar H., Hermassi T.

**Monitoring of the state of coastal oases in Tunisia by MOD13Q1
products (Case of the oasis of Gabes)**

Cherine Ben Khalfallah, Dalel Ouerchefani, Eric Delaitre, Laurent De-
magistri, Faiza Khebour-Allouche, Darragi Fadhlila, Frédérique Seyler
**Mapping Land Use and Dynamics of Vegetation Cover in South-
eastern Arabia using the Remote Sensing Technology: The Study
Case of Wilayat Nizwa (Oman) from 1987 to 2016**

Fairouz Megdiche-Kharrat, Rachid Ragala, Mohamed Moussa

**Evaluation of land degradation using Geo-Spatial modeling ap-
proach A case study in Koutine watershed (Médenine-Tunisia)**

Mongi Ben Zaied, Mohamed Ouassar

**Cartography of olive trees in the delegation Zarzis (governorate of
Medenine) by Landsat 8 OLI: Impact of climate change**

Achraf Katar, Bouajila Essifi , Hamouda Aichi

**Actual evapotranspiration estimation over a semi-arid heteroge-
neous land surface using coupled remote sensing data with surface
energy budget and crop water budget models**

SAADI Sameh, Boulet Gilles, Simonneaux Vincent, Mougnot Ber-
nard, Lili Chabaane Zohra, Bahir Malik, Brut Aurore, Fanise Pascal

DISCUSSIONS

04:15 pm-04:30 pm **COFFEE BREAK**

04:30 pm- 07:00 pm **POSTER SESSION**

DAY 3: 10 MAY 2018

Session 5: Theme 4. SOCIETIES AND DEVELOPMENT

**Chair: Prof M. Sghaier, IRA, Tunisia/ Co-Chair: Dr. Mohamed Ouessar Tunisia/
Rapporteur: Dr. Dalel Ouerchefani, Tunisia**

08:30 am - 08:55 am **Keynote: Dr Caroline King, The Borders Institute (TBI), Kenya**

08:55 am- 11:00 am **Papers**

The status of Shea butter processing in Nigeria and identification of processing practices

Esiegbuya, O. D., Okungbowa, F. I., Obibuzor, J.U. and Koloche, I. M.

Measurement of Social-Ecological Systems Resilience in Tunisia: Innovative approach using Tri-capital framework

Maroua Afi, Boubaker Dhehibi, Aymen Frija

Contextualizing the six components of the Policy Support System for monitoring the progress toward achieving SDG6 in Tunisia

Olfa Mahjoub, Abderrahman Ouasli, Lisa Guppy

Assessing livelihood vulnerability in Tunisian arid zones

Mondher Fetoui, Mongi Sghaier, Fatma Aribi

Multi-criteria analysis of water harvesting techniques in south east of Tunisia

Naceur Mahdhi, Nesrine Kadri

Virtual water flows and water value in Tunisia: a case study of wheat and olive productions

Asma Souissi, Ali Chebil, Nadhem Mtimet & Chokri Thabet

Gaming simulation for the sustainability of the dairy sector: the role of trust and cooperation

Meriem Msaddak, Jamel Nasr, Lokman Zaibet

Impact of farmers' background on adoption of soil conservation strategy, Ethiopia

Anissa Gara, Hiromichi Toyoda, Edwin P. Mhede, Hiroyuki Iwamoto

Quantification of environmental and socio-economic impacts of hill lakes and of soil and water conservations techniques in Bizerte Governorate

Sellami M. H., Ben Nouna B., Jebari S., Aichi H., Chemak F, Romdhani C., Msolli S.

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**Impact of water shortage on the competitiveness of agricultural
commodities in Tunisia**

Ali Chebil, Aymen Frija and Bechir Bennouna

DISCUSSIONS

11:00 am - 11:20 am **COFFEE BREAK**

11:20 am- 01:00 pm **REPORT AND RECOMMENDATIONS**

CLOSING CEREMONY

01:30 pm- 02:00 pm **LUNCH**

DEPARTURE