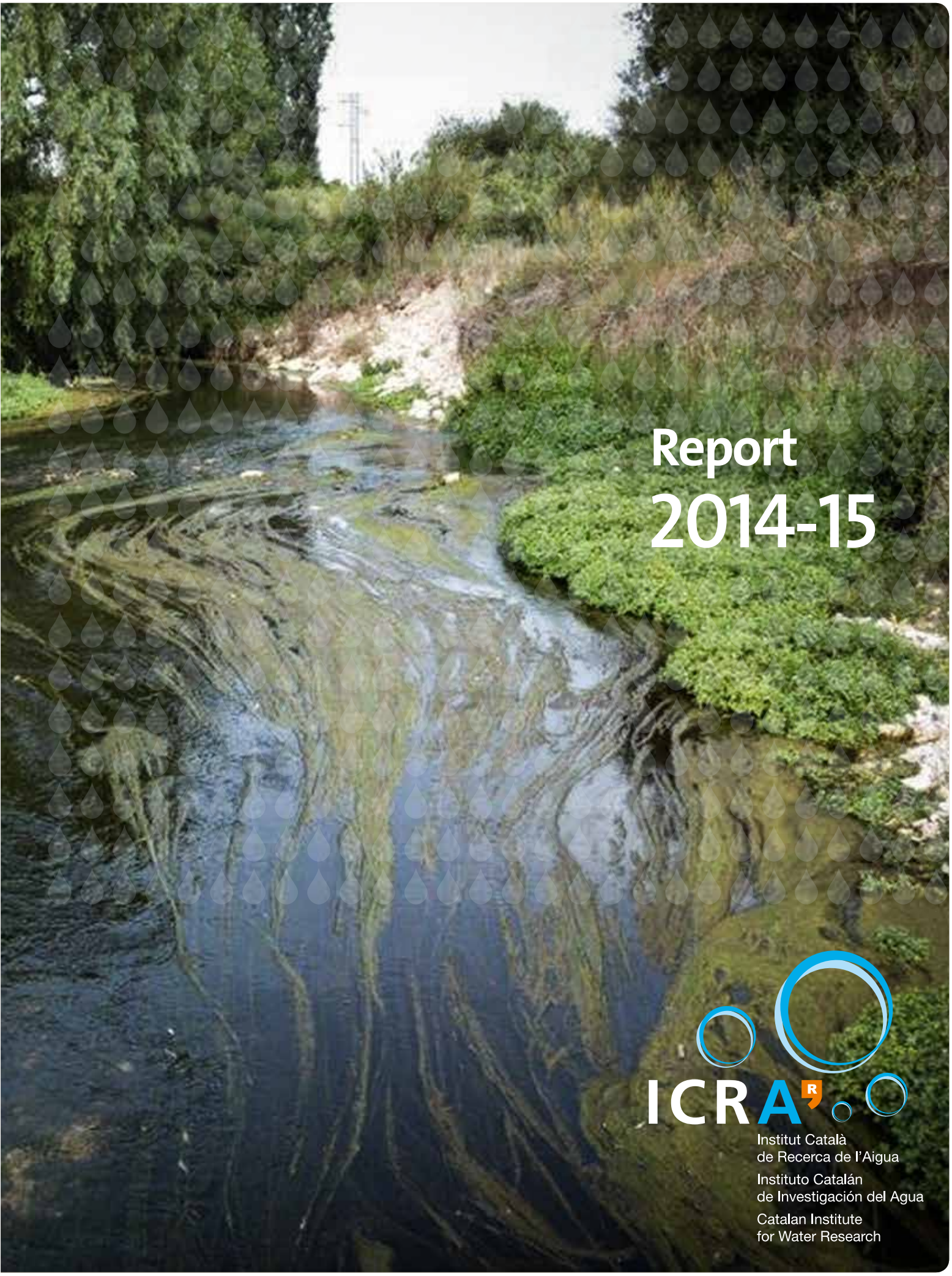


Report 2014-15

ICRA

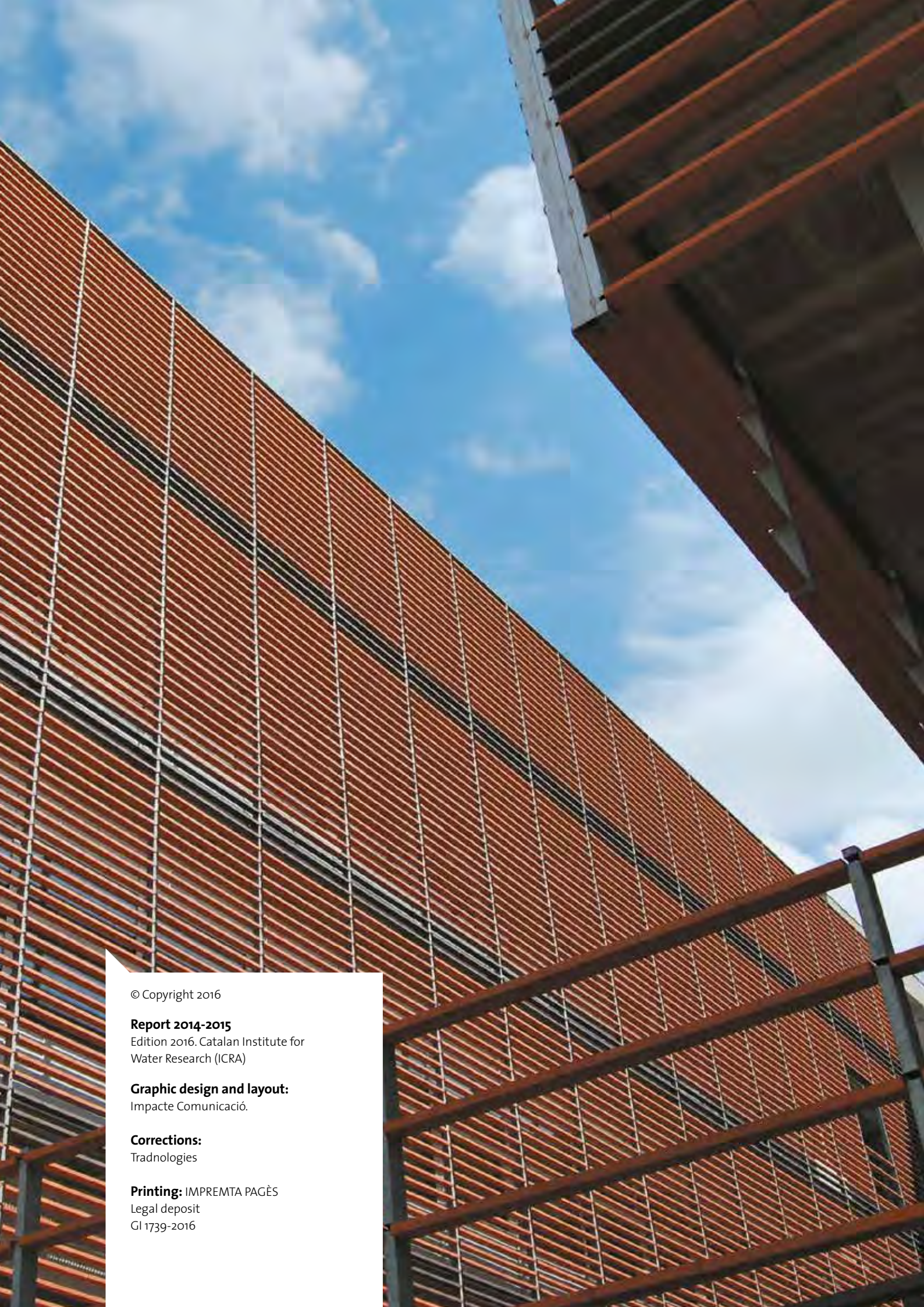
Institut Català
de Recerca de l'Aigua

Instituto Catalán
de Investigación del Agua

Catalan Institute
for Water Research

Annual Report

2014-2015



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Contents

Annual report *2014-2015* ICRA

01.

Presentation

Damià Barceló
Director of the ICRA

It is my pleasure to present to you the annual report from the Fundació Institut Català de Recerca de l'Aigua – ICRA (The Catalan Institute for Water Research) for the years 2014-2015.

In these two years, ICRA continued with its consolidation as a leading research center in the field of the water cycle. This consolidation is shown in the obtaining of new economic resources through competitive projects such as the 7th Programa Marc, JPI-Water, H2020 and programs of the National Plan, among others. Notable programs include **GLOBAQUA, FUNSTREAM, StARE, TreatREC,; ECsafe-SEAFOOD, Sea-on-a Chip, WATINTECH, TRACE, PERSIST,...**) Additionally, the incorporation of researchers into the ICREA program, Ramon y Cajal, Juan de la Cierva, Beatriu de Pinós, and Marie Curie – International Incoming Fellowships (IIF), among others, have allowed the ICRA to grow in human resources, which are still limited. Some of these incorporations have contributed to opening a new line **"*Water supply and Advanced Treatment*"** in the area of Technologies and Valuation.

Our research activity has also received various recognitions, among which I would like to highlight the **Extraordinary PhD Award from the University of Gerona – 2015 (Premi Extraordinari de Doctorat de la Universitat de Girona – 2015),** which was awarded to the thesis **"***Occurrence of antibiotic resistance genes in aquatic microbial communities exposed to anthropogenic activities"* read by Elisabet Marti PhD (ICRA), and directed by Dr. José L. Balcazar (ICRA) and Dr. Joan Jofre (University of Barcelona). Another prize worth highlighting is the **International IWA Award (Premi Internacional IWA)** for the best innovation project and applied research in the Asian-Pacific region, awarded to the project titled **"***Sewer Corrosion and Odour Research SCORe: Putting science into sewers,"* of which one of the leaders is an ICRA researcher, Dr. Oriol Gutiérrez.

Thanks to the aid of Support to Research Groups (Suport als Grups de Recerca – **SGR-ICRA),** we were able to reinforce and consolidate the Office of R+D+I of the institute, incorporating a Project Manager in mid-2015 to support researchers in the elaboration of European and international projects with the objective of increasing research investments through European funds.

I also want to point out the incredible growth in scientific production. In these two years there have been numerous contributions to knowledge, with a total of 305 publications, including 278 indexed articles, of which nearly 90% have been published in distinguished journals in the first quartile of their respective disciplines.

ICRA has also been present in the media, with 359 involvements in the written and digital press, TV, and radio. In the past year, we also joined the social networks, Twitter and LinkedIn.

The growth in projects and progressive research staff has not made us neglect our involvement in the training of new researchers. In this period, seven pre-doctoral ICRA students have defended their respective theses.

One must highlight that at the end of 2015, ICRA received the international recognition of **HR Excellence in Research, an honor from the European Commission that recogniz**es the efforts of the research center to improve the recruitment and the rights of the researchers. This honor is included as part of of the **HRS4R** (Human Resources Strategy for Researchers) action from the European Commission, which highlights the completed task by the institute in the promotion of a work environment, favoring work conditions in accordance with the principles of the European Charter for Researchers, and the code of conduct for the recruitment of researchers. As part of the actions to be carried out, ICRA has elaborated, and its board of trustees has approved the **Equality Gender Plan**, which establishes policies of equality among men and women. In addition, the board has also approved the creation of a Permanent Committee Equality. A good summary for these two years is that, despite the general economic adversity, ICRA continues to move forward on a straight course. The professional and personal involvement by researchers and administrative and technical staff is what allows us to maintain the project and mission that defines ICRA.

I hope that you find the reading of interest.

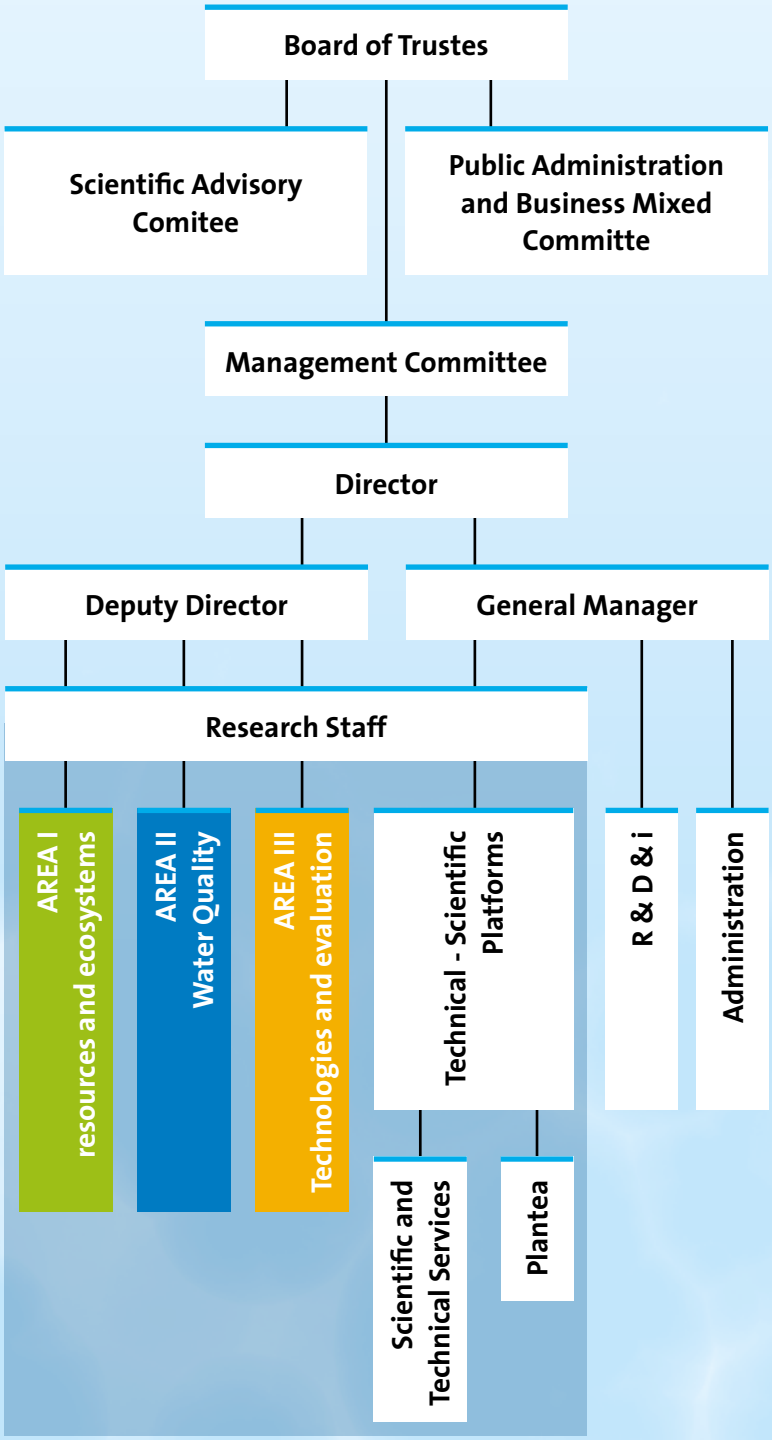
Cordially,

Damià Barceló

Director

02.

Organisation



Board of trustees

The Board of Trustees is ICRA's highest governing body. The trustees are the Catalan Regional Government's Ministry of Economy and Knowledge (DECO), the Catalan Water Agency (ACA) and the University of Girona (UdG). In the June 2014 and in the same month of 2015, the Board of Trustees held an ordinary general meeting.

As elections were held in December 2013 at the University of Girona, in 2014, we renewed three members of the Board of Trustees: Sergi Bonet replaced Anna M. Geli de Ciurana and Ramon Moreno-Amich replaced Josep Calbó and Anna Albar replaced Pere Condom. Futhermore, Jordi Agustí, Director of the Catalan Water Agency (ACA) was appointed as the representative of that body, to replace Enrique Velasco.

Members

CHAIRMAN

Andreu Mas-Colell
Minister for Economy and Knowledge
Ministry of Economy and Knowledge
Regional Government of Catalonia

DEPUTY CHAIRWOMAN

Sergi Bonet
Rector
Universitat de Girona

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Antoni Castellà
Secretary for Universities and Research
Secretariat for Universities and Research
Ministry of Economy and Knowledge
Regional Government of Catalonia

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Managing Director of Research
General Directorate of Research
Ministry of Economy and Knowledge
Regional Government of Catalonia

Anna Albar
Managing Director
Science and Technology Park
Universitat de Girona

Ramon Moreno
Vice-Rector of Planning,
Innovation and Enterprise
Universitat de Girona

Jordi Agustí
Director by the Catalan Water Agency
Catalan Water Agency
Ministry of Territory and Sustainability
Regional Government of Catalonia

TRUSTEE SECRETARY

Lluís Rovira
Director of the CERCA
(Catalan Research Centres)
General Directorate of Research
Ministry of Economy and Knowledge
Regional Government of Catalonia

NON-TRUSTEE DEPUTY SECRETARY

Josep M. Alcoberro
Legal Department of the CERCA
(Catalan Research Centres)
Ministry of Economy and Knowledge
Regional Government of Catalonia

Committees

Scientific advisory committee

The **Scientific Advisory Committee** is appointed by the Board of Trustees and its members consist of an unspecified number of scientists of acknowledged repute and expertise in the field of water and all other related areas of science. This Committee's membership represents the ICRA's different priority areas of research. One of its most significant tasks is to ensure the quality of the research carried out at the ICRA. Accordingly, it acts as an advisory body for all issues relating to the scientific activities submitted for its consideration, and, when requested, it will also act as an evaluating body for these activities.

Bernd Bilitewski

Chair of the Scientific Advisory Committee. General Commissioner for Foreign Affairs. Head of the Institute for Waste and Pollutant Management, Dresden University of Technology (DE)

Clifford Dahm

Emeritus Professor of Department of Biology, University of New Mexico, Albuquerque (USA)

Gustaf Olsson

Emeritus Professor of Industrial Automation, Department of Industrial Electrical Engineering and Automation (IEA), Lund University, Lund (SE)

Inmaculada Ortiz Uribe

Head of the research group in Advanced Separation Processes. Faculty member of the Department of Chemical Engineering and Inorganic Chemistry, University of Cantabria, Santander (ES)

Edward Furlong

Head of the Methods Research & Development Program, National Water Quality Laboratory, US Geological Survey, Denver Federal Center, Denver, CO (USA)

Amadeo Rodríguez Fernández-Alba

Head of the European Reference Laboratory for Pesticides. Faculty member of the Department of Hydrogeology and Analytic Chemistry, University of Almería, Almería (ES)

Klement Tockner

Director of the Leibniz Institute of Freshwater Ecology and Inland Fisheries. Professor of Aquatic Ecology, Free University of Berlín (DE). Researcher at the Swiss Federal Institute of Aquatic Science and Technology (EAWAG)

Jeanne Garric

Director of the Ecotoxicology Laboratory, Aquatic Ecosystems Biology Unit, Department of Water Quality and Pollution Prevention, IRISTEA (FR)

The Scientific Advisory Committee met on 10 and 11 April 2014. During this meeting, the areas gave general presentations of their activities in 2012 and 2013 before the Scientific Advisory Committee, which assessed their work and issued a report on each area. This report was delivered to the Board of Trustees by the management of ICRA.

Emilio Custodio Gimena

Emeritus Professor of the Department of Geotechnical Engineering and Geosciences, Groundwater Research Team of the Polytechnic University of Catalunya, Barcelona (ES). Correspondent member of the Royal Spanish Academy of Sciences. President of the Advisory Committee of the Fundación Centro Internacional de Hidrología Subterránea

Georg Teutsch

Scientific Managing Director of the Helmholtz - Centre for Environmental Research (UFZ) at Leipzig, Germany (DE), Full Professor in Hydrogeology at the same centre, Member of the National Committee for Global Change Research, Member of the German Commission on Water Research

Jörg Overmann

Director of the Leibniz-Institute German Collection of Microorganisms and Cell Cultures (DSMZ) and Head of the Department Microbial Ecology and Diversity Research, Leibniz, Germany (DE)

Peter-Dietrich Hansen

Director of the Department of Ecological Impact Research and Ecotoxicology, Berlin Institute of Technology (BIT), Germany (DE)

Maria Reis

Full Professor in Environmental Biotechnology, Department of Chemistry, Sciences and Technology Faculty, University Nova of Lisbon (UNL), Portugal (PT)

Peter Vanrolleghem

Holder of the Canada Research Chair on Water Quality Modeling (modelEAU) and Professor of the Department of Civil Engineering and Water Engineering, Université Laval, Quebec, Canada (CA)

Paola Verlicchi

Professor in Environmental and Sanitary Engineering, Engineering Faculty, Department of Engineering, University of Ferrara, Italia (IT)

Public administration and business mixed committee

Josep Arráez Escrig

Manager of the Consortium for the Protection of the Besòs River Basin.

Jaume Carol Pañach

Managing director of FLUIDRA. President of the Catalan Water Partnership (CWP), the Catalan water cluster and member of the board Cluster sport (INDESCAT).

Joan Gaya Fuertes

Environmental consultant. Ex-manager of the Consortium for Integrated Management of Water of Catalonia (CONGIAC) and Professor at the University of Girona (UdG).

Jesús Gómez del Blanco

Managing director of RECIPHARM Parets S.L.U., the Spanish subsidiary of RECIPHARM AB (Sweden).

Jorge Juan Malfeito Sánchez

Director of R&D&i at ACCIONA Agua S.A..

Sergi Martí Costa

Managing director of STENCO, AQUA AMBIENT IBÉRICA and TRAINING INDUSTRIAL.

Tomás A. Michel Mayer

Managing director of CETaqua and Director of R&D&i at AGBAR.

Xavier Tristán Prat

Acting manager of the Consortium of the Costa Brava (CCB) and engineer responsible for technical services at the CCB. Member of the Advisory Council for the Sustainable Developement of Catalonia (CADS).

On 14 January 2014, the Public Administration and Business Mixed Committee held a meeting in which the new line of research of the Technologies and Evaluation Area was presented: Alternative Water Supply and Advanced Water Treatment research line. The objective of this line of research is the optimization of the different parts of the urban wastewater system in order to improve the performance of the treatment and reduce harmful emissions.

Two new members joined the Public Administration and Business Mixed Committee in 2014: Valentín Garcia, Director of Hydraulic Public Works, National and International, at SOIL AGUAS, Grupo SOIL, and Antonio Ordóñez, Director of Research, Development and Innovation - GS INIMA Environment, S.A.

On 15 January 2015, the annual meeting of the Public Administration and Business Mixed Committee was held, at which the new projects obtained in the "Joint Programming Initiative "Water Challenges for a Changing World" (Water JPI) European call for applications were presented. StARE Project: Stopping Antibiotic Resistance Evolution. PERSIST Project: Persistence and migration of emerging contaminants and multiresistant bacteria in the continuum between surface water and groundwater from the laboratory scale to the regional scale. TRACE Project: Monitoring and assessment of the risk associated with the diversity and abundance of genes for resistance to antibiotics in surface water, using DNA biochips.

Valentin Garcia

Director of Hydraulic Public Works, National and International, at SOIL AGUAS, Grupo SOIL.

Antonio Ordóñez

Director of Research, Development and Innovation - GS INIMA Environment, S.A.

Departments & staff

In 2014, 70 people contributed to ICRA's R&D&I activities

54 research personnel
13 management/administration personnel
3 R&D&I personnel

In 2015, 86 people contributed to ICRA's R&D&I activities

72 research personnel
11 management/administration personnel
3 R&D&I personnel

DIRECTOR

Damià Barceló

Deputy Director of the Institute of Environmental Assessment and Water Studies (IDAEA), of The Spanish National Research Council (CSIC). Head of ICRA's Water Quality Research Area

DEPUTY DIRECTOR

Sergi Sabater

Full Professor of Ecology at the University of Girona. Head of ICRA's Resources and Ecosystems Research Area

GENERAL MANAGER

Iván Sánchez

General Manager

EXECUTIVE SECRETARY

Olga Corral

PA to Managing Director

R&D&i Support services

The ICRA's general manager is responsible for all the basic services that provide support for R&D&I:

- > Administration
- > R&D&I Office
- >Technical and scientific platforms:
  - >> Scientific and Technical Services (SCT)
  - >> PLANTEA

Administration

The active administrative services that performed specific functions within each field of activity were:

- Human resources
- Purchasing and procurement (Outsourcing)
- Finance and accounting
- Information Technologies
- Communication, Image and Promotion
- Quality and environment
- General services

General Manager
IVÁN SÁNCHEZ

PA to Managing Director
OLGA CORRAL

Human Resources Head
DAVID LÓPEZ

Human Resources Head
EMMA COLLELLDEVALL (only 2014)

Eco-Fin Head
XAVIER FRÍGOLA

Accounting and Support to Research
ANTÒNIA DONADEU

Accounting
ISAAC GRABOLEDA (only 2014)

IT
RUBÉN DÍAZ

Reception
PERE ROYO

Reception
LLUÍS TORNÉ

Reception
CARLA SANTIAGO (only 2015)

Maintenance
RICARD ZAMORA

Administration Support to Research
LOURDES BALMISA (only 2014)

Support to Research
DAVID CORNELLÀ

From left to right:
Ricard Zamora, Pere Royo, Xavier Frigola, Ivan Sánchez, David López, Albert García, Carla Santiago.
From left to right (sit down):
Antonia Donadeu, Olga Corral, Lluís Torné, Ruben Díaz.

The **Outsourcing Service** has managed 3 types of contract: services, supplies and construction, with the goal of providing ICRA's 3 research areas and the SCT with both basic and special scientific equipment.

This equipment has been 50% co-financed by the EU's European Regional Development Fund (FEDER) under the Catalan FEDER Operative Program 2007-2013 and it also received funding from MINECO (The Spanish Ministry of Economy and Competitiveness), directly and through the Third Additional Provision (DA3ª) of the Catalan Statute of Autonomy.

R&D&i office

In 2014 and 2015, the R&D&I office worked on detecting opportunities for fundraising, providing application-call dissemination services and consulting and technical and administrative support for management of ICRA technology transfer research projects. In 2014-2015, a total of 238 proposals were managed (111 in 2014 and 127 in 2015) for grants for new projects and contracts with companies; this is an increase of 30% for 2014 and 15% for 2015 over the number of applications from the previous year. Of these proposals, 186 (82 and 104) were submitted to different bodies for funding, and a total of 65 (31 and 34) were granted funding and are currently under way or due to start. Of these, there are 11 European or international projects, 34 national projects and 20 contracts with companies and institutions. At the close of 2015, there were 27 proposals pending decisions.

With regard to knowledge transfer, during these years, contracts were signed with European and international companies (Canada and Australia) and in 2014, the first patent was obtained based on the results of research carried out at ICRA, with the title "System to determine the frequency and duration of spills in sewage networks (P201330274 ES). The invention is owned by three ICRA researchers: Lluís Corominas and Oriol Gutiérrez of the Technologies and Evaluation Area, and Vicenç Acuña of the Resources and Ecosystems Area.

R&D&I Office Manager
JAUME ALEMANY

Project Manager
ZURIA AGUILAR

European and International Project Officer
LAURA BERTOLINI (only 2015)

Technical Support for Transfer
ANITA GEISZINGER (only 2014)

From left to right:
Jaume Alemany, Zúria Aguilar, Laura Bertolini

In order to strengthen contacts with the production sector and transfer research results, the R&D&I Office took part in the administrative management of the ABASTICAT project of Comunitat RIS3CAT Aigua. This project is a consortium of 13 companies and 7 groups from different research and technology centres, aimed at developing innovation activities.

During these years, training activities have emphasized the new MINECO Spanish state research plan and the new H2020 European Framework Programme, which started in 2014 and has now completed its first two years. Training in the economic and financial aspects of research was also provided for personnel of the office.

Objectives and activities of the R&D&i Office

The primary function of the R&D&I Office is to seek funding, from public or private institutions, with the aim of obtaining the necessary funds to develop the R&D&I projects of ICRA's researchers. The Office also performs monitoring and control functions during different stages of the project, once funding has been granted. The Office provides a quality service to researchers by helping them with the administrative and financial management of their research projects and supporting them in technology and knowledge transfer, from the initial version/initial idea to the administrative closure of the project. The main areas of activity are the following:

- **Collection and dissemination of information relating to grants awarded to researchers.**
- **Support in the preparation of the application (eligibility, compatibility with the call, budget, etc.)**
- **Accompaniment of the researchers in negotiating their KTT projects.**
- **Liaison with funding agencies and research institutions (Agency for Administration of University and Research Grants-AGAUR, Agency for Internationalisation and Innovation Support of Catalan Enterprises-ACC1Ó,-Ministry of Economy and Competitiveness-MINECO, Ministry of Education, Culture and Sports-MECD,-European Commission, etc.) at all stages of the project.**
- **Management of public and private funding to ensure the administrative requirements are fulfilled.**
- **Management of research, and knowledge and technology transfer (KTT) projects:**
  - **-Technical Support**
  - **-Administrative Support**
  - **-Financial Management**
- **Management of the protection and exploitation of research results by ICRA (patents, know-how, etc.).**
- **Identification of opportunities for the protection of knowledge and results generated.**
- **Contact point between companies and ICRA in order to assess the researchers transferring the results and knowledge obtained in their research activities.**

We have attended several conferences on information and training as part of the continuous improvement system service for ICRA researchers. This activity keeps the training staff of the R&D&I Office up to date, strengthens relationships with the environment and establishes new relations (networking).

Technical-Scientific Platforms

Since one of the objectives of ICRA is to transfer knowledge and to provide practical solutions, the Scientific and Technical Services (STS) provide analytical services and PLANTEA for scaling up processes to pilot plant scale.
In 2014-2015, the technical and scientific platforms have been consolidated in order to provide a quality scientific and technical support service to researchers.
The STS has also carried out continuous training and specialization of technicians.

These platforms are the following:

PLATFORM (PLANTEA)

- **SCIENTIFIC AND TECHNICAL SERVICES (SCT)**
- **WATER SCIENCE AND TECHNOLOGIES R-ESEARCH PLATFORM (PLANTEA)**

Scientific and Technical Services(SCT)

In the 2014-2015 period, the ICRA Scientific and Technical Services (STS) used their human and material resources to provide research support services for ICRA researchers and researchers from other public and private institutions.
The provision of services by the Chemical Analysis Unit (CAU) in 2014 and 2015 focused mainly on the physical and chemical characterization of different types of water masses, from wastewater to surface water. The expansion of quality standards has led to the consolidation of routine analyses and has provided new tests, such as the expansion of the parameters measured using ionic methods (hardness, lithium, etc.), optical techniques (total phosphorus

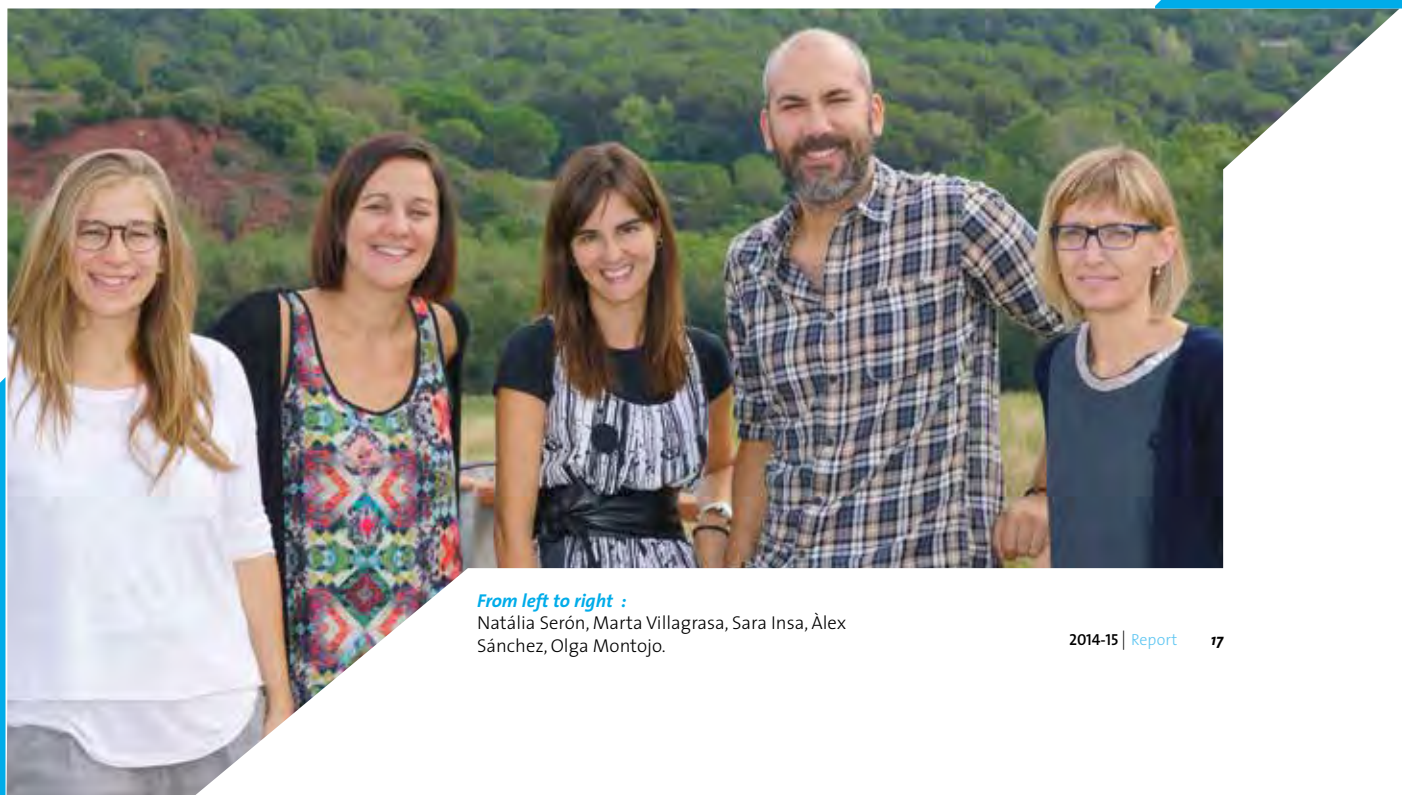
ICRA Head of SCT
SARA INSA

ICRA HEAD OF SCT
MARTA VILLAGRASA

TECHNICIAN
OLGA MONTOJO

TECHNICIAN
ALEX SÁNCHEZ

TECHNICIAN
NATÀLIA SERÓN



From left to right :
Natália Serón, Marta Villagrasa, Sara Insa, Àlex Sánchez, Olga Montojo.

in solids, colorants for fluorescence, etc.) and elemental analysis.

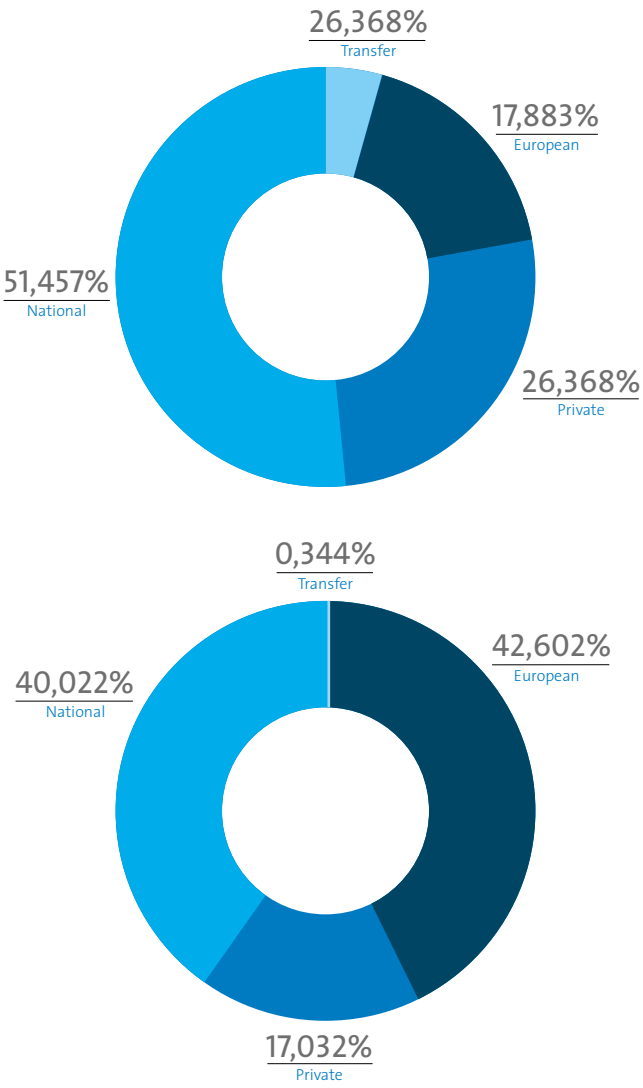
The Mass Spectrometry Unit (MSU) has been consolidated as an environmental laboratory dedicated to the identification and/or quantification of emerging organic contaminants in water samples. With the aim of achieving the strict levels of sustainability described by European directives, we have technologically advanced instruments in the field of mass spectrometry, often connected to preconcentration techniques. The analytical catalogue of the MSU includes a large variety of analytes, including drugs and antibiotics, their metabolites, endocrine disruptors, nitrosamines, etc. With the cooperation of the CAU, training was carried out at the MSU for the BFC doctoral student María de Guadalupe Panduro Rivera, who carried out a study for the "Determination of endocrine disrupting compounds in water using liquid chromatography connected to a mass spectrometer".

In general terms, the work carried out at the Biological and Molecular Techniques Unit (BMTU) is based on the characterization and quantification of microorganisms in environmental samples through the application of molecular techniques. The service provided by this unit has focused on the identification and quantification of resistance genes, characterization of bacterial and archaea communities in samples of sediment, biofilm and plankton, and analysis of acute toxicity in environmental samples and pharmaceutical products.

The most important applications carried out at the Microscopy Unit (MU) were the determination of viable (live/dead) bacterial populations, identification and quantification of populations of ammonia oxidizing bacteria in nitrifying reactors and methane generating microorganisms in samples of wastewater using the fluorescence in situ hybridization (FISH) technique.

The interaction between the STS and the research areas has led to several publications as part of the different ICRA research projects, with the participation of members of the STS.

In order to ensure the fullest training for the STS team, their ongoing training was maintained by means of participation in courses and seminars, such as the Ion Chromatography User Meeting, held in March 2014 in Barcelona.
The summary of the economic activity carried out by the STS in 2014 and 2015 is shown in the following diagram, indicating the percentages of income by source of funding:



Water Science and Technologies-Research Platform (PLANTEA)

The Catalan Institute for Water Research (ICRA) is the home of the Water Science and Technologies-Research Platform (PLANTEA).

The Water Science and Technologies-Research Platform (PLANTEA) is a space where research and industrial development projects can be carried out with pilot plants of different sizes (up to semi-industrial scale). These pilot plants make it possible to carry out research projects on advanced treatment of both wastewater and treated water or water that can be made potable, and on projects for monitoring, eliminating and evaluating the effects of contaminants in water, as well as studies that require large-scale equipment.

This facility has been 50% co-financed by the EU's European Regional Development Fund (FEDER) under the Catalan FEDER Operative Program 2007-2013 and also received funding from MINECO (Spanish Ministry of Economy and Competitiveness), directly, and through the Third Additional Provision (DA3ª) of the Catalan Statute of Autonomy.

Scientific-Technical Platforms

The PLANTEA test platform currently provides ICRA with benchmark facilities for carrying out two different aims:

- **The study of wastewater transport and treatment systems in conditions as similar as possible to the real world (pilot plants).**
- **The study of the response of fluvial ecosystems in different conditions thanks to the installation of an experimental stream facility (ESF).**
- **A mesocosm artificial aquatic ecosystem that makes it possible to carry out studies on exposing organisms such as mussels and/or fish to chemical contaminants.**

Wastewater treatment pilot plants

We currently we have several pilot plants in operation in the PLANTEA platform to mimic real wastewater transport and treatment systems. There are two pilot scale sewer systems simulating two rising mains from a sewer network, which are being operated to study the biochemical transformations occurring in these systems. The majority of the detrimental compounds produced during wastewater transport originate in the anaerobic zones of the sewer networks, the rising mains. The two most detrimental compounds produced are hydrogen sulphide, responsible for bad odours and toxic at certain concentrations, and methane, which is the most important greenhouse gas today, after carbon dioxide. These sewer pilot plants make it possible to study the chemical and microbiological transformations in these parts of the sewer networks, which are very difficult to access in real facilities. These installations, which are

the first if their kind in Europe, allow the researchers to investigate why and how these detrimental products form during wastewater transport and how their formation can be prevented. In 2015, different chemical dosing strategies were tested and optimized to mitigate the production of sulphide and methane with very good results. Also, the fate of several microcontaminants present in the wastewater during its transport through the pilot scale sewer system has been assessed. Several sequencing batch reactors (SBR) are also currently being operated to study different biological processes involved in the removal of contaminants in wastewater treatment plants. The current investigations focus on two lines of research: 1) Optimization of biological nitrogen removal from different wastewater streams while minimizing production of nitrous oxide (N_2O), a potent greenhouse gas, and 2) Identifying the mechanisms involved in biodegradation of emerging microcontaminants in domestic wastewater (i.e. pharmaceutical compounds, endocrine disruptors, etc.) by different types of microbial communities present in wastewater treatment plants.

Also, a low energy requirement membrane bioreactor (Smart Air MBR) pilot plant (200L) is being operated as part of the project demEAUmed (www.demeaumed.eu), co-funded by the European Union under the 7th Framework Program and scientifically coordinated by ICRA. The Smart Air MBR was being tested in controlled conditions at ICRA and, since November 2015, at the DEMO site (Hotel Samba, Lloret de Mar), it has been treating real hotel greywater, in terms of optimization of process variables and calibration of Smart air MBR control parameters when treating synthetic greywater and wastewater.

All demEAUmed innovative technologies have been tested, at pre-demonstration level by each of the partners, and the PLANTEA facilities have made it possible to optimise the operational parameters of the membrane bioreactor pilot plant before its placement at the demonstration site.

All these installations are fully monitored and controlled by different PLC systems connected to an SCADA program, allowing real-time control of the processes occurring in each of the pilot plants. This is possible thanks to the numerous monitoring systems in the PLANTEA installations such as dissolved oxygen, pH, redox, nitrate, dissolved N_2O and hydrogen sulfide sensors, as well as online gas analyzers for N_2O and nitric oxide (NO) monitoring connected to the SCADA system. Finally, the PLANTEA laboratory has a direct connection to a sewage pumping station that collects the wastewater originating in the local neighbourhoods.

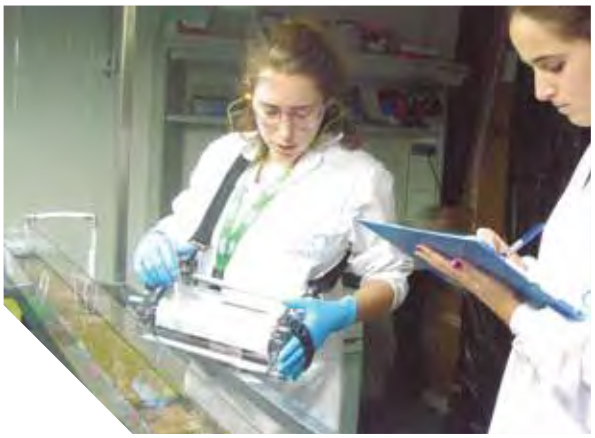
This greatly facilitates the use of real wastewater for the experiments conducted in the PLANTEA pilot plants. The projects that have benefited from the PLANTEA platform during 2015 are: SGHGEMS-Sulfide And Greenhouse Gas Emissions From Mediterranean Sewers (EU Marie Curie Reintegration grant), NITRI-GHG- Exploring novel nitrifying pathways to minimize greenhouse gas emissions from WWTPs (EU Marie Curie Career Integration Grant), GEISTTAR- Greenhouse gas Emissions from wastewater transport and treatment systems (MINECO, Spanish Government), WATER FATE - The fate of microcontaminants and disinfection by-products in membrane bioreactors and reverse osmosis or nanofiltration membranes followed by disinfection (MINECO, Spanish Government), SMARTGREEN GAS exploring novel sludge pretreatments to enhance biogas production (CDTI, CIEN) and demEAUmed - Demonstrating integrated innovative technologies for an optimal and safe closed water cycle at Mediterranean tourist facilities (EU funded project, 619116).

Fig. 1. Membrane bioreactor (Smart Air MBR) pilot plant (200L) for the treatment of greywater, being operated in the framework of the project demEAUmed.

The Experimental Streams Facility makes it possible to simulate the response of fluvial ecosystems to different environmental conditions.

This facility makes it possible to study the behaviour of rivers in different situations, such as episodes of drought, the response to chemical and/or biological contaminants and ambient temperature fluctuations; it is therefore a benchmark tool for the lines of research of the Resources and Ecosystems Area and for others in the ICRA research areas.

The facility is the only one of its kind in Europe in terms of its design and automation. Other similar facilities exist in Vienna, Berlin and London, but the most similar facility is that of the Environmental Protection Agency (EPA) in Cincinnati, Ohio, in the United States.
Several experiments were carried out at the Experimental Streams Facility (ESF) during the 2014-2015 period. These experiments are described below with the project title and funding agency (a), project duration and experiment dates (b), principal investigator (c), lead scientist for the experiment (d), scientists involved (e), summary of goals and design (f), summary of results (g), and scientific outcomes (h).



1) Effects of flow intermittency severity on stream organic carbon processing.

A) Project title and funding agency: CARBONET, funded by the MINECO.

B) Project duration, and experiment dates: 2013-2015; 22/09 to 09/12 of 2014.

C) Principal Investigator: Sergi Sabater.

D) Lead scientist for the experiment: Isabel Muñoz.

E) Scientists involved: Vicenç Acuña, Joan Pere Casas, Maria Casellas, Lluís Gómez, RafaMarcé, Isabel Muñoz, Sergi Sabater, Daniel vonSchiller. This experiment was a collaboration between the University of Barcelona and ICRA.

F) Summary of goals and design: Assess the effect and severity of the non-flow period of temporary streams on organic carbon processing and emissions. Design: randomized block design with 2 treatments (severe flow intermittency, and less severe flow intermittency) and 2 controls (always dry and always wet). With 4 replicates per treatment/control, there were a total of 16 artificial streams used.

G) Summary of results: The severity of the flow intermittency is certainly relevant in determining the effects on the stream biofilms carbon metabolism.

H) Scientific outcomes: manuscript in preparation (I Muñoz, lead author).

2) Interaction effects between assimilable and toxic contaminants.

A) Project title and funding agency: GLOBAQUA, by the European Union, FP7-ENV-2013 (603629).

B) Project duration, and experiment dates: 2013-2019; 11/06 to 30/07 of 2014.

C) Principal Investigator: Sergi Sabater.

D) Lead scientist for the experiment: Vicenç Acuña.

E) Scientists involved: Vicenç Acuña, Ibon Aristi, Maria Casellas, Arturo Elosegi, Sara Insa, Mira Petrovic, Sergi Sabater. This experiment was a collaboration between the University of the Basque Country and ICRA.

F) Summary of goals and design: Assess the interaction effects of a mixture of assimilable and toxic 2013-2019.contaminants on stream biofilms, following a factorial design with three nutrient levels (low, medium or high) and either presence or absence of a mixture of emerging contaminants. With 3 replicates per treatment/control, and six treatments and 2 types of control, there were a total of 24 artificial streams used.

G) Summary of results: Emerging contaminants can pose a threat to non-target aquatic organisms at concentrations observed in polluted rivers, that assimilable contaminants such as nutrients can alleviate the stress effect of emerging contaminants.

H) Scientific outcomes: manuscript published in Environmental Pollution (I Aristi as first author).

3) Emerging contaminants attenuation mechanisms.

A) Project title and funding agency: GLOBAQUA, by the European Union, FP7-ENV-2013 (603629), and TRANSFORMER, a Marie Curie International fellowship (657425).

B) Project duration, and experiment dates: 2013-2019; 21/10 to 14/12 of 2015.

C) Principal Investigator: Sergi Sabater.

D) Lead scientist for the experiment: Marko Rozman.

E) Scientists involved: Vicenç Acuña, Maria Casellas, Mira Petrovic, Marko Rozman.

F) Summary of goals and design: Assess emergent contaminants attenuation mechanisms (photo-degradation, biodegradation and sorption) and rebuild transformation routes of each assessed emergent contaminant. Assess the effects that flow intermittency has on the biodegradation potential of stream biofilms. With 3 replicates per treatment/control, and 4 treatments and 4 controls, there were a total of 24 artificial streams used.

G) Summary of results: Because of the selected compounds, most attenuation was related with the biodegradation potential. This was in fact influenced by flow intermittency, as stream biofilms experiencing a non-flow phase had a greater capacity to biodegrade emerging contaminants.

H) Scientific outcomes: manuscript in preparation (M Rozman as lead author).

4) Usage of MALDI MSI dynamics as freshwater ecological indicators.

A) Project title and funding agency: GLOBAQUA, by the European Union, FP7-ENV-2013 (603629).

B) Project duration, and experiment dates: 2013-2019; 22/06 to 24/07 of 2015.

C) Principal Investigator: Sergi Sabater.

D) Lead scientist for the experiment: Daniel Rivas.

e) Scientists involved: Vicenç Acuña, Damià Barceló, Maria Casellas, Antoni Ginebreda, Sandra Pérez, Carmen Quero, Daniel Rivas, Sergi Sabater. This experiment was collaboration between the CSIC-IDAEA and ICRA.

F) Summary of goals and design: Assess the degradation of solid polycaprolactone diol by stream biofilms under controlled conditions, aiming to properly quantify degradation changes to assess the likelihood of using this technique as an ecological indicator. With no replicates per treatment/control, and only 2 treatments, a total of 2 artificial streams was used.

G) Summary of results: We demonstrate that MALDI MSI can be conveniently used for the identification of changes occurred in the polymer structure after exposure to different water conditions, such as those encountered in different relevant environmental scenarios, either natural or man-made. Samples of polycaprolactone diol were exposed to aerobic and denitrifying conditions to mimic those found on streams and wastewater treatment plants, respectively, as representatives of relevant real scenarios.

H) Scientific outcomes: manuscript in revision (D Rivas as lead author).

Artificial aquatic ecosystem

A space has been set up within the ICRA facilities (see attached drawing) for the installation of a mesocosm consisting of two aquarium systems of 400 L each, which can be used to recirculate both fresh and salt water. The system will make it possible to cover the needs of the European Sea on a Chip project, in which ICRA is responsible for providing an artificial system that mimics the environmental conditions of the marine environment. The objective is to evaluate the operation of a sensor to measure pollution in environmental conditions as similar as possible to those in the real world throughout its technological development in this project. This mesocosm is also available for carrying out experiments with marine and freshwater organisms, thanks to the versatility of the system, which makes it possible to simulate the characteristics of marine and continental-water environments. The applications of this mesocosm make it possible to carry out studies on exposing organisms such as mussels and/or fish to chemical contaminants, in order to study the impact of environmental pollution on these organisms and to evaluate the implications it may have for human consumption.

This facility is expected to generate added value for the research carried out in our centre by opening it up to other lines of research in the future.

Activities 2014-2015. The marine mesocosm facilities located at ICRA basement has hold two events related to the SEA-on-a-CHIP project. This project aims to develop an immuno-sensor platform that will allow real time analysis of marine water in multi-stressor conditions. ICRA is involved in the verification and validation of the prototype. For this purpose, two sensor trial meetings have been organized. The 1st Sensor trial meeting took place in July 2014 and the 3rd Sensor trial meeting in March 2015, in that occasion it was also simultaneously hold by ICRA the 1st Annual project meeting. Both meetings had duration of 3 days and the number of participants was 25 and 55 people respectively.

HR Excellence in Research Award

In December 2015, the Institut Català de Recerca de l'Aigua (ICRA) received the "HR Excellence in Research" award from the European Commission.

This award and its logo recognizes that ICRA endorses the policies and practices of The Human Resources Strategy for Researchers (HRS4R), established by the European Commission to implement principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (Charter & Code).

The implementation process started in October 2014 when the HRS4R Work Group was created. After performing a gap analysis and a self-assessment in accordance with the results of the analysis obtained, a 2015-2017 Action Plan was produced.
ICRA has adopted this 2015-2017 Action Plan in consonance with HRS4R and the principles of the Charter and Code of the European Commission, focusing on key areas for change and further development.
These two documents (Charter & Code) prove that ICRA has the means to achieve a transparent and open labor market for researchers and includes general principles and requirements associated with the position, obligations and rights of researchers and their employers, as well as with the recruitment of researchers. This recognition makes it possible to achieve international visibility by providing favorable working environment for research with equal opportunities, ethical integrity and work life balance.
ICRA believes that researchers will be able to focus on their career development and increase their employability and career advancement.

Equality Gender Plan

According to Organic Law 3/2007 of 22 March, on effective equality between women and men, with the aim of establishing and developing policies that integrate equal treatment and opportunities between women and men, ICRA and the Permanent Committee on Equality have exeduted the Equality Gender Plan. The Permanent Committee on Equality is a multidisciplinary team composed of 4 people from different areas and groups of ICRA. Questions or concerns on this matter can be addressed to the Permanent Committee.

Permanent Committee on Equality: Marta Villagrasa, José L. Balcazar, Olga Corral I David López

HR EXCELLENCE IN RESEARCH

03. Research Areas

ICRA's Research Plan is structured in three main research areas, each with a mission and a vision aligned with those of ICRA. ICRA's areas and respective lines of research are as follows:

Area I Resources and Ecosystems

LINES

- **AI1** Hydrological Processes
- **AI2** Lacustrine and Reservoir Systems
- **AI3** Fluvial Systems
- **AI4** Modelling of Ecosystems and Basins

Area II Water Quality

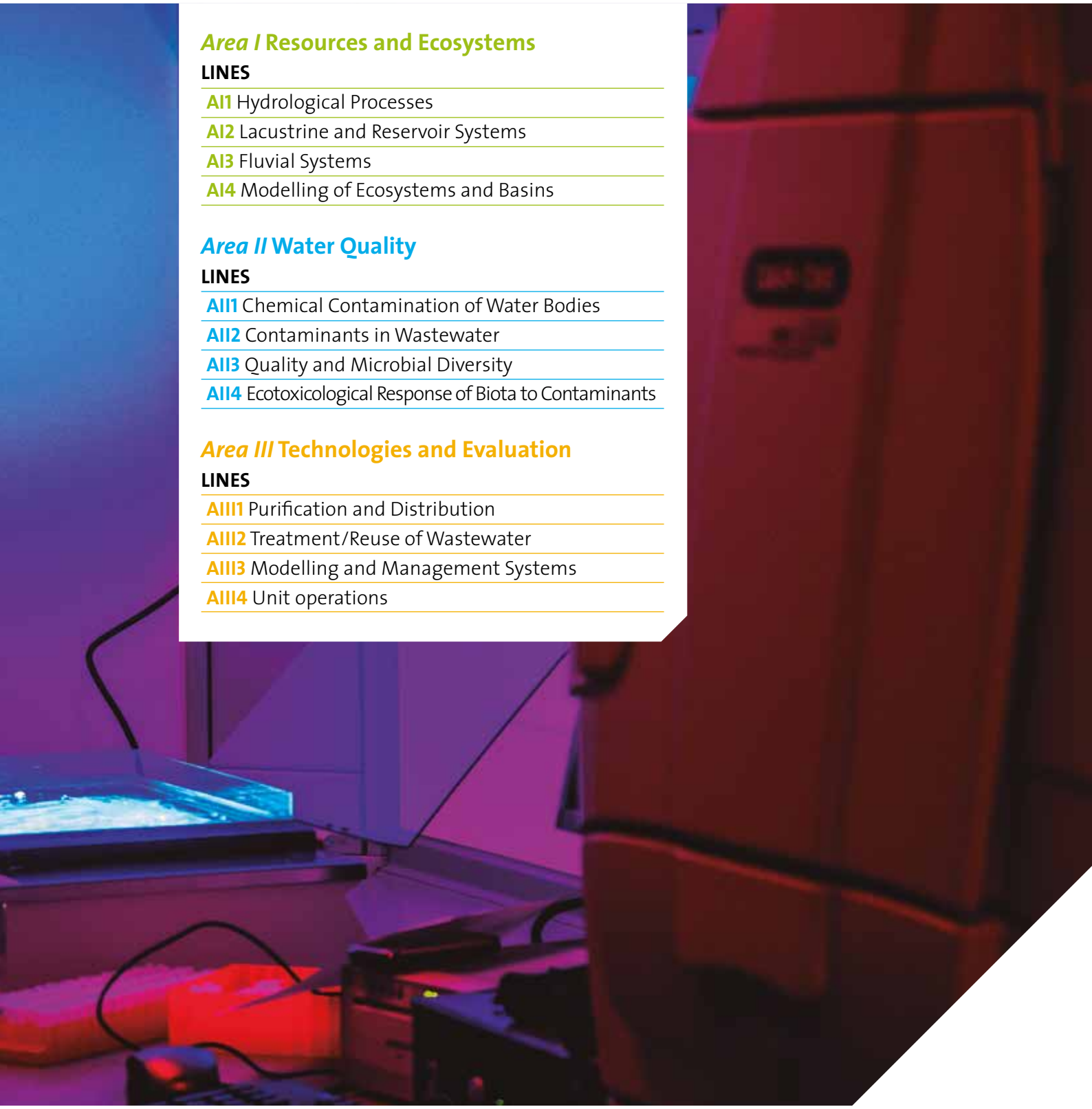
LINES

- **AII1** Chemical Contamination of Water Bodies
- **AII2** Contaminants in Wastewater
- **AII3** Quality and Microbial Diversity
- **AII4** Ecotoxicological Response of Biota to Contaminants

Area III Technologies and Evaluation

LINES

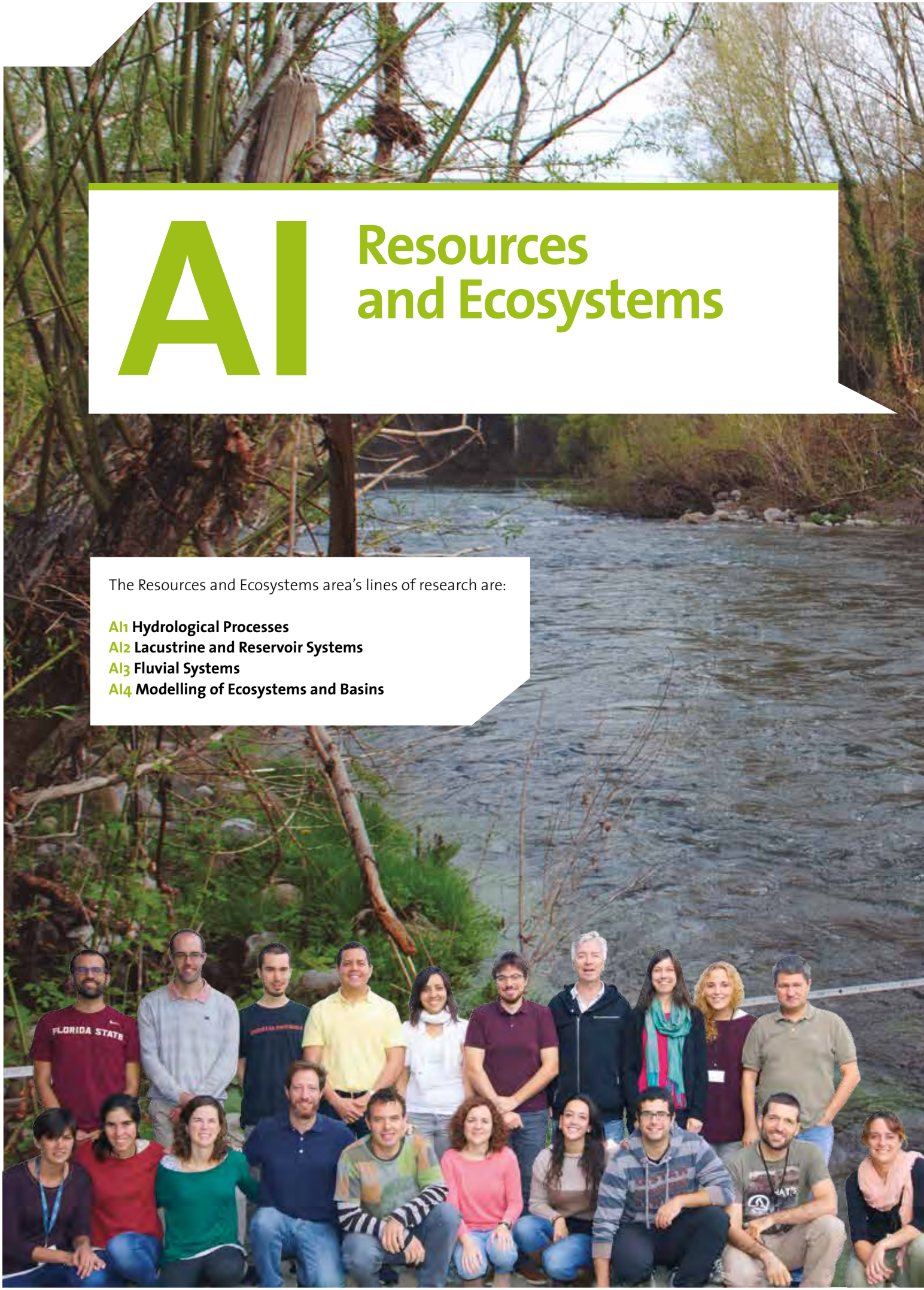
- **AIII1** Purification and Distribution
- **AIII2** Treatment/Reuse of Wastewater
- **AIII3** Modelling and Management Systems
- **AIII4** Unit operations



A1 Resources and Ecosystems

The Resources and Ecosystems area's lines of research are:

A1.1 Hydrological Processes
A1.2 Lacustrine and Reservoir Systems
A1.3 Fluvial Systems
A1.4 Modelling of Ecosystems and Basins



25 researchers in the

1 Research professor (UdG associated) and group leader
SERGI SABATER

1 Research professor (UdL associated)
RAMON J. BATALLA

1 Research professor (UdG associated)
JOSEP MAS-PLA

2 Research scientists
VICENÇ ACUÑA
RAFAEL MARCÉ

1 Postdoc researcher (Juan de la Cierva)
MARTA TERRADO

1 Postdoc researcher
DANIEL VON SCHILLER (only 2014)

1 Postdoc researcher
MERCÈ BOY (only 2015)

1 Postdoc researcher (UDG associated)
ELISABET TORNÉS

1 Postdoc researcher
CRISTINA BUENDÍA

1 Postdoc researcher
LORENZO PROIA (only 2014)

1 Postdoc researcher
ADA PASTOR (2015)

8 Predoctoral students
JOAN PERE CASAS
MIRIAM COLLS (2015)
FERRAN ROMERO (2015)
GEMMA PIQUÉ
LIDIA PONSATÍ (only 2014)
ROSANA AGUILERA BECKER
XISCA TIMONER
JORDI-RENÉ MOR ROY (UdG associated)

5 Research technicians
MARIA CASELLAS
MIREIA FILLOL (only 2015)
CARMEN GUTIÉRREZ
SILVIA BUBÉ (only 2014)
LAURA VERGOÑOS

From left to right (stand up): Joan Pere Cases, Albert Herrero, Jose Pedro Ramaio, Javier Rodríguez, Xisca Timoner, Jordi-René Mor, Sergi Sabater, Mercé Boy, Lena Portell, Josep Mas-Pla. From left to right (squat down): Carmen Gutiérrez, Ada Pastor, Anna Freixa, Francesco Bregoli, Rafael Marcé, Elisabet Tornés, Miriam Colls, Ferran Romero, Vicenç Acuña, Mireia Fillol.

The activities of the ICRA Resources and Ecosystems Area have developed through projects reaching their conclusion, the arrival of other new projects, and activities with firms and administrations. Several PhD students have also completed their theses during these two years, and the area took on a new senior investigator (J Mas-Pla) for the hydrogeological modelling research line.

In terms of activities with firms, the ongoing contract on the sustainability of water resources in the face of global change with ENDESA has materialized in applied and scientific products. This has also made it possible to contract of a full time post-doc researcher (C Buendía), who has been fully involved in the development of the project. Furthermore, a small contract has been signed with ATLL on the implications of the potential development of the zebra mussel for drinking water facilities, in a prevention exercise.

The large projects SCARCE and GLOBAQUA, one ending and the other starting, have provided the basis for a common research arena to many members of the Area (as well as to others from other areas of ICRA). Interdisciplinary activities on ecology, geomorphology and chemistry have been performed through these projects in order to respond to highly complex questions related to water scarcity. Together, national projects such as CARBONET, FUNSTREAM, ATTENUATION and FREEDOM have triggered intense research in the area, related to water intermittency, carbon dynamics and hydrological dynamics. These projects have contributed to providing a perspective on the role of river ecosystems and basins from a perspective of global change.

As in past recent years, the risks of global change are expressed in potential higher flow intermittency (affecting both the biodiversity and the functioning of the river), and in more complicated relationships between streams and aquifers. These are aspects that demand integrated research from different perspectives, based on a variety of tools, to produce a reliable understanding. Numerical flow modelling, basin-wide modelling, and careful examination of processes, need to combine to enable fuller comprehension of the effects of global change. The ecosystem services provided by river basins, and the integration of ecosystem services in environmental management, may be outputs, but their reliable appreciation has to be based on careful examination of underlying mechanisms.

Also important during these two years has been the ongoing COST action NETLAKE. This network has provided a good basis for research on reservoirs as well as the necessary contacts to expand our research network. And the new JPI project PERSIST (Persistence and fate of emerging contaminants and multi-resistant bacteria in a continuum of surface water and groundwater from the laboratory scale to the regional scale) has begun its trajectory with a very recent kick-off meeting.

Different assignments for knowledge transfer, such as HIDSOS (phase II and phase III) contracted by the company ENDESA, Canal Gestion Embassament contracted by Canal Isabel II, and ITUANGO contracted by the University of Cantabria, were carried out in 2015, based on the knowledge accumulated by the area in the aforementioned projects and in those carried out in previous years.

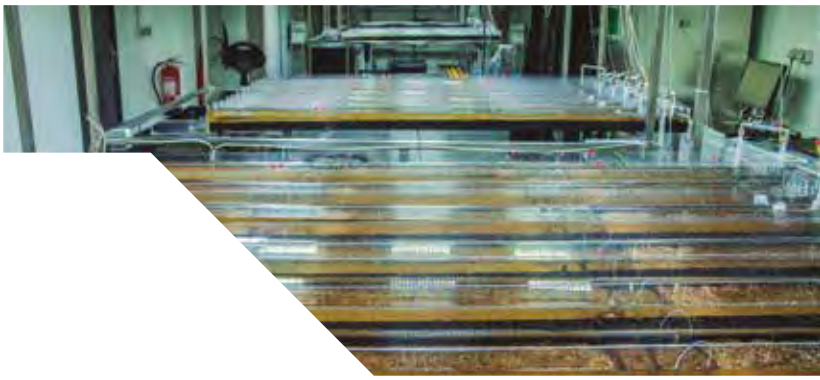
As indicated at the beginning of this introduction, several theses were completed during this period; this was the case of Rosana Aguilera and Lidia Ponsati, who presented their PhDs in 2015. And finally, the arrival of Professor Mas-Pla, attached to UdG, was been very good news for the development of the area. We warmly welcome him and look forward an exciting collaboration!

A1
Hydrological Processes

Monitoring of fluvial processes in the River Muga basin continued in 2014 and finished in 2015. The main tasks gave priority to the maintenance and further withdrawal of flow and turbidity sensors in the five measuring sections installed since 2012 along the basin's drainage network. Sensors recorded water depth (subsequently transformed into discharge by means of the site-derived *h/Q* rating curves) and turbidity (suspended sediment load, both mineral and organic). Regular samples were taken at all sections for calibration purposes. Water samples were taken to the laboratory, where suspended sediment concentrations and the content of organic matter were determined. In addition, topographic measurements of the river channel were completed and incorporated into the hydraulic modelling of the river. Also, radiofrequency tagged particles were surveyed to determine bedload entrainment and particle step-length. This compiled database will make it possible to construct the water and sediment budget of the catchment, as well as the analysis of the impact of the Boadella Dam on the downstream water and solid load transfer. Bedload formulae were tested and applied to estimate the total load delivered to the reservoir. The analysis of the hydrological characteristics of the basin in a regional Mediterranean context started in 2014 and was published in an international journal during this year.

Special attention was given to the analysis of the results obtained after the flume trials to observe the influence of biofilm on bed-material entrainment carried out at the ICRA Mesocosm facility. A paper reporting the main finding of this research will be submitted in early 2016. These activities are the central part of the PhD's project by Gemma Piqué, which is due to finalise in the first half of the year ('Analysis of hydrosedimentary processes and impacts affecting river basins and channels').

The team followed up on the modelling tasks relating to water temperature, hydrology and sediment transport in the Ribera Salada and Noguera Pallaresa rivers within the frame of the Research Contract 'Sostenibilidad de recursos hídricos bajo el cambio global' funded by ENDESA SA.



The setup of a monitoring network for flow and sediment transport was completed in the Noguera Pallaresa river basin. A bathymetrical survey of the Talarn Reservoir (927 ha.) in collaboration with the University of Lleida was also completed. Both activities, together with the long-term determination of the siltation rates in the reservoir (already performed) are key to the calibration and validation of the TETIS model results, which will eventually lead to the implementation of global change scenarios in this large representative basin of the Southern Pyrenees.

Finally, the team also continued its involvement in the GLOBAQUA Project. The compilation of the flow and sediment transport database for the Ebro river basin (with the ultimate objective to assess how sediment transport regime is affected by changes in land use and climate change) was accomplished and complemented with data from 135 other basins in the Western Mediterranean region. Data are being analysed to characterise sediment yield and determine the main factors that control this central element for the rivers' ecosystems. The development of a field strategy to analyse the dynamics of sediment-laden traditional and emergent contaminants in the ca. 10000 km^2 River Cinca basin (affected by long-term pollution) was also completed and is being implemented in collaboration with the Environmental Chemistry Group at IDAEA-CSIC.

AI2
Lacustrine and Reservoir Systems

A main goal of this line of research is defining the effect of global changes on water quality in water storage systems. Within the COST action "Networking Lake Observatories in Europe" (NETLAKE), we coordinate the working group devoted to the application of high frequency measurements in lake and reservoir management. Within the goals of this network, a new automatic monitoring station was deployed in Sau Reservoir (Spain) which has been included in the NETLAKE network.

Intense research on the carbon cycle in Mediterranean reservoirs and weirs has been carried out in coordination with the research lines AI3 (Fluvial systems) and AI4 (Modelling of ecosystems and basins). This research takes into account the location of reservoirs in river networks and their interactions with the other fluvial compartments. The project FREEDOM (*Resolving the dissolved organic matter degradability dilemma in freshwater ecosystems*) began in 2015; this is an EXPLORA project funded by MINECO. The EXPLORA call funds risky projects at the edges of knowledge, to test innovative ideas. This also allowed for the incorporation of a new post-doc researcher (Ada Pastor) to the line.

Several contracts with companies began during this period. One of these (in collaboration with the Instituto Hidráulico de Cantabria) investigates carbon cycling in a projected reservoir in the Colombian tropics. The role of water quality in reservoirs on the cost of water treatment for human supply is a contract with the Canal de Isabel II Gestión (Spain). The modelling of emergent pollutants in river networks at very large scales with the EU Joint Research Centre at Ispra (Itay).

Collaboration with other projects includes CARBASSES (Institute of Minorcan Studies), where we studied the carbon emissions from small temporary ponds; IBERDROLA (Iberdrola Foundation), on the role of large dams and mini-hydraulic as sinks and sources of carbon and its relevance to the carbon footprint of hydropower production; LICUA (MINECO), focusing on climate change impacts in the Guadalquivir Basin; and COLOT, devoted to GHGs emissions from weirs in the Fluvià River. Finally, we contribute to the CYTED network IBEPECOR, devoted to the assessment of the ecological status of waterbodies.

A13
Fluvial Systems

This research line pursued the research lines already active during the past years:

1) The effects of flow intermittency on stream biota and biogeochemistry,
2) The effects of multiple stressors on the ecosystem structure, functioning and services,
3) The effects of emerging contaminants on the biota in fluvial ecosystems, and the natural attenuation of this biota in stream ecosystems.
4) The integration of ecosystem services in environmental management.

Most of the research carried out within these lines was done in the framework of the CONSOLIDER-INGENIO 2010 project (SCARCE), which finished in December 2014, as well as the project of the Spanish Ministry of Economy and Competitiveness (CARBONET), also completed by the end of 2014, and in the recently started FUNSTREAM and GLOBAQUA projects.

In 2014-15, most aspects associated with the SCARCE project were completed, and this resulted in a relatively high number of collaborative publications with the other research areas of ICRA, as well as with other research centers.

In collaboration with line I.4, and within the CARBONET project, we finished an ambitious fieldwork program to collect the necessary data to build basin-scale models devoted to understanding carbon cycling in Mediterranean river networks. Results are being published in association with the development of two different PhD theses, one of them at ICRA (Joan Pere Casas).

The new project FUNSTREAM, which started recently, will continue our ongoing research on intermittent river systems, focusing particularly on the biological response of autotrophs within the biofilms under the dry-rewetting cycles. FUNSTREAM is a project coordinated MINECO in collaboration with UB and UdG, and also includes two PhD students (from ICRA and from UB).

Research on multiple stressors was performed under the project GLOBAQUA. Work is being performed both at the field and mesocosm (artificial stream systems) scales, and includes the response of biofilm and invertebrates. This project hosts two PhD students of the Area (Jordi René Mor and Ferran Romero).

Mostly within SCARCE and GLOBAQUA, research also focused on the application of ecosystem services and their connection with environmental management and policy. This resulted in collaborative articles in the journals Science and in Nature. Indeed, the link between science and policy, and the use of the concept of ecosystem services to integrate different components of the urban water cycle, are summarizing challenges in this line of research.

A14
Modelling of ecosystems and basins

Modelling activities continued within the CONSOLIDER-INGENIO 2010-SCARCE Project, in particular regarding emerging contaminants and nutrients at the basin scale. These modelling efforts can be summarized as follows:

-Modelling of emerging contaminants has been addressed though the GREAT-ER model, with special emphasis on the processes occurring at the river reaches and wastewater treatment plants;

- The inclusion of the in-stream processes in the watershed-scale model InVEST, an ecosystem services evaluation model platform, in close collaboration with its developers (Natural Capital Project, Stanford);

- The study of nutrient retention in river networks including impaired streams using the SPARROW model; and

- The study of vulnerable regions in terms of water quality changes under conditions of water scarcity across the Iberian Peninsula, using state-of-the-art, computing-intensive statistical tools (MINE and DFA) in Undarius, our High Performance Computing cluster.

Other modelling work is under way within the CARBONET project, to perform basin-scale models of carbon cycling in Mediterranean river networks. Finally, we are defining the modelling framework in the GLOBAQUA project, mainly in terms of the fate of contaminants at large scales.

Another main part of this line is the hydrogeological analysis of river basins. This has been conducted at the Empordà and Selva basins (NE Catalonia) with a twofold objective: 1) depicting regional flow systems that recharge the overlying aquifer formations, and 2) investigating the relationship between streams and aquifers. Both tasks are included in the research project ATTENUATION in collaboration with the UdG. Large scale, regional flow systems have been identified by means of hydrochemical and isotopic data, looking for the relationships between deep aquifers and supply wells whether for urban or agricultural demand. Nitrate pollution in the aquifer system has also been evaluated and natural attenuation rates are studied by means of nitrogen and sulfur isotopes.

The relationship between streams and aquifers, especially flow rates between both elements, was studied in alluvial plains along the Selva basin (Onyar River). Numerical flow modeling was conducted to estimate the magnitude of such flow exchange, and its effect on nutrient fluxes among surface water and groundwater. Geophysical tools, as ERT (Electrical Resistivity Tomography) are used to depict the extent of geological formations and the evolution of the water-table in riparian areas. Modelling resistivity values in cross-section is being conducted to calculate the thickness of the unsaturated zone and its relative saturation.

The PERSIST project (*Persistence and fate of emerging contaminants and multi-resistant bacteria in a continuum of surface water groundwater from the laboratory scale to the regional scale*) aims at modelling the fate of emerging contaminants in alluvial aquifers. In 2015, PERSIST conducted intensive field-research completing a field-campaign with ca. 60 sampling points monitored for hydrochemical and isotopic components to depict the hydrogeological setting of the aquifer system and, more importantly, antibiotic concentration data and microbiological parameters to identify the occurrence of antibiotic-resistant genes in the subsurface water resources. ICRA was visited by our PERSIST project partners, and a scientific meeting was held in Munich, Germany, on October 22-23 2015.

The new MINECO project REMEDIATION (*Water pollution remediation strategies based on the optimization of natural attenuation processes*) in collaboration with UB and UPC looks for the dynamics of nitrogen in transitional environments (groundwater, wetlands, and streams) and the modelling of the transport of nitrate and emerging organic contaminants at field scale.

This line of research has also been actively involved in studying the effects of climate change on water resources. It conducted a review of the existing knowledge and an estimation of such effects on water availability in Catalonia as part of the *3rd Report on Climate Change in Catalonia*, edited by CADS and IEC. Moreover, the Metropolitan Area of Barcelona (AMB) signed a contract with ICRA to study the effects of climate change on the hydrological system that supplies water to the Barcelona area. This study involves a large scale approach, taking into account the Llobregat and Ter river basins, as well as a local approach, in which local water-resource opportunities are evaluated as potential alternative water sources. The study looks forward to coping with water scarcity in the overall hydrological system and to avoiding water-related conflicts with other users demanding water allocation within the mentioned basins.

The Euroregion "Pirineus-Mediterrània", in its call for innovation, which included research on water resources, awarded ICRA with a grant to enhance collaboration between universities from Catalonia and Midi-Pyrénées and Languedoc Rousillon, and to build up a consortium to submit proposals to EU calls during 2016. This grant, coordinated by ICRA, is formed by the University of Girona, Université de Perpignan-Via Domitia and a cluster of firms located at the Roussillon region (Terinova). The proposed topic of research deals with "Water balance, remote sensing and climate change in Mediterranean agricultural regions".

Finally, the group hosted and organized the workshop "*Segundas jornadas El papel del agua subterránea en el funcionamiento de los humedales*" as an activity of the Spanish Chapter of the International Association of Hydrogeologists on November 26-27, 2015.

Technological Transfer of Resource Area and Ecosystems

The agenda for the transfer of knowledge of the Resource Area and Ecosystems of the ICRA in 2014 and 2015 has been developed through ongoing projects, the arrival of new projects, and work carried out on behalf of businesses and administrations.

The large projects, **SCARCE** (completed in 2014) and **GLOBAQUA**, one in the homestretch, and the other just beginning, have served as a base for joint investigation of the area (as well as other investigators in other areas of the ICRA.) Interdisciplinary activities in ecology, geomorphology, and chemistry have been completed through these projects, and have answered extremely complex questions related to the scarcity of water.

However, national projects such as **CARBONET** (also completed in 2014), **FUNSTREAM**, **ERA NET NANO TRANSFER** and **FREEDOM** have led to intense research in the area, particularly in relation to the intermittence of water, carbon dynamics, and hydrological dynamics. These projects have come together to provide a perspective on the role of river ecosystems and watersheds on a perspective of global change.

The project **PERSIST** has also begun with an objective to investigate the transportation of emerging pollutants in alluvial aquifers, as well as the new project **REMEDIATION** (Remediation strategies for water contamination based on optimization of natural mitigation processes) which

investigates the dynamics of nitrogen in transitional environments (groundwater, wetlands, and rivers) and the modeling for transportation of nitrate and for emerging organic pollutants in fields on a large scale.

Derived from the knowledge accumulated by the area in the aforementioned projects, as well as completed ones in previous exercises, throughout these years institutions have executed different commissions for the transfer of knowledge, such as **HIDSOS** (phase II and phase III) contracted by the company **ENDESA**, **Canal Reservoir Management** contracted by Canal Isabel II and **ITUANGO** contracted by the University of Cantabria.

AI- PhD dissertations

Xisca Timoner
Stream biofilm responses to flow intermittency.
Directors: Vicenç Acuña, ICRA Research Scientist and Sergi Sabater, Research Professor (University of Girona Associated) and Professor of Ecology of the University of Girona (Institute of Aquatic Ecolog).

Rosana Aguilera
***Effects of land uses and climate variability on the water quality of Mediterranean rivers: towards a regional vision of global change*.**
Directors: Rafael Marcè, ICRA Research Scientist and Sergi Sabater, Research Professor (University of Girona Associated) and Professor of Ecology Ecologia of the University of Girona (Institute of Aquatic Ecolog).

Lydia Ponsati
***Biofilm responses to physical and chemical alterations in river ecosystems*.** Supervisor: Sergi Sabater, Research Professor (University of Girona Associated) and Professor of Ecology at the University of Girona (Institute of Aquatic Ecolog)**.**

Roger Puig i Caminal. ***Multi-isotopic and statistical approaches to trace nitrate pollution sources and assess natural attenuation in groundwater: examples from nitrate vulnerable zones in Catalonia (NE Spain)***.
Program: Doctorat en Geologia. Universitat de Barcelona.
Advisors: A. Soler (UB) and Josep Mas-Pla (ICRA)

Visiting Scientists

CLAUDIA FEIJOO
Professor at Universidad Nacional de Luján (Argentina) - (September – October 2015)

GABRIEL PINILLA
Professor at Universidad Nacional de Colombia, Bogotá - (July 2015)

GEMMA URREA
Research technician at the Institute of Aquatic Ecology, University of Girona, Girona, Spain (January – December 2014).

Visiting Students

MARIA JOSÉ SÁNCHEZ
Research technician at the Department of Applied Mathematics and Computer Science of the School of Mining Engineering, Technical University of Madrid, Madrid, Spain (January – February 2014).

LLUÍS GÓMEZ GENER
Phd Student, UB, Barcelona, Spain (December 2012 – November 2016)

PAULO CESAR LIMA SALES
PhD Student, Maringá State University (UEM) - (May – July 2015)

CECILIA HEGOBURU
PhD Student, Universidad de Buenos Aires – (September – November 2015)

NADIA GUETATA PhD Student, National Engineering School of Sfax (ENIS) – (November – December 2015)

MOHAMED RAFAA TRIGUI
PhD Student, National Engineering School of Sfax (ENIS) – (November – December 2015)

JOAQUIM ANTONI PLA
Student intern studying Science of the Sea MCs, University of Girona, Girona, (January – May 2014)

LAURA PÉREZ
Student intern studying a degree in Biology, University of Girona, Girona, Spain (January – April 2014).

ALBERT SERRA COMPTE
Student intern studying Science and Technology of Water MSc, University of Girona, Girona, Spain (April – September 2014).

JESSICA BARRAUD
Student intern studying at the National Engineering School of Limoges (Ecole Nationale Supérieure d'Ingénieurs de Limoges - ENSIL), in the framework of the Lifelong Learning Programme-Erasmus of the European Union (July – August 2014).

IRENE GIRONÈS CALVET
Student intern studying Biodiversity MSc, University of Barcelona (UB), Barcelona, Spain (June – August 2014)

CARLA SANTIAGO CORRAL
Student intern studying Science and Technology at Vicens Vives High School, Girona, Spain (June – August 2014)

CAMILLE SOULET
Student intern studying at the National Engineering School of Limoges (Ecole Nationale Supérieure d'Ingenénieurs de Limoges – ENSIL), in the framework of the Lifelong Learning Programme-Erasmus of the European Union (May – August 2014)

BERTA MARTÍNEZ BUIL
Student intern studying at Institut de Palamós - (June – July 2015)

ADRIANA OLENICI
Student intern studying at Universitatea Babes-Bolyai, Cluj-Napoca, Rumania - (June – July 2015)

MARIA NURIA RAMOS COROMINAS
Student intern studying at Institut Pla de l'Estany - (July 2015)

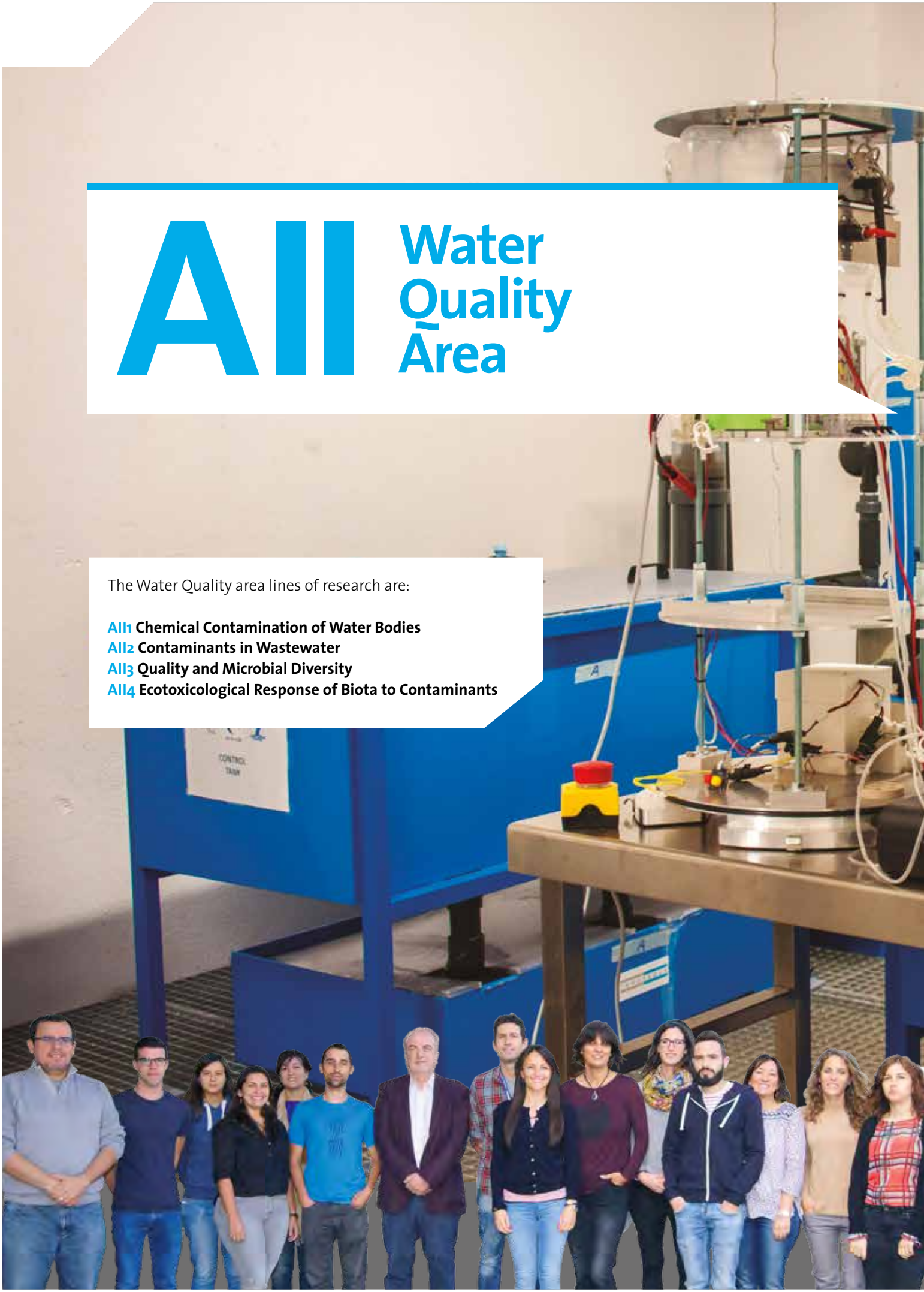
ADRIAN ORTIZ NIETO
Student intern studying at the University of Girona, Science Faculty - (June – September 2015)

JUAN DAVID GONZALEZ TRUJILLO
Student intern studying at the University of Colombia - (September 2015)

AI – Stays Abroad

Josep Mas-Pla
Centre for Soil and Environmental Research, Lincoln University, New Zealand (July and August 2015). Funded by a grant from the EU NESSIE-Erasmus Mundus program. Research on nitrate dynamics in agricultural polluted soils.

AII Water Quality Area



The Water Quality area lines of research are:

AII1 Chemical Contamination of Water Bodies
AII2 Contaminants in Wastewater
AII3 Quality and Microbial Diversity
AII4 Ecotoxicological Response of Biota to Contaminants

23 researchers in the area

1 Research professor (CSIC associated) and group leader
DAMIÀ BARCELÓ

1 Research professor (UdG associated)
CARLES BORREGO

1 ICREA research professor
MIRA PETROVIC

1 Research scientist (Ramon y Cajal)
JOSÉ LUIS BALCÁZAR

1 Research scientist (Ramon y Cajal)
SARA RODRÍGUEZ-MOZAZ

1 Postdoc advanced (IIF)
JELENA RADJENOVIC

1 Postdoc advanced (IIF)
MARIA JOSE FARRE

5 Postdoc researchers
DIANA ALVÁREZ
MERITXELL GROS
ITZIAR LEKUNBERRI (only 2015)
MARKO ROZMAN (only 2015)
MARTA LLORCA

8 Predoctoral students
SERGI COMPTE
LUCIA GUSMAROLI (only 2015)
ADRIÁN JAÉN (only 2015)
DANIEL LUCAS
LADISLAV MANDARIC
ALBERT SERRA COMPTE (only 2015)
JESSICA SUBIRATS
BELINDA HUERTA

2 Research technicians
NÚRIA CÀCERES
SAULO VARELLA (only 2015)

1 RDI technician
MIYAKO NITTA (ONLY 2015)

From left to right: José L. Balcazar, Albert Serra, Lucia Gusmaroli, Diana N. Ribeiro, Sara Rodríguez, Sergi Compte, Damià Barceló, Carles Borrego, Mira Celic, Mira Petrovic, Cristina Avial, Adrian Jaén, Meritxell Gros, Jessica Subirats, Lúcia Helena Santos, Ladislav Mandaric, Miyako Nitta, Diana Alvarez.

Research in the Water Quality area follows three main lines of investigation, namely: i) Chemical contamination of water bodies, ii) Contamination in wastewater, and iii) Effects of chemical and environmental stressors of aquatic microbial communities. The main results and activities of these three research lines carried out in 2014-2015 are summarized below.

AII1
Chemical contamination of Water Bodies

In 2014-2015, the main activities of this line in the framework of different projects were the following:

Assessing and predicting effects on water quantity and quality in Iberian rivers caused by Global Change (SCARCE). **Ministerio de Economía y Competitividad (MINECO) 2010 CSD2009-00065**

Within this multidisciplinary project, the group is involved in determining the environmental quality of the Mediterranean river basins regarding to the presence of emerging contaminants in different environmental compartments including biota. In 2014 we developed specific analytical methods for the determination of pharmaceutical compounds in fish plasma and different fish tissues. The study of the occurrence of the target contaminants in these aquatic organisms allows us to better assess the impact of chemical pollution in the ecosystem and therefore to evaluate the current condition of aquatic systems.

Fungi, algae and bacteria degrading pharmaceuticals. Hospital effluents treatment by fungi (H2PHARMA). **Ministerio de Economía y Competitividad (MINECO)-CTM2013-48545-C2-2-R**

This project proposes the development of a treatment process of hospital wastewater using lignolytic fungi, which possess a powerful non-specific enzymatic system capable of degrading a wide range of xenobiotic compounds. The performance of other biodegrading microorganisms such as algae and bacteria will also be evaluated within the project.

In 2014 and 2015, we tested the efficiency of these treatment technologies regarding the removal of pharmaceuticals in urban hospital wastewater. The generation of transformation products from target pollutants along the treatment processes and their potential environmental impact were also assessed.

These systems open up the possibility of reuse by industry or agriculture of effluent treated with these alternative treatments.

***Enzymatic DEcontamination TECHnology (ENDETECH).* FP7-ENV-2011-Eco-innovation. Project 282818**

ENDETECH project, which aims at promoting a novel decontamination technology based on enzymes able to eradicate pharmaceutical compounds and EDCs pollutants from water. In 2014, the last year off the project, a membrane bioreactor was optimized by using tailored immobilization supports to enhance stability and efficiency of the catalytic enzymes.

The technology was applied for the removal of target antibiotics from synthetic and real hospital wastewater. The efficacy of enzyme-based treatment processes was evaluated by means of combining both, chemical analyses and ecotoxicological hazard assessment. In addition, the generation of transformation products of selected antibiotics was studied in depth along treatment process.

***Priority Environmental Contaminants in seafood: safety assessment, impact and public perception (ECsafeSEAFOOD)* FP7-KBBE-2012-6-singlestage (311820)**

The overall objective of the ECsafeSEAFOOD project is to study the presence of non-regulated priority contaminants in seafood and to evaluate their impact on public health through food safety issues.

In 2014 and 2015, ICRA collaborated on the creation of a database with relevant information required for risk assessment, gathered from literature and national monitoring programs, as well as on the analysis of emerging contaminants (pharmaceuticals and EDCs in seafood in a monitoring campaign performed in contaminated spots in Europe as well in commercial seafood samples from all over the world.

***Stopping Antibiotic Resistance Evolution (StARE).* JPIW2013-089-C02-02**

The main objective of the project is to provide information about the presence of antibiotics, antibiotic-resistance genes (ARG) and antibiotic-resistant bacteria (ARB) during wastewater treatment and to evaluate the removal efficiency of advanced treatment technologies. In 2015, we collaborated with other partners of the project in order to formulate harmonized protocols to measure target contaminants. These protocols were applied in the monitoring of final effluent of urban wastewater treatment plants from different European regions in 2 sampling campaigns, (March and October 2015). These regions are characterized by different patterns of antibiotic consumption and resistance occurrence, giving a broad overview of ARB&G. In addition, part of the efforts will be devoted to the identification of the critical factors in WWTPs linked to ARB&G and to developing and improving advanced WW treatment technologies and/or their combination with biological processes. The project will create the first Europe-wide dataset on the prevalence of AR in order to develop effective guidelines to be implemented or added in the future to the existing common legislation related to water (*i.e.* the DWD [98/83/ECC], the WFD [2000/60/EC] and the Waste Water Directive.

***Real Time monitoring of SEA contaminants by an autonomous lab-on-a-chip biosensor (SEA-on-a-CHIP).* FP7 Ocean 2013 (614168)**

SEA-on-a-CHIP project aims at developing and implementing automatic sensors operated by remote control in seawater. In 2014, ICRA partners participated in the first project workshop where a preliminary sensor prototype was tested in the mesocosm facilities at ICRA. The infrastructure was adapted to mimic seawater conditions under controlled conditions in the framework of the project. Two contaminants (out of the 8 contaminants selected as target pollutants within the project) were monitored successfully in these conditions. In 2015 we also participated in the workshop where the prototype was tested in an aquaculture facility. Our group also participated in the characterization of contaminated sites in aquaculture facilities by determining the levels of pharmaceuticals and endocrine disruptors in fish and mussels collected from these sites.

Formation of disinfection by-products in drinking and recycled water

The group also initiated the study on the formation of disinfection by-products in drinking and recycled water with the arrival of Dr. Maria José Farré. Her MC IIF project is entitled "Assessment of nitrogen containing disinfection by-products and their precursors in drinking waters of the Mediterranean Basin". In this context, we also completed two research contracts with the relevant industry in this field: Canal de Isabel II Gestión: NDMA formation potential assessment by mass spectrometry and ATLL Concesionària de la Generalitat de Catalunya: Efficiency evaluation of the potabilization processes at the Ter and Llobregat WTPs to remove disinfection byproduct formation potential.

AI12
Contaminants in Wastewater

In the 2014-2015 period, the main activities of this research line were:

Study of transport, distribution and fate of emerging contaminants in wastewater-receiving rivers under multiple stress conditions

The group was involved in two interdisciplinary projects: **SCARCE** Consolider project, funded by the Spanish Ministry of Economy and Competitiveness (MINECO) and FP7 project **GLOBAQUA,** studying the occurrence of emerging contaminants such as pharmaceuticals, hormones, personal care products and diverse industrial chemicals in the aquatic environment. In the case of SCARCE, the studied area included 4 Iberian river basins: the Llobregat, Ebro, Jucar and Guadalquivir rivers, while GLOBAQUA focuses on water scarcity issues in the European context, involving two Mediterranean case rivers (Ebro in Spain and Evrotas in Greece), one continental river (Sava, transnational river) and one Alpine river (Adige, Italy). In both projects, the analysis of selected contaminants in water and sediment samples provided better insight into the spatial distribution of emerging contaminants linked to different land uses in studied river basins. The data obtained for Iberian rivers are used to identify the contaminants that pose the highest environmental risk. For this purpose, a prioritization approach has been developed, with a resulting ranking index associated with each compound. The ranking index is based on the measured concentrations of the chemical in each river and their ecotoxicological potential (EC50 values for algae, *Daphnia* sp. and fish). Ten compounds were identified as most important for the studied rivers: pesticides chlorpyriphos, chlorfenvinphos, diazinon, dichlofenthion, prochloraz, ethion carbofuran and diuron, and the industrial organic chemicals nonylphenol and octylphenol. Furthermore, the chemical data and information on the occurrence and distribution of emerging contaminants was used to establish causal links between contamination and biodiversity patterns.

In GLOBAQUA, a detailed study in the Adige river basin (Italy) showed that tourist activities (ski resorts) in the winter period have major impact on the quality of water, while the contamination of the Evrotas river is dominated by point sources (WWTP).

At a smaller scale and in controlled laboratory conditions (Experimental Stream Facility of ICRA), a study was carried out within the framework of the H2020 MSC project **TRANSFORMER** aimed at identifying controlling factors and mechanisms behind in-stream attenuation of selected emerging contaminants, studying specific processes biodegradation *vs.* photodegradation *vs.* sorption, and including the component of water intermittency in the experimental setup.

Characterization of dissolved organic content in wastewater

A research of the entire content of dissolved organic matter in waste water, using advanced capabilities of liquid chromatography-high resolution mass spectrometry (LC-HRMS), offers a better understanding of treatment processes and fate of the contaminants therein, and provides more information on how treatment transforms DOM on a broad scale. In this study, done within the framework of H2020 MSC ITN-EID project **TreatREC,** we use statistical fingerprinting: an innovative approach to treat HRMS data. The method considers the entire available data (typically, 103 – 105 mostly unknown signals) obtained by LC–Orbitrap–MS. A comprehensive list of features with molecular properties, e.g. weight, elemental composition, retention time, is constructed using the signal data of LC–HRMS. The described approach is used to fingerprint organic content in wastewater treated by reverse osmosis (RO) and by biological treatment.

Fate and transformation of contaminants during wastewater treatment

Hospital wastewater effluents exhibit significantly higher pollution, up to 3500 mg/L of chemical oxygen demand, compared to municipal sewage (i.e., 100-500 mg/L). Research conducted at ICRA in the scope of FP7 MC project **ELECTRO-HOSPITAL** is focused on the application

of electrochemical processes for the treatment of hospital wastewater effluents, with a particular focus on the degradation of organic contaminants typically found in hospital wastewater, such as X-ray contrast media (ICM), antibiotics and others. ICM are widely applied in hospitals for imaging of soft tissues, and are typically used in high doses. They are known to be very persistent to biological degradation, and are difficult to degrade in chemical oxidation processes. Analysis of the electro-degradation mechanisms of ICM has revealed that strong oxidant species formed at the anode, sulfate and hydroxyl radicals, are capable of efficiently dehalogenating and degrading ICM. Given that the oxidation by-products formed are halogen-free, electrochemical treatment should lower the load of absorbable organic halogen (AOX), which is often considered as a source of bio-toxicity in hospital wastewater.

Fate and transformation of emerging contaminants in the water cycle

This activity involved participation in several projects and contracts, all aimed at studying the removal and fate of emerging contaminants in the water cycle, focusing on drinking water treatment, reuse and recycling of water in closed circuits.

The group was involved in FP7 project **DemEAUmed,** performing the characterization of the main water fluxes used/generated at the Samba DEMO site (hotel in Lloret de Mar). Analysis of pharmaceuticals and personal care products was done in different waters such as trap water, gray water, kitchen wastewater, laundry wastewater, pool water, and combined fluxes. Microcontaminant content is considered in terms of contamination and possible accumulation inside the water cycle after several water reuses.

Study of the elimination of emerging contaminants (pharmaceutically active compounds (PhACs), endocrine disrupting chemicals (EDCs) and related compounds) in **drinking water treatment plant (DWTP) Abrera and pilot plant using Electrodialysis Reversal (EDR).** This study was conducted in collaboration with TiA of ICRA and ACCIONA, showing that oxidation using chlorine dioxide and granular activated carbon filters were the most efficient technologies for contaminants removal, while the EDR process constituted an additional barrier by removing ionized compounds.

Study of the presence and fate of **pharmaceuticals and personal care products in water pools and wellness facilities.** A comprehensive monitoring study of pharmaceuticals and personal care compounds in the waters of public or private facilities that have pools, spas or whirlpools was conducted in collaboration with TiA (ICRA), IDAEA-CSIC, UNESCO-IHE and FLUIDRA.

Environmental risks of swine manure reuse in agriculture

The group initiated this research line with the incorporation of Dr. Merixell Gros. Her **Beatriu de Pinós project** aims at broadening knowledge on the possible environmental risks associated with swine manure reuse as fertilizer in agricultural fields. The project focuses on hot-spot areas in Catalonia with intensive livestock activities, whose groundwater quality may be seriously compromised. Special focus is on: *i)* evaluating the performance of small scale manure treatment techniques in removing target antibiotics, veterinary pharmaceuticals and ARGs, *(ii)* assessing the current chemical status of swine manure amended soils and groundwater of vulnerable sites of interest, and *iii)* evaluating the leaching potential of selected pharmaceuticals from soil to groundwater, at both field and laboratory scale.

AI13
Quality and Microbial Diversity

In the 2014-2015 period, the main activities of this research line were:

Effect of antibiotics on the diversity and abundance of the aquatic resistome

We investigated the impact of anthropogenic contaminants on the emergence of new antibiotic-resistant strains and the prevalence of antibiotic resistance genes (ARGs) in aquatic microbial communities. Our latest results indicated that the *qnrS* gene (encoding resistance to fluoroquinolones) was the most prevalent among aquatic bacteria. We also found a significant increase in the abundance of antibiotic resistance genes in water samples collected in river waters downstream of the WWTP effluent discharges. Furthermore, we observed that bacteriophages play a key role in the mobilization of antibiotic resistance genes in environmental settings, since some ARGs are conspicuous in phage genomes. Results from these investigations were included in the Ph.D. thesis by Elisabet Marti and contributed to a better understanding of factors and mechanisms involved in the emergence and spread of antibiotic resistance.

In this context, we are currently involved in three European projects dealing with the effects of environmental stressors and emerging contaminants, especially antibiotics, on aquatic microbial communities and the associated resistome. We combined cultivation–dependent and cultivation–independent approaches to study the diversity and prevalence of resistance genes in aquatic organisms and the changes in the composition of microbial communities in response to these stressors.

Two of the above-mentioned projects received funding from the Water JPI Pilot Call on "Emerging Water Contaminants – Anthropogenic Pathogens and Pollutants", namely: projects TRACE and PERSIST. These projects started in September 2014 and will end in December 2016.

Project TRACE: *Tracking and assessing the Risk from Antibiotic resistant genes using Chip technology in surface water Ecosystems* (JPIW2013-129) is aimed to develop a multiplex DNA Chip-based analysis for the detection of antibiotic resistance genes (ARGs) in both environmental bacteria and aquatic pathogens. This DNA-based technology will be used to track the origin and fate of ARGs in waters used for recreational and irrigation purposes, providing data for studying the potential spread of resistance genes among environmental bacteria and assessing the risk for human health in relation to exposure to antibiotic resistant organisms. The TRACE team is composed of Dr. Carles Borrego (PI), Dr. José Luis Balcázar, Dr. Marta Villagrasa and Alex Sanchez. In May 2015, we incorporated Dr. Itziar Lekunberri as a TRACE postdoc researcher. Dr. Lekunberri is a microbial ecologist with broad expertise in the application of molecular techniques to the study of aquatic microbial communities.

In 2015, we conducted a series of chemical and molecular analyses aimed at characterizing antibiotic pollution and the abundance of antibiotic resistance genes (ARGs) in surface water samples from the River Ter (Girona), the river Saale and the Luetsche Lake (Germany). These latter samples were collected by our project partners in Germany (*Food Analytical Consulting*). Our results indicated that river Ter was the most impacted system and yielded the highest abundance of ARGs, especially *Sul-I* (conferring resistance to sulfonamides). No differences in the normalized concentration of all ARGs analyzed (*sul-I*, *ermB*, *qnrS*, *blaTEM* and *tetW*) were detected between samples collected upstream and downstream of the WWTP effluent discharge point. Interestingly, *sul-I* and *intI1*, an integrase gene of Class-I integrons, were also the most abundant genes measured in the river Saale and Luetsche lake, although no links were observed between the concentration of these ARGs and the antibiotic concentration in the corresponding samples. These investigations allowed us to identify the proper ARGs to be included in the DNA chip. Accordingly, we carried out sequence data mining to

identify conserved regions within sequence alignments of each gene to find regions of interest for designing LAMP (Loop-mediated isothermal amplification) primers and nanoprobes to use in the chip. The partner group led by Dr. Pedro Baptista (Universidade Nova de Lisboa, Portugal) carried out the primer and probe design and the corresponding laboratory test to validate these molecular tools using DNA extracts from surface water samples collected by our group in different impacted systems.

On June 16 2015, ICRA hosted the Kick-Off meeting of TRACE. For two days, researchers from all partner groups (Leibniz Institute for Photonics Technology (Jena, Germany); Food Analytical Consulting (Jena, Germany); Sapienza Univeristà di Roma (Italy); The University College of Dublin (Ireland), the Universidade Nova de Lisboa (Portugal) and the ICRA team) discussed several issues regarding sampling campaigns and analytical procedures related to project goals.

Project PERSIST: *Persistence and fate of emerging contaminants and multi-resistant bacteria in a continuum of surface water groundwater from the laboratory scale to the regional scale* (Ref. JPIW2013-118). PERSIST is aimed at increasing knowledge on the occurrence and behaviour of a selection of Emerging Organic Compounds, especially antibiotics, and multi-resistant bacteria in both surface and groundwater in an agricultural area. The field study is carried out in a fluvial-deltaic area formed by a multilayered system in the Empordà basin (NE Catalonia, Spain), which is known to present notable nitrate pollution levels.

The ICRA team in PERSIST is led by Dr. Josep Mas from the RiE Area. We collaborate on the analysis of the groundwater microbiome and resistome in relation to nutrient and pollutant concentration (nitrate, antibiotics and other pharmaceutical active compounds). A total of 56 water samples were collected from May to July 2015 from 47 wells (mainly used for farming or irrigation), 7 samples from the Fluvià River and 2 samples from WWTP effluents. Antibiotic resistance genes (ARGs) were quantified from DNA extracted from 8 wells and 2 surface water points selected according to their antibiotic pollution, hydrochemistry and location. To date, almost all target ARGs (*sul-I*, *ermB*, *qnrS*, *blaTEM* and *tetW*) were detected in most of the wells except *qnrS*, which was below the detection limit in one of the wells. Normalization of ARG copies to bacterial abundance (16S rRNA gene copies) indicated that some wells harbour a community of antibiotic resistance bacteria. Furthermore, most ARGs showed a similar average concentration except for *sul-1* and *intl1*, which were detected in higher amounts. Assuming *intl-1* as a proxy for anthropogenic pollution, some wells appear more impacted than others. The selected wells will be also analyzed on a per-season basis to detect variations in the composition of microbial communities and the associated resistome in relation to seasonal fluctuations of chemical pollution (both nitrate and antibiotics).

Project GLOBAQUA: Managing the effects of multiple stressors on aquatic ecosystems under water scarcity (ENV-2013-603629). Our group is involved in this interdisciplinary project to study the effect of environmental and chemical stressors (mainly pharmaceuticals and industrial chemicals) on the composition and functioning of aquatic microbial communities. In September 2014, we incorporated Jessica Subirats as a PhD student of GLOBAQUA. Her PhD work plan includes the study of the effect of such stressors on the abundance, diversity and distribution of antibiotic resistance genes in different compartments of the riverbed (the epilithic, the epipsammic and the hyporheic) and the comparison of these data between the case river basins under study (Ebro [Spain], Adige [Italy] and Evrotas [Greece]). Since September 2014, the results of our investigations can be summarized as follows:

Ebro river basin: We compared the prevalence and distribution of ARGs (*sul-I*, *ermB*, *tetM*, *qnrS* and *vanA*) and class 1 Integron integrase (*intl1*) between epilithic and epipsammic biofilms in two tributaries streams of Ebro River (La Bisbal and Vallderoures), differing in their pollution source. Whereas La Bisbal receives effluent discharges from a local WWTP, Vallderoures is impacted by raw sewage from a neighboring village. All rivers showed higher concentrations of ARGs in epipsammic samples collected downstream of the discharge point, but no significant differences in their concentrations were detected among epilithic samples, except for the *ermB* gene. These results suggest that some ARGs preferentially accumulate in epipsammic biofilms, which may be regarded as an environmental reservoir of resistance.

Adige river basin: We conducted a similar study in biofilm and sediment samples collected at seven tributaries along the Adige River basin, differing in their trophic status and contamination sources (tourism, microcontaminants from glacier melting and hydropower production plants, and agricultural runoff). Whereas copy numbers of *qnrS* and *tetM* genes were below the detection limit in all samples analyzed, *sul-I*, *vanA* and *intl1* genes were detected in all samples, although no significant differences in their concentration were detected between streambed compartments. Interestingly, abundance of *sul-I* and *intl1* showed a similar trend, increasing their concentration in samples collected at the lower part of the river basin. These results suggested that the lower part of the Adige basin may act as an integrator of pollution from the upper part of the basin.

Response of bacterial communities to combined stressors: In collaboration with colleagues from our Area and from RiE, we have been conducting a laboratory manipulative study at the ICRA's artificial stream facility to assess the effects of a combined regime of nutrients and pharmaceutical active compounds (PhACs) on the composition of biofilm bacterial communities and their associated resistome. The main goal behind this experiment was to determine whether the combined regime has either compensatory or additive effects on bacterial communities in terms of bacterial diversity and ARGs abundance. Our results point to clear effects of chemical treatment on the abundance of some ARGs genes (*sul-I* and *intI1*), whereas nutrients exert a subsidy effect on streambed biofilms treated with PhACs.

Microbial ecology of sewer systems

We collaborate on project **SGHGEMS ("Sulfide and Greenhouse Gas emissions from Mediterranean Sewers)",** led by Dr. Oriol Gutiérrez (TiA area), to investigate the impact of nitrate and nitrite addition on the diversity and activity of sulfate reducing bacteria and methanogenic archaea in sewer systems. To date, our investigations have shown that sewer biofilms appear as a dynamic ecosystem that experiences changes in composition and activity over time according to both operational and environmental conditions. Our results suggested that, at early stages of biofilm development, the methanogenic community is mainly composed of archaea derived from human feces, which were then outcompeted by methanogenic species more adapted to actual conditions in sewers. Besides, results from process data on methane emissions suggest that the archaeal community needs some time to prosper after biofilm formation. This lag-phase is probably related to the time needed by some methanogenic species to succeed into the biofilm matrix and outcompete those prevalent in wastewater.

We studied the changes in the composition and functioning of bacterial and archaeal communities to chemical treatments aimed at mitigating sulfide and methane emissions from sewer systems. Sewer management companies routinely apply oxidizing chemical compounds (*e.g.* nitrite and nitrate) to sewers to reduce the production of H_2S and CH_4 by sulfate-reducing bacteria and methanogenic archaea, respectively. Our results showed that these treatments severely affect biofilm microbial communities and cause drastic changes in their composition thus modifying their functioning and activity. Notwithstanding these effects, both bacterial and archaeal communities in sewer biofilms recovered from the oxidative stress imposed by nitrite and nitrate addition in terms of both composition and activity (*i.e.* H_2S and CH_4 production), pointing to a high resilience and resistance to environmental disturbances.

Diversity and activity of uncultured microorganisms in lacustrine and riverine ecosystems

Project ARCOS: Contribution of uncultured archaea in the organic carbon recycling in anoxic sediments (MINECO, Ref. CGL2012-33033). The main goal of project ARCOS is to resolve the contribution of uncultured groups of sedimentary archaea to organic carbon recycling in lacustrine systems. Archaeal communities in anoxic sediments of karstic lakes of the Banyoles Karstic System share striking similarities to those of the marine subsurface, with a predominance of uncultured groups within the *Halobacteria*, *Thermoplasmata* and the *Miscellaneous Crenarchaeotic Group*. Sulfide concentration and dissolved organic carbon appear as the main variables shaping the archaeal community composition. Moreover, in collaboration with Dr. Laura Villanueva from the Royal Netherlands Institute for Sea Research (Royal NIOZ) and making use of state-of-the art spectroscopic techniques (Inductively Coupled Plasma Mass Spectrometry), we found a hitherto unknown membrane lipid profile that may be linked to one of these uncultured archaeal groups. Moreover, an analysis of the phylogenetic composition of archaeal communities in surface sediments from lakes and ponds across Spain and differing in their trophic status and limnological features showed a predominance of MCG archaea in sediments from karstic lakes characterized by euxinic water layers. In turn, sediments from reservoirs and temporary ponds presented a predominance of methanogenic archaeal lineages that agrees with the high content of organic carbon in these systems.

We also investigated the ability of several organic compounds to stimulate the growth and activity of predominant archaeal groups in sediment (MCG, MBG-B and Thermoplasmata) as a first step to resolving their contribution

to organic carbon recycling. Comparison of DNA and cDNA (*i.e.* RNA) Illumina libraries pointed to a direct stimulation of Group C3 (*MCG*) and MBG-D and DHVEG (*Thermoplasmata*) by all organic compounds but especially by aromatic compounds. Although preliminary, these results will provide clues to the potential role of these uncultured archaeal groups in the mineralization of recalcitrant organic matter in anoxic sediments. In this regard, recent studies using genomic reconstructions and analysis of large fosmid fragments have revealed an astonishing diversity and large metabolic versatility of these enigmatic archaeal groups.

Project *FREEDOM: Resolviendo el dilema de la degradabilidad de la materia organica disuelta en los ecosistemas de agua dulce (CGL2014-61771-EXP).* In 2015, we began our participation in project FREDOM led by Dr. Rafael Marcé (RiE). FREEDOM is aimed at resolving whether the biophysical opportunity (environmental conditions + microbial networks co-occurring at each site) rather than the intrinsic properties of DOM is responsible of the degradation of organic matter along the land-to-ocean aquatic continuum. Our first task in the project is to find an optimal co-culture composed of different bacterial species that fulfill two main requirements (high tolerance to different physical-chemical conditions and large metabolic versatility). This mixed bacterial inoculum will then be used in a series of laboratory tests under a wide range of physical-chemical scenarios to determine its ability to efficiently degrade complex organic matter under the assayed conditions.

Other collaborations conducted in the period 2014–2105 dealt with the effect of environmental stressors, mainly flow intermittency and nutrient availability, on aquatic microbial communities. With regard to the former, we unraveled drastic changes in the composition of bacterial and archaeal communities in streambed biofilms subjected to flow intermittency. Whereas bacterial communities experienced an increment in groups adapted to resist stressful conditions after stream desiccation (*e.g. Firmicutes* and *Actinobacteria*), archaeal communities were less affected, showing a prevalence of archaeal nitrifiers throughout the hydrological cycle. Interestingly, most archaeal groups detected in epipsammic and hyporrheic biofilms correspond to the same taxa found in both subsurface habitats and anoxic sediments, and probably play a role in the degradation of complex organic matter in river systems. With regard to the effect of nutrient availability on aquatic microbial communities, we investigated differences in community composition across three habitats of the river ecosystem, namely, free-living, particle-attached and sedimentary prokaryotes. This study is aimed at identifying which members of the bacterial and archaeal communities remain active in each habitat and which factors stimulate this activity in relation to organic carbon availability in either its dissolved or particulate form.

The knowledge acquired by ICRA on the formation of the byproducts of the disinfection of drinking water has resulted in different knowledge-transfer contracts with institutions working in this field: NDMA CANAL ISABEL II contracted by Canal Isabel II, and ATLL DBPS contracted by the company ATLL.

Quality area Tecnology Transfer

During the period 2014-2015, the following projects have been developed: H2PHARMA, whose objective is to develop a treatment process for hospital wastewater using lignolytic fungi; ENDETECH with the aim of promoting a new decontamination technology based on enzymes able to remove pharmaceuticals and endocrine disruptors (EDCs) from water; JPI StARE with the aim of providing information about the presence of antibiotics, antibiotic resistance genes (ARG) and antibiotic-resistant bacteria (ARB) in wastewater treatment plants and their removal by conventional and innovative treatment processes; JPI TRACE aimed to develop a DNA chip for the rapid and cost-effective detection of ARGs in surface waters; SEA-on-a-CHIP with the aim of developing automatic sensors for water contaminants in marine environment and that operate by remote control; ECsafeSEAFOOD with the overall objective to study the presence of priority pollutants that are not regulated in shellfish and fish; ARCOS whose main objective is to resolve the contribution of uncultured archaea in organic carbon recycling in lacustrine sediments; TRANSFORMCOAST that aims to evaluate the occurrence and transport of emerging contaminants to coastal areas; the European project ITN TREATREC, whose main objective is to train young professionals from the water sector but in the same time to quantitatively and qualitatively characterize the entire content of dissolved organic matter in wastewater, the MROZMAN TRANSFORMER IF project, which is aimed at identifying controlling factors and mechanisms behind in-stream attenuation of selected emerging contaminants by studying the specific contribution of biodegradation, photodegradation and sorption processes; the JRADJENOVIC IIF project focused on the application of electrochemical processes for the treatment of hospital wastewater effluents, with a particular focus on the degradation of organic contaminants typically found in hospital wastewater; and the MJFARRE IIF project, which is aimed to gain a better insight on the mechanisms behind the formation of disinfection by-products (DBPs) in drinking and recycled water.

Thanks to the knowledge acquired by ICRA, especially in the formation of DBPs in drinking water and in the area of fate and behaviour of emerging contaminants, several contract agreements have been signed in the recent years with private and public entities belonging to this field: NDMA CANAL ISABEL II contract by Canal Isabel II, URJCI_Salud hired by Instituto de Salud Carlos III and ATLL DBPs and EDR hired by Aigües Ter-Llobregat (ATLL).

PhD dissertations

Elisabet Marti

Occurrence of antibiotic resistance genes in aquatic microbial communities exposed to anthropogenic activities.

Directors: José Luis Balcázar (ICRA Ramon y Cajal research scientist, from the ICRA Water Quality Area, quality and microbiological diversity line), and Joan Jofre (Microbiology Department, Faculty of Biology, University of Barcelona).
This doctoral thesis investigates the prevalence of genes for resistance to antibiotics in aquatic microbial communities affected by anthropogenic activities. Resistance to antibiotics is considered to be a natural phenomenon, as many microorganisms possess intrinsic genes that code for resistance to the antibiotics that they themselves produce. Although most research in this field has focused on human pathogens of clinical importance, it is now known that environmental bacteria can play an important role in the appearance and dissemination of genes for resistance to antibiotics.

Visiting Scientist

MERITXELL GROS
Postdoctoral researcher, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden (April-May 2014)

MARIA JESÚS GARCIA GALAN
Postdoctoral researcher, University of Girona, Girona, Spain (July 2013 – July 2014)

OZELITO POSSIDONIO DE AMARANTE JUNIOR
Professor at Instituto Federal de Educaçao, Ciencia e Tecnologia de Maranhao – (January – June 2015)

Visiting Students

IMMA NOGUEROLA
Phd student studying Water science and technology, University of Girona, Spain (February 2012 – September 2014)

MARIA EUGENIA VALDÉS
Phd student studying a Chemistry Degree, National University of Cordoba (UNC), Argentina (April – July 2014)

SARA MIRALLES CUEVAS
Phd Student at University of Almeria (UAL), Almeria, Spain (June – July 2014)

ERZSÉBET ILLÉS
Phd student studying an Enviromental Chemistry Degree, University of Szeded, Szeged, Hungary (July 2014)

MIRA CELIC
Phd student studying an Enviromental Chemistry Degree, University of Novi Sad, Novi Sad, Serbia (October – December 2014)

CAMILA GUTIÉRREZ RODRÍGUEZ
Phd student studying a Chemistry Degree, University of Chile (September 2014 – February 2015 & July 2015 – October 2015)

MIREIA FILLOL
Phd student studying Water science and technology, University of Girona, Spain (September 2014 – June 2015)

SEVCAN AYDIN
Phd student at Istanbul Technical University, Istanbul, Turkey (July 2014 – June 2015)

DIANA ZHAKUPOVA
PhD Student at Al-Farabi Kazakh National University (September 2015)

YENGLIK NURZHANOVA
PhD Student at Al-Farabi Kazakh National University (September 2015)

GUILLEM LLORENS BLANCH
PhD Student at Universitat Autònoma de Barcelona (November 2015)

ERIKA CASTRIGNANO
PhD Student at University of Bath, UK – (October – December 2015)

THIAGO CAIQUE ALVES
PhD Student at University of Blumenau – (April – December 2015)

SAULO VARELA DELLA GIUSTINA
Volunteer Postdoc, Postdoc researcher on Water Resources and Sanitation, University Federal do Rio de Janeiro, Brazil (June 2014 – March 2015)

VINCENZO DONNARUMMA
Student intern studying Environmental Sciences, (Università degli Studi di Genova, Italy), ERASMUS of the University of Girona, Girona, Spain (January – March 2014)

JESSICA SUBIRATS
Student intern studying a Molecular Biology and Biomedicine MSc, University of Girona, Girona, Spain (January – July 2014).

NÚRIA PUIGMAL DOMINGUEZ
Student intern studying a Biotechnology Degree, University of Girona, Girona, Spain (January – April 2014)

IKRAM ARRAHAOUI DOUIRI
Student intern studying a Biology Degree, University of Girona, Girona, Spain (January – March 2014)

LUKAS MASKOW
Student intern studying a Water Science BSc, University Duisburg-Essen, Germany (May – July 2014)

MIRAY ETYEMEZ
Student intern studying at Çukurova University, Adana, Turkey, in the framework of the Lifelong Learning Programme-Erasmus of the European Union (May – September 2014)

SARA GARCÍA ORTEGA
Student intern studying at Sagrada Família High School, with a grant from La Pedrera Foundation (July 2014)

JUDIT PLANAS PUIG
Student intern studying a Microbiology Degree, Universitat Autònoma de Barcelona (UAB), Barcelona, Spain (July – September 2014)

CARLOS ESTEBAN GIL ARROYO
Student intern studying an Enviromental Science Degree, University of Girona, Girona, Spain (September 2014 – June 2015)

JOAN CARLES HINOJOSA GALISTEO
Student intern studying at the University of Lleida – (February – April 2015)

CARLOTA AGUILERA ORDÓÑEZ
Student intern studying at the University of Girona – (February – May 2015)

SARA ROMERO AGUILÀ
Student intern studying at the University of Girona – (February – May 2015)

BEATRICE PARDO
Student intern studying at Instituto Químico de Sarriá – (May 2015)

IRENE PERÉ FOSSOUL
Student intern studying at the University of Girona (February – July 2015)

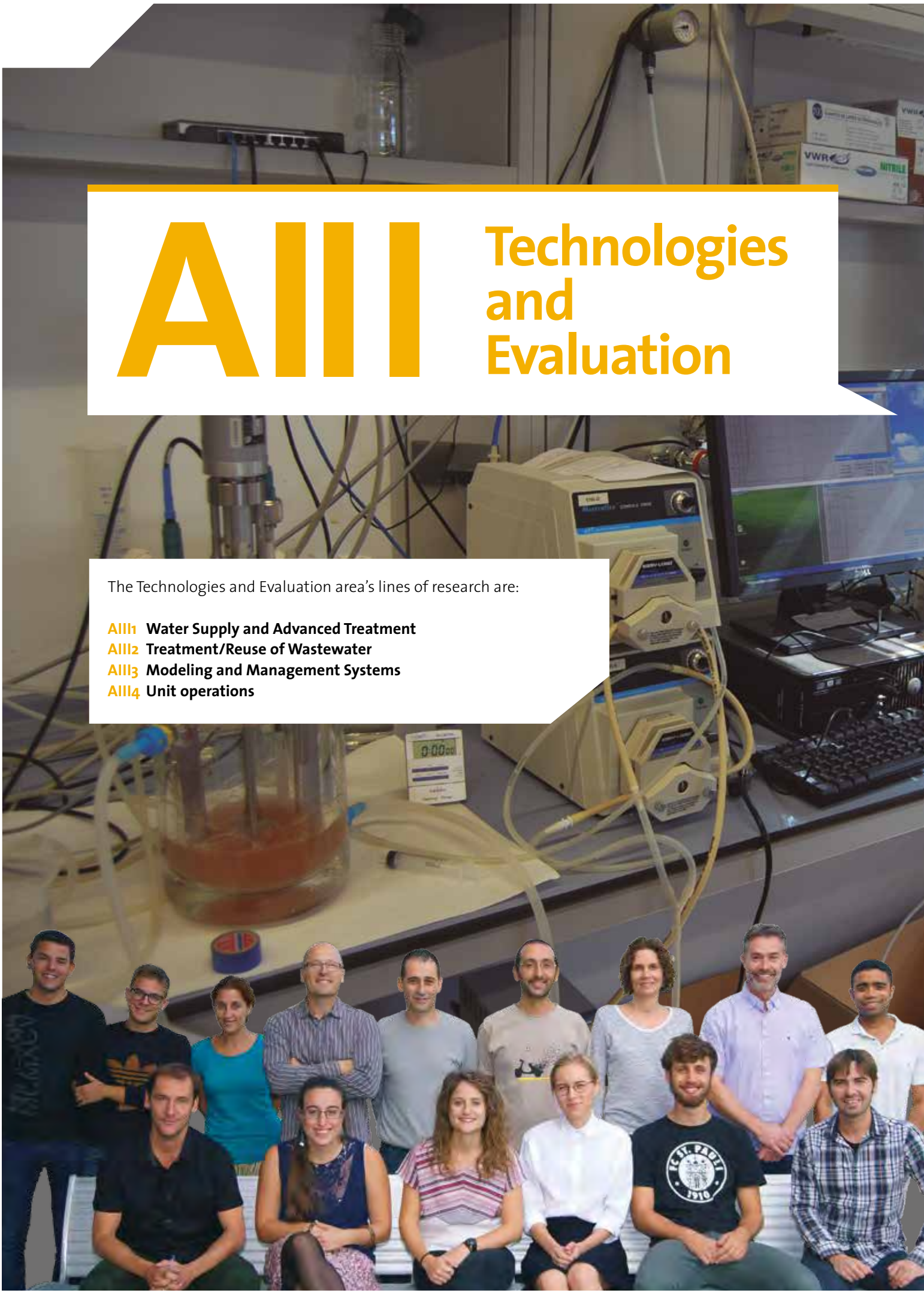
NEUS ALCOLEA ROBAS
Student intern studying at the University of Girona, Science Faculty – (June – July2015)

MARINA LORENTE PICÓN
Student intern studying at the University of Girona, Science Faculty – (June – July 2015)

TAMARA PERELLÓN LÓPEZ
Student intern studying at the University of Girona, Science Faculty – (April – September 2015)

ANDREZA CIPRIANI
Student intern studying at the University of Blumenau (FURB) – (April – December 2015)

AIII Technologies and Evaluation



The Technologies and Evaluation area's lines of research are:

AIII1 Water Supply and Advanced Treatment
AIII2 Treatment/Reuse of Wastewater
AIII3 Modeling and Management Systems
AIII4 Unit operations

From left to right (stand up): Marc Balcells, Salvatore Midulla, Soraya Zahedi, Wolfgang Gernjak, Oriol Gutiérrez, Gianluigi Buttiglieri, Maite Pijuan, Joaquim Comas, Mark Santana. Rodríguez-Roda. From left to right (sit down): Ignasi Rodríguez-Roda, Anna Rivera, Elissavet Kassotaki, Natalia Sergienko, Federico Ferrari, Lluís Corominas.

26 researchers in the area

1 Research professor (UdG associated) and group leader
IGNASI RODRÍGUEZ-RODA

1 Research professor (UdG associated)
JOAQUIM COMAS (only 2015)

1 ICREA research professor
WOLFGANG GERNJAK

1 Research scientist
MAITE PIJUAN

1 Research scientist (Ramon y Cajal)
GIANLUIGI BUTTIGLIERI

1 Research scientist (Ramon y Cajal)
LLUÍS COROMINAS

4 Postdoc researchers
ORIOL GUTIÉRREZ
MEHLIKA AYLA KISER (only 2015)
MARK SANTANA (only 2015)
SORAYA ZAHEDI (only 2015)

1 IT technician
LLUÍS Mª BOSCH

7 Research technicians
ELENA ARAN (only 2015)
OLGA AUGUET
ISMAEL MORELL
MARC CESPEDES (only 2015)
LLUIS GODO (only 2015)
FÈLIX HILL (only 2015)
STEPHANIE MERBT

8 predoctoral students
IGNASI AYMERICH
PAU GIMENO (ONY 2015)
ANNA RIBERA
MARC SAUCHELLI (ONLY 2015)
ALBERT MONTSERRAT (ONLY 2014)
ADRIÁN RODRÍGUEZ (ONLY 2014)
SARA GABARRON
ELISSAVET KASSOTAKI

The balance of these two years has been fully satisfactory for the Area of Technologies and Evaluation. New strategic research and development projects were approved, both at European and National level, and several technology-transfer contracts were signed with the water sector. This is a big challenge that we face with lots of commitment and enthusiasm. With the activation of another research line in late 2014, the area now investigates aspects regarding the complete urban water cycle from water supply to wastewater collection and treatment, recycling and reuse. Within Spain, this is a unique capability that ICRA can offer to its publicly and privately owned clients providing expertise on the whole urban water cycle.

With respect to human resources, the team has grown and consolidated most of the senior researcher positions. Dr. Joaquim Comas (from the University of Girona) joined ICRA in early 2015 to cover the senior position that was left vacant by Prof. Manel Poch (who returned to his former research group LEQUiA [Uni. Girona]). Dr. Comas brings to the Area his valuable experience in process modelling and optimization, LCA, EDSS and wastewater treatment in general to lead Line III.3 (Modeling and management systems). Dr. Wolfgang Gernjak, who leads Line III.1 (Water Supply and Advanced Treatment), obtained one of the prestigious ICREA Research Professorship positions from the Catalan Government, and Dr. Maite Pijuan, leading Line III.2 (Treatment/reuse of wastewater), completed her Ramon y Cajal contract and got the first ICRA permanent research position of the Area. Also important were the new Ramon y Cajal grants awarded to Dr. Lluís Corominas (Line III.3) and Dr. Gianluigi Buttiglieri (Line III.2). The Area research team is complemented with the ICRA post-doc position covered by Dr. Oriol Gutierrez.

The training of highly qualified personnel to develop skills inside and outside academia is also a priority for the Area and we participate in two Innovative Training Networks (funded by the Marie Curie program, EU) that bring together universities, research centres, and companies from different European countries. The involvement of industry in the training of researchers is also further evidenced by an agreement between ICRA and S:CAN, which finances industry-relevant research training for outstanding students.

Finally, we are members of a number of local, national and international associations and initiatives, contributing our expertise to provide solutions to the current water challenges. Together with the Campus Aigua of the Univ. of Girona, we are actively involved in the development of the strategic plan for the city of Girona to define its roadmap to become a smart and water-sensitive city. Members of the Area also participate in several IWA working groups such as the Life cycle assessment group co-chaired by Dr. Corominas, the Greenhouse gas emissions modeling and monitoring, the Instrumentation, control and automation, or the Modelling and integrated assessment group. Members of the Area are also involved in COST Actions WATER2020 and NEREUS, tackling current challenges of wastewater treatment.

Overall, we have developed substantially over the last few years, establishing and consolidating our current research lines. Our commitment, however, remains the same: provide first-class research relevant to industry.

Different assignments for knowledge transfer contracted by private companies and institutions were carried out in 2015, based on the knowledge obtained by the aforementioned lines of activity; these include INCTRL, contracted by the company inCTRL Solutions, SMART-GAS, contracted by the company AQUALIA, SANT PERE PESCADOR CORROSIÓ, contracted by the institution EMACBSA, DIPSALUT NO_3, contracted by DIPSALUT, and ATLL EDR2, contracted by the company ATLL.

AIII1
Water Supply and Advanced Treatment

This research line was opened in late 2014 following the commencement of the employment at ICRA of Dr. Wolfgang Gernjak, Dr. Maria José Farré, and Dr. Jelena Radjenovic, three experienced researchers in this area, each funded by competitive individual fellowships.

The activities can be grouped under three overarching themes:

- **Novel processes and treatment trains**
- **Water quality management**
- **System integration**

The first of these themes studies novel treatment trains and combinations including chemical oxidation, membranes and/or biofiltration. Energy efficient desalination will be another research topic, addressing some of the major challenges of integrating novel processes such as forward osmosis with existing technologies, drawing upon different water sources and water qualities. Laboratory facilities have been set up for forward osmosis filtration and UV treatment with collimated beam apparatuses. In 2015, Mr. Marc Sauchelli commenced his PhD on operational and water quality aspects of forward osmosis. Also, in 2016, a MINECO Retos project (TRICERATOPS) will commence research on novel UV LED advanced oxidation processes and the impact of oxidative pre-treatment on the fouling potential of effluent organic matter on nanofiltration and reverse osmosis membranes.

The second theme, water quality management, interacts closely with ICRA's water quality research area. It develops and assesses technological solutions to water quality challenges related to contaminants of emerging concern, disinfection byproducts, and dissolved organic matter, making use of existing and developing novel analytical capabilities where necessary. Examples of activities in 2015 include evaluating the performance of electrodialysis reversal for the removal of trace organic contaminants and disinfection byproduct precursors as well as monitoring of disinfection byproduct precursors in several drinking water plants in Spain.

The third theme implements a broader perspective of water management including interactions of management solutions within the contexts of urban and watershed scales. As an example, we aim to connect activities of potable water substitution by storm water harvesting with existing research dedicated to urban drainage systems in research line AIII.3. An important milestone in establishing this research theme was the positive funding decision of the ICRA coordinated WatInTech proposal in the 2015 call of the JPI Water. This project, commencing in 2016, will investigate a series of aspects of storm water reuse and sewer mining, i.e. the extraction of resources, including energy and water from urban drainage systems.

AII2
Treatment/reuse of waste water

This research line aims at optimizing the different parts of the urban wastewater system to achieve better treatment performance, recover energy and nutrients and reduce detrimental emissions, including organic microcontaminants. The research line is also expanding into water reuse, with the development and demonstration of novel technologies closing the water cycle in tourist facilities. The experimental approach ranges from basic to applied research, with most of the projects counting on strong involvement and participation of industry partners.
The main activities focus on the following themes:

- **Minimization of carbon footprint and detrimental emissions from sewers and wastewater treatment plants**
- **Improving biogas production during anaerobic sludge digestion through innovative and environmentally friendly sludge pre-treatment methods.**
- **Monitoring of organic microcontaminants in the environment and biodegradation/removal by means of several treatment technologies**
- **Integration of innovative technologies to achieve an optimal and safe closed water cycle in tourist facilities**.

Several projects funded by the Spanish Government and the European Union have been executed in recent years in order to understand and develop mitigation strategies to minimize detrimental gas emissions (H_2S, greenhouse gases-GHG) occurring during the transport and treatment of wastewater. The first GHG monitoring campaigns at the national level were conducted in 2014-2015 in two full-scale wastewater treatment plants (Granollers WWTP and La Roca del Vallès WWTP) and a sewer network located on the Costa Brava (NE of Spain). Novel strategies to minimize CH4 and N2O emissions were developed using several pilot plants operated at the ICRA PLANTEA facility and validated at full scale. Current research is moving towards an integrated assessment of these emissions in the overall urban water system (UWS). A new research project has recently been awarded in the competitive call from the Spanish Government MINECO, Retos project (REACH), to assess how environmental stressors (e.g. storms, seasonal variability) affect direct GHG emissions in different sections of UWS.

The second block of activities is aimed at enhancing energy recovery from wastewater treatment by improving methane production in anaerobic digestion. One of the current projects is exploring a novel and more sustainable sludge pre-treatment based on free nitrous acid (FNA). This research is done in close collaboration with FCC AQUALIA S.A., one of the leading national wastewater companies, and is part of a €7M research project awarded by the Spanish Government (CDTI). In 2015, we worked to optimize the pretreatment conditions with FNA and pilot-scale validation at a full-scale WWTP will occur during 2016.

The third block is aimed at monitoring organic microcontaminants (pharmaceutical and endocrine disrupting compounds) in full-scale municipal and industrial WWTPs as well as expanding knowledge regarding their removal/biodegradation mechanisms in conventional activated sludge systems, SBR and nitrifying biomass, MBRs, constructed wetlands, etc. Not only the parent compounds but also their transformation products have been considered in all the scenarios. Also, basic aspects of the removal of pharmaceuticals and disinfection by-product (DBPs) precursors in all the steps involved in the water recycling systems have been studied in the framework of a national project that was completed in 2015. Experiments were carried out in a MBR + NF/RO pilot plant and at laboratory scale to identify the fate of targeted pharmaceuticals and the corresponding transformation products, generation of DBPs, integrated control aspects, and retentate/permeate post-treatment with advanced oxidation processes.

AIII3
Modeling and Management Systems

The fourth research topic within this line focuses on treatment technologies for water reuse. The integration of innovative technologies to achieve a closed water cycle at a tourist facility has been pursued within the framework of a European demonstration project (demEAUmed, ICRA as project scientific coordinator). First, the PLANTEA laboratories at ICRA and then, the EU project demonstration site (Hotel Samba, Lloret de Mar) have been used to identify at a semi-industrial scale the most appropriate operational parameters for greywater and wastewater treatment with a low energy requirement membrane bioreactor (Smart Air MBR).

The main focus is on the development of tools and methodologies to support urban water systems (UWS) management. Line III.3 seeks the integration of subsystems (e.g. sewer systems, wastewater treatment plants and receiving water bodies) and the integration of criteria (technical, environmental, economic and social) to help urban water operators make more qualified decisions.

The main activities focus on the following three themes:

- **Integrated management of urban wastewater systems**
- **Maintenance and upgrade of urban wastewater system**
- **Multi-criteria decision making**

The first activity aims at finding solutions to enhance the integrated management of current urban wastewater systems and freshwater ecosystems, which reduce environmental impacts while minimizing the costs of wastewater treatment. This includes i) the examination of current legislation to find gaps and propose improvements, ii) experimental work to better understand how contaminants attenuate across these systems, iii) monitoring for the detection of sensor and process failures, and iv) modeling to evaluate design and operation alternatives. SANITAS, R3-Water and EcoMaWat projects are examples of this activity.

The second activity aims at improving current management of UWS infrastructure. We investigate pro-active maintenance, focusing especially on sewer systems and the control of the biochemical processes responsible for corrosion, odour and GHG emissions (e.g. sGHGems project). We also research upgrading of current WWTPs to address new challenges and opportunities such as micro-contaminant removal and resource recovery. Part of this research is dedicated to increasing the resilience of current systems to adapt to climate change and other stressors (TreatRec project).

The third activity aims at developing multi-criteria decision support systems (DSS) for complex UWS-related decision-making. These DSS integrate multiple objectives, criteria and tools to evaluate and compare alternative planning, design and operation strategies. Sustainability assessment guides the research activity, through developments on Life Cycle Assessment and water footprint accounting. We provide comprehensive inventories of resources required for the construction and operation of sewers and WWTPs to enhance widespread application in the UWS field. Line III.3 is involved in the development of DSS for several purposes in wastewater management (adaptive management of WWTP in SANITAS, closing water cycles in demEAUmed, resource recovery in Water_2020 or upgrading of UWS in TreatRec).

The main activities focus on the following three themes:

- **Integrated management of urban wastewater system**
- **Maintenance and upgrade of urban wastewater system**
- **Multi-criteria decision making**

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Technologies and Evaluation area Technolgy Tranfer

With the start-up of a new research line at the end of 2014, all the aspects related with the urban water cycle are being tackled, from drinking water treatment and distribution to wastewater transport, treatment and reuse.
The first research line within the Area is aiming at developing solutions for the optimum integrated management of wastewater treatment systems with natural aquatic ecosystems. With that and effective reduction of the environmental impacts as well as the economical costs can be achieved. The research conducted within the European projects ITN SANITAS, R3 WATER and CIG MPI-JUAN and the national project WATERFATE have generated results and new knowledge which can be used to achieve this aim and can be also exported to International and national markets.

The objective of the second line of activities is to improve the management of the sewer infrastructure. From the knowledge acquired studying the biochemical transformations occurring within sewer Systems, effective mitigation strategies can be implemented to avoid corrosion problems in the sewer pipes, malodours and uncontrolled emissions of greenhouse gases. Research on this topic has been conducted in the frame of the European project IRG OGUTIERREZ.

The third line of research aims at developing Environmental Decision Systems (EDS). These EDS have multiple objectives, criteria and tools to evaluate and compare alternatives regarding the design and operation of different urban water systems. Detailed inventories have been developed to estimate the resources needed to construct and operate wastewater transport and treatment systems. Some of these inventories have been translated into informatic tools (i.e. Sewer LCA). The research projects that have contributed to this research line during 2015 have been CIGLCOROMINAS and the European research project DEMEAUMED.

Some of the knowledge generated within the research lines mentioned above, have originated consulting projects with the water private industry and also public administration. A summary of these activities is presented below:

INCTRL: this project is a contract with the company inC-TRL Solutions. Within this project the current mathematical models used in wastewater treatment plants are expanded to incorporate energy costs (based on the energy tariffs) and failures of sensors.

SMARTGAS: contracted by the company AQUALIA aims at enhancing biogas production during anaerobic digestion by applying a novel sludge pre-treatment.

SANT PERE PESCADOR CORROSIO is a contract with EMACBSA and has the objective of reducing and controlling malodours, toxicity and corrosion in the sewer network of the municipalities of Sant Pere Pescador and Armentera.

DIPSALUT NO_3 is a project carried out for DIPSALUT and monitors the influent and effluent chemical characteristics of an electrodesnitrification system installed to remove nitrates from groundwater.

ATLL EDR2 contracted by ATLL evaluates the fate of trace organic contaminants in the electrodialysis reversal process.

PhD dissertations

Sara Gabarrón Fernández
Diagnosis, assessment and optimisation of the design and operation of municipal MBRs. Directors Dr. Joaquim Comas (UdG) and Dr. Ignasi Rodriguez-Roda, Mayo 2014.

Albert Montserrat
Towards better management of combined sewer systems-a methodology based on low-cost monitoring. Directors Dr. Lluís Corominas and Dr. Manel Poch.

Adrián Rodriguez-Caballero
Fugitive green-house gas emissions during biological wastewater treatment: Investigating sources and mitigation strategies in laboratory and full-scale systems. Directors Dra. Maite Pijuan and Dr. Ignasi Rodriguez-Roda. (March 2015)

STAYS ABROAD

ANNA RIBERA
(Phd student) – Centre: Universidade Nova de Lisboa, Lisbon, Portugal (1/3/2014 to 31/7/2014).

Visiting Scientist

XAVIER GARCÍA ACOSTA
Postdoctoral Researcher, Yarqon River Authority (YRA), Michmoret, Israel (November 2013 - February 2014).

Visiting Student

RICARDO MARÇALO DA SILVA MARQUES
Phd student, Sciences and Technology Faculty of Lisboa Nova University (UNL), Lisboa, Portugal (January – March 2014).

LAURA SNIP
Phd student, Technical University of Denmark (DTU), Kongens Lyngby, Denmark (March – June 2014).

YULI EKOWATI
Phd student at UNESCO-IHE (September 2014 & April – May 2015)

ALBERT MONTSERRAT
Phd student studying Experimental Sciences and Sustainability, University of Girona (UdG), Spain, (June 2012 – August 2014).

ADRIÁN RODRIGUEZ
Phd student studying Experimental Sciences and Sustainability, University of Girona (UdG), Spain, (February 2011 – November 2014).

ANNA RIBERA
Phd student studying Science and Technology of Water, University of Girona (UdG), Spain, (December 2014 – November 2016)

ELISSAVET KASSOTAKI
Phd student, Sciences Faculty, University of Girona (UdG). (March 2014 – February 2015)

OLGA AUGUET
Phd student studying Experimental Sciences and Sustainability, University of Girona (UdG) (April 2014 – March 2016)

IGNASI AYMERICH
Phd student, Sciences Faculty, University of Girona (UdG). (September 2014 – September 2015)

SARA GABARRON
Phd student, Sciences Faculty, University of Girona (UdG) (June 2014 – September 2015).

CARLOS EDUARDO ZAVALA GÓMEZ
PhD Student, Universidad de Querétaro, México – (January – June 2015)

IBON ARISTI DE LA HOZ
Phd Student, University of País Vasco (UPV) (June – July 2014).

ÚRSULA CÁRDENAS
Student intern studying Environmental Sciences Degree, University of Girona, Girona, Spain (January-May 2014 & January – September 2015)

XAVIER GARCÍA BERNAT
Student intern studying Science and Technology of Water MSc, Univeristy of Girona, Girona, Spain (January – July 2014).

LAURA ESTORCH
Student intern studying Industrial Engineering at the Technical College of the University of Girona, Girona, Spain (January – July 2014).

SELENA GISMEROS
Student intern studying Biology Degree, Sciences Faculty, University of Girona, Girona, Spain (January – June 2014).

HELENA GUASCH
Student intern studying the Science and Technology of Water MSc, University of Girona, Girona, Spain (September 2013 – September 2014).

CÈLIA MIRÓ MANUBENS
Student intern studying Environmental Sciences Degree, University of Girona, Girona, Spain (January – May 2014).

JACQUELIN JIMENA SILVA SILVERA
Student intern studying Chemistry Degree, University of Girona, Girona, Spain (January – February 2014).

GUILLEM IRIONDO
Student intern studying Environmental Sciences Degree at the Autonomous University of Barcelona, Bellaterra, Barcelona, Spain (January 2014).

CORRADO ARANGIO
Student intern studying Civil and Environmental Engineering at the University of Catania, Italia in the framework of the Lifelong Learning Programme-Erasmus of the European Union (March – September 2014).

ISMAEL MORELL PLA
Student intern studying Science and Technology of Water MSc, University of Girona, Girona, Spain (April – July 2014).

ANNA BLANCAFORT SABATA
Student intern studying Food Biotechnology MSc, Technical College, University of Girona, Girona, Spain (April – September 2014).

TÀNIA GÓMEZ MORCILLO
Student intern studying Chemical Engineering Grade, Technical College, University of Girona, Girona, Spain (April-September 2014 & February – September 2015)

CRISTINA FERNÁNDEZ ASENSIO
Student intern studying Science and Technology of Water MSc, University of Girona, Girona, Spain (April – September 2014).

JOAN LLITERAS RIERA
Student intern studying Science and Technology of Water MSc, University of Girona, Girona, Spain (April – September 2014).

MARIA CALDERÓ PASCUAL
Student intern studying Biotechnology Degree, University of Girona, Girona, Spain (May – September 2014).

HECTOR VALCARCEL MARCHANTE
Student intern studying Science and Technology of Water MSc, Univeristy of Girona, Girona, Spain (April – July 2014)

MARIA SIMON FONT
Student intern studying Chemical Engineering Degree, Univesity of Girona, Girona, Spain (June – September 2014 & February – September 2015)

NÚRIA RIGAU GARCIA
Student intern studying Enviromental Science Degree, University of Girona, Girona, Spain (June 2014 – July 2015)

ARNAU PRATS BOTA
Student intern studying Industrial Technology Degree, University of Girona, Girona, Spain (June – September 2014 & February – July 2015)

RAIMON CANAL PEREZ
Student intern studying Industrial Technologies Engineering Degree, University of Girona, Girona, Spain (September 2014 – September 2015)

LIDIA SANCHEZ PADILLA
Student intern from Institut Vallvera, Salt – (June – July 2015)

RENATA FINOCCHIARO
Student intern from Universita' Degli Studi di Catania (April – September 2015)

04. Publications and congresses

Total publications: 313

Resources and Ecosystems Research area

> SCI PUBLICATIONS
(Science Citation Index)
(Ordered by impact index JCR 2013-2014)

2014

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Sergi Sabater. Member of the Editorial board of ***Acta Biológica Colombiana***. Universidad Nacional de Colombia.

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> POSTERS

2014

Valdes, M.E., M.A. Bistoni, D.A. Wunderlin, B. Huerta, S. Rodriguez-Mozaz, D. Barceló. **Bioaccumulation of pharmaceuticals in fish of Suquía River basin** (Córdoba, Argentina). ***10th LC/MS/MS workshop on environmental applications and food safety***. Barcelona, Spain, 1-3/07/2014

Fernández, D.L., S. Rodríguez-Mozaz, L. Ferrando Climent, C. Cruz Morató, M. Badia, G. Llorens, M. Gros, E. Marco Urrea, G. Caminal, P. Blánquez, T. Vicent, M. Sarrà, D. Barceló. **Non-conventional biodegradation treatment by fungi for the removal of selected pharmaceuticals from effluents**. ***4th International Conference on Industrial and Hazardous Waste Management***. 2-5 September 2014 (Crete, Greece)

Subirats, J., M. Fillol, S. Compte, A. Sánchez-Melsió, P. Rivas, A. Rosell y C.M. Borrego. **Distribution and diversity of members of the *Miscellaneous Crenarchaeotic Group* in sediments of freshwater lakes with different climatic and trophic conditions.** ***I Jornada del Clúster Catalán del Agua*****.** 27 June 2014 (Girona).

Technologies and Evaluation Research area

> SCI PUBLICATIONS

(Science Citation Index)
(Publications ordered by impact index JCR 2013-2015)

2014

Marques, R., Oehmen, A., Pijuan, M., 2014. **Novel microelectrode-based online system for monitoring N2O gas emissions during wastewater treatment**. *Environmental Science and Technology* 48, 12816-12823. I.F. 5.481, Q1.

Auguet, O., Pijuan, M., Guasch, H., Borrego, C., Gutierrez, O. 2015. **Implications of downstream nitrate dosage in anaerobic sewers to control sulfide and methane emissions**. *Water Research* 68, 522-532. I.F. 5.323, Q1.

Jelic, A., Rodriguez-Mozaz, S., Barceló, D., Gutierrez, O. 2014. **Impact of in-sewer transformation on 43 pharmaceuticals in a pressurized sewer under anaerobic conditions**. *Water Research* 68, 98-108. I.F. 5.323, Q1.

Pijuan, M., Tora, J., Rodriguez-Caballero, A., Cesar, E., Carrera, J., Perez, J. (2014). **Effect of Process parameters and operational mode on nitrous oxide emissions from a nitritation reactor treating reject wastewater**. *Water Research* 49, 23-33. I.F. 5.323, Q1.

Risch, E., Gutierrez, O., Roux, P., Boutin, C., Corominas, L. (2015). **Life cycle assessment of urban wastewater systems: Quantifying the relative contribution of sewer systems**. *Water Research* 77, 35-48, I.F: 5.323, Q1.

Rodriguez-Caballero, A., Aymerich, I., Marques, R., Poch, M., Pijuan, M. (2015). **Minimizing N2O emissions and carbon footprint on a full-scale activated sludge sequencing batch reactor**. *Water Research* 71, 522-532. I.F. 5.323, Q1.

Rubirola, A., Llorca, M., Rodriguez-Mozaz, S., Casas, N., Rodriguez-Roda, I., Barceló, D., Buttiglieri, G. (2014). **Characterization of metoprolol biodegradation and its transformation products generated in activated sludge batch experiments and in full scale WWTPs**. *Water Research* 63, 21-32. I.F. 5.323. Q1.

Wang, Q., Jiang, G., Ye, L., Pijuan, M., Yuan, Z. 2014. **Heterotrophic denitrification plays an important role in N2O production from nitritation reactors treating anaerobic sludge digestion liquor**. *Water Research* 62, 202-210. I.F. 5.323, Q1.

Dalmau M., Monclús H., Gabarrón S., Rodriguez-Roda I., Comas J. **Towards integrated operation of membrane bioreactors: Effects of aeration on biological and filtration performance.** *Bioresource Technology*, 171 (2014) 103–112. I.F. 5.039, Q1.

Law, Y., Ye, L., Wang, Q., Hu, S., Pijuan, M., Yuan, Z. 2014. **Producing free nitrous acid, a green and renewable biocidal agent, from anaerobic digester liquor**. *Chemical Engineering Journal* 259, 62-69. I.F. 4.058, Q1.

Collado, N., Rodriguez-Mozaz, S., Gros, M., Rubirola, A., Barceló, D., Comas, J., Rodriguez-Roda, I., Buttiglieri G. (2014). **Pharmaceuticals occurrence in a WWTP with significant industrial contribution and its input into the river system**. *Environmental Pollution* 185, 202-212. I.F. 3.902. Q1.

Acuña, V., Schiller, D. Von, García-galán, M. J., Rodríguez-mozaz, S., Corominas, L., Petrovic, M., Poch M., Barceló D., Sabater, S. (2014). **Occurrence and in-stream attenuation of wastewater-derived pharmaceuticals in Iberian rivers**. *Science of the Total Environment* 503-504, 133–141. IF: 3.258, Q1.

Flores-alsina, X., Arnell, M., Amerlinck, Y., Corominas, L., Gernaey, K. V, Guo, L., Lindblom E., Nopens I., Porro J., Shaw A., Snip L., Vanrolleghem P.A., Jeppsson, U. (2014). **Balancing effluent quality, economic cost and greenhouse gas emissions during the evaluation of (plant-wide) control / operational strategies in WWTPs.** *Science of the Total Environment*, 466-467, 616–624. IF: 3.258, Q1.

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Verdaguer, M., Clara, N., Gutierrez, O., Poch, M. (2014). **Application of Ant-Colony-Optimization algorithm for improved management of first flush effects in urban wastewater systems**. *Science of the Total Environment* 485-486,143-152. I.F: 3.258, Q1.

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Corominas, L., & Neumann, M. B. (2014). **Ecosystem-based management of a Mediterranean urban wastewater system: A sensitivity analysis of the operational degrees of freedom.** *Journal of Environmental Management* 143, 80-87. IF: 3.188, Q1.

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Gabarrón S, Gómez M., Dvořák L., Růžičková I., Comas J., Rodriguez-Roda, I. Ragging in MBR: **Effect of operational conditions, chemical cleaning and pre-treatment improvements**. *Separation Science and Technology,* 49, 2115-2123. I.F. 1.2, Q2.

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Aymerich, I., Rieger, L., Sobhani, R., Rosso, D., Corominas, L., 2015. **The difference between energy consumption and energy cost: Modelling energy tariff structures for water resource recovery facilities**. *Water Research*. 81, 113–123. I.F. 5.323, Q1.

Monclús, H., Dalmau, M., Gabarrón, S., Ferrero, G., Rodriguez-Roda, I., Comas, J., (2015). **Full-scale validation of an air scour control system for energy savings in membrane bioreactors.** *Water Research*, 79, 1-9. I.F. 5.323, Q1.

Morera, S., Comas, J., Poch, M., Corominas, L., 2015. **Connection of neighboring wastewater treatment plants: economic and environmental assessment**. *J. Clean. Prod*. 90, 34–42. I.F. 3.844, Q1.

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Acuña, V., von Schiller, D., García-Galán, M-J, Rodríguez-Mozaz, S., Corominas, Ll., Petrovic, M., Poch, M., Barceló, D., Sabater, S. (2015) **Occurrence and in-stream attenuation of wastewater-derived pharmaceuticals in Iberian rivers.** *Sci. Total Environ*. 133-141. IF: 4.099, Q1.

Auguet, O., Pijuan, M., Batista, J., Borrego, C., Gutierrez, O. (2015**). Changes in microbial biofilm communities during colonization of sewer systems**. *Applied and Environmental Microbiology* 81 (20), 7271-7280. IF: 3.668, Q1.

Buttiglieri, G., Collado N., Casas N., Comas J., Rodriguez-Roda, I. 2015. **Proteomics reliability for micropollutants degradation insight into activated sludge systems**. *Water Sci Technol*, 72 (6) 882-888. I.F: 1.106, Q3

Dalmau M., Atanasova N., Gabarrón S., Rodriguez-Roda I., Comas J. (2015**). Comparison of a deterministic and a data-driven model to describe MBR fouling**. *Chemical Engineering Journal*, 260, 300-208. IF: 4.321, Q1.

De Vera, G.A., Stalter, D., Gernjak, W., Weinberg, H.S., Keller, J., Farré, M.J. (2015). **Towards reducing DBP formation potential of drinking water by favouring direct ozone over hydroxyl radical reactions during ozonation**. *Water Res*., 87, 49-58. IF: 5.528, Q1.

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Filloux E., Wang J., Pidou M., Gernjak W., Yuan Z. (2015). **Biofouling and scaling control of reverse osmosis membrane using one-step cleaning-potential of acidified nitrite solution as an agent**. *J. Memb. Sci.* 495, 276-283. IF: 5.056, Q1.

Gabarrón S., Dalmau M., Porro J., Rodriguez-Roda I, Comas J. (2015). **Optimization of full-scale membrane bioreactors for wastewater treatment through a model-based approach**. *Chemical Engineering Journal*, 267, 34–42. IF: 4.321, Q1.

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Law, Y., Ye, L., Wang, Q., Hu, S., Pijuan, M., Yuan, Z. 2015. **Producing free nitrous acid - A green and renewable biocidal agent - From anaerobic digester liquor**. *Chem. Eng*. J. 259, 62-69. IF: 4.321, Q1.

Montserrat, A., Bosch, L., Kiser, M. a., Poch, M., Corominas, L. (2015). **Using data from monitoring combined sewer overflows to assess, improve, and maintain combined sewer systems**. *Sci. Total Environ*. 505, 1053–1061. IF: 4.099, Q1.

Morera, S., Corominas, L., Poch, M., Aldaya, M., Comas, J. (2015). **Water footprint assessment in Wastewater Treatment Plants**. *J. Clean. Prod*. 1–8. IF. 3.844, Q1.

Risch, E., Gutierrez, O., Roux, P., Boutin, C., Corominas, L. (2015). **Life cycle assessment of urban wastewater systems: Quantifying the relative contribution of sewer systems**. *Water Res*. 77, 35–48. IF: 5.528, Q1.

> BOOKS CHAPTERS

J. Alex; C. Rosen; M-N Pons; Ll. Corominas. **Benchmark models: Sensor and fault models. Benchmarking of Control Strategies for Wastewater Treatment Plants.** *IWA Scientific and Technical Report. London (United Kingdom): IWA Publishing*, 2014. ISBN 978-1-8433-9146-3.

I. Nopens; L. Benedetti; D. Vrecko; Ll. Corominas. **Simulation results and ringtesting. Benchmarking of Control Strategies for Wastewater Treatment Plants**. *IWA Scientific and Technical Report*. London (United Kingdom): IWA Publishing, 2014. ISBN 978-1-8433-9146-3.

O. Gutierrez, G. Jiang, K. Sharma, Z. Yuan. **Chapter 8. Biofilm Development in Sewer Networks.** Book: *Aquatic Biofilms: Ecology, Water Quality and Wastewater Treatment. Caister Academic Press*. ISBN 978-1-910190-17-3. http://www.horizonpress.com/aquaticbiofilms

> EDITORIAL BOARDS OF BOOKS ANS SCIENTIFIC JOURNALS

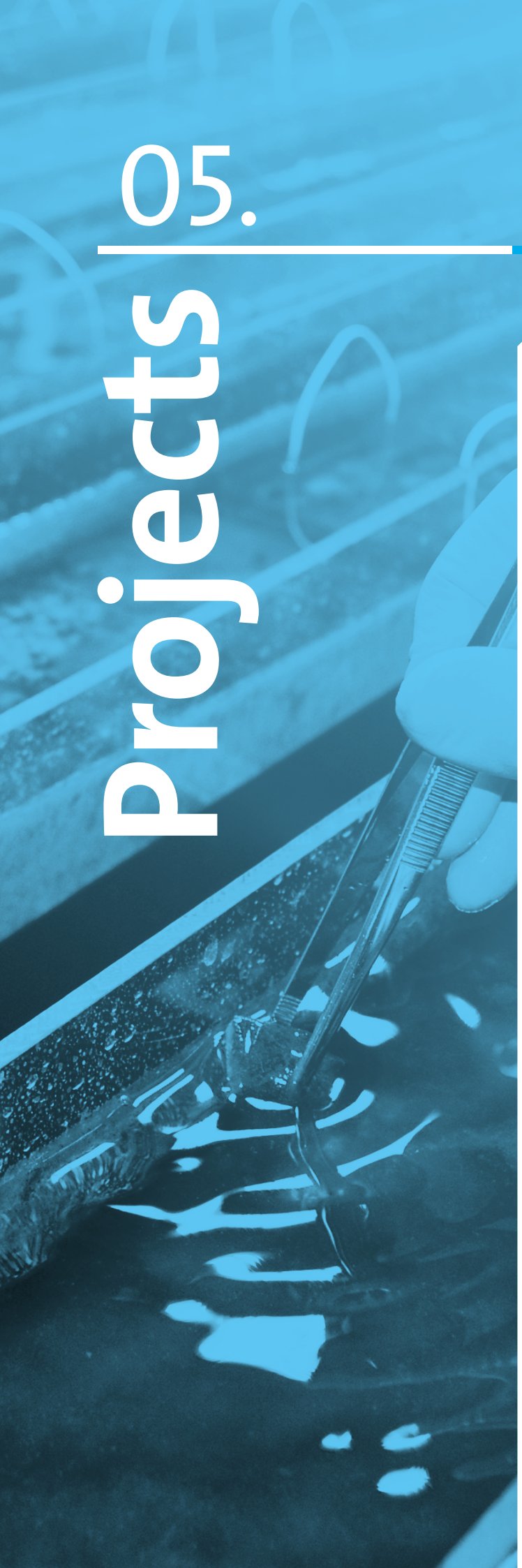
M. Pijuan is an Editorial Board member from the journal Scientific reports (I.F. 5.1) from the Nature Group.

> PRESENTATION AT CONGRESSES ORAL PRESENTATIONS

Dra. Maite Pijuan. **Chair of the session on Biological phosphorus removal**. *IWA World Water Congress and Exhibition 2014*, Lisboa 22-29th September.

Dra. Maite Pijuan. **Chair of the session on Greenhouse Gas emissions from wastewater systems**. *IWA World Water Congress and Exhibition 2014*, Lisboa 22-29th September.

05. Projects



Resources and Ecosystems Research Area

Project	**CONSOLIDER-INGENIO 2010 – Evaluación y predicción de los efectos del cambio global en la cantidad y calidad del agua en ríos ibéricos (SCARCE)**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CSD2009-00065).
Duration	2009-2014
Coordinator	Consell Superior d'Investigacions Científiques (CSIC)
Leader researcher	Sergi Sabater
Amount for ICRA	€484.006

Project	**Transporte y procesado del Carbono en la red fluvial: relevância del cambio global (CARBONET)**
Funding agency	Ministerio de Economía y Competitividad (MINECO), Convocatoria de ayudas de Proyectos de Investigación Fundamental no orientada. (CGL2011-30474-C02-01).
Duration	2011-2014
Coordinator	ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€177.870

Project	**NETworking LAKe observatories in Europe (NETLAKE)**
Funding agency	European Union – COST Action - ES1201
Duration	2012-2016
Coordinator	Dundalk Institute of Technology, Ireland
Leader researcher	Rafael Marcé
Amount for ICRA	€0

Project	**Managing the effects of multiple stressors on aquatic ecosystems under water scarcity (GLOBAQUA)**
Funding agency	European Union FP7-ENV-2013 (603629)
Duration	2013-2019
Coordinator	Consejo Superior de Investigaciones Científicas (CSIC)
Leader researcher	Sergi Sabater
Amount for ICRA	€637.550

Project	**Estrategias de descontaminación de recursos hídricos basadas en la optimización de procesos de atenuación natural (REMEDIATION)**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CGL2014-57215-C4-2-R).
Duration	2015-2017
Coordinator	ICRA
Leader researcher	Josep Mas-Pla
Amount for ICRA	€84.700

Project	**Persistence and fate of emerging contaminants and multi-resistant bacteria in a continuum of surface water groundwater from the laboratory scale to the regional scale (PERSIST). (JPI-Water_2013_PERSIST).**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (JPIW2013-118).
Duration	2014 - 2016
Coordinator	Universitat de Nîmes
Leader researcher	Josep Mas-Pla
Amount for ICRA	€136.000

Project	**Ecosistemas fluviales temporales y cambio global: efectos sobre la estructura y función del ecosistema (FUNSTREAM)**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CGL2014-58760-C3-3-R).
Duration	2015-2017
Coordinator	ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€108.900

Project	**Resolving the organic matter degradability dilemma using an unconventional approach to assess the biophysical opportunity for degradation along the aquatic continuum (FREEDOM)**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CGL2014-61771-EXP).
Duration	2015-2016
Coordinator	ICRA
Leader researcher	Rafael Marcé
Amount for ICRA	€60.000

Project	**Science and Management of Intermittent Rivers and Ephemeral Streams (COST_SMIRES)**
Funding agency	European Union – Cost Action
Duration	2015-2020
Coordinator	Institut National de Recherche en sciences et technologies pour l'environnement et l'agriculture (IRSTEA).
Leader researcher	Vicenç Acuña Salazar
Amount for ICRA	€0

Project	**Balanç hídric, teledetecció i canvi climàtic: Control amb dades de camp i de teledetecció dels necessitats hídriques dels conreus de secà (vinya, olivera) en escenaris futurs d'escassetat d'aigua (CMI_Josep Mas Pla)**
Funding agency	Euroregió Pirineus Mediterrània
Duration	2015-2016
Coordinator	ICRA
Leader researcher	Josep Mas-Pla
Amount for ICRA	€10.000

Project	**Efectes del canvi global sobre els recursos hídrics de les gran conques fluvials de l'Euroregió Pirineus – Mediterrani (CMI_Sergi Sabater)**
Funding agency	Euroregió Pirineus Mediterrània
Duration	2015-2016
Coordinator	ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€0

Water Quality Research Area

Project	**ENzymatic DEcontamination TECHnology (ENDETECH)**
Funding agency	European Union FP7-ENV-2011-Eco-Innovation (Project 282818)
Duration	2011-2015
Coordinator	Da Volterra (Paris, France)
Leader researcher	Damià Barceló
Amount for ICRA	€218.838

Project	**Contribución de las Archaea no cultivadas en el Reciclaje del Carbono Orgánico en Sedimentos (ARCOS)**
Funding agency	Ministerio de Economía y Competitividad (MINECO) – CGL2012-33033
Duration	2012-2015
Coordinator	ICRA
Leader researcher	Carles Borrego
Amount for ICRA	€99.450

Project	**Associate Partner at "A new paradigm in drug use and human health risk assessement: Sewage profiling at the community level" Estada Post-doc + 2 short courses (ITN-SEWPROF).**
Funding agency	European Union FP7-PEOPLE-2012-ITN
Duration	2012-2016
Coordinator	University of Bath (UK)
Leader researcher	Damià Barceló
Amount for ICRA	€0

Project	**Next-Generation Electrochemical Technology for the Treatment of Hospital Wastewater: Electrogenerated Sulfate Radicals for Complete Destruction of Persistent Pollutants (ELECTRO HOSPITAL)**
Funding agency	European Union – FP7 – People – 2013 – IIF. (Marie Curie Action).
Duration	2013-2015
Coordinator	ICRA
Leader researcher	Mira Petrovic
Amount for ICRA	€173.370,60

Project	**Hongos, algas y bacterias en la degradación de fármacos. Depuración de efluentes de hospital por hongos (H2PHARMA).**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CTM2013-48545-C2-2-R)
Duration	2013 - 2016
Coordinator	ICRA
Leader researcher	Sara Rodríguez-Mozaz
Amount for ICRA	€114.950

Project	**Priority Environmental Contaminants in seafood: safety assessment, impact and public perception (ECsafeSEAFOOD)**
Funding agency	European Union FP7-KBBE-2012-6-singlestage Project N°: 311820
Duration	2013-2017
Coordinator	Antonio Marqués, Instituto de Investigaçao das pescas e do Mar (IPIMAR), Portugal
Leader researcher	Damià Barceló
Amount for ICRA	€274.067

Project	**Real time monitoring of SEA contaminants by an autonomous lab-on-a-chip biosensor (SEA-on-a-CHIP)**
Funding agency	European Union - FP7 OCEAN 2013 (614168)
Duration	2013-2017
Coordinator	Institut de Diagnòstic Ambiental i Estudis de l'Aigua (IDAEA- Consejo Superior de Investigaciones Científicas-CSIC)
Leader researcher	Sara Rodríguez
Amount for ICRA	€179.152

Project	**Tracking and assessing the Risk from Antibiotic resistant genes using Chip technology in surface water Ecosystems (JPI-Water_2013_TRACE).**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (JPIW2013-129)
Duration	2014 - 2016
Coordinator	Leibniz Institute of Photonic Technology
Leader researcher	Carles Borrego
Amount for ICRA	€150.000

Project	**Stopping Antibiotic Resitance Evolution (Stare). (JPI-Water_2013_StARE).**
Funding agency	Ministerio de Economía y Competitividad (MINECO).
Duration	2014 - 2016
Coordinator	Universidad de Oporto, Portugal
Leader researcher	Sara Rodríguez-Mozaz
Amount for ICRA	€115.000

Project	**Assessment of nitrogen containing disinfection by-products and their precursors in drinking waters of the Mediterranean Basin (N-DBPs).**
Funding agency	European Union – FP7 – People – 2013 – IIF. (Marie Curie Action). Project nº: 623711
Duration	2014 - 2016
Coordinator	ICRA
Leader researcher	Damià Barceló Culleres
Amount for ICRA	€173.370,60

Project	**Next-generation electrochemical technology for the treatment of hospital wastewater: electrogenerated sulfate radicals for complete destruction of persistent pollutants.**
Funding agency	European Union – FP7 – People – 2013 – IIF. (Marie Curie Action). Project nº: 623041
Duration	2014 - 2016
Coordinator	ICRA
Leader researcher	Jelena Radjenovic
Amount for ICRA	€173.370,60

Project	**New and emerging challenges and opportunities in wastewater reuse (NEREUS).**
Funding agency	European Union – COST Action - ES1403
Duration	2014-2018
Coordinator	University of Cyprus
Leader researcher	Sara Rodríguez-Mozaz
Amount for ICRA	€0

Project	**Transformation of emerging contaminants in the aquatic environment. Fate of transformation products under multiple stress conditions (TRANSFORMER)**
Funding agency	European Union – H2020 – MSCA – IF 2014. Project nº: 657425
Duration	2015 - 2016
Coordinator	ICRA
Leader researcher	Mira Petrovic
Amount for ICRA	€106.326

Project	**Estudio de la transformación de los contaminantes emergentes en las aguas residuales y ecosistemas fluviales y costeros (TRANSFORMCOAST)**
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CGL2014-56530-C4-4-R).
Duration	2015-2017
Coordinator	ICRA
Leader researcher	Mira Petrovic
Amount for ICRA	€108.900

Project	**Interdisciplinary concepts for municipal wastewater treatment and resource recovery. Tackling future challenges (TreatRec)**
Funding agency	European Union. H2020. MSCA – ITN – 2014. Project nº:642904
Duration	2015 - 2018
Coordinator	ICRA
Leader researcher	Mira Petrovic
Amount for ICRA	€495.745,92

Project	**Transferencia de los nanomaterials de carbon en el medio acuático (ERA-NET Nanotransfer)**
Funding agency	Ministerio de Economía y Competitividad (MINECO).
Duration	2015
Coordinator	CSIC
Leader researcher	Sara Rodriguez
Amount for ICRA	€90.000

Technologies and Evaluation Research area

Project	**Gases de efecto invernadero en los sistemas de transporte y tratamiento de aguas residuales: evaluación de las emisiones (GEISTTAR)**
Funding agency	Ministerio de Economía y Competitividad (MINECO) – CTM2011-27163
Duration	2011-2014
Coordinator	ICRA
Leader researcher	Maite Pijuan
Amount for ICRA	€110.110

Project	**Sulfide and GreenHouse Gas emissions from Mediterranean Sewers (SGHGEMS)**
Funding agency	European Union PIRG08-GA-2010-277050. Marie Curie Actions – International Reintegration Grant.
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Oriol Gutiérrez
Amount for ICRA	€100.000

Project	**Ecosystem-based Management strategies for urban wastewater systems (EcoMaWat)**
Funding agency	European Union PCIG09-GA-2011-293535
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Lluís Corominas
Amount for ICRA	€100.000

Project	**Sustainable and integrated urban water system management (SANITAS)**
Funding agency	European Union PITN-GA-2011-289193
Duration	2011-2015
Coordinator	LEQUIA-Universitat de Girona
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€256.387

Project	**Eliminación de microcontaminantes y productos de desinfección en sistemas integrados de membranas seguidos de desinfección. Potencial para la reutilización directa o indirecta (WATER-Fate)**
Funding agency	Ministerio de Economía y Competitividad (MINECO) – CTM2012-38314-C02-01
Duration	2012-2015
Coordinator	ICRA
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€127.530

Project	**Exploring novel nitrifier pathways to minimise direct greenhouse gas emissions from WWTPs (NITRI-GHG)**
Funding agency	European Union FP7-PEOPLE-2011-CIG, PCIG10-GA-2011-303946
Duration	2012-2016
Coordinator	ICRA
Leader researcher	Maite Pijuan
Amount for ICRA	€100.000

Project	**Conceiving Wastewater Treatment in 2020. Energetic, environmental and economic challenges (Water 2020)**
Funding agency	European Union - ES1202
Duration	2012 - 2016
Coordinator	University of Santiago de Compostela
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€0

Project	**Demonstrating integrated innovative technologies for an optimal and safe closed water cycle in Mediterranean tourist facilities (demEAUmed)**
Funding agency	European Union FP7-ENV-2013-Water-Inno-Demo (619116)
Duration	2013-2017
Coordinator	ICRA
Leader researcher	Oriol Gutiérrez
Amount for ICRA	€100.000

Project	**Ecosystem-based Management strategies for urban wastewater systems (EcoMaWat)**
Funding agency	European Union PCIG09-GA-2011-293535
Duration	2011-2015
Coordinator	LEITAT (Technological Center), Terrassa, Barcelona, Spain
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€422.732

Project	**Demonstration of innovative solutions for Reuse of water, Recovery of valuables and Resource efficiency in urban wastewater treatment (R3-Water)**
Funding agency	European Union FP7-ENV-2013-Water-Inno-Demo (619093)
Duration	2013-2017
Coordinator	IVL, SVENSKA MILJOEINTITUTET AB, Sweden
Leader researcher	Lluís Corominas
Amount for ICRA	€272.800

Project	**Smart decentralized water management through a dynamic integration of technologies (JPI_Water2014_WATINTECH)**
Funding agency	Ministerio de Economía y Competitividad (MINECO)
Duration	2015-2018
Coordinator	ICRA
Leader researcher	Ignasi Rodriguez-Roda Layret
Amount for ICRA	€250.000

Project	**Tecnologías eficientes para la eliminación de contaminantes de preocupación emergente, contenidos en Directiva 2013/39/CE o de riesgo significativo según Directiva 2008/105/CE (TRICERATOPS)**
Funding agency	Ministerio de Economía y Competitividad (MINECO)
Duration	-
Coordinator	ICRA
Leader researcher	Wolfgang Gernjak
Amount for ICRA	€145.000

Project	**Resiliencia de los sistemas de saneamiento a desafíos emergentes: de la generación de conocimiento a la mejora de la gestión integrada (ReACH)**
Funding agency	Ministerio de Economía y Competitividad (MINECO)
Duration	2015-2018
Coordinator	ICRA
Leader researcher	Lluís Corominas Tabares
Amount for ICRA	€0

Project	**Determinación de los rendimientos de eliminación de micro-contaminantes en el proceso de Electrodiálisis Reversible de la ETAP de Abrera. Segunda Fase (ATLL_EDR2)**
Funding agency	ATLL
Duration	2015-2016
Coordinator	ATLL
Leader researcher	Wolfgang Gernjak
Amount for ICRA	€39.241

Project	**Converting ECAM Excel tool into a ECAM web-based tool in the framework of WaCCliM Project (IWA_WaCCliM)**
Funding agency	International Water Association (IWA)
Duration	2015-2016
Coordinator	International Water Association (IWA)
Leader researcher	Lluís Corominas Tabares
Amount for ICRA	€22.200

ICRA

Project	**Grups de recerca consolidats (GRC). (SGR2014-16).**
Funding agency	Agència de Gestió d'Ajuts Universitaris i de Recerca (AGAUR). (2014-SGR-291)
Duration	2013 - 2016
Coordinator	ICRA
Leader researcher	Damià Barceló
Amount for ICRA	€63.000

06. Contracts

Resources and Ecosystems Research Area

Contract	**Estudio, seguimiento y evaluación de alternativas de minimización ante la posible presencia de mejillón cebra en los embalses e instalaciones del ámbito de ATLL, concessionària de la Generalitat de Catalunya (ZEBRA)**
Contracting Agency	ATLLc (Aigües Ter Llobregat, concesionària de la Generalitat de Catalunya)
Duration	2013-2014
Leader researcher	Sergi Sabater

Contract	**Adaptación de la métrica de fitobentos IPS a los tipos de masas de agua 16 y 17 correspondientes a grandes ríos. Análisis del grado de correlación de la métrica de fitobentos IPS con el multimétrico de diatomeas MDIAT**
Contracting Agency	TRAGSA
Duration	2013-2014
Leader researcher	Sergi Sabater Cortés

Contract	**Sostenibilidad de recursos hídricos bajo el cambio global (HIDSOS II)**
Contracting Agency	ENDESA
Duration	2014
Leader researcher	Sergi Sabater Cortés

Contract	**Asistencia Técnica para la asesoría científica en el Deasarrollo de Modelos de Cuenca en el Plan 2 de Empresa de Canal Isabel-ii Gestión (Canal Gestion_Embassament)**
Contracting Agency	Canal Isabel II Gestión S.A.
Duration	2015
Leader researcher	Rafael Marcé Romero

Contract	**Sostenibilidad de recursos hídricos bajo el cambio global (HIDSOS III)**
Contracting Agency	ENDESA
Duration	2015-2016
Leader researcher	Sergi Sabater Cortés

Contract	**Support to JRC work in inverse modelling of chemicals in the Danube region (JRC_Danube)**
Contracting Agency	JRC
Duration	2015-2016
Leader researcher	Rafael Marcé Romero

Water Quality Research area

Contract	**Los fármacos como contaminantes prioritarios: efectos toxicológicos, ambientales y riesgos para la salud humana (URJCI_Salud).**
Funding Agency	Instituto de Salud Carlos III (ISCIII).
Duration	2015
Leader researcher	Sara Rodríguez-Mozaz

Contract	**Determinar los rendimientos de eliminación de precursores de subproductos de desinfección en el proceso de Electrodiálisis Reversible de la ETAP de Abrera (ATLL_DBPs)**
Funding Agency	Aigües Ter Llobregat (ATLL)
Duration	2015
Leader researcher	Maria Jose Farré Olalla

Contract	**Determinar els rendiments d'eliminació de micro-contaminants en el procés d'Electrodiàlisis Reversible (EDR) de l'ETAP d'Abrera (EDR)**
Funding Agency	Aigües Ter Llobregat Concessionària (ATLLc)
Duration	2014
Leader researcher	Ignasi Rodriguez-Roda i Mira Petrovic

Technologies and EvaluationResearch area

Contract	**Investigación de tecnologías de tratamiento, reutilización y control para la sostenibilidad futura de la depuración de aguas residuales (ITACA).**
ICRA Subcontract	Pharmaceutical removal in WWTP)
Contracting Entity	DEISA (Programa INNPRONTA, CDTI)
Duration	2011-2015
Leader researcher	Ignasi Rodríguez-Roda

Contract	**Estudi de quantificació de sulfhídric i de metà en el sistema de sanejament de Sant Pere Pescador, proposta de mesures correctores per reduir la concentració i els impactes del sulfhídric**
Contracting Entity	Consorci de la Costa Brava (CCB) and Empresa Mixta d'Aigües Costa Brava S.A. (EMACBSA)
Duration	2013-2014
Leader researcher	Oriol Gutiérrez

Contract	**Assess the effect of temperature on multiple N2O microsensors to characterize and predict its effect under real environment**
Contracting Entity	UNISENSE A/S, Denmark
Duration	2013-2014
Leader researcher	Maite Pijuan

Contract	**Desenvolupament de software de modelització SIMBA (inCTRL).**
Contracting Entity	InCTRL
Duration	2014
Leader researcher	Lluís Corominas

Contract	**Determinación de los rendimientos de eliminación de micro-contaminantes en el proceso de Electrodiálisis Reversible de la ETAP de Abrera. Segunda Fase (ATLL_EDR2)**
Contracting Entity	Aigües Ter Llobregat (ATLL)
Duration	2015-2016
Leader researcher	Wolfgang Gernjak

Contract	**Realització de l'estudi de reducció de males olors i de la corrosió en el sistema de sanajamanet en alta de Palamós (Palamos_Corrosio)**
Contracting Entity	Consorci Costa Brava (CCB)
Duration	2015-2016
Leader researcher	Oriol Gutierrez García-Moreno

Contract	**Mejora de la producción de biogas mediante pretratamiento de lodos con ácido nitroso (SMART–GREEN–GAS).**
Contracting Entity	AQUALIA
Duration	2015 - 2018
Leader researcher	Maite Pijuan

Scientific and Technical Services

Contract	**Determinació de paràmetes físico-químics de qualitat d'aigua (SORELLO).**
Contracting Entity	SORELLO, S.L.
Duration	2014 - 2018
Leader researcher	Sara Insa

Total amount (2014-2015): **559.359,65€**

07. Agreements

13/01/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on biology undergraduate **Ikram Arrahaoui Douiri** as an intern during the period from 13/01/2014 to 31/05/2014 in the Quality Area, under Carles Borrego More, ICRA Research Professor.

20/01/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on biotechnology undergraduate **Nuria Puigmal Dominguez** as an intern during the period from 20/01/2014 to 30/07/2014 in the Quality Area, under Carles Borrego More, ICRA Research Professor.

21/01/2014

Lifelong Learning Programme-Erasmus of the European Union

Cooperation agreement in the framework of the Lifelong Learning Programme-Erasmus of the European Union to provide an internship for **Corrado Arangio**, Civil and Environmental Engineering student at the University of Catania, during the period from 17/3/2014 to 17/6/2014, in the Technologies and Evaluation Area, under Maite Pijuan ICRA Ramon y Cajal research scientist.

2/01/2014

European Commission REA-IIF- Maire Curie

Grant Agreement 623711 (IIF- MarieCurie) Assessment of nitrogen containing disinfection by-products and their precursors in drinking waters of the Mediterranean Basin (Dr. M. Jose Farre)

18/02/2014

European Commission REA-IIF- Maire Curie

Grant Agreement 623041 ELECTROHOSPITAL project (Dr. Jelena Radjenovic)

01/03/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the Centre for Research and Support in Technology and Design of the State of Jalisco (CIATEJ), Guadalajara, Mexico, to take on environmental technology student **Maria Guadalupe Panduro Rivera** as an intern during the period from 01/03/2014 to 31/05/2014 in Scientific and Technical Services, under Dr. Sara Insa.

17/03/2014

Technological School, University of Girona

Educational cooperation agreement for external academic internships with the technological school of the University of Girona to take on **Anna Blancafort**, student of the Master's Programme in Food Biotechnology, during the period from 01/04/2014 to 12/09/2014 in the Technologies and Evaluation Area, under Gianluigi Buttiglieri, ICRA Postdoc Researcher.

18/03/2014

Technological School, University of Girona

Educational cooperation agreement for external academic internships with the technological school of the University of Girona to take on **Tanya Gómez**, chemical engineering undergraduate, during the period from 01/04/2014 to 12/9/2014 in the Technologies and Evaluation Area, under Gianluigi Buttiglieri, ICRA Postdoc Researcher.

01/04/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on chemical engineering undergraduate **Tanya Gómez Morcillo** as an intern during the period from 01/04/2014 to 12/09/2014 in the Technologies and Evaluation Area, under Gianluigi Buttiglieri, ICRA Postdoc Researcher.

14/04/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on the student of the Master's Programme in Water Science and Technology **Joan Lliteras Riera** as an intern during the period from 14/04/2014 to 12/09/2014 in the Technologies and Evaluation Area, under Gianluigi Buttiglieri, ICRA Postdoc Researcher.

22/04/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on the student of the Master's Programme in Water Science and Technology **Ismael Morell Pla** as an intern during the period from 22/04/2014 to 31/07/2014 in the Technologies and Evaluation Area, under Oriol Gutiérrez, Postdoc Researcher.

30/04/2014

University of Lleida

Framework educational cooperation agreement with the object of establishing a general cooperation framework in order to carry out joint practical training of students in the field of water.

05/05/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on biotechnology undergraduate **Maria Calderó Pascual** as an intern during the period from 05/05/2014 to 12/09/2014 in the Technologies and Evaluation Area, under Ignasi Rodriguez-Roda Layret, ICRA Research Professor.

15/05/2014

University of Girona Science and Technology Park – University of Girona

Scientific cooperation agreement with the objective of transfer by UdG and PCiT of the spaces of the H2O building to ICRA under the established terms and conditions, and provision of certain services by PCiT to ICRA.

02/06/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on environmental science undergraduate **Nuria Rigau Garcia** as an intern during the period from 06/02/2014 to 31/08/0214 in the Technologies and Evaluation Area, under Lluís Corominas, ICRA Research Scientist.

11/06/2014

Fundació Catalunya-La Pedrera

Cooperation agreement with Fundació Catalunya-La Pedrera to establish the framework in which the project approved by the foundation in the 6th edition of the Teachers and Science Programme will be carried out; the aim of the programme is to raise awareness among secondary

school teachers in Catalonia of the research activity carried out in Catalan research centres.

25/06/2014

ATLL (Aigües Ter – Llobregat)

Scientific cooperation agreement with ATLL, licensee of Generalitat de Catalunya SA, which will determine the microcontaminant elimination performance in the reversible electrodialysis process at the Arbrera DWTP.

01/07/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with Universitat Autònoma de Barcelona to take on microbiology undergraduate **Judit Planas Puig** as an intern during the period from 01/07/2014 to 05/09/2014 in the Quality Area, under Carles Borrego More, ICRA Research Professor.

01/07/2014

Educational cooperation agreement for carrying out internships in companies

The object of the agreement is to provide business internship credits for secondary school students in the final two years from Jaume Vicens Vives High School (Girona) via cooperating bodies such as companies and public and private institutions.

ICRA takes on secondary school student specializing in science and technology **Carla Santiago Corral** to carry out an internship from 01/07/2014 to 31/07/2014 in the Resources and Ecosystems Area, under Dr. Sergi Sabater.

07/07/2014

Educational cooperation agreement for carrying out internships in companies

The object of the agreement is to provide business internship credits for secondary school students in the final two years from Sagrada Familia High School (Barcelona), in the framework of the agreement with Fundació La Pedrera, via cooperating bodies such as companies and public and private institutions.

ICRA takes on secondary school student specializing in science and technology Sara Garcia Ortega to carry out an internship from 07/07/2014 to 18/07/2014 in the Resources and Ecosystems Area, under Dr. Sergi Sabater.

07/07/2014

GRUPO SOIL TRATAMIENTO DE AGUAS INDUSTRIALES S.L.

Framework cooperation agreement with the objectives of promoting scientific, technological and outreach relations between the two institutions. Promoting cooperation between researchers and information exchange, particularly in the framework of technology development.

21/07/2014

EMACBSA (Empresa Mixta Aigües Costa Brava Societat Anònima)

Scientific cooperation agreement to study the estimation of the potential level of corrosion in the Sant Pere Pescador water treatment system.

22/07/2014

UTE-PSARU TER-DARÓ

Scientific cooperation agreement with the aim of framing and coordinating the actions of ICRA and UTEW PSAURO TER-DARÓ in consultancy, information exchange and research studies in the field of water treatment.

22/09/2014

University-Business/Institution Educational Cooperation Programme

Educational cooperation programme with the University of Girona to take on industrial technology engineering undergraduate **Raimon Canal Perez** as an intern during the period from 22/09/2014 to 01/09/2015 in the Technologies and Evaluation Area, under Lluís Corominas, ICRA Research Scientist.

01/12/2014

Centre for Studies of Mediterranean Rivers, Ter Museum, Manlleu Municipal Council

Cooperation agreement with the object of framing and coordinating actions with Manlleu Municipal Council, via CERM (Centre for Studies of Mediterranean Rivers) of the Ter Museum, for consultancy, information exchange and studies in the fields of research and technology in the overall management and use of water.

27/01/2015

University of Girona

Agreement to appoint Dr. Joaquim Comas, which establishes the framework of his incorporation and appointment to his research at ICRA (Technologies and Evaluation Area).

01/02/2015

inCTRL solutions inc

The object of this agreement is to frame and coordinate the actions of ICRA as a preferred developer of the SIMBA modelling programme.

04/02/2015

European Commission

Citation of honour for the project MSCA-IF-2014-TRANSFORMER for the 15-month internship of Marko Rozman, to begin on 01/05/15

09/02/2015

Universidad Militar de Nueva Granada – UMNG

The object of this agreement is to promote scientific and technological relations between the two institutions. Promote research activity on technological development and training in areas of common interest, as well as knowledge transfer activities.

11/02/2015

IH_Cantabria - Instituto de Hidraulica de Cantabria

Consultancy and cooperation with IH Cantabria on the project "Modelling of water quality in the reservoir and downstream in the Ituango hydroelectric project".

13/02/2015

UTE-PSARU TER-DARÓ

Addendum to the agreement signed on 22/07/2014, on the installation and management of the pilot plant installed by ICRA in the Quart water treatment plant. Management conditions/installation/responsibilities.

09/03/15

Universiteit Gent

Exchange information regarding the development of a physical-chemical wastewater treatment plant including A-stage combined with DAF, ion exchange based ammonia removal, regeneration of the ion exchange resin with in situ electro-generated acid/base and us.

09/03/2015

ENAC - Entidad Nacional de Acreditación

The general object of this agreement is to establish the framework for cooperation between the two institutions on evaluation activities assigned by ENAC.

17/03/2015

MECD - Spanish Ministry of Education, Culture and Sport

The aim of this agreement is to establish the general cooperation framework between the two institutions to improve management of grants for the promotion of researcher mobility, and training of researchers in doctoral programmes.

30/03/2015

ATLL

This scientific cooperation agreement is part of the Marie Curie IIF programme led by Dr. Maria José Farré. Its aim is to establish and specify cooperation for carrying out a study to evaluate the performance in eliminating precursors of byproducts of disinfection in the potabilization process of the Llobregat DWTP, especially in the reversible electrodialysis phase, and in the Ter DWTP.

05/05/2015

IF Instituto Federal de Educaçao, Ciencia e Tecnologia

Framework cooperation agreement with the Instituto Federal de Educaçao, Ciencia e Tecnologia do Maranhao (Brazil), with the objective of providing training and interdisciplinary research in different areas of scientific knowledge, as well as other social actions.

06/05/2015

DIPSALUT- Diputació GRN

The object of this agreement is to monitor the implementation of an electrochemical denitrification plant by Hydrokemos in the municipality of Borrassa.

18/05/2015

ATTC

Material transfer agreement that establishes the terms and conditions of the agreement (AMO gene in a bioreactor treating domestic wastewater).

16/06/2015

CANAL ISABEL II- Gestion

Agreement for technical service and scientific consultancy in the development of basin models in plan 2 of the company Canal Isabel II Gestión, ref U-1920-15-02-CM.

03/07/2015

UFZ- HELMHOLTZ

Cooperation agreement with the Center for Environmental Research (Leipzig) to install a CO_2 sensor on the ICRA platform in Boadella.

20/08/15

Universidad Técnica de Machala

The object of this agreement is to establish the framework for cooperation between ICRA and Utmach in aspects of research, knowledge transfer, training and outreach regarding water resources and the water cycle.

05/09/15

AL-Farabi Kazakh National University

The purpose of this agreement is to establish the framework for collaboration between ICRA and AL-Farabi Kazakh National University.

26/10/2015

ICREA

Agreement to incorporate on 01/11/15 the researcher Wolfgang Gernjak of ICRA in the water supply and advanced treatment research line.

01/11/15

ATLL

The object of this cooperation agreement is to carry out the second phase of the study to determine the micro-contaminant-elimination performance in the Reversible Electrodialysis process of the Abrera Drinking Water Treatment Plant (DWTP).

25/11/2015

DIPSALUT

The object of this agreement is to monitor the implementation of an electrochemical denitrification plant by Hydrokemos in the municipality of Caldes de Malavella.

15/12/15

European Commission

The subject matter of the contract is "support for the JRC work on inverse modelling of chemicals in the Danube region".

08. Other dissemination activities

09/01/2014

The Peruvian national water authority visits ICRA to learn about its scientific management model.

ICRA, Girona

A delegation from the Peruvian national water authority (ANA), the governing body of the national water resource management system in Peru, visited the Catalan Institute for Water Research (ICRA) in Girona. The meeting was part of a packed schedule of meetings with the main universities and scientific and technological research institutes in the Netherlands, the UK, Belgium, Germany and Spain, and ICRA was the only water research centre visited in Spain.

10/01/2014

Institutional visit of the Honourable Catalan Minister Santi Vila (Department of Territory and Sustainability)

ICRA, Girona

The visit allowed the Minister for Territory and Sustainability to learn first-hand about the facilities of the three ICRA research areas (Resources and Ecosystems, Water Quality, and Technologies and Evaluation) and about the different projects currently being carried out, some of which (Globaqua, demEAUmed and R3-Water) have recently obtained funding from the European Union to the value of 1.3 million Euro. The minister showed particular interest in visiting the experimental streams facility, the only one of its kind in Europe, which was inaugurated in May 2012 and which makes ICRA one of the few water research institutes in Europe to have all the resources and services in one place that are necessary to provide a comprehensive and transversal service in water research through different disciplines.

14/01/2014

Annual Meeting of the ICRA Business and Social Council

ICRA, Girona

The results of the projects being carried out at ICRA, particularly GLOBAQUA, R3WATER and DemEAUmed, were presented at this meeting, which was attended by all the members of the Business and Social Council and presided over by Manel Farré. The new line of research, which will open at the end of the year, "Alternative Water Supply and Advanced Water Treatment research line" and which will be led by Dr. Wolfgang Grenjak (Ramon y Cajal), was also presented.

16/01/2014

Institutional visit: Costa Brava Consortium

ICRA, Girona

Iván Sánchez, manager of ICRA and Jaume Alemany, head of the ICRA R&D&I Office, received political and technical representatives of the municipalities of the Costa Brava Consortium and Costa Brava water services - a total of 41 people - to show them the most state-of-the-art facilities of ICRA and strengthen interactions and relations between ICRA and the municipalities of the Costa Brava region.
The visitors included the Chairman of the Consortium, Carles Pàramo; the acting manager, Xavier Tristán; and Lluís Sala, Head of Applied Research.

21-23/01/2014

Meeting: Management Committee and Working Groups Meeting of NETLAKE

ICRA, Girona

European scientists met at ICRA to coordinate a project for the remote control of water quality in lakes and reservoirs.
The meeting brought together 57 water researchers, technology experts and manager from all over Europe and will serve to put the final touches to the network that will coordinate automatic stations for measuring water quality in lakes and reservoirs around Europe.
The NETLAKE (Networking Lake Observatories in Europe) network, funded by the European Office of Cooperation in Science and Technology (COST), is an unprecedented effort in Europe and is made up of 80 water researchers and managers from 24 countries, and coordinates some 50 automatic measuring stations spread throughout Europe.
The general coordinator is the Dundalk Institute of Technology (Ireland).
ICRA is coordinating relations between water scientists and managers in the project, together with the University of Malaga and the University of Barcelona.
The objective of the NETLAKE international network is to coordinate automatic stations for measuring water quality in lakes and reservoirs around Europe in order to standardize methods for measuring and transmitting data and interpreting the enormous amount of information that these stations can generate. The ultimate goal is to make this technology a standard for scientific research, water quality management and implementation of the Water Framework Directive. Work will also be carried out on citizen science projects to bring this technology to schools.

06/02/2014

Forum of the Science and Technology Park of the University of Girona

Science and Technology Park of UdG, Girona

ICRA took part in the 4th Forum of the Science and Technology Park of the University of Girona The forum is a showcase for innovation and technology, a technology transfer conference, a marketplace, a meeting space for public and private agents (research groups, startups and entrepreneurs, as well as consolidated companies) interested in innovation.
Lluís Corminas and Oriol Gutiérrez, both postdoc researchers at the ICRA Technologies and Evaluation Area, gave the presentation System for Monitoring Spills in Sanitation Networks.

17/02/2014

Institutional visit of the University of Girona

ICRA, Girona

Damià Barceló, Director of ICRA, Sergi Sabater, deputy director of ICRA, and Iván Sánchez, manager of ICRA, received the new appointees of the University of Girona: Sergi Bonet, Rector, Ramon Moreno-Amich, Vice-Rector of Planning, Innovation and Enterprise, and Jordi Freixenet, Vice-Rector of Research.
The visit was an opportunity to showcase ICRA and its facilities and to reaffirm the institutional relations between ICRA and the University of Girona.

05/03/2014

Visit by a group of master's students in chromatography from the University of Girona

ICRA, Girona

A group of 5 students of the master's programme on chromatography from the University of Girona, accompanied by professors Mònica Iglesias and Enriqueta Anticó, visited the ICRA Scientific and Technical Services facilities in order to learn about the scientific chromatography equipment and techniques and the research carried out. Sara Insa, head of STS at ICRA, accompanied the group.

07/03/2014

Reading of the thesis of Elisabet Marti: Occurrence of antibiotic resistance genes in aquatic microbial communities exposed to anthropogenic activities.

ICRA, Girona

The directors of this thesis were: José Luis Balcázar (ICRA Ramon y Cajal research scientist, from the Water Quality Area, quality and microbiological diversity line), and Joan Jofre (Microbiology Department, Faculty of Biology, University of Barcelona).

This doctoral thesis investigates the prevalence of genes for resistance to antibiotics in aquatic microbial communities affected by anthropogenic activities. Resistance to antibiotics is considered to be a natural phenomenon, as many microorganisms possess intrinsic genes that code for resistance to the antibiotics that they themselves produce. Although most research in this field has focused on human pathogens of clinical importance, it is now known that environmental bacteria can play an important role in the appearance and dissemination of genes for resistance to antibiotics.

12-19/03/2014

Debates on the participation processes for the review of the River Basin Management Plan of Catalonia.

ICRA, Girona

ICRA hosted 60 regional representatives from different areas to take part in a series of meetings - debate workshops organized by the Catalan Water Agency (ACA) in order to begin the review of the River Basin Management Plan of Catalonia (2016-2021), thereby complying with Water Framework Directive 2000/600/CE of the European Parliament. The event was presided over by representatives of the Government of Catalonia: Àlex Rocas, Head of the ACA Girona Region, Isabel Muradàs, Director of Territorial Services in Girona, Department of Government and Institutional Relations, Josep Cortadellas, Director of Territorial Services in Girona, Department of Territory and Sustainability, and Eudald Casadesús, Delegate of the Government in Girona.

10-11/04/2014

Conference to evaluate ICRA research

ICRA, Girona

On 10 April 2014, a conference was held at ICRA to evaluate the research carried out from 2012 to the start of 2014. It was attended by members of the ICRA Scientific Advisory Committee and by all the researchers from the three research areas.
The four new members of the Scientific Advisory Committee who were visiting the ICRA facilities were introduced.

28/04/2014

First CERCA-Conference Exhibition

Barcelona

The Catalan Research Centres (CERCA) are among the most important actors in the European and international science setting. Their contributions are helping to implement standards and technologies for the future and to promote the knowledge society.
This first CERCA conference was inaugurated by the Honourable Andreu Mas-Colell, Catalan Minister for the Economy and Knowledge, and concluded with the paper "HR Excellence in Research Award in UK and Europe: main challenges" by Dr. Janet Metcalfe, chair of the VITAE international programme.
Damià Barceló, director of ICRA, which is a CERCA centre, also took part. The aim was to give visibility to the activity carried out by CERCA and to facilitate the formation of cooperation partnerships with other scientific institutions at the international level.

30/04/2014

Institutional visit: Social Council of the University of Girona

ICRA, Girona

Damià Barceló, Director of ICRA, Sergi Sabater, deputy director of ICRA, and Iván Sánchez, manager of ICRA, received the members of the University of Girona Social Council. Rosa Núria Aleixandre Cerarols, Chairwoman, Ricard Meléndez, Vice-Chairman representing the Government of Catalonia, Agustí Codina, representative of the Catalan Parliament, Manel Ibarz, representative of the Catalan Parliament, Josep Pujades, representative of alumni, Assumpció Vila, representative of PIMEC, Pilar Planas, Technical Secretary of the Social Council, Joan Miró, Ombudsman.
The visit was an opportunity to showcase ICRA and its facilities and to strengthen institutional relations between ICRA and the University of Girona.

05/05/2014

Reading of the thesis of Xisca Timoner: Stream biofilm responses to flow intermittency

ICRA, Girona

The directors of this thesis were: Vicenç Acuña (ICRA Re-

search scientist) and Sergi Sabater (Associate Research professor, University of Girona, of the ICRA Resources and Ecosystems Research Area and Full Professor of the Institute of Aquatic Ecology at the University of Girona).

Interruption of flow in rivers is an extreme form of the hydrological variability caused by a period without water flow, or dry phase, which generally occurs during the dry season due to a lack of precipitation. The duration and physical extent of this dry phase is increasing due to climate change, overuse of water resources and changes in land use and, as a result, rivers in more temperate zones of the planet are experiencing long periods without water flow. During the dry phase the river bed dries out and the microorganisms that live in the stones and sediments are therefore also exposed to desiccation. The microorganisms that grow on the river bed are known as the biofilm and are very important in the biogeochemical processes of the ecosystem. Biofilm plays a key role in the carbon and nutrient cycles, due to its ability to process organic material. Furthermore, biofilms are the bases of the trophic network, providing energy to the higher trophic levels. Therefore, the main objective of the thesis is to understand the functioning of biofilm during the dry phase, as it is a key step to understanding and predicting the implications of increasing periods without water flow in the biogeochemical cycles and in the functioning of the ecosystem.

07/05/2014
Homage to Ramon Margalef: the person, the teacher and the scientist.
ICRA, Girona

The Institute of Aquatic Ecology in partnership with the Faculty of Science of the University of Girona and ICRA organized this Homage: The following people talked about his life, his scientific work and his teaching activity: Francesc Peters (ICM-CSIC) and Sergi Sabater (IEA-UdG and ICRA).

11/05/2014
24th SETAC Europe Annual Meeting
Basel, Switzerland

GLOBAQUA and SCARCE ICRA's projects, together with the SETAC Advisory Group on freshwater salinization, will organise a Session with the title: What do we know about the effects of multiple stressors and salinization on aquatic ecosystems under water scarcity? The society of Environmental Toxicology and Chemistry (SETAC) organized the 24th SETAC Europe Annual Meeting, which was held in Basel, Switzerland, from 11-15 May 2014.

21/05/2014
Online seminar: Emerging Contaminants Seminar
ICRA, Girona

Damià Barceló took part in the online seminar "Analysis and Identification of Emerging Contaminants and their Transformation Products in River Water, Urban Water, and Hospital Wastewater: Sample Preparation and LC-MS Techniques".

25/05/2014
16th edition of ExTech, the International Symposium on Advances in Extraction Technologies, Chania, Crete, Greece, from 25th - 28th May 2014.
Chania, Greece

The ExTech symposium series is the flagship event for sample preparation, analytical extraction and sample clean-up techniques. The series, started in 1999 by University of Waterloo analytical chemistry professor Janusz Pawliszyn, has been held annually around the world and has become a unique and vital medium for the exchange of information and ideas in the expanding field of sample preparation. Damià Barceló, director of the ICRA, is on the Scientific Committee.

27/06/2014
Conference of the Catalan water-research cluster: New challenges for the conservation of water quality
Science and Technology Park of UdG, Girona

ICRA took part in this conference organized by researchers from the centres that make up the cluster: CEAB-CSIC, IDAEA-CSIC, IEA-UdG, ICRA. With the participation of the Doctoral Program in Water Science and Technology of the University of Girona (UdG).

01-03/07/2014
10th Annual LC/MS/MS workshop on environmental applications and food safety
CSIC, Barcelona

The Spanish National Research Council (CSIC) and ICRA organized this workshop covering environmental analysis and food. It took place from 1 to 3 July, 2014. Damià Barceló, director of the ICRA and Mira Petrovic, research professor (ICREA) of the Water Quality Area of ICRA took part in the Scientific Committee.

22-24/07/2014

Sea on a Chip project conference: 1ST sensor trial meeting

ICRA, Girona

The first conference on the project was held from 22 to 24 June, with the presence of 17 top level research groups from 10 countries (Austria, France, Greece, Italy, Norway, Portugal, Romania, Spain, Sweden and the United Kingdom). Researchers from the following institutions are involved: Université de Lyon (UCBL, France), AEIFORIA SRL (Italy), Organització Qualitat i Projectes (OQP, Spain), Institut Português do Mar e da Atmosfera (IPMA, Portugal), University of Barcelona (UB, Spain), Scuola Superiore Sant'Anna (SSSA, Italy), INTRAROM SA (Romania), CAPSENZE Handelsbolag (Sweden), CEST kompetenzzentrum für elektrochemische oberflächentechnologie (Austria), Panepistimio Ioanninon (UOI, Greece), Norsk Institutt for Vannforskning (NIVA, Norway), SCALPRO AS (Norway), Istituto Delta Ecologia Applicata SRL (IsDEL, Italy), SKALOMA AE (Greece), Plymouth University (PU, United Kingdom) and Institut Català de Recerca de l'Aigua (ICRA, Spain). The first prototype of the sensor was presented at this meeting.

23/07/2014

Conference to present JPI-Water projects

ICRA, Girona

Presentation to the media and those attending the conference of the three projects selected by the European programme, Water JPI, which were awarded to ICRA research teams, led by Sara Rodríguez from the StARE project, Josep Mas-Pla from the PERSIST project, and Carles Borrego of the TRACE project.

10/08/2014

248th ACS National Meeting & Exposition

San Francisco, California

The American Chemical Society, Division of Environmental Chemistry organized Analytical Methods for Detecting and Prioritizing Contaminants of Concern at San Francisco. Damià Barceló, director of the ICRA, was one of the symposium organizers.

19/09/2014

Awarding of the Doctor Honoris Causa prize by the University of Ioannina.

University of Ioannina, Greece

Damià Barceló director of ICRA, accepted the prize in October 2013, for the appointment of Doctor Honoris Causa by the University of Ioannina (Greece), proposed by the Department of Chemistry of that University.
Prof. Triantafyllos Albanis, Rector of the University of Ioannina said "we greatly appreciate his spiritual personality, which is deeply committed to the promotion of genuine European values, and his notable contribution to environmental science and education, as is evidenced by the impressive number of books, articles and studies he has published in the field of environmental chemistry".

30/09/2014

Conference on Industrial Doctorates: innovation, attracting talent and improving products, services and processes.

ICRA, Girona

ICRA took part in the information sessions on the Industrial Doctorates, aimed at: Students, companies and research groups interested in carrying out an industrial doctorate in the area of water science and technology, organized by: PDCiTA, Doctoral Programme in Water Science and Technology of the University of Girona (UdG), UdG Institute of Aquatic Ecology, UdG Chemical and Environmental Engineering Laboratory, Catalan Water Research Institute (ICRA), Water Research Institute of the University of Barcelona (UB), Doctoral Programme in Environmental Engineering, Universitat Politècnica de Catalunya (UPC), Doctoral Programme in Experimental Sciences and Technology; Research Group on Biodiversity, Ecology, Technology and Environmental Management (Grup SGR Emergent) and Research Group on Food, Health and Welfare; University of Vic – Universitat Central de Catalunya (UVic-UCC).

02/10/2014

International Symposium 'Molecular Sciences: Facing Up to Major Societal Challenges'

Université du Lorraine, France

Dr. Mira Petrovic of the ICRA Water Quality Area took part in this conference organized by Université du Lorraine (France).

20-21/10/2014

Final SCARCE International Conference

Tarragona

The final conference of the SCARCE project was held on 20 and 21 October in Tarragona, with the title RIVER CONSERVATION UNDER WATER SCARCITY: Integration of water quantity and quality in Iberian Rivers under global change.

06/11/2014

Visit of the European Innovation Partnership on Water (EIP Water)

University of Girona – ICRA, Girona

Participants at the second annual conference of the European Innovation Partnership on Water (EIP Water) visited the facilities of UdG and ICRA. UdG and ICRA presented jointly as a destination for innovation in singular research infrastructure for the event, the main continental event related to water. The EIP Water organization, a project led and initiated by the European Union, began in May 2013, with the first meeting held at the European Parliament in Brussels, with the aim of driving the development of innovative solutions to meet the main challenges in the world of water, to contribute to the creation of work and economic growth, giving support to established policies for water management.

02-03/12/2014

Workshop: Pharmaceuticals in wastewaters and surface waters under multistressor situations: Fate, Adverse effects, Risks and Removal Technologies

Barcelona

Conference organized in BCN as part of the Globaqua-Cytothreat-Endetech-Scarce projects, on 2 and 3 December 2014.

21/01/2015

Visit by representatives of the Department of Agriculture, Livestock, Fisheries, Food and the Environment

ICRA welcomed Domènec Vila, Director General of Food, Quality and Agrifood Industries, and Jaume Sió, Subdirector General of Rural Innovation of the Department of Agriculture, Livestock, Fisheries, Food and the Environment. They were very interested in learning first-hand about the projects currently under way at ICRA that are related to their department. Dr. Sara Rodriguez and Dr. Diana Alvarez presented the projects SEA-on-a-CHIP and ECsafeSEAFOOD. Dr. Josep Mas-Pla gave an explanation regarding nitrate pollution of groundwater and the studies being carried out to examine their real impact on groundwater. Dr. Oriol Gutièrrez of the Technologies and Evaluation Area showed the visitors the pilot plant facilities for small-scale reactors and treatment plants and gave a brief explanation of the research being carried out.

22/01/2015

Kick Off Meeting TreatREC (Interdisciplinary concepts for municipal wastewater treatment and resource recovery. Tackling future challenges)

ICRA, Girona

Kick Off Meeting TreatREC (Interdisiciplinary concepts for municipal wastewater treatment and resource recovery. Tackling future challenges) - Institut Català de Recerca de l'Aigua (ICRA). 5 European industrial doctorates to meet future challenges on the treatment of urban wastewater and resource recovery.

The kick off meeting of the TreatRec project was held on 22 and 23 January 2015 at the headquarters of ICRA in Girona. TreatREC (Interdisciplinary concepts for municipal wastewater treatment and resource recovery. Tackling future challenges) is a European network of industrial doctorates (EID-ITN) funded via the Horizon 2020 Marie Sklodowska-Curie programme.

28/01/15

Kick-off meeting StARE (STOPPING ANTIBIOTIC RESISTANCE EVOLUTION WaterJPI/0001/2013)

ICRA, Girona

The research objectives established for this project are: 1) to formulate harmonized protocols to measure AR in aquatic environments; 2) to assess the occurrence of antibiotic residues and AR and potentially interacting emerging pollutants in effluents with different impact on the consumption of antibiotics; 3) to identify critical factors of purification treatments; and 4) to develop and improve advanced waste water treatment technologies with/or biological processes to be implemented in critical points.

05/02/2015

Exhibition: THE WATER SPHERE

Factoria Cultural Coma Cros- Salt, Girona

The exhibition, The Water Sphere, produced by the CSIC and Aqualogy as part of the celebrations of the 2013 UNESCO International Year of Water Cooperation, introduces visitors to the world of water, from its chemical properties to its role in human history and civilization.
The exhibition consisted of 21 panels and was divided into two blocs. The first bloc, Water and Nature, dealt with the water cycle, its relationship with the climate and ecosystems. The second bloc, Water and Society, dealt with the influence of humans on the natural water cycle, pollution, and resources for accessing drinking water, while looking at the relationship between water and history, health and technology.
The content of the exhibition was prepared by researchers and experts who work on responses and solutions regarding water.

06/02/2015

Damià Barceló conference at King Saud University (Saudi Arabia)

As part of the conferences organized by King Saud University (Riyadh, Saudi Arabia), with international researchers, the director of ICRA gave a conference titled "Emerging Persistent Organic Pollutants, Micro Plastics and Nanomaterials in Marine Samples".

13/02/2015

ICRA was visited by representatives of different Brazilian universities

As part of the conference organized by CTENO at the UdG Science and Technology Park, "Technological Innovation in the Treatment and Management of Water" (regional conference in Girona), ICRA opened its doors to representatives of Universidad do Estado do Amazonas UEA, Instituto Nacional de Pesquisas da Amazônia- INPA, and Universidad Federal do Paranà, who had expressed their interest in visiting ICRA as an international benchmark centre in relation to water.

09/03/15

A SHORT COURSE ON HIDROLOGICAL MODELLING GLOBAQUA

UNIVERSITY OF TRENTO, Italy

The course was organized by the hydrology group of the University of Trento within the framework of GLOBAQUA, a EU FP7 project. The focus of the course was on modeling hydrological processes across spatial scales. Particular interest was devoted to catchment and continental scales, highlighting difficulties and the solutions proposed to cope with uncertainty arising from the dichotomy between process complexity, due to spatial heterogeneitynd the endemic data scarcity with which hydrology struggles. Practical sessions were organized on the relevant topic of modeling uncertainty

11/03/15

3rd SENSOR TRIAL MEETING & 1st ANNUAL MEETING

ICRA, Girona

PROJECT Real time monitoring of Sea contaminants by an autonomous lab-on-a-chip biosensor (SEA-on-a-CHIP).
REFUNDING AGENCY European Union –OCEAN 2013.1.
Chemical contamination of estuarine-coastal waters is affecting water quality, with negative implications for the environment, human health, fisheries and aquacul-

ture facilities. In response to the increasing concern on biological and chemical degradation of water, the EU has focused on technology development and innovation for rapid assessment and monitoring of contaminants.

18/03/2015

1st Water Congress in Catalonia

Barcelona, Catalonia

ICRA took part in the 1st Water Congress in Catalonia, organized by the Catalan Association of Friends of Water. Dr. Sergi Sabater acted as moderator at the round table "Present and future of water in Catalonia".

19/03/2015

Conference on Water, Ecosystems and Humans: An equation with many unknowns - Sergi Sabater

Salt, Girona

Seminars organized by Centre Associat UNED Girona and the Ter Consortium, as part of the events organized around the exhibition THE SPHERE OF WATER.

27/03/2015

Final-year secondary school students of the Escola Maristes de Girona visited ICRA

ICRA, Girona

ICRA was visited by final-year secondary school students of the Escola Maristes de Girona. This visit was part of the activities of the Cultural Week organized by the school.

08/04/2015

Aquatic ecotoxicology seminars- Master in Water Science and Technology- Doctoral Program in Water Science and Technology

UdG, Girona

ICRA took part in the seminars organized by UdG as part of the Master's Programme in Water Science and Technology. "Pharmaceutical Environmental pollution. Sources, elimination in WWTP and impact on aquatic systems" given by Dr. Sara Rodríguez.

10/04/2015

Visit of the Honourable Josep M. Pelegrí, Minister of the Catalan Department of Agriculture, Livestock, Fisheries, Food and the Environment

The Catalan Minister for Agriculture, Livestock, Fisheries, Food and the Environment, Josep Maria Pelegrí visited the facilities of ICRA, where he highlighted the key role played by centres of this kind. Pelegrí met with the director of ICRA, Damià Barceló, to learn about the latest research projects being carried out that are related to pollution of estuaries and coastal areas and that may have an impact on the environment and on resources such as fisheries and aquaculture.
The minister highlighted "the importance of having reliable data and accurate knowledge of the functioning of ecosystems and biodiversity, and of the factors that can affect their quality, when establishing policies, plans and programmes or aiding competitiveness in the agrifood industry; for this, the role of benchmark centres such as ICRA, who are recognized internationally, is key".

11/04/2015

World Water Day Girona 15

Girona, Catalonia

ICRA took part in the conference organized in Girona as part of World Water Day.

03/05/15

25th SETAC Annual Meeting: Environmental protection in a multi-stressed world: challenges for science, industry and regulators

Barcelona

The SETAC Europe 25th Annual Meeting was held in Barcelona, Catalonia, Spain, from 3-7 May 2015.
The innovative use of chemicals and nanomaterials in new technologies, industry and agriculture challenges many aspects of the ecosystem functioning of the global environment. However, these new technologies and materials also offer opportunities to remediate or minimise these anthropogenic insults. Finding innovative solutions to environmental problems is ever more important in the current economic scenario. For SETAC, this is a challenge we relish.

08/05/2015

Visit by UFMA University and Uppsala University

ICRA, Girona

Management of ICRA and the head of the Technologies and Evaluation Area met with representatives of Universidad Federal de Marañao (Brazil), with the aim of setting out the bases for cooperation as part of a general agreement that will be signed in early 2016, during the conference organized by UFMA, in which ICRA takes part each year.

10/05/15

Desalination for clean water and energy

Palermo, Italy

This was the seventh conference in the EuroMed series and the twelfth in the Mediterranean region, and provided an excellent forum for professionals, scientists and technologists in all aspects of water desalination, to meet and to exchange their ideas and experiences, and to update their knowledge of latest developments in the various aspects of water desalination and water treatment, science and technology.

14/05/15

ECsafeSEAFOOD First Stakeholder Workshop

Palazzo San Giorgio, Italy

ECsafeSEAFOOD First Stakeholder Workshop.

Risk and benefit perception of seafood consumption on human health (including vulnerable groups) for consumer organisations and producers/processors: information needs and communication strategies
How contaminated is the fish we eat? And how much do we know about it? This meeting brought together consumer organisations and seafood producers and processors to discuss how best to develop strategies to ensure that the correct information is communicated while also safeguarding confidence in the fishing industry. Interesting results about emerging pollutants found in seafood products from the ECsafeSEAFOOD project were also presented at the workshop.

27/05/2015

ICRA conference at Université Pierre et Marie Curie

ICRA was present at the conference organized by Université Pierre et Marie Curie, Paris, France, with the seminar: Fate, Effects and Management of Emerging Contaminants in River Catchments under Water Scarcity.

12/06/2015

Roadshows 15 Be Captivated by Leica Geosystems

ICRA, Girona

ICRA lent its premises to Leica Geosystems, who, in collaboration with the distributor **Instop** organized the presentation of **Roadshows 15 Be Captivated by Leica** Geosystems, where they demonstrated their wide range of integrated solutions.

16/06/2015

Kick off of TRACE-JPI project

ICRA hosted the first meeting of the project TRACE – *Tracking and Assessing the Risk from Antibiotic Resistant Genes using Chip Technology in Surface Water Ecosystems.* JPI-Water call. Coordinated at ICRA by Dr. Carles Borrego.

24/06/15

NICOLE Network for Industrially Contaminated Land in Europe (NICOLE Workshop Spring 15)

Manchester, United Kingdom

NICOLE is a leading forum on contaminated land management in Europe, promoting co-operation between industry, academia and service providers on the development and application of sustainable technologies.
The overall objective of NICOLE is to pro-actively enable European industry to identify, assess and manage industrially contaminated land efficiently, cost-effectively, and within a framework of sustainability. In order to achieve this objective, NICOLE focuses its activities in three main areas:
provide a European forum for the dissemination and exchange of good practice, practical and scientific knowledge and ideas to manage contaminated land in a sustainable way; stimulate coordinated, interdisciplinary projects on collaborative, problem oriented research and knowledge transfer to address identified needs; and develop new relationships and strengthen existing relationships with other networks.
NICOLE members are working on management of contaminated land and benefit from the NICOLE network activities.

27/06/2015

FORUM of Young Talent in Catalonia 15 - Water on Earth-
Berga, Barcelona

ICRA took part in the Forum of Young Talent in Catalonia 2015. Dr. Jordi René Mort held the *WORKSHOP ON THE PROPERTIES OF WATER*. The objective of this forum is to give awards to the best pre-university students in Catalonia in order to provide incentives for science and technology, which is essential to the development of society.

30/06/2015

Conference: Current challenges in the field of water
Science and Technology Park of UdG, Girona

The objective of the conference was to highlight the importance of water for society and the need to implement sustainable systems that help to improve its management. It also showed attending companies how they could access industrial doctorates and get intern students from UdG.

08/07/2015

Periodico de Catalunya Debate

ICRA took part in the debate organized by El Periodico de Catalunya *"R&D&I in the Water Sector: The Challenge of Energy Efficiency"*, with the participation of ACCIONA-Agua, ATLL, Dow Chemical and Dow Water&Process Solutions, EADyR and ACA.

10/07/2015

Prize-giving for the 3rd Photography Competition 'Posa el teu objectiu en la prevenció' (Point your lens at prevention)
ICRA, Girona

For the third consecutive year, ACTIVA MUTUA organized the photography competition *"Posa el teu objectiu en la prevenció" (Point your lens at prevention)*

This competition promotes prevention of occupational risks in companies and is a platform for raising awareness about safety and protection of workers. Raising awareness at all levels of the organization is one of the ways of improving behaviour and attitudes.

More than one hundred photographs were submitted to the competition, from different companies throughout Spain that are clients of Activa Mutua. The Occupational Risk Prevention area is committed dynamic and participative involvement of workers in achieving values in this area while promoting and encouraging best preventive practices.
Ricard Zamora, an employee of ICRA won one of the prizes for his photograph "Arc welding".

14/07/2015

Visit of the CSIC Institutional Coordinator in Catalonia

ICRA received Lluís Calvo, the institutional coordinator of the CSIC in Catalonia, together with Francesc Ferrer, director of the CSIC Student Residency. The visit was part of the ongoing cooperation between the CSIC and ICRA.

19/07/15

35th Biennial Meeting of RSEQ
A Coruña, Spain

From the University A Coruña, which celebrates its 25th anniversary this 2014/2015 academic year, we are very honoured by the trust that the Royal Spanish Chemistry Society (RSEQ) has placed in us by asking us to organize its 35th Biennial Meeting, which will be held in A Coruña from 19 to 23 July 2015 and in which we invite you, from here, to take part.
The 35th Biennial Meeting of RSEQ will take place in our city's Exhibition Centre (Palacio de Exposiciones y Congresos, Palexco) and will revolve around 16 specialized symposia on the most diverse areas of chemistry, which will undoubtedly lead to a direct exchange of the latest chemical science and technology. We have an exceptional group of plenary and guest speakers, including Richard R. Schrock, winner of the 2005 Nobel Prize for Chemistry, and Avelino Corma Canós, winner of the 2014 Prince of Asturias award. Furthermore, the 2015 Biennial Meeting kicks off with an important challenge aimed at internationalizing the biennial meetings of RSEQ and, indeed, Spanish chemical science, with 50% of guest speakers coming from foreign institutions.

07/09/15

SETAC Latin America 11th Biennial Meeting 7-10 September 15
Buenos Aires, Argentina

Meeting Objectives
The objective of the SETAC Latin America 11th Biennial Meeting, "The Role of Science in Environmental Decision-Making" was to continue with the series of SETAC Latin America meetings and to promote the interaction among Latin American professionals engaged in environmental science with colleagues from other parts of the world. We wish to stimulate education and participation of students and to facilitate scientific exchanges among the academic, business and government sectors.

15/09/15

TreatRec Advanced Training Course 1, State-of-the art in wastewater treatment, challenges and opportunities.

ICRA and University of Girona, Girona

The first TreatRec Advanced Training Course, was held at ICRA from 15 to 18 September 2015. All the project members gathered for this training program with the objectives of coordinating all network-wide training activities and facilitating interfacing between ESRs and their host institutions and the Doctoral School of the University of Girona.

20/09/15

ICCE 15, the 15th EuCheMS International Conference on Chemistry and the Environment

Leipzig, Alemanya

ICCE 15 provided a unique information and communication platform for environmental scientists and a forum of exchange with their collaborators in (eco-) toxicology, microbiology, geosciences and other disciplines.
Please visit our websiteDocumento7 for latest information on topics, important dates, abstract submission etc. With your active participation the Organizing Committee and the Scientific Committee strive to make ICCE 15 a fruitful and inspiring scientific event.

24/09/2015

CHEMOMETRICS Workshop 2015

The Technologies and Evaluation Area organized two work sessions with researchers and representatives of companies in the sector to share ideas and current needs.

14/10/15

Advanced Materials and Processes for Environment, Energy and Health (Procédés Avancés pour l ' Environnement, l ' Énergie et la Santé, PAEES)

Quebec, Canada

Institut national de la recherche scientifique (INRS)
The purpose of the meeting is to assess the latest scientific and technical breakthroughs in advanced processes applied to the environment, renewable energy and health. This international event is organised for research circles (university labs, governmental labs, and industry) and socio-economic stakeholders and policy makers in this area of the future.

17/10/2015

BRICS- Sustainable Development and Eco-Civilization

ICRA was an invited participant at the conference organize by BRICS, formed by the main emerging economies (Brazil, Russia, India, China and South Africa), who meet each year to debate different topics, including environmental problems; this year's meeting was in Beijing, China.

10/11/2015

Forum d'acteurs COTE - Agenda Eau

ICRA took part, for the second consecutive year, in the Forum d'acteurs COTE - Agenda EAU, organized by the University of Bordeaux. The forum brings together experts from around the world to debate problems of water scarcity in the Mediterranean region.

11/11/2015

Visit of the director of the UdG Science and Technology Park

ICRA received Anna Albar, Director of the UdG Science and Technology Park, who came to visit the facilities and learn about the research being carried out at the centre.

17/11/2015

Conference: Future of Analytical Chemistry in the Spanish Industrial Environment

ICRA took part in the conference organized by the Repsol Technology Centre, with the participation of Spanish universities and research centres.

25/11/15

GLOBAQUA: SHORT COURSE ON RAPID SCREENING OF AQUATIC ORGANIC POLLUTION AND TOXICITY USING BIOASSAYS AND BIOSENSORS

Barcelona, Catalunya

The course was organized by the IDAEA-CSIC within the framework of GLOBAQUA (www.globaqua-project.eu), a EU FP7 project. The focus of the course was the development and application of biological analysis techniques for the rapid detection of organic contaminants or their effects. In this course, special attention was devoted to immuno-analytical techniques, miniaturized and remote unmanned operating systems, and ecotoxicological ap-

proaches for evaluating the effects of toxic mixtures. Practical sessions were organized to show relevant aspects of the mentioned approaches.

26/11/15

Second Conference: The role of groundwater in the mechanism of wetlands

Girona

In recent years, there has been an increase in hydrogeological studies of wetlands in which the source of the water is partially, predominantly or exclusively groundwater. These experiments enable us to understand the hydrogeological mechanism of wetlands (water balance, hydrogeochemical processes, contaminant-attenuation capacity, etc.) and to recognize the importance of the contribution of groundwater to conserving water flow and to the ecological services provided by wetlands. Moreover, the different types of relationships between groundwater and wetlands have been studied and catalogued in an attempt to systematize this type of natural dynamics and to contribute to their study and management.
The International Association of Hydrogeologists - Spanish Group (IAH-SG) organized the first conference on "The role of groundwater in the mechanism of wetlands" (Zaragoza, 22 October 2009). This second conference highlights the geological constitution of these hydrological systems, distinguishing between continental and littoral wetlands, with different dynamics, and the techniques necessary to monitor them and understand their geometric characteristics. The use of hydrochemical and isotopic methods is closely linked to the study of wetlands and groundwater; however, at this conference, they will also be taken into consideration for their ability to naturally attenuate different contaminants. Furthermore, different numerical flow and transport models in this type of system will be presented and the ecological functions, the interrelation between hydrogeological and biological systems and the influence of wetlands on carbon balances will be taken into consideration. The aim of the foregoing is to assess the role of groundwater in the understanding and environmental importance of these environments.

26/11/15

SHORT COURSE ON RAPID SCREENING OF AQUATIC ORGANIC POLLUTION AND TOXICITY USING BIOASSAYS AND BIOSENSORS

Barcelona, Catalunya

The course was organized by the IDAEA-CSIC within the framework of GLOBAQUA (www.globaqua-project.eu), a EU FP7 project. The focus of the course was the development and application of biological techniques of analysis for the rapid detection of organic contaminants or their effects. In this course, special attention was devoted to immuno-analytical techniques, miniaturized and remote unmanned operating systems, and ecotoxicological approaches for effects evaluation of toxic mixtures. Practical sessions were organized to show relevant aspects of the mentioned approaches.

11/12/2015

Conference: Realities and Research in the World of Water in Girona and Catalonia

Science and Technology Park of UdG, Girona

The conference "Realities and Research in the World of Water in Girona and Catalonia" was held on 11 December at the Manel Xifra Boada auditorium in the Narcís Montuiol Building at the UdG Science and Technology Park. It is a conference open to the water sector with the participation of the main water managers in Girona, notable experts in R&D&I, and representatives of regional public authorities.

Over the course of the day, it provides a snapshot of the current state of the urban water cycle, presents different instruments for improving the efficiency of the services and the competitiveness of the sector, and presents the technologies developed to resolve the problem of nitrates in groundwater and corrosive greenhouse gases in sewer systems. We attach the conference programme with details of the papers presented.

14/12/15

4th PROGRESS MEETING MONTH 24 (European project demEAUmed)

ICRA, Girona and Samba Hotel, Lloret de Mar (Spain)

On 14t and 15 December 2015, demEAUmed consortium held a meeting to discuss the progress of the project and its planned activities for the following 6 months in Spain. On the first day, participants gathered at ICRA facilities, located in Girona, to present the status of each work package. On the following day, the consortium visited the demonstration site (Hotel Samba) in Lloret de Mar to observe the installation of demEAUmed technologies and to continue the roundtable discussions.

SEMINARS organized by ICRA as part of the science dissemination programme

07/01/2014

Biosolids as a resource: limitations and potential risks

Dr. Alba Torrents**,** Professor/Director of Graduate Studies Department of Civil and Environmental Engineering/University of Maryland/USA.

31/01/2014

GDGTs as biomarkers of archaeal populations

Mireia Fillol, Predoctoral Student, scientific contributor at ICRA from the UdG Institute of Aquatic Ecology in the ICRA Water Quality Area, Quality and microbiological diversity line.

25/02/2014

How can we protect aquatic organisms from chemical pollution?

Dr. John Sumpter Professor in Ecotoxicology, Brunel University (London, U.K.).

18/03/2014

Application of toxicological biomarkers to different environmental problems

Dr. Montse Solé, researcher at the Department of Renewable Marine Resources of the Institute of Marine Sciences of the Science Research Council.

04/04/2014

Calibration of BSM2 influent generator with micropollutants

Laura Snip (DTU-Technical University of Denmark) a visiting scientific contributor at ICRA (Early Stage Researcher on the SANITAS project).

22/07/2014

Improved efficiency in the use of water in agriculture in semiarid environments

Dr. Juan José Alarcón of the Segura Centre for Edaphology and Applied Biology (CEBAS-CSIC) Murcia, Spain, was invited by the ICRA Water Quality Area.

29/07/2014

Bioprocessing of Wastes for Valorisation and Decontamination

Dr. Satinder Kaur Brar, Ph.D. Assistant Professor. Centre for Water, Earth and Environment, Québec, CANADA, invited by the Water Quality Area.

29/07/2014

Radiolysis and other advanced oxidation processes for degradation of non-steroidal anti-inflammatory drugs in dilute aqueous solutions

Erzsébet Illés, Ph.D. University of Szeged, Institute of Chemistry/ Hungarian Academy of Sciences, Centre for Energy Research. Budapest, Hungary.

17/09/2014

Quantifying N2O Emissions from five full-scale wastewater treatment plants in Australia

Dr. Liu Ye, Lecturer, Architecture and Information Technology, Faculty of Engineering, University of Queensland, gave this seminar.

04/03/15

Urban (waste) water management: challenges, opportunities and future directions.

Dr. Ilje Pikaar. Lecturer in civil and environmental engineering, school of civil engineering. The University of Queensland. (Australia).

04/03/15

Continuous Flow Integrative Sampling (CFIS), A new device for control of water pollution.

Dr. Julio Llorca Porcel, Head of Chromatography Department, Labaqua, (Alicante).

08/05/15

When organics interact with particles: the case of Nanopesticides.

Dr. Melanie Kah, University of Vienna. (Austria).

09/06/15

From Ecosystems to Genes: Effects of Glyphosate-based Herbicides on Native North American Frogs Exposed at Environmental Realistic Concentrations.

Dr. Laia Navarro Martin. Beatriu de Pinos Postdoctoral Fellow Institute of Environmental Assessment and Water Research IDAEA-CSIC (Barcelona).

26/05/15

Cleaning Waters with Nanoparticles.

Dr. Victor Puentes, ICREA researcher at the Catalan Institute of Nanoscience and Nanotechnology. ICN3 (Barcelona).

27/05/15

Organic pollutants determination in surface water samples from Maranhão state, Brazil

Prof. Dr. Ozelito Possidônio de Amarante Junior, Professor Visitant de la Federal Institute of Education, Science and Technology of Maranhão (IFMA) (Brazil)

26/06/15

Discharge anomalies and persistence of fish communities in the American Southwest: a time series approach.

Dr. Albert Ruhi, Post-doctoral research associate at the Arizona State University- (USA)

22/09/15

Screening of microcontaminants in wastewater using HR-MS and statistic al approach.

Yaroslav Verkh, PhD fellow TreatRec ITN-EID project

07/10/15

Nutrients in pampas streams: challenging some of the paradigms of fluvial ecosystems.

Dr. Claudia Feijoó. Universidad Nacional de Lujan (Argentina)

11/11/15

Stream food web: including meiofauna to complete the picture.

Dr. Nabil Majdi. Post-doc fellow of the Alexander von Humboldt foundation at the department of Animal Ecology - Bielefeld University (Germany)

02/12/15

Tandem mass spectrometry behind the scenes.

Dr. Marko Rozman, Postdoc Researcher (MSCA Individual fellowships (IF)

15/12/2015

Presentation of recently incorporated ICRA researchers "From here to there".

Dr. Wolfgang Gernjak – Àrea TiA

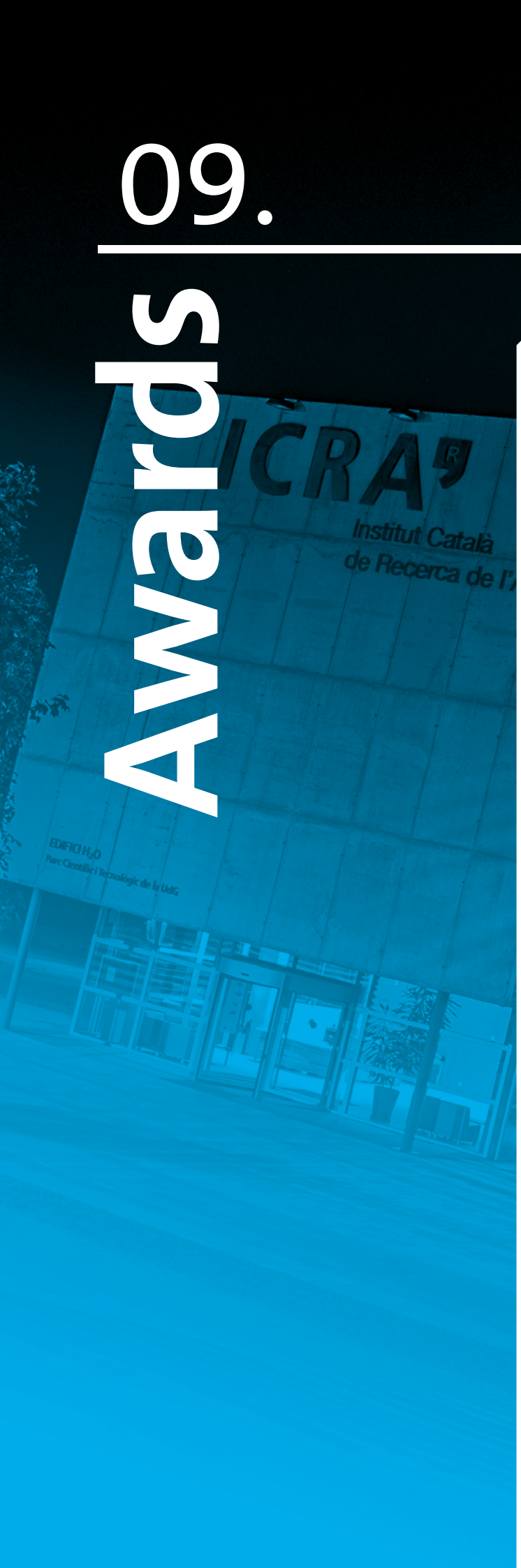
"Disinfection by products in drinking and recycled water in Australia".

Dr. M. José Farré – Quality Area

"Challenges and opportunities for electrochemical systems as next-generation (waste) water treatment technology".

Dr. Jelena Radjenovic – Quality Area

09. Awards



Prize for the best oral presentation of the conference:

Rodriguez-Caballero A., Aymerich I., Poch M., Pijuan M. (2014). Identification and characterization of Process scenarios leading to peak CH4 and N2O emissions in a full-scale wastewater treatment plant. 2nd IWA Specialized International *Conference: ecoSTP2014 EcoTechnologies for Wastewater Treatment. Technical, Environmental & Economic Challenges. Verona, Italy 23-27 June 2014*.

International Water Association 2014 Project Innovation Award in the Applied Research Category" Global winner for the project "SCORe: putting science into sewers". The IWA Project Innovation Awards (PIA) is a prestigious global competition which recognises and celebrates innovation and excellence in water engineering projects around the world in six different project categories – applied research, planning, design, operations/management, small projects and marketing and communications.

B-HERT Business/Higher Education Round Table, Australia. Best Research & Development and Award for Outstanding Excellence in Collaboration 2014 for the project "SCORe: putting science into sewers". B-HERT pursue policies and collaboration initiatives that will advance the goals and improve the performance of business and tertiary education.

2014 Research Innovation Award at the Australian Water Association (AWA) Queensland Branch for the project 'Putting Science into Sewers'.

The project "Sewer Corrosion and Odour Research SCORe: Putting science into sewers", of which one of the leaders is ICRA researcher Oriol Gutierrez, recipient of the international IWA award for the best innovation and applied research project in the Asia-Pacific Region.

The SCORe project "Sewer Corrosion and Odour Research: Putting science into sewers", which includes the ICRA researcher Oriol Gutiérrez as a key member, has been awarded the International Water Association Prize for best innovation and applied research project in the Asia-Pacific region. It is the second time the team, of which Dr. Oriol Gutierrez is a member, receives this prize. In 2008, it was given for the project "Understanding the Biotransformation Processes in a Sewer System to Achieve Optimal Management".

The 2014 prize, which was awarded the following month at the Water Week in Singapore, recognizes the exceptional level of the knowledge generated, the new tools developed and the innovative technologies that the research generated to help urban water treatment companies in the face of the enormous problems of odour and corrosion in wastewater treatment systems.

The International Water Association (IWA) established the programme of Prizes for Innovation Projects to recognize excellence and innovation in engineering projects relating to water worldwide, based on 5 fundamental criteria: 1) originality and innovation, 2) future value to engineering, 3) social, economic and sustainable focus, 4) complexity, and 5) meeting the needs of the client/owner.

This 5-year project is the largest research at world level dedicated to odour and corrosion in sewers and was led by the Advanced Water Management Centre of the University of Queensland (Australia) and carried out by 5 research centres and 11 industrial partners. The project consists of a team of the best engineers, microbiologists, materials scientists, analytical chemists and mathematical modellers, who have developed solutions to provide support for effective and sustainable economic management of the problems of odour and corrosion in sewer systems. During the course of the project, the industrial partners have saved in the order of hundreds of millions of dollars. The project is fundamentally changing the management of odours and corrosion in sewers in Australia and will have a lasting impact on the water industry worldwide.
The project "Sewer Corrosion and Odour Research: Putting science into sewers" will now represent the Asia-Pacific region at the World Water Congress in September in Lisbon (Portugal) in the competition to be considered the best applied research project worldwide.

Poster Award. Valdes, M.E., M.A. Bistoni, D.A. Wunderlin, B. Huerta, S. Rodriguez-Mozaz, D. Barceló. Bioaccumulation of pharmaceuticals in fish of Suquía River basin (Córdoba, Argentina). 10th LC/MS/MS workshop on environmental applications and food safety. Barcelona, Spain, 1-3/07/2014

Poster Award. Fernández, D.L., S. Rodríguez-Mozaz, L. Ferrando Climent, C. Cruz Morató, M. Badia, G. Llorens, M. Gros, E. Marco Urrea, G. Caminal, P. Blánquez, T. Vicent, M. Sarrà, D. Barceló. Non-conventional biodegradation treatment by fungi for the removal of selected pharmaceuticals from effluents. 4th International Conference on Industrial and Hazardous Waste Management. 2-5 September 2014 (Crete, Greece)

Poster Award. Subirats, J., M. Fillol, S. Compte, A. Sánchez-Melsió, P. Rivas, A. Rosell y C. M. Borrego. Distribution and diversity of members of the Miscellaneous Crenarchaeotic Group in sediments of freshwater lakes with different climatic and trophic conditions. I Jornada del Clúster Catalán del Agua. 27 June 2014 (Girona).

Poster Award: Buttiglieri G., Collado N., Ricken B., Corvini P.F.X., Comas J., Rodriguez-Roda I. (2014). Sulfamethoxazole biodegradation by a specific bacterial strain and investigation of its proteome. 2nd IWA Specialized International Conference: ecoSTP2014 EcoTechnologies for Wastewater Treatment. Technical, Environmental & Economic Challenges. Verona, Italy 23-27 June 2014. Poster and proceedings pp. 755-758. Prize for the 2nd best poster of the conference

In 2015, the University of Girona awarded the extraordinary doctorate prize to the thesis

"Occurrence of antibiotic resistance genes in aquatic microbial communities exposed to anthropogenic activities" by Dr. Elisabet Marti, directed by Dr. José Luís Balcázar (ICRA) and Dr. Juan Jofre (UB).

10. Financing

FINANCING 2014

Contribution of the Catalan Regional Government's **Ministry of Economy and Knowledge (DECO)**	€1,811,904.28
Competitive projects **(Catalan Regional Government)**	€41,188.48
Competitive projects **(Ministry of Economy and Competitiveness)**	€447,942.17
Competitive projects **(European Union)**	€530,740.53
Transfer projects	€158,391.13
Financial income	€318.99
Other income	€3,006.75
TOTAL INCOME 2014	**€2,993,492.33**

FINANCING 2015

Contribution of the Catalan Regional Government **Ministry of Economy and Knowledge (DECO)**	€1,812,000.00
Competitive projects **(Catalan Regional Government)**	€68,411.35
Competitive projects **(Ministry of Economy and Competitiveness)**	€576,711.21
Competitive projects **(European Union)**	€984,827.81
Transfer projects	€153,424.40
Financial income	€13,182.90
Other income	€5,002.15
TOTAL INCOME 2015	**€3,613,559.82**

11. ICRA in the news and press

ESTUDI DE L'ICRA DE GIRONA

Els fàrmacs contaminen la fauna dels estuaris europeus

- Peixos i mol·luscos mostren traces de drogues psiquiàtriques o antiinflamatoris
- Tot i que no se superi el nivell d'alerta, és «un problema emergent», adverteixen els autors

ANTONIO MADRIDEJOS
BARCELONA

Una anàlisi de diverses espècies de peixos, mol·luscos i algues que viuen en estuaris de cinc rius europeus ha detectat en tots ells productes farmacèutics i disruptors endocrins –substàncies capaces d'alterar l'equilibri hormonal–, incloent-hi medicaments psiquiàtrics, productes antibacterians, antiinflamatoris i retardants de flama, segons mostra un estudi internacional en el qual han participat investi-...

JOAN CASTRO / ICONNA

La investigadora Diana Álvarez, en un laboratori de l'ICRA a Girona.

ESTUARIS CONTAMINATS

Concentració de contaminants

Les depuradores no ho filtren tot

L'ADN de la setmana

PERE Puigdomènech

Terratrèmols

El terratrèmol del Nepal del 25 d'abril va causar enormes destrosses en vides humanes i en edificis. En fenòmens com aquest no s'hi pot fer gran cosa més enllà de la recerca de morts i ferits i reparació dels danys. Però sabem que hi ha llocs on hi ha terratrèmols amb més freqüència i el Nepal és un d'aquests llocs. Les mesures de prevenció hi haurien de ser especialment importants.

El Nepal és un país situat en un dels llocs més actius del món des del punt de vista geològic: es pot mesurar fins i tot com la placa que forma l'Índia s'introdueix sota la placa del Tibet a una velocitat d'uns quants centímetres cada any. Això aixeca les grans muntanyes de l'Himàlaia i al mateix temps crea unes tensions que de vegades desencadenen ruptures...

No podem evitar un terratrèmol, però sí que podem aplicar mesures de prevenció

HORIZON
The EU Research & Innovation Magazine

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HEALTH AGRICULTURE

Warming oceans, floods and drought – protecting food from climate change

26 May 2015

by Joanna Roberts

Rising sea temperatures and acidity levels can increase the level of contaminants in seafood. Image: Shutterstock/lupu robert ciprian

Extreme weather and a changing climate are presenting new threats to the safety of our fish, seafood and vegetables, according to European scientists who are working out how to keep our food safe to eat.

Fish and vegetables form an important part of a healthy diet but only if they are safe to eat when they reach your dinner plate. Food-borne and diarrhoeal disease kills two million people per year, including children.

Professor Mieke Uyttendaele, from the University of Ghent, Belgium, who is looking into the safety of vegetables, says that extreme weather such as floods can lead to contamination, whereas drier periods could make water a scarce resource. Both of these can impact on the safety of crops.

See also

Inequality, not unavailability, is the main driver of food

MEDI AMBIENT

Els rius pirinencs perden aigua

Un estudi constata que el cabal de la Noguera Pallaresa s'ha reduït un 20% durant l'últim mig segle

MARIO MARTÍN MATAS
BARCELONA

Les dades són cada cop més clares. Els estudis científics més recents constaten que el canvi climàtic és una realitat que té efectes mesurables, també a casa nostra. Ea el cas de la Noguera Pallaresa, un dels rius més representatius del Pirineu català, que, segons les dades d'un treball que estan desenvolupant investigadors de l'Institut Català de Recerca de l'Aigua (ICRA) i d'Endesa, ara se sap que durant l'últim mig segle ha perdut entre el 16% i el 25% del seu cabal històric depenent del tram del riu. Seria injust atribuir tota aquesta pèrdua al canvi climàtic perquè, de fet, la modificació dels usos del sòl hi està estretament relacionada. Abans hi havia més camps i més pastures, però, amb el despoblament rural i una massa forestal creixent, no arriba tanta aigua al riu. Quanta? Els càlculs que recull l'estudi xifren en una quarta part, com a màxim, el percentatge d'aigua perduda que es pot atribuir a aquest factor, segons explica a l'ARA l'investigador de l'ICRA i catedràtic d'ecologia de la Universitat de Girona (UdG) Sergi Sabater.

MENYS AIGUA AL RIU
Diversos estudis científics apunten que la reducció progressiva de cabal dels rius és pel canvi climàtic. Els Pirineus són, segons els models climàtics, una de les zones més vulnerables. A la fotografia, el riu Noguera Pallaresa després de sortir de la presa de la Torrassa entre els municipis de la Guingueta d'Àneu i Esperi. MARIO

Pluges canviants

Les pluges, el fet que hi hagi menys innivació als pics més elevats i la desmesticació del riu embassament reembassament també hi han tingut el seu paper. De fet, tal com explica el responsable de biodiversitat i recursos hídrics d'Endesa, Antoni Palau, que també és professor de la Universitat de Lleida (UdL), pot ser que, en termes globals, plogui la mateixa quantitat d'aigua cada any i que el riu estigui perdent cabal, perquè la manera com cau aquesta pluja és determinant. No és el mateix una pluja torrencial de dos dies, en què molta aigua es perd, que la mateixa quantitat de pluja al llarg d'un mes seguit, constant i sobre un terreny humit. El treball sobre la Noguera Pallaresa es va iniciar el 2012 i tot just ara s'ha acabat la part que mesura els paràmetres físics del riu. La idea, però, és continuar estudiant si també s'han vist afectats la quantitat de sediments que transporta i els nutrients i, en última instància, com repercuteix tot plegat en els ecosistemes fluvials. Per arribar a la conclusió que el cabal s'ha reduït una cinquena part, els investigadors han analitzat l'aportació natural, la transpiració d'un bosc en comparació amb un camp de pastura, les dades històriques de registres del riu i la superfície de boscos, entre altres factors.

Sabater ho resumeix en tres trams concrets d'un riu que, abans de desembocar al Segre, recorre prop de 150 quilòmetres. A Escalò la pèrdua de cabal en comparació amb els anys 50 del segle passat ha sigut del 10%, a Flamisell, del 27%, i a Talarn, del 16%. La diferència dins d'una àrea geogràfica petita amb una variabilitat climàtica "mínima", segons Sabater, s'explica sobretot pel canvi en els usos del sòl, tot i que la reducció generalitzada de cabal evidencia que hi ha una "tendència general" inqüestionable, com ja apunten altres estudis similars fets sobre el riu Ebre des dels anys 90. Tot i que la recerca sobre la Noguera Pallaresa "no és extrapolable", perquè cada riu transcorre per una zona diferent i amb unes altituds concretes, els treballs actuals volen anar més enllà i preveure els impactes que tindrà aquesta realitat en totes les nivells i, en aquest sentit, el model traçat pot ajudar a entendre altres realitats. La lògica de tot plegat per a Endesa és també econòmica, ja que, en un riu en què la generació d'electricitat ha substituït els tradicionals raiers com a principal activitat econòmica, saber com canviarà el cabal pot ser essencial per adaptar el model de negoci.

Amb menys aigua al riu hi haurà menys capacitat de produir electricitat, però no és només això. Si plou torrencialment entraran més sediments als embassaments i caldrà netejar el fons més sovint, si l'aigua augmenta el temps mitjà de residència creixeran més algues i, addicionalment, si hi ha menys líquid embassat la temperatura també serà superior. Molts desafiaments ara per ara impossibles de predir al segle X, quan els documents medievals de l'època ja donaven fe de l'existència del "*Flumen Nogare*". —

El Govern assumeix que el canvi climàtic és una realitat i cal adaptar-s'hi

M. M. M.
BARCELONA

"Els Pirineus són un dels punts més sensibles al canvi climàtic i la previsió és que patiran increments de temperatura superiors a la mitjana". Ho explica a l'ARA Salvador Samitier, el director de l'Oficina Catalana de Canvi Climàtic (OCCC), una institució pública que treballa des de fa anys en la modelització del canvi climàtic. L'any 2012 va definir l'estratègia d'adaptació, amb més d'un centenar de mesures concretes que s'haurien de prendre, i ara acaba de definir uns indicadors precisos per saber en quina mesura Catalunya s'està adaptant o no als impactes previsibles.

L'estany de Certascan, a més de 2.200 metres d'altitud, acaba desembocant a la Noguera Pallaresa. MARIO

65 efectes concrets

L'estratègia catalana del 2012 ja definia 65 efectes del canvi climàtic, la majoria existents i contrastables, com l'increment de la temperatura mitjana o, precisament, la reducció de cabals als rius. Samitier explica que en qüestió d'emissions de CO_2 hi ha més consciència i ha sigut més fàcil prendre mesures concretes, però en termes d'adaptació al canvi climàtic és més difícil, sobretot entre el món empresarial, perquè l'adaptació té a veure amb el risc futur i, en la pràctica, s'imposa la gestió diària i a curt termini.

L'OCCC ha definit una trentena d'indicadors estadístics capaços de definir el grau d'adaptació al canvi climàtic, com els consums d'aigua i d'energia, l'ocupació del transport, el nombre de canons instal·lats a les pistes d'esquí per produir neu o les hectàrees cremades en un incendi, entre d'altres. Gràcies a això, l'oficina sap que Catalunya hi un "aprovat just" en adaptació i que fins i tot la nota a ha reduït lleugerament entre el 2005 i el 2011. L'eina, però, s'ha de perfeccionar amb més indicadors i, a la pràctica, suposa un tret de sortida sobre una problemàtica que, malgrat que ara per ara és teòrica, es farà cada cop més real. —

ÉS NOTÍCIA

La Pallaresa perd un 30% de l'aigua a causa del canvi dimàtic i la reforestació

Segons un informe d'Endesa, que avisa que es posa en risc la qualitat del rierol

La conca de l'Ebre ha perdut un 5% del cabal global, segons la CHE

BUSINESS

CLEANING UP DRUGS IN WASTEWATER

Project to degrade pharmaceuticals with ENZYMES falls short but could yet be made commercially viable

34 Comarques Gironines GIRONÈS

EL PUNT AVUI
DIJOUS, 24 DE JULIOL DEL 2014

L'ICRA estudia la resistència als antibiòtics en l'aigua

L'Institut Català de Recerca de l'Aigua, amb seu a Girona, és l'únic que participa en tres dels set projectes de recerca d'un programa europeu sobre contaminants emergents en el cicle de l'aigua

Lurdes Artigas
GIRONA

L'Institut Català de Recerca de l'Aigua (ICRA), amb seu a Girona, és l'únic organisme europeu que participarà en tres dels set projectes que s'han seleccionat en el programa europeu Water JPI. Els reptes de l'aigua en un món canviant. Concretament, tot i que la convocatòria era més àmplia i es referia a l'estudi de tot tipus de contaminants emergents en el cicle de l'aigua, els tres projectes en què està involucrat se centren en l'estudi i combat de la presència de patògens resistents als antibiòtics. "Es tracta d'un greu problema de salut pública, com va dir fa poc l'OMS, i hi estudiat poc", va destacar Carles Borrego, un dels investigadors.

"Participar en tres dels tanies set projectes elegits entre un centenar consolida el pes de l'ICRA a Europa", remarcava ahir el director de l'Institut, Damià Barceló, que va admetre que no ser coordinadors de cap projecte els ha permès participar en més.

En total el Water JPI té un pressupost de 9 milions d'euros, que pagaran directament els estats. El govern espanyol hi ha destinat 1,2 milions, dels quals "Catalunya s'endú més de la meitat", en paraules de Barceló. L'ICRA en rebrà 401.000; la UB, 248.000, i la URV, 50.000.

Els tres projectes

Els tres projectes en què participa l'ICRA són multidisciplinaris i es començaran a desenvolupar entre finals d'any i gener.

El projecte Stars se centra a estudiar el problema de la resistència dels antibiòtics des del punt de vista de les depuradores, que en són un dels principals focus, i analitzar "diferents tractaments d'aigua avançats", segons va explicar Sara Rodríguez Mozaz, una de les investigadores de l'ICRA que hi participaran. Hi prenen part 11 socis de 7 països i també una durada de tres anys. L'ICRA rebrà 115.000 euros.

El projecte Persist es vol "fixar en l'aigua subterrània", que està contaminada per purins, per estudiar si els contaminants poden viatjar fins a arribar a les captacions i si així cansia la comunitat microbiana, en paraules de Josep Mas-Pla, un dels investigadors. En aquest cas és un projecte de només tres entrues i 2 anys de durada, i el pressupost per a l'ICRA és de 136.000 euros.

I el projecte Trace, en què participa Borrego, preveu desenvolupar "un test basat en biosiqics d'ADN per detectar gens de resistència a antibiotics en sistemes aquàtics". Se centrarà en tres ambients –diu Tera Girona, el Ter Lustcho a Alemanya i la platja d'Ostia a Itàlia– per "intentar identificar i quantificar la presència de gens de resistència a antibiòtics i intentar avaluar el risc que suposa per al consum humà, per als banyistes...". L'ICRA rebrà 150.000 euros i la durada serà de tres anys.

Van destacar també les tres beques associades als projectes, que permetran fugar tres persones i, per tant, que "entri gent nova de doctorat o postdoctoral" a l'ICRA.

La xifra

401.000

euros és el pressupost total que rebrà l'ICRA per al seu treball en els tres projectes del Water JPI.

La data

2017

és l'any en què acabaran dos dels tres projectes; l'altre acabarà el 2016, fets d'iniciaran a finals d'aquest any o gener.

Borrego, Barceló, Rodríguez i Mas-Pla, durant la roda de premsa d'ahir ■ ACN

Presenten un projecte d'estalvi energètic

Redacció
GIRONA

La Diputació de Girona ha presentat a la convocatòria del programa europeu Horitzó 2020 un projecte, anomenat BEnerGI (*Bundling sustainable energy investments for Girona municipalities*), que pretenderà millorar l'estalvi energètic dels municipis gironins. Sogasa ha informat fems, el projecte disposa del suport tècnic del Clima i té un cost d'1,5 milions d'euros. L'objectiu és estalviar anualment 28,38 Gwh, augmentar la producció de renovables (11,60 Gwh) i superar la reducció del 20% de CO_2 que requereix la UE. L'estalvi econòmic anribaria a 16 milions anuals, alhora que es crearien 122 llocs de treball indirectes i es formaria més de 180 treballadors de pimes i d'entitats locals.

La Diputació explica que el procediment per assolir aquest objectiu exigeix trobar noves empreses de finançament que ajudin a signar nous contractes amb empreses de serveis energètics (ESE i ESE) i, alhora, capacitar les pimes gironines del sector més i d'entitats locals.

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La Diputació assumeix tres vies locals més

Beatriz Magín
GIRONA

La Diputació va aprovar en el ple de dimarts, per unanimitat, els convenis amb els ajuntaments de Cruïlla, Gombrèn, Amer i Susqueda per assumir la cessió de tres vies locals. Abans del canvi de propietat, la Diputació destinarà 985.000 euros a condicionar-les (rehabilitació del ferm i dels elements tècnics).

Concretament, es tracta del tram de carretera que uneix la GI-682 amb el nucli de Cruïlla, de 650 metres, en què s'invertiran 67.250 euros; de la carretera que uneix Gombrèn i Castellar de n'Hug, de 6,5 quilòmetres, amb un pressupost de 140.250 euros, i del camí a Sant Martí Sacalm, de 8,2 quilòmetres, al qual es destinaran 690.310 euros.

Les cessions formen part del plà de carreteres de les comarques gironines, pel qual la diputació assumirà en els propers anys 1.230 quilòmetres de carreteres, el doble que ara. ■

6 DILLUNS, 3 DE MARÇ DE 2014 Diari de Girona

Comarques

Damià Barceló

Director de l'ICRA, (Institut Català de recerca de l'Aigua) el doctor Barceló és també subdirector de l'Institut de Diagnosi Ambiental i Estudis de l'Aigua i dirigeix així mateix diversos projectes sobre els rius ibèrics. Ha rebut nombrosos premis internacionals pels seus estudis relatius a l'aigua i el medi ambient. És en definitiva una referència internacional, i acaba de ser nomenat Doctor Honoris Causa per la universitat grega de Ioànnina

«La major part de la contaminació de l'aigua és urbana, pels medicaments que prenem»

Albert Soler
GIRONA

Per què maltractem l'aigua?
La maltractem perquè hi estem tirant moltes porqueries. La necessitem per tot, dos del ciutadà normal per beure-se i cuinar, per a usos agrícoles i també per a usos industrials. Com que és un producte limitat, s'ha de reutilitzar. Però la maltractem sobre tot pels usos.

Estudien els escolars prou ciències ambientals?
No fer, no n'estudien, estudien ciències naturals, la natura, les plantes... Només si és una visió prou de conjunt del que és el medi ambient, els ecosistemes, el canvi climàtic. Fem perquè el funcionament en conjunt del nostre ecosistema no s'enfonsi.

Doni'm una alegria, digui'm que els rius i els mars no estan tan malament com es diu.
Hem millorat, està clar, sobretot perquè ara hi ha depuradores d'aigues residuals urbanes. Uns exemples són el Llobregat i el Ter, perquè com més ecosistemes, el canvi climàtic. Fem perquè el funcionament en conjunt del nostre ecosistema no s'enfonsi.

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Ah, no?
No, perquè s'han fet millores tecnològiques però també ha anat el consolidament i saltem de més productes que es troben a l'aigua.

Com ho fem?
Sobretot els productes farmacèutics d'ús personal.

Es refereix al fet que ells que ens ajuden els Bencens al vàter?
Això també, hi ha qui llença els caducats. Però jo en refenèix al general i el paracetamol o qualsevol medicament que prenem. Com que sempre prenem més dosi de la normal, l'excés el deixem anar per fotma, i d'allà a les aigües, ja que les depuradores no ho poden eliminar. Així en dia la major part de la contaminació de les aigües és urbana, bàsicament de medicaments. I cada vegada més, ja que augmenta l'edat mitjana de la població i per tant també el consum de medicaments. A més, hi ha els xampús, dentífics, etc.

I cap al riu?
Cap al riu. I ja està afectant els peixos i l'ecosistema. No mata els peixos, però els està produint canvis importants. Als EUA ahir ja ha provocat una campanya perquè la gent prengui menys medicaments.

Com afecta els peixos?
Els provoca canvis hormonals, i per tant als seus moviments i a la seva reproducció. Als mascles els surten caràcters femenins.

La contaminació de les aigües està provocant canvis de sexe?
No, no és que els mascles es tornin femelles, però perden la capacitat de reproduir-se. Entre els medicaments que acaben als rius n'hi ha de tipus hormonal.

Tanmateix, estarem d'acord que els rius estan molt millor que fa trenta anys.
Es clar, els rius a Catalunya estan molt millor avui, gràcies al fet que es va construir tota la xarxa de depuradores d'aigües residuals a partir de l'any 90, com li deia.

Deu estar al cas del pobre cabal del Ter a causa del trasvasament d'aigua a Barcelona. Temen diet els regants a quedar-se sense rius i es de nínguit?
Ho sé de tots. Au hé, tenen dret de queixar-se, i no només els regants sinó també tothom que ha servir el Ter per a altres usos que no sigui el mc. Que hi ha un trasvasament a Barcelona és un fet, i això ja ho ha volia resoldre el primer Govern tripartit, per això ens les dessanitzadores que s'havia previst construir. L'aigua desaladritzada aniria a Barcelona i així el Ter amirà recuperant el seu cabal original. Però ens han dit que hem entrat en crisi –i és veritat– i una desaladradora és cara, com també ho és fer-la funcionar. Imagino que d'aquí uns anys això se solucionarà, sé que tots els governs catalans han tingut aquest tema sobre la taula.

Vostè és també un expert en medi ambient. Ha hi gent –i no només el cosí d'en Rajoy– que neguen el canvi climàtic. Com els convenceria del contrari?
Jo he estat treballant a Alaska. Només els hauria d'ensenyar com s'està desglaçant, com estan desaparaixent les glaceres i la neu. No cal ser un entès en gaires matèries per adonar-se de quina és la causa. A Groenlàndia està passant el mateix, a l'Artic està obrint una ruta per la qual hi podem passar vaixells, cosa abans impossible... El desglaçament dels oceans Àrtic i Antàrtic és conegut. I el nigú no s'ho creu, que hi vagi, que s'apuntin a una excursió i ho vegeu claríssimament. Són només alguns exemples. Com ho són els episodis de sequera que des de fa anys pateix l'est dels Estats Units. Està augmentant la temperatura a moltes zones del món.

Tot això ho admeten, però consideren que són canvis naturals i que l'acció de l'home no hi té res a veure.
Això no és veritat. En primer lloc, la població mundial està augmentant en no milions de persones cada any, i això suposa més consum d'energia. En segon, el 30% de la població xinesa ja és urbana, i és evident que consumeix també més energia. Tot això suposa més consum de combustible, més gasos que provoquen efecte hivernacle i afecta els recursos naturals. Alguns estudis asseguren que l'any 2050 la massa d'aigua i d'aliments serà un greu problema mundial. Tot és una cadena.

CONTAMINACIÓ DELS RIUS
«Els peixos estan patint canvis hormonals, perdent la capacitat de reproduir-se»

CANVI CLIMÀTIC
«Si algú no hi creu, que vagi d'excursió als oceans Àrtic o Antàrtic i ho veurà amb els seus ulls»

DEMOGRAFIA MUNDIAL
«Augmenta 80 milions de persones l'any i creix el consum de combustible i fefecte hivernacle»

POLICYFORUM

Why Should We Care About Temporary Waterways?

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■ Diari de Girona | DILLUNS, 9 DE JUNY DE 2014 | 3

CORREU ELECTRÒNIC diaridegirona@epi.es | TEMA DEL DIA

Científics gironins participen en un projecte australià que millora la gestió del clavegueram

▶ Una recerca que resol els problemes d'olors i de corrosió a les xarxes de sanejament d'aigües residuals rep un premi internacional

GIRONA | PILI TURON

■ L'Associació Internacional de l'Aigua ha premiat un projecte desenvolupat a Austràlia que millora la gestió de les xarxes de clavegueram, en el qual va participar primer l'investigador de l'Institut Català de Recerca de l'Aigua (ICRA) de Girona Oriol Gutiérrez i, després, un altre científic gironí, Ramon Ganigué, ara adscrit al Laboratori d'Enginyeria Química i Ambiental (Lequia) de la UdG.

Sewer Corrosion and odour research: Putting science into sewers («Corrosió de claveguera i investigació de l'olor: posant la ciència a les clavegueres») és la principal recerca a nivell mundial per combatre els problemes d'olors i de corrosió a les xarxes urbanes de sanejament d'aigües residuals.

La investigació ha estat promoguda per la Universitat de Queensland, a Austràlia, que ha comptat amb la participació de cinc centres de recerca diferents i onze empreses. Així ho detalla l'ICRA, com també destaca que en el seu desenvolupament hi estan implicats els millors enginyers, microbiòlegs, científics de materials, químics analítics i modelitzadors matemàtics. Tots ells –remarca l'institut gironí– treballen per aconseguir una gestió econòmica, eficaç i sostenible de les males olors i la corrosió que es produeixen en els sistemes de clavegueram.

256 MILIONS
Estalvi calculat per a les empreses inversores en els propers 15 anys

Els resultats d'aquesta recerca ja s'estan aplicant a Austràlia, s'ha constatat que suposarà beneficis de centenars de milions d'euros per a les empreses que hi han invertit –sobretot en concepte d'estalvi– i, per al futur, es preveu que tindrà un fort impacte en la indústria de l'aigua a nivell mundial.

Ara, l'Associació Internacional de l'Aigua (IWA, amb les seves sigles en anglès) ha reconegut aquesta investigació amb participació gironina amb el premi al millor projecte d'innovació i de recerca aplicada a la regió d'Àsia-Pacífic, zona que al setembre representarà al Congrés Mundial d'aigües que se celebrarà a Lisboa (Portugal) i en el qual s'escollirà la millor investigació d'àmbit mundial. Abans, aquest juny, l'IWA els entregarà el guardó que ja han aconseguit en un acte a Singapur.

El Doctor Oriol Gutiérrez –nascut a Vic el 1975 i pertanyent al grup de Tractament i Sanejament de l'ICRA, amb seu al Parc Científic de la UdG– és un dels investigadors responsables del projecte, en el qual va treballar entre 2005 i 2010. Aquest últim any, i pocs mesos abans que Gutiérrez tornés a Girona, s'hi va incorporar Ramon Ganigué (la Bisbal d'Empordà, 1982). Tots dos es van formar a la UdG, van fer el doctorat al mateix Departament i van guanyar una plaça universitària a Austràlia.

La investigació que ha aconseguit millorar la gestió del clavegueram es va desenvolupar entre 2008 i 2013, però va sorgir d'«un projecte llavor» –tal com el va descriure Gutiérrez– que es va iniciar el 2005 i en el qual també va treballar l'investigador de l'ICRA.

La implicació de les principals empreses d'aigües australianes va permetre afrontar el segon projecte, aquest de gran envergadura, tal com deixa clar el seu pressupost: prop de 12 milions d'euros, la meitat aportats per l'empresariat i l'altra, pel govern. El Doctor Ganigué va remarcar que «és el pressupost més gran donat fins ara a aquell país».

Solucions reals i aplicables

Darrere aquest projecte hi havia la voluntat de les empreses per trobar solucions reals i aplicables als problemes presents en la gestió dels col·lectors i, sobretot, als causats per la producció de sulfhídrics. Aquest últim fet, tal com va explicar Oriol Gutiérrez, provoca tres grans problemes: una olor d'ous podrits, que pot molestar els veïns; una toxicitat susceptible de causar riscos per a la salut, que poden anar des de mals de cap i nàusees fins a la mort en cas de concentracions molt altes –amb el consegüent perill per a treballadors–; i per últim, la formació d'àcid sulfúric, que és possible quan els sulfhídrics passen de l'aigua a l'atmosfera dels col·lectors. Tal com van advertir els científics gironins, aquest àcid és molt corrossiu i es menja el ciment de les canonades, escurçant dràsticament la seva vida útil i col·lapsant el sistema.

Dels múltiples factors resolts gràcies a la investigació, destaquen des de materials més resistents fins a la creació d'un model matemàtic que, de manera científica, permet predir què passarà en un col·lector a diferents anys vista.

GIRONA

Aplicació als pobles de la Costa Brava

▶ **Part dels coneixements adquirits a Austràlia s'apliquen a Girona a través d'una col·laboració entre l'ICRA i el Consorci de la Costa Brava. Gutiérrez va explicar que un dels problemes de la costa gironina és la gran diferència entre la població habitual i la de l'estiu, ja que el clavegueram està preparat per absorbir una gran quantitat d'aigua residual que a l'hivern es redueix ostensiblement. Això fa que arribi més lentament a la depuradora i augmenti el contacte amb els microorganismes, igual que les possibilitats de produir sulfhídric o metà. L'objectiu és aplicar les descobertes a problemàtiques locals com aquesta, una feina en què treballa l'equip de l'ICRA.** P.T.V. GIRONA

ANIOL RESCLOSA

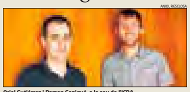
El Doctor Oriol Gutiérrez, dijous, al laboratori de l'Institut Català de Recerca de l'Aigua a Girona.

Falta de tradició de les empreses per acudir als investigadors

L'EXPERIÈNCIA

Els doctors Oriol Gutiérrez i Ramon Ganigué defensen els beneficis de la col·laboració per a la societat

ANIOL RESCLOSA



Oriol Gutiérrez i Ramon Ganigué, a la seu de l'ICRA.

P.T.V. | GIRONA

■ L'experiència dels investigadors gironins els ha permès comprovar una diferència molt significativa: «a Austràlia –va explicar Oriol Gutiérrez–, hi ha més tradició de les empreses d'adreçar-se a la universitat i als científics per resoldre els problemes reals». En l'opinió del científic de l'ICRA, allà «tenen més interioritzat que empresa i investigació poden aconseguir coses alhora». I fins i tot un rendiment econòmic, tal com demostra la previsió d'estalvi de 256 milions d'euros calculada a partir del projecte del clavegueram. De totes maneres, l'investigador va apuntar que en les noves convocatòries de l'administració catalana i espanyola ja s'observa un canvi de tendència, perquè s'incideix que hi hagi més sinergia entre els sectors de la recerca i empresarial. Per ressaltar els beneficis d'aquest tipus d'interaccions, Ramon Ganigué va recordar que el projecte australià va ser possible perquè «una empresa explotadora va apostar pels científics universitaris i, a partir d'aquí, es van adonar del potencial de la col·laboració». A més, va remarcar que aquesta recerca n'ha generat d'altres de noves i que no ha servit per resoldre un problema exclusiu de l'ús industrial sinó de tota la població, «ja que qualsevol aigua que surti de l'aixeta té sulfats i, potencialment, pot causar el problema» –va aclarir.

The activity in communicating the work that has been done both to the scientific community and to society in general had more than for the two last years is the 359 news items appearing in the communication media (110 impacts in printed format, 228 in digital format, 6 on radio stations and 15 on TV). In early 2015 ICRA has also become part of social media on Twitter (@icrawater) and Linkedin (Catalan Institute for Water Research).

As specific actions for dissemination

Press release/Press conference

13/01/ 2014: Visita del conseller Santi Vila a l'ICRA
http://www.clipmedia.net/galera/ICRA/Conv/2013/122413-visita-Santi-Villa/index.html

13/01/2014 Científics europeus es troben a l'ICRA per coordinar un projecte de control remot de la qualitat de l'aigua en llacs i embassaments
http://www.clipmedia.net/galera/ICRA/NdP/2014/011314-visita-Vila/index.html

16/01/2014. Científics europeus es troben a l'ICRA per coordinar un projecte de control remot de la qualitat de l'aigua en llacs i embassaments
http://www.clipmedia.net/galera/ICRA/NdP/2014/011214-xarxa-estacions- ICRA/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2014/011214-xarxa-estacions-ICRA/index_es.html

23/01/2014. L'autoritat nacional de l'aigua del Perú visita l'ICRA per conèixer el seu model de gestió científic
http://www.clipmedia.net/galera/ICRA/NdP/2014/010914-visita-ANA/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2014/010914-visita-ANA/index_es.html

26/01/2014. Girona aposta per ser la capital de la recerca de l'aigua
http://www.clipmedia.net/galera/ICRA/NdP/2014/062614-cluster-recerca-aigua/index.html

7/3/2014: Presentació de "Why should we care about temporary waterways?" publicat a la revista Science
http://www.clipmedia.net/galera/ICRA/Conv/2014/030414-science/index.html
http://www.clipmedia.net/galera/ICRA/Conv/2014/030414-science/index_es.html

7/03/2014 L'ICRA adverteix sobre la degradació dels rius temporals a causa dels buits legals en la legislació ambiental internacional
http://www.clipmedia.net/galera/ICRA/NdP/2014/030714-RdP-science/index.html

23/07/ 2014: Presentació dels 3 projectes de recerca seleccionats pel programa europeu Water JPI, "Els reptes de l'aigua en un món canviant"
http://www.clipmedia.net/galera/ICRA/Conv/2014/071514-projectes-JPI/index.html

23/07/2014 Europa selecciona tres projectes de l'ICRA per investigar la problemàtica de la resistència d'antibiòtics en l'aigua
http://www.clipmedia.net/galera/ICRA/NdP/2014/072314-Water-JPI/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2014/072314-Water-JPI/index_es.html

12/11/2014. L'investigador de l'ICRA, Oriol Gutiérrez, rep un premi internacional per un projecte australià de recerca sobre la gestió del clavegueram, que actualment ja es desenvolupa en col·lectors de Girona
http://www.clipmedia.net/galera/ICRA/NdP/2014/110714-SCORe/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2014/110714-SCORe/index_es.html

26/01/2015. Es descobreix per primer cop que el 50% del CO_2 que els llacs emeten a l'atmosfera procedeix de la dissolució de les roques
http://www.clipmedia.net/galera/ICRA/NdP/2014/010914-visita-ANA/index_es.html
http://www.clipmedia.net/galera/ICRA/NdP/2015/012615-METEORITZACIO/index_es.html

03/02/2015. El 30% dels antibiòtics presents a les aigües residuals no s'eliminen a les depuradores i són abocats al riu
http://www.clipmedia.net/galera/ICRA/NdP/2015/013015-antibioticos-hospitales/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2015/013015-antibioticos-hospitales/index_es.html

16/11/2015. II Jornades "El paper de l'aigua subterrània en el funcionament dels aiguamolls"
http://www.clipmedia.net/galera/ICRA/NdP/2015/101115-jornadas-humedales/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2015/101115-jornadas-humedales/index_es.html

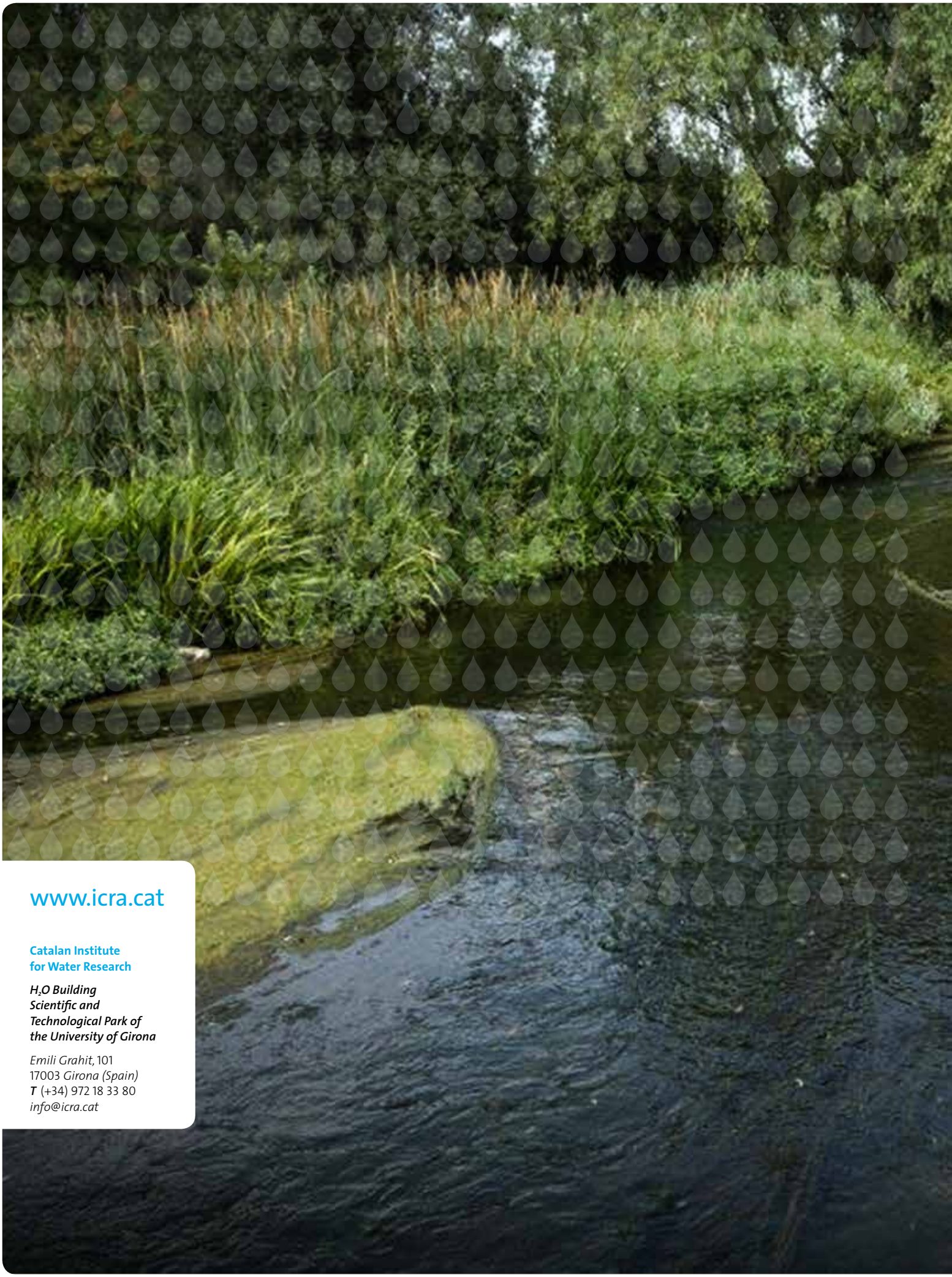
05/03/2015 Presentació del primer prototip de sensor autònom per a la detecció de contaminants en grans zones marines : El mar en un xip o la nova generació de sensors

per controlar la contaminació marina"
http://www.clipmedia.net/galera/ICRA/NdP/2014/011214-xarxa-estacions-ICRA/index_es.html
http://www.clipmedia.net/galera/ICRA/RdP/030915-SEA-on-a-CHIP/index.html

07/04/2015 Atenció a mitjans amb motiu de la visita institucional del conseller Josep M. Pelegrí a l'ICRA
http://www.clipmedia.net/galera/ICRA/Conv/2015/040715-visita-Pelegri/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2015/041015-Conseller-Agricultura/index.html

28/04/2015 Congrés Anual de la SETAC a Barcelona "SETAC-Europa atreu més de 2.500 experts en medi ambient a Barcelona"
http://www.clipmedia.net/galera/ICRA/Conv/2015/040215-SETAC/index.html

28/04/2015 Nova metodologia metabolòmica per establir les alteracions en els biofilms fluvials de l'Ebre, Llobregat, Guadalquivir, Xúquer, i primers resultats sobre els fàrmacs i els disruptors endocrins que amenacen la pesca i l'aqüicultura, a Noruega, Itàlia, Portugal, Holanda i Espanya
http://www.clipmedia.net/GALERA/ICRA/NdP/2015/050615-SETAC/index.html
http://www.clipmedia.net/galera/ICRA/NdP/2015/050615-SETAC/index_es.html



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