Report 2016

ICRA

Institut Català
de Recerca de l'Aigua

Instituto Catalán
de Investigación del Agua

Catalan Institute
for Water Research


Girona
Centre de Girona
Autopista AP7
C/ Emili Grahit
POLÍGON
DE SANT FELIU
GIRONA
C-250
C/ del Far
GIV-6703
Riu Onyar
Carretera de Sant Feliu
C/ del Puig de Montilivi
C/ Les Serres
C/ Sant Roc
H2O
ICRA
PARC CIENTÍFIC
I TECNOLÒGIC
UdG
C/ de Puigsacalm
C/ Emili Grahit
Camí Serra de Bestiaçà
C/ de Puigsacalm
C/ de Pic de Peguera
Av. Carrilet
Camí de Mige
La Creueta
C/ Universitat de Girona
Carretera dels Àngels
UdG
CAMPUS
MONTILIVI
C/ de Girona
Sant Feliu
C-250
N-II
Carretera de França

Annual Report
2016

Report 2016
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Annual report *2016* ICRA

01.

Presentation

Damià Barceló
Director of the ICRA

Welcome,

I am pleased to present the 2016 Activity Report for the Catalan Institute for Water Research Foundation (ICRA).

This year our centre celebrates ten years since its creation on 6 October 2006. Although it was created and began working at the beginning of 2007, the real activity of the ICRA began in June 2009, when we moved into our current headquarters, the H2O building.

Over this time, its evolution has been evident regarding the projects, publications and number of researchers. It has consolidated its presence, nationally and internationally, as a centre of reference in the study of the water management cycle, for its differentiating factor that is the commitment to researching the water management cycle, on water resources, water quality in the broadest sense of the word (chemical, microbiological, ecological, etc.) and treatment and evaluation technologies and the transfer of this knowledge to society and to the business and industrial sectors. With particular interest in researching and solving the impact of droughts, as well as quality aspects in the treatment and reuse of water, paying specific attention to the Mediterranean.

Throughout 2016 the ICRA has continued its consolidation as a research centre; obtaining new competitive projects we have made a great commitment to European projects. €2.5M have been allocated to four new H2020 proposals, highlighting the attainment of a Starting Grant, ELECTRON4WATER, financed by the European Research Council (ERC) led by Dr. Jelena Radjenovic. Regarding national projects and the recruitment of research personnel, four of the proposals presented have been granted for a total amount of €0.81M.

Regarding the Transfer of Knowledge, during 2016 a total of 19 contracts have been signed, 13 of which with private companies, three of them European, as well as six contracts with public institutions for a total amount of €0.24M.

Over this year thirteen theses have been read, directed or co-directed by ICRA researchers, three of them read at our centre.

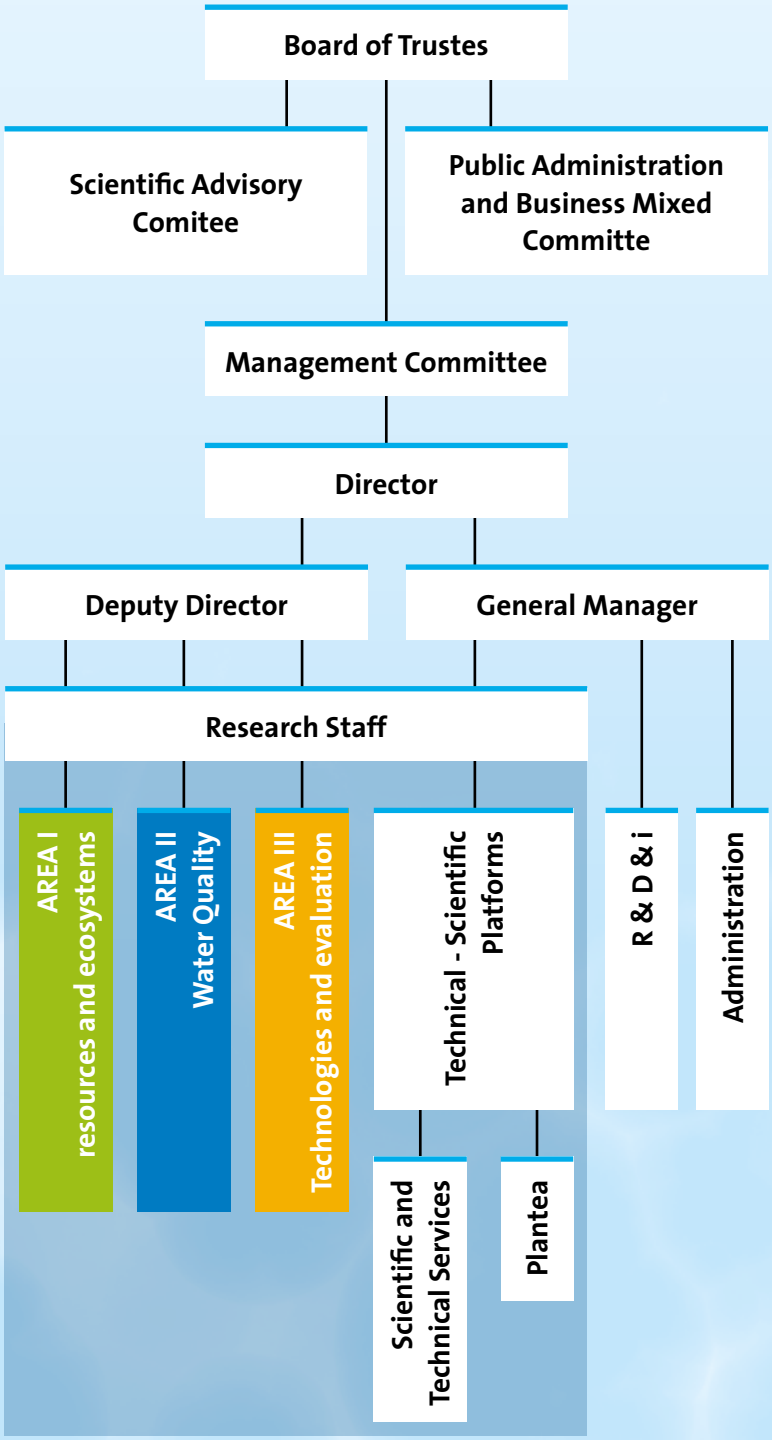
To conclude I would like to make clear that none of this work would be possible without the professionals we have at the ICRA. Their involvement enables the project and the mission that identifies us as a centre of reference to continue.

We hope that you find the report interesting.
Yours faithfully,

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).

During 2016, the Board of Trustees met in an ordinary session on 15/06/2016 and on 20/09/2016 in an online extraordinary session.

Members

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Ministry of Business and Knowledge
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(Catalan Research Centres)
General Directorate of Research
Ministry of Economy and Knowledge
Regional Government of Catalonia

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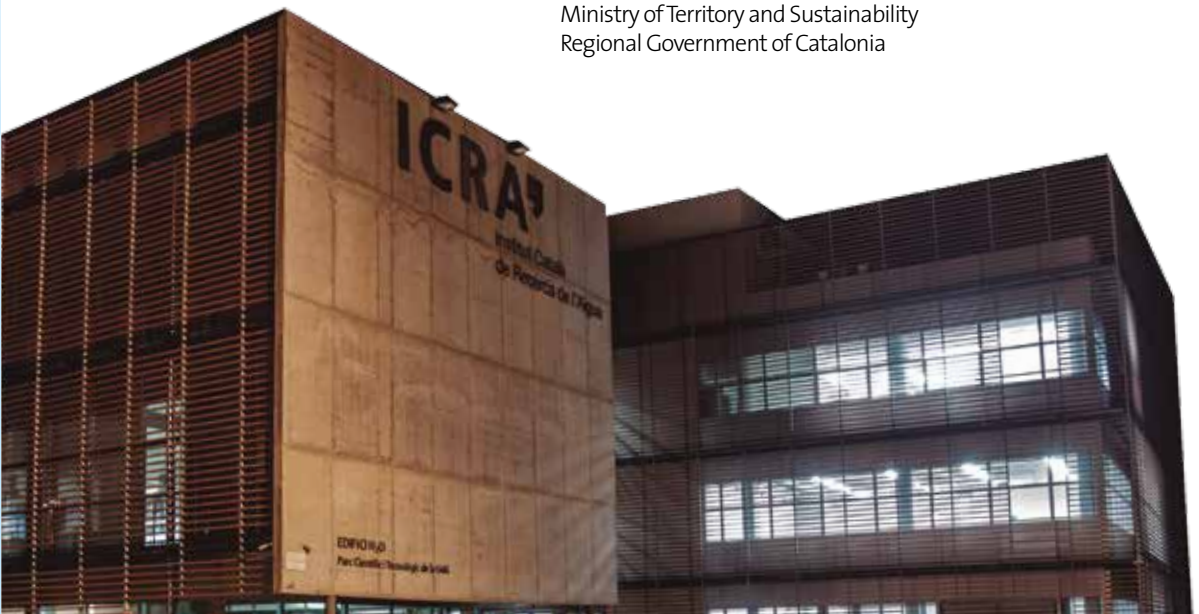
Josep M. Alcoberro
Legal Department of CERCA
(Catalan Research Centres)
Ministry of Economy and Knowledge
Regional Government of Catalonia



Committees

Scientific advisory committee

The **Scientific Advisory Committee** is appointed by the Board of Trustees, and its members comprise an unspecified number of scientists of recognised standing and expertise in the field of water or any related scientific fields. Its membership represents the ICRA's different priority research areas. One of its most important tasks is to ensure the quality of the research carried out at the ICRA. Accordingly, it acts as an advisory body for any issues relating to the scientific activities submitted for its consideration and, when requested, it also acts 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, 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)

Jeanne Garric

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

During 2016, the Scientific Advisory Committee met on 20 and 21 June for the biannual monitoring meeting. Over these days, the different areas presented the research they had carried out, their most representative projects and a transverse view of their research. This involved all of the areas. The Committee made a positive evaluation of each area, and provided its strategic and external vision for consolidating ICRA as a centre of excellence at an international level. On the second day, it set out the strategic plan for ICRA beyond 2016, including challenges, difficulties and opportunities.

Emilio Custodio Gimena

Emeritus Professor, Department of Geotechnical Engineering and Geosciences, Groundwater Research Team at the Polytechnic University of Catalunya, Barcelona (ES). Correspondent member of the Royal Spanish Academy of Sciences. President of the Advisory Committee of the International Groundwater Foundation Centre

Georg Teutsch

Scientific Managing Director of the Helmholtz Centre for Environmental Research (UFZ), 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 (DSMZ)–German Collection of Microorganisms and Cell Cultures. 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, Faculty of Science and Technology, University Nova of Lisbon (UNL), Portugal (PT)

Peter Vanrolleghem

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

Paola Verlicchi

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

Public administration and business mixed committee

Xavier Tristán Prat

President of the Business Committee
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 Development of Catalonia (CADS).

Jaume Carol Pañach

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

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.

Carlos Montero

Managing director of CETaqua.

The meeting of the Business Committee took place on 5 May 2016, where the main transfer projects of the areas and of ICRA and of its Scientific and Technical Services were presented. The members of the Business Committee contributed their experiences and the needs of their sectors.

Antonio Ordóñez

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

Valentin Garcia

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

Departments & staff

In 2016, 88 people contributed to ICRA's R&D&I activities

72 Research personnel

10 Management/administration personnel

6 R&D&I personnel

DIRECTOR

Damià Barceló

Deputy Director of the Institute of Environmental Assessment and Water Studies (IDAEA) at 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 the Managing Director

R&D&i Support services

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

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

Administration

The active administrative services that performed specific functions within each field of activity in 2016 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

Eco-Fin Head
XAVIER FRÍGOLA

Accounting and Research Support
ANTÒNIA DONADEU

IT
RUBÉN DÍAZ

Reception
PERE ROYO

Reception
LLUÍS TORNÉ

Reception
ROSER SAEZ

Maintenance
RICARD ZAMORA

Visiting Students

ADMINISTRATION:
ALBERT GARCIA – Internship Student, Montilivi Secondary School (January–May 2016)

HUMAN RESOURCES:
LEYRE ITURRALDE – Internship Student, University of Girona (February–April 2016)

ISABEL GÓMEZ – Internship Student, University of Girona (June–July 2016)

AIDA BARCELÓ – Internship Student, Santa Eugènia Secondary School (November–December 2016)

IT:
ARNAU BENJUMEA – Internship Student, Montilivi Secondary School (June–September 2016)

From left to right:
Ricard Zamora, Ivan Sánchez, David López, Marc Matas, Ruben Diaz, Xavier Frigola, Roser Saez.
From left to right (sit down):
Pere Royo, Antonia Donadeu, Olga Corral.

The **Outsourcing Service** manages 3 types of contract – services, supplies and construction – to provide ICRA's 3 research areas and the STS with basic and specialist scientific equipment.

This equipment was 50% co-financed by the EU's European Regional Development Fund (ERDF) under the Catalan 2007–2013 ERDF Operational Program and it has 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

The R&D&I Office's primary responsibility is to assist ICRA's researchers in the definition and implementation of strategies for participation in research grant funding initiatives at local, national and international levels. The ultimate aim of the office is to contribute to enhancing ICRA's capacity to scale research and gain international prestige by attracting external funding and partnerships. We offer our researchers full support for searching for calls and the preparation and presentation of proposals, as well as advice on all proposal-related financial and legal issues.

The office also provides support for the administrative and financial management of successful grants and technology transfer contracts with local and international enterprises.

At present, the office is managing 4 collaborative projects under the 7th European Union Research and Innovation Funding Programme (FP7), 1 Marie Curie Innovative Training Network under the new European Union Research and Innovation Funding Programme (H2020) and 4 WATER Joint Programming Initiative projects (one as coordinator).

At a national level, during 2016 the Office covered 14 Research projects funded by the Spanish Ministry of Economy and Competitiveness (MINECO), 4 projects also co-funded by the European Fund for Regional Development (EFRD), 14 Fellowship Grants (11 funded by MINECO and 4 by the Catalan Agency for Management of Universities and Research Grants – AGAUR) and 2 networking projects funded by other institutions.

R&D&I Of_ce Manager
JAUME ALEMANY

European and International Project Of_cer
LAURA BERTOLINI

Project Manager
ZURIA AGUILAR

Project Manager
ESTHER LLORENS

Administration Technician
ALBERT GARCIA (December 2016)

From left to right:
Laura Bertolini, Esther Llorens, Jaume Alemany, Rina Weltner.

Regarding Knowledge and Technology Transfer (KTT), a total of 13 collaborative contracts were signed with private companies (3 of them European) and 6 contracts with public institutions worth a total of €0.24M.

In the European and International sphere, 37 International proposals were presented in 2016, 25 of which under H2020, worth a total of €12.5M. A total of €2.5M was awarded for 4 new H2020 proposals, including the European Research Council (ERC) ELECTRON4WATER Starting Grant. Eight proposals, worth a total of €5.8M, are still pending.

At a national level, 34 proposals were submitted during 2016 to different programmes. Nine proposals were awarded worth a total of €0.81M, and 5 are still awaiting a decision.

For the forthcoming H2020 Work Programme 2018-2020, our aim is to work intensively with international consortia to prepare at least 15 H2020 proposals, submitting a minimum of 5 as coordinator. We have excellent and highly motivated researchers who will apply for ERC Grants (at least 4) and Marie Curie Individual Fellowships (at least 4), adding another 8 proposals for which ICRA will be responsible as coordinator. ICRA will also participate actively, either as coordinator or participant, in the next calls issued by the WATER JPI, and in water related ERA-NET initiatives, such as ERANETMED and ERA4CS.

ICRA is very actively involved in collaborations with national and international research and technology partners, contributing to drafts of strategic implementation plans and future calls relating to different European initiatives in the field of water science. ICRA has joined the Water Supply and Sanitation Technology Platform (WssTP), which was launched by the European Commission in 2004 to promote coordination and collaboration in research and technology development in the water industry.

ICRA also participates in 4 COST actions: Networking Lake Observatories in Europe (NETLAKE), Conceiving Wastewater Treatment in 2020, Energetic, Environmental and Economic Challenges (Water 2020), New and Emerging Challenges and Opportunities in Wastewater Reuse (NEREUS) and Science and Management of Intermittent Rivers and Ephemeral Streams (SMIRES).

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. It 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 through to administrative closure of the project. Its main areas of activity are the following:

> Collection and dissemination of information relating to grants awarded to researchers.

> Support for preparation of the application (eligibility, compatibility with the call, budget, etc.)

> Accompanying 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.

> Managing public and private funding to ensure administrative requirements are fulfilled.

> Managing 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.).

> Identifying opportunities for the protection of the knowledge and results generated.

> Acting as a contact point between companies and ICRA to assess the researchers' transfer of 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, We 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 within the field and establishes new relations (networking).

Technical and Scientific Platforms

Since one of ICRA's objectives is to transfer knowledge and provide practical solutions, the Scientific and Technical Services (STS) provide analytical services and the PLANTEA research platform for scaling processes up to pilot plant scale.

In 2016, the technical and scientific platforms were consolidated to provide a quality scientific and technical support service to researchers.

STS have also carried out continuous training and specialization of technicians.

These platforms are the following:

PLATFORM (PLANTEA)

> SCIENTIFIC AND TECHNICAL SERVICES (STS)

> WATER SCIENCE AND TECHNOLOGIES-RESEARCH PLATFORM (PLANTEA)

Scientific and Technical Services(STS)

As the backbone of the research carried out at the ICRA, the Scientific and Technical Services (STS) offer a total solution for any requirements, whether analytic or for specialised technical guidance, associated with different research projects, including the centre's own ones and collaborations with external bodies.

The main task performed by the STS in 2016 focussed on the roll-out of the current analytical catalogue across all units. This led to a significant increase in the analyses in comparison with the previous years' activity. Alongside the consolidation of validated methodologies, it is also important to mention the development and implementation of new procedures for determining the parameters regulated by EU directives, and also as future proposals, approximations have been performed for identifying and quantifying emergent contaminants that currently fall outside the legislation. As a final outcome of this activity that is more closely linked to research itself, various publications have appeared in journals with significant scientific recognition, while at the same time these collaborations resulted in papers presented at various conferences.

ICRA Head of STS
SARA INSA

ICRA HEAD OF STS
MARTA VILLAGRASA

TECHNICIAN
OLGA MONTOJO

TECHNICIAN
ALEX SÁNCHEZ

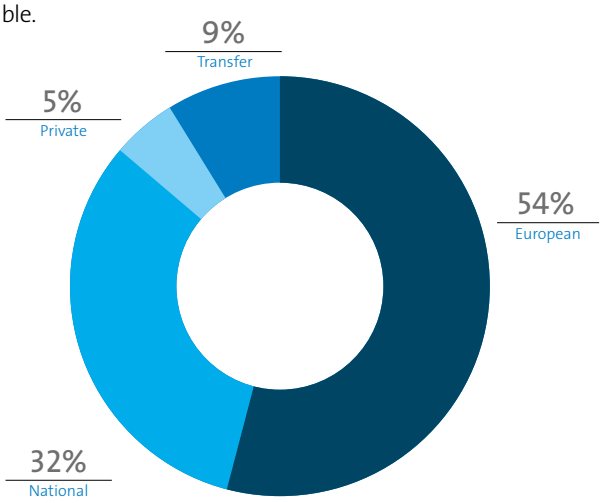
TECHNICIAN
NATÀLIA SERÓN

From left to right:
Olga Montojo, Marta Villagrasa, Isabel Arenas.
From left to right (sit down):
Àlex Sánchez, Natalia Serón, Sara Insa.

The potential of the STS as a support platform along with the experience acquired by their staff contributed to the award of competitive projects, participation in educational sessions and, ultimately, producing knowledge in the different research areas through the training of the centre's professionals.

1-TECHNOLOGY TRANSFER

At a strictly economic level, and focussing the activity covered on different funding sources, it has been possible to group all of the income into the following categories, where the importance of the European funds is especially noticeable.



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, as well as projects for monitoring, eliminating and evaluating the effects of contaminants in water, and studies that require large-scale equipment.

This facility was 50% co-financed by the EU's European Regional Development Fund (ERDF) under the 2007-2013 Catalan ERDF Operational Program and it 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 tackling two different aims:

- **Studying wastewater transport and treatment systems in conditions as similar as possible to the real world (pilot plants).**

- **Studying 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 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. These are being operated to study the biochemical transformations occurring in these systems. The majority of the detrimental compounds produced during wastewater transport originate in rising mains, the anaerobic zones of the sewer networks. The two most detrimental compounds produced are hydrogen sulfide, which is responsible for bad odours and is 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, the first of their kind in Europe, allow researchers to investigate why and

how these detrimental products form during wastewater transport and how their formation can be prevented.

In 2016 we expanded our research in sewer networks towards exploring the transformations of micropollutants occurring in sewers during the transport of wastewater. This has also been linked with the study of the presence of antibiotic resistance genes in sewers, which has not yet been reported in the literature. These activities are part of a recently awarded project funded by the Spanish Government that started in 2016 (SEWAGENE).

Several sequencing batch reactors (SBR) are also currently being operated to study different biological processes involved in contaminant removal in wastewater treatment plants. Part of the research during 2016 focussed on assessing the effect of seasonal temperature variations on emissions of nitrous oxide (N_2O), a potent greenhouse gas, from a nitrifying mixed community. Understanding if changes on temperature have an effect on the reactions triggering the production of this powerful greenhouse gas is crucial for developing effective mitigation strategies. This research is taking place as part of the REACH project funded by the Spanish Government, which is intended to assess the effect of seasonal variations on GHG emissions on the whole urban wastewater cycle.

During 2016, the WATINTECH project started. This is funded by the EU through the JPI WATERWORKS call. This project aims to combine different decentralised treatment approaches for sewage and urban run-off to recover water, energy and valuable chemicals. Within the scope of this project, an anaerobic lab-scale membrane bioreactor (AnMBR) was set up and put into operation. The aim of this system is to enhance biogas production by treating concentrated wastewater from a forward osmosis unit receiving raw sewage.

A low energy requirement membrane bioreactor (Smart Air MBR) pilot plant (200 L) was also operated as part of the demEAUmed project (www.demeaumed.eu), co-funded by the European Union under the 7th Framework Program and scientifically coordinated by ICRA. The Smart Air MBR was tested in controlled conditions at ICRA and, since November 2015 has been treating real hotel greywater and wastewater at the demo site (Hotel Samba, Lloret de Mar) to study the optimization of process variables and calibration of Smart air MBR control parameters when treating synthetic greywater and wastewater. The MBR has been working in series and in parallel with other innovative technologies from other European partners at the demo site. The aim is to compare water reuse possibilities in terms of quality as well as energy, environmental impacts, LCA, DSS, etc.
All of these installations are fully monitored and controlled by different PLC systems connected to a 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 analysers 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 wastewater originating in local neighbourhoods. This greatly facilitates the use of real wastewater for the experiments conducted in the PLANTEA pilot plants.

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, and their responses 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 other 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.

Various experiments were performed in 2016 as part of the FUNSTREAM project, to determine the differential responses of biofilm in intermittent flow conditions between ephemeral and permanent rivers, principally in regard to the structure and functioning of the biofilm, and as part of the NANOTRANSFER project, the main objective of which is to investigate the effects of ecotoxicity of C60 and other combinations of organic microcontaminants in an experimental study using river biofilms

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 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 marine environmental conditions. The objective is to evaluate the operation of a sensor for measuring pollution in environmental conditions that are as similar as possible to those in the real world throughout its technical 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 perform studies on exposing organisms such as mussels and/or fish to chemical contaminants to study the impact of environmental pollution on these organisms and evaluate the possible implications for human consumption.

In 2016, various experiments were performed as part of the European SEA-on-a-CHIP project to study the abiotic processes (sorption and physical chemistry of degradation) of microcontaminants in the system. This allowed us to characterise the system and distinguish these processes from biotic processes in subsequent exposure experiments. Also, and to determine the impact of antibiotics on aquatic organisms (marine mussels), the metabolomic response of bivalves, the bioaccumulation and clearance of the antibiotic, and the appearance of resistance to antibiotics were evaluated.

HR EXCELLENCE IN RESEARCH

HR Excellence in Research Award

In December 2015, ICRA received the HR Excellence in Research award from the European Commission.

This award and its logo recognise 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 Working Group was created. After performing a gap analysis and a self-assessment in accordance with the results obtained from the analysis, a 2015–2017 Action Plan was produced.

ICRA adopted this 2015–2017 Action Plan in accordance 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 labour market for researchers and include general principles and requirements associated with the position, obligations and rights of researchers and their employers, as well as the code for recruitment of researchers. This recognition makes it possible to achieve international visibility by providing a favourable working environment for research with equal opportunities, ethical integrity and a good 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, ICRA and the Permanent Committee on Equality have implemented a gender equality plan to establish and develop policies that integrate equal treatment and opportunities for women and men.

The Permanent Committee on Equality is a multidisciplinary team comprising 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 and David López


PAPERS
2009: 87
2016: 203
PhD DISSERTATIONS
2009: 0
2016: 8
EU PROJECTS
2009: 0 €
2016: 0,8M €
10th ANIVERSARY
IMPACTS ON PRESS
2009: 64
2016: 288
NATIONAL PROJECTS
2009: 0,2M€
2016: 1M€
RRHH
2009: 36
2016: 88
TRANSFER PROJECTS
2009: 0,1M€
2016: 0,3M€

2008

2009

2010

2011

2012

2013

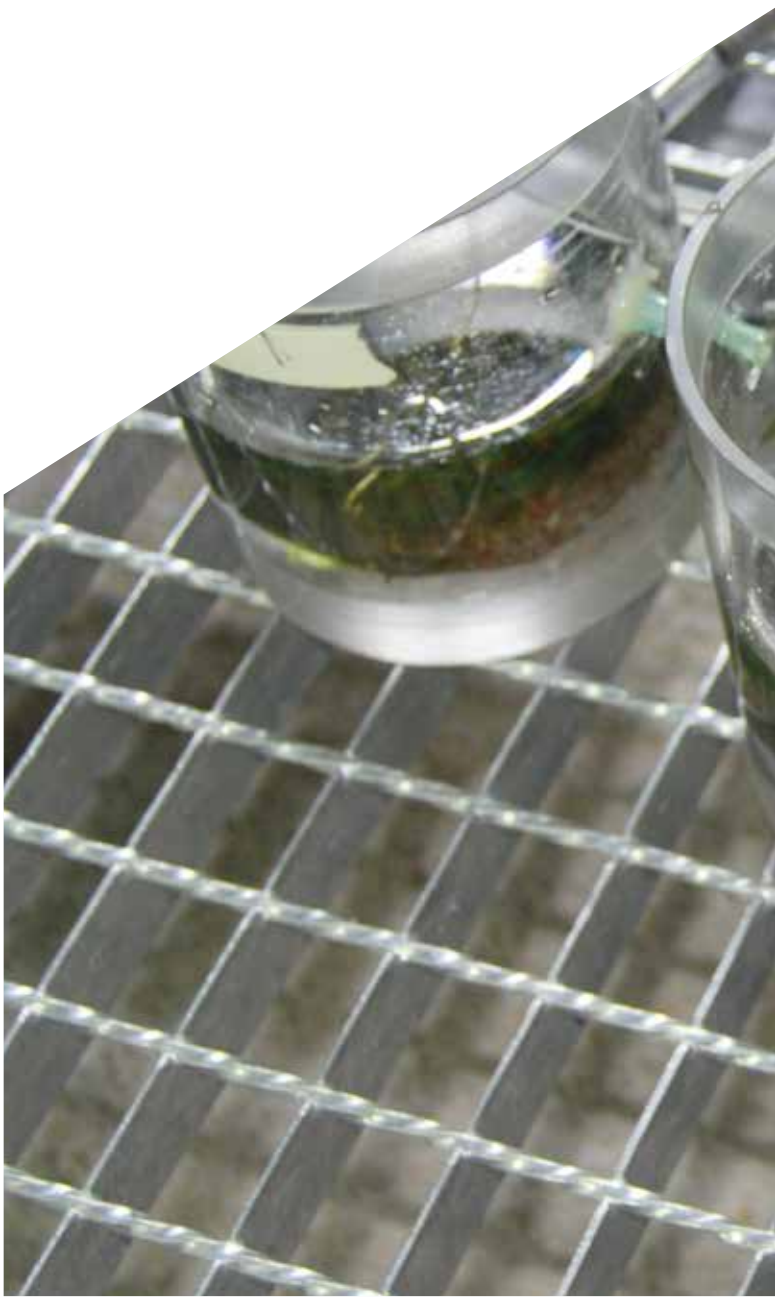
2014

2015

2016

03. Research Areas

ICRA's Research Plan is structured in three main research areas. The mission and a vision of each of them are 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

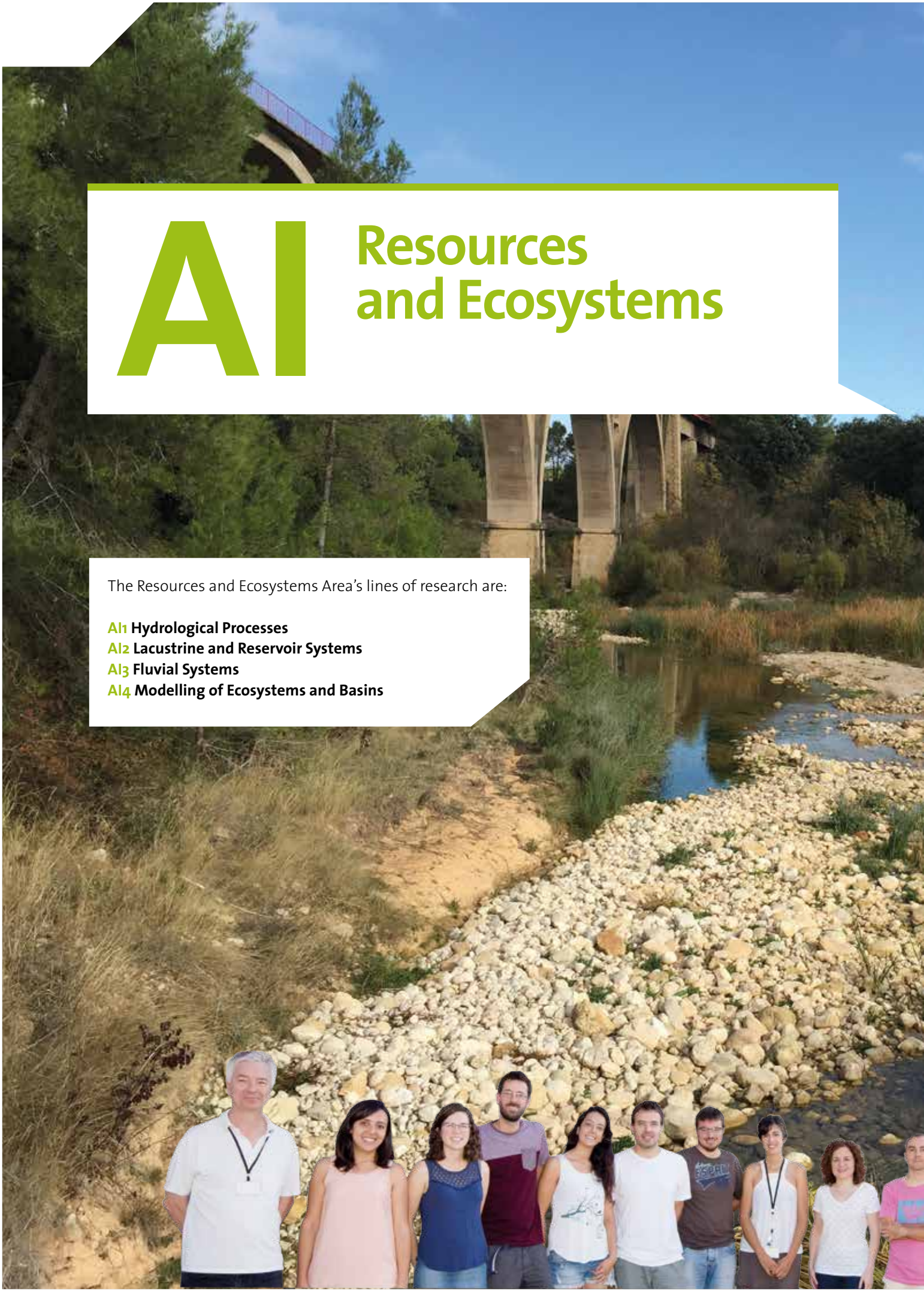
LINES

- **AIII1** Water Supply and Advanced Treatment
- **AIII2** Wastewater Treatment, Reuse and Resource Recovery
- **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



This area has 19 researchers:

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 postdoctoral researcher
MERCÈ BOY

1 postdoctoral researcher
FRANCESCO BREGOLI

1 postdoctoral researcher
NÚRIA CATALÁN

1 postdoctoral researcher
ANNA FREIXA

1 postdoctoral researcher
ADA PASTOR

1 postdoctoral researcher
ALBERT HERRERO

1 postdoctoral researcher
XISCA TIMONER

3 predoctoral students
JOAN PERE CASAS
MIRIAM COLLS
FERRAN ROMERO

4 research technicians
MARIA CASELLAS
MIREIA FILLOL
CRISTINA BUENDIA
CARMEN GUTIERREZ

From left to right: Sergi Sabater, Xisca Timoner, Anna Freixa, Dídac Jordà, Míriam Colls, Rafael Marcé, Jordi-René Mor, Núria Catalán, Elisabet Tornés, Julio López, Carme Font, Vicenç Acuña, Carmen Gutiérrez, Josep Mas, Joan P. Casas.

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 companies and public bodies. New postdocs joined the area team on the topics of river and stream ecology (N. Catalán, A. Freixa), and fluvial hydrology and geomorphology engineering (A. Herrero), as well as some graduate students working towards their PhDs.

In terms of activities with companies, the ongoing contract on the sustainability of water resources in the face of global change with ENDESA has resulted in applied and scientific products. The results of the HIDSOS-III project have provided challenging results on sediment transport in a Pyrenean river basin under a changing hydrological environment.

The large projects such as GLOBAQUA, in full swing during 2016, have provided the basis for a common research arena for many members of the area (as well as for others from other areas of ICRA) in terms of fluvial geomorphology, sediment transport and pollutant occurrence. Also in line with the goals of GLOBAQUA, the effects of wastewater releases on freshwater ecosystems have been investigated, as have their impacts on ecological services along specific reaches of the River Ebro. National projects such as CARBONET, FUNSTREAM, ATTENUATION and FREEDOM have triggered intense research in the area relating to water intermittency, carbon dynamics and hydrogeological dynamics. These projects have helped to provide interesting insights on river ecosystems and hydrological basin dynamics from a perspective of global change.

As in recent years, the risks of global change are expressed in potential greater 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 must 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 must be based on careful examination of underlying mechanisms.

The JPI-Water PERSIST project has concluded its field surveys, providing an extensive hydrogeological dataset on antibiotic occurrence as a result of agricultural activity in a coastal alluvial aquifer (Baix Fluvià). Results indicate the widespread occurrence of these pollutants, at varying concentrations across the aquifer and fluctuating time distribution in each well. This research notes the complexity of emergent contaminant transport in groundwater because of their reactive nature and the input diversity that can be found in natural environments. Antibiotic resistant genes in the groundwater microbiome have also been studied by colleagues at ICRA, providing a comprehensive data matrix of the consequences and impacts of this type of pollution.

The NETLAKE COST action provided a good basis for research on reservoirs as well as the necessary contacts to expand our research network. The newly initiated SMIRES COST action aims to bring together the multiple implications of water intermittency occurring in streams.

Researchers from this area have been intensively involved in writing two chapters for the Third report on climate change in Catalonia, namely the chapters corresponding to the hydrological impacts and freshwater ecology changes due to future climate scenarios. This scientific contribution has also triggered an assessment of the impact of climate change on the water supply of the Barcelona Metropolitan Area.

A11
Hydrological Processes

The team has continued the tasks of modelling water temperature, hydrology and sediment transport in the Noguera Pallaresa river within the framework of the 'Sustainability of Water Resources under Global Change' HIDSOS-III Research Contract funded by ENDESA S.A. The establishment of a monitoring network for flow and sediment transport has been completed in the Noguera Pallaresa river basin. We also analysed the data from the bathymetrical survey of the Talarn reservoir (927 ha), done in 2015 in collaboration with the University of Lleida. Both activities together with the already achieved long-term establishment of the siltation rates in the reservoir 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. Results have been accepted for publication as a research paper in the *Journal of Soils and Sediments*.

The team has 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 of assessing how sediment transport regime is affected by changes in land use and climate change) was performed and complemented with data from 135 other basins in the western Mediterranean region. Data were analysed to characterise sediment yield and determine the main factors that control this central element of the rivers' ecosystems. Results were published in the journal *Science of The Total Environment* (see papers list). The development of a field strategy to analyse the dynamics of sediment-laden traditional and emergent contaminants in the ca. 10,000 km2 Cinca river basin (affected by long-term pollution) was executed in collaboration with the Environmental Chemistry Group at the IDAEA-CSIC. Several floods were monitored to do this, and historical sediment samples were processed to determine the concentrations of different pollutants within the fine sediment transported in suspension by the river.

AI2
Lacustrine and Reservoir Systems

Activities in this line in 2016 focused on understanding the carbon cycle in Mediterranean reservoirs of differing sizes, and defining the effect of global changes on water quality of these storage systems.

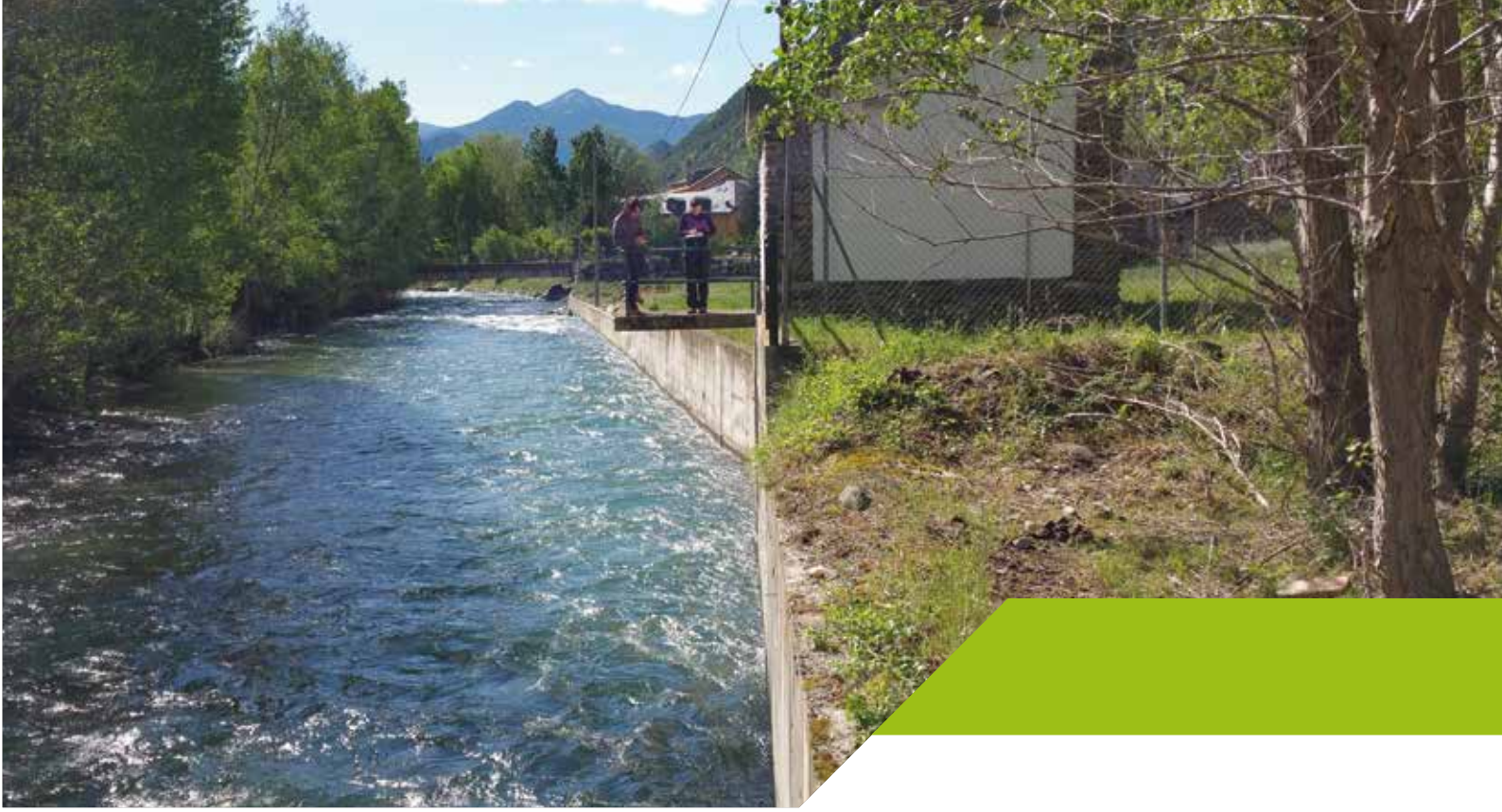
These objectives were addressed in coordination with the AI3 (Fluvial systems) and AI4 (Modelling of ecosystems and basins) research lines, by pursuing the activities in a previous CARBONET project (MINECO). Currently, the REMEDIATION project (MINECO) is investigating in greater detail the origin of the carbon that escapes from the river network. We are therefore investigating the role of lentic ecosystems on carbon cycling in an integrated perspective, taking into account their location in river networks and their interactions with the other compartments in the river.

During 2016, we performed several activities as part of the FREEDOM project (Resolving the dissolved organic matter degradability dilemma in freshwater ecosystems), an EXPLORA project funded by MINECO. The EXPLORA call funds risky projects on the boundaries of knowledge to test innovative ideas.

We were also engaged in several contracts with companies: the role of water quality in reservoirs on the cost of water treatment for human supply with Canal de Isabel II Gestión (Spain) and the behaviour of emergent pollutants in river networks at very large scales with the EU Joint Research Centre at Ispra (Italy).

We have also been involved in several projects as associated researchers: IBERDROLA (Iberdrola Foundation), on the role of large dams and mini-hydro as sinks and sources of carbon and their relevance to the carbon footprint of hydropower production; and LICUA (MINECO), focussing on climate change impacts in the Guadalquivir Basin.

We were also fully involved in the COST "Networking lake observatories in Europe" action (NETLAKE), where we coordinated the working group devoted to the application of high frequency measurements in lake and reservoir management. A new automatic monitoring station was deployed in the Sau reservoir (Spain) and this has been included in the NETLAKE network. Finally, we contributed to the CYTED IBEPECOR network, devoted to assessing the ecological status of waterbodies.



AI3
Fluvial Systems

During this reporting period, we pursued our research lines on (i) the effects of flow intermittency on stream biota and biogeochemistry, (ii) the integration of ecosystem services in freshwater ecosystem management and (iii) the effects and fate of emerging contaminants in freshwater ecosystems.

Most of the research regarding the effects of flow intermittency on freshwater ecosystems was carried out within the framework of the GLOBAQUA project (603629-ENV-2013-6.2.1), as well as the FUNSTREAM project (MINECO, CGL2014-58760-C3-3R) and the SMIRES COST Action (CA15113). Within GLOBAQUA, we performed extensive field surveys in the lower Ebro watershed, assessing the effects of wastewater releases on freshwater ecosystems, considering both the chemical impact and the alteration of the flow regime. In fact, the effects of flow augmentation by wastewater releases have been one of the main novelties in this extensive survey, and we expect to publish these results during 2017. In regards to the FUNSTREAM project, its main goal is to understand how the temporal components of the dry period (duration, frequency and predictability) influence temporary waterways. To ascertain the distinctive effects of each component, we selected over 55 sites around Catalonia, differing by the previously mentioned temporal components of the dry period, and we described the ecosystem response. As with GLOBAQUA, we expect to publish the scientific results during 2017. In regards to the SMIRES COST Action on water intermittency, this was its first year, and we have mainly worked on the planning of the whole action. In fact, we just launched the first specific activities of the ICRA-led working group 2 on eco-hydrology and ecosystem services.

The research line on the integration of ecosystem services in water management produced several publications during 2016. Most of the work was done within the GLOBAQUA framework, as well as with internal collaborations within ICRA. Thus, we have pursued our work with basin scale models, developing a new InVEST module for assessing habitat quality and assessing habitat quality changes under different global change scenarios. However, we have mainly focused on theoretical issues such as uncertainty in valuation, or the integration of ecosystem services in the management of urban water systems.

Finally, we have also pursued our research on both the effects and the fate of emerging contaminants in freshwater ecosystems. In regards to effects, we have performed several experiments assessing the combined effects of multiple stressors. In regards to fate, we have been working on models to mechanistically quantify attenuation of pharmaceuticals in coupled wastewater treatment plant–river systems.

AI4 Modelling of ecosystems and basins

In the framework of the GLOBAQUA project, we have been working with the modelling of emerging contaminants at very large scales. We have built a river network model for the entire Earth, which can simulate the consumption, treatment, and river decay of emerging contaminants in the whole river network.

Intensive work was conducted in the second year of the PERSIST project involving the occurrence and transport of antibiotics in groundwater. During 2016, monthly sampling surveys of groundwater and surface water provided extensive data on general hydrochemistry, nitrate dynamics, antibiotic occurrence and the identification of antibiotic resistance genes in subsurface microbioma. In conjunction with REMEDIATION, analysis of pesticide occurrence in the same sampling points completes the evaluation of the water resource quality in this area. The data has highlighted the difficulty of assessing antibiotic occurrence due to the effect of patchy/diffuse inputs, manure content variability, and more importantly, the reactive nature of these pollutants.

The REMEDIATION project has also contributed to the study of the dynamics of coastal lagoons under an environmental restoration activity linked to a Life+ project coordinated by UdG. Hydrochemical and isotopic data have determined the recharge of these lagoons, whether from seawater, surface drainage or groundwater flow contributions. Such a water balance controls the lagoon water content as well as nutrient flow and processes.

During 2016, special emphasis was given to promoting efficient use of water in agriculture based on remote sensing data. This key idea is the core of a new proposal devoted to launch an innovative idea in the productive sector submitted to the Industry Department of the Catalan Government (Llavors call, 2016; decision notification in 2017).

AI- PhD dissertations

ROBERTO MERCIAI
(PhD student, University of Girona)
Effects of drought and hydrological alterations in Iberian freshwater fish Supervisors: Emili Garcia-Berthou (UdG) and Sergi Sabater (ICRA)

Visiting Scientists

JORDI RENE MOR ROY
PhD Student, University of Girona
(January–December 2016)

ELISABETH TORNES BES
Visiting Scientist, University of Girona
(January–December 2016)

ANA PREVISIC
Visiting Scientist, University of Zagreb
(May 2015–June 2016)

JERONIMO ENRIQUE AINCHI
Visiting Scientist, National University of la Plata
(June 2016)

EDUARDO ZUNINO
Visiting Scientist, National University of la Plata
(March–June 2016)

Visiting Students

JULIA LUCENA HUESO
Internship Student, University of Girona
(March–July 2016)

LAURA SANCHEZ PACHECO
Internship Student, University of
Girona (June–July 2016)

ANGELA SALVAT CAZORLA
Internship Student, University of Girona
(April–June 2016)

AI – Stays Abroad

VICENÇ ACUÑA
(As José Castillejo Fellow). National Socio-Environmental Synthesis Center (SESYNC), Annapolis (Maryland, USA).
(April–June 2016)

RAMON J. BATALLA.
Austral University of Chile, Valdivia. (PAI-MEC 80150023 Project, Programme to Attract Advanced Human Capital from Abroad, CONICYT).
(July–October 2016)

AII Water Quality Area

The Water Quality Area's research lines are:

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

This area has 26 researchers

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 research scientist (IIF)
JELENA RADJENOVIC

1 research scientist (IIF)
MARIA JOSE FARRE

1 research scientist
MARKO ROZMAN

5 postdoctoral researchers
DIANA ALVAREZ MUÑOZ
CRISTINA AVILA MARTIN
MERITXELL GROS CALVO
ITZIAR LUKENBERRI GARCIA
LUCIA HELENA MOREIRO

10 predoctoral students
MIRA CELIC
SERGI COMPTE
LUCIA GUSMAROLI
ADRIAN JAEN
MAJA KUZMANOVIC
DANIEL LUCAS
LADISLAV MANDARIC
ALBERT SERRA
JESSICA SUBIRATS
YAROSLAV VERKH

2 research technicians
SAULO VARELLA
NURIA CACERES

1 RDI technician
MIYAKO NITTA

From left to right: María José Farré, Martina Mastrangelo, Adrián Jaén, Miyako Nitta, Sergi Compte, Ladislav Mandaric, Rocío Bonansea, Albert Serra, Lucía Gusmaroli, María Eugenia Valdés, Jessica Subirats, Lucía Helena Santos, Sara Rodríguez, Núria Cáceres, Cristina Ávila, Meritxell Gros, Mira Petrovic, Mira Celic, Damià Barceló, Natalia Zawrotna, Carles Borrego, Klaudia Fila, Erdem Irtem, José Luis Balcázar.

Research in the Water Quality Area follows three main lines of investigation, namely i) chemical contamination of water bodies, ii) pollution in wastewater, and iii) effects of chemical and environmental stressors on aquatic microbial communities. The main results and activities of these three research lines carried out in 2016 are summarized below.

AI1
Chemical contamination of Water Bodies

During 2016, the main activities of this line in the framework of different projects was the following:

Evaluation of alternative treatment strategies for the elimination of emerging pollutants from wastewater.
Pharmaceutical degrading fungi, algae and bacteria: hospital effluent treatment by fungi (H2PHARMA). Ministry of Economy and Competitiveness (MINECO)-CTM2013-48545-C2-2-R
This project proposes to develop a treatment process for 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 is also evaluated within the project.

During 2016, 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 alongside the treatment processes and their potential environmental impact were also assessed.

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

Presence and impact of antibiotics in the environment: Antibiotic resistance.
Stopping antibiotic resistance evolution (StARE). JPIW2013-089-C02-02
The main objective of this project is to provide information about the presence of antibiotics, antibiotic resistance genes (ARG) and antibiotic resistance bacteria (ARB) during wastewater treatment and to evaluate the removal efficiency of advanced treatment technologies. During 2016, we monitored the final effluent of urban wastewater treatment plants from different European regions in 2 sampling campaigns (March and October 2016). These regions are characterized by different patterns of antibiotic consump-

tion and resistance occurrence giving a wide overview of ARB&G. In addition, part of the efforts is being devoted to identifying the critical factors in wastewater treatment linked to ARB&G. In this line, ICRA has performed specific studies in pilot wetlands facilities as well as at full-scale.

The creation of the first Europe-wide dataset on the prevalence of AR is foreseen in the project. This will help to develop effective guidelines to be implemented or added in future to the existing common legislation relating to water (i.e. the DWD (98/83/ECC), the WFD (2000/60/EC) or the Waste Water Directive.

Bioaccumulation of emerging pollutants in aquatic organisms from marine and freshwater ecosystems: Impact on public health

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.

During 2016, ICRA collaborated in the creation of a database with relevant information required for risk assessment gathered from literature and national monitoring programs as well as in the analysis of emerging pollutants (pharmaceuticals and EDCs in seafood in the monitoring campaign performed in contaminated spots in Europe as well as in commercial seafood samples from all over the world). ICRA also participated in the study of climate change impact on the uptake and metabolization of marine emerging pollutants by seafood as well as evaluating the bioaccessibility of these contaminants by human consumers.

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

The SEA-on-a-CHIP project aims to develop and implement automatic sensors operated by remote control in seawater. During 2016, ICRA partners participated in the sensor prototype testing. Mesocosm facilities at ICRA, adapted to mimic seawater conditions under controlled conditions, were used in the framework of the project to monitor the performance of the sensor.
ICRA also participated in the description of contaminated sites in aquaculture facilities by determining the levels of pharmaceuticals and endocrine disruptors in mussels collected from the most important fish and shellfish production areas in Europe

Study of occurrence and fate of disinfection by-products and their precursors in drinking and recycled water

Within the Marie Skłodowska-Curie Research Program the group consolidated the analytical capabilities for studying the occurrence and fate of disinfection by-products (DBPs) in different water matrixes.

This activity was initiated in late 2014 with the incorporation of Dr Maria José Farré within the EU funded N-DBPs project: Assessment of nitrogen containing disinfection by-products and their precursors in drinking waters of the Mediterranean Basin. In addition, two different technology transfer projects were conducted with private and public entities from this field, namely CANAL ISABEL II Gestión and Ter-Llobregat Water (ATLL).

In particular, we investigated the occurrence and fate of N-nitrosodimethylamine (NDMA) and other DBPs and their precursors in different water treatment systems such as membrane bioreactors (MBR) followed by nanofiltration for water reuse applications and ozone followed by biological activated carbon (BAC) to produce drinking water. Other investigated systems involved conventional drinking water technology and electrodialysis reversal (EDR). We also developed an innovative method based on automated online solid-phase extraction followed by ultra-high-performance liquid chromatography tandem mass spectrometry to detect specific NDMA precursors.
In 2015 Dr Farré was awarded the prestigious Ramon y Cajal Fellowship, which will ensure the continuity of this research line in ICRA.

AI12
Contaminants in Wastewater

In 2016, 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 the **GLOBAQUA** FP7 project that focuses on water scarcity issues in the European context by studying the occurrence, distribution and transport of wastewater derived contaminants in the aquatic environment. The analysis of selected contaminants (i.e. pharmaceuticals) in two Mediterranean rivers (the Ebro in Spain and the Evrotas in Greece), one continental river (the Sava, a transnational river) and one Alpine river (the Adige, Italy) aims to improve understanding of occurrence patterns and their spatial variability linked to contamination sources and land uses, as well as the variability associated with river hydrology and environmental variables (temperature) affecting contaminant attenuation and their distribution in the water and sediment. A detailed study in the Adige river basin (Italy) has revealed worrying signs of aquatic deterioration in the catchment due to increased tourist flows. Increased concentrations of analgesics/anti-inflammatories, antihypertensives and antibiotics were detected during the winter season, providing evidence that the Alpine streams are strongly affected by tourism.

At a smaller scale and in controlled laboratory conditions (ICRA's Experimental Stream Facility), a mesocosm case study was conducted within the framework of the H2020 MSC **TRANSFORMER** project to gain an understanding and practical knowledge of biofilm emerging contaminant biodegradation capacity under stressor and multiple stressor conditions. Two real life scenarios were examined via multifactorial experiment using an artificial stream facility: i) biodegradation in a pristine intermittent stream experiencing acute pollution and ii) biodegradation in chronically polluted intermittent stream. Stream biofilms were exposed to different water flow conditions, i.e. permanent and intermittent water flow.

The group was also involved in the national **TRANSFORM-COAST** project, aimed at performing an integrated study of the fate, behaviour, and river transport of emerging contaminants in estuaries, wetlands and coastal waters. The main objective is specifically to evaluate and characterize chemical contamination coming from discharges of WWTP effluents to estuarine and coastal areas in the Ebro delta region and to identify the most relevant contaminants.

Evaluation of treatment performance through comprehensive characterization of dissolved organic content in wastewater

Current methods used to evaluate the efficiency of dissolved organics treatment at WWTPs (e.g. chemical oxygen demand (COD), biological oxygen demand (BOD) and total organic carbon (TOC) or specific analysis of selected contaminants) do not necessarily reflect true performance with regard to environmental and public health risks, especially for complex treatment technologies that generate transformation products and by-products. Within the framework of the H2020 MSC ITN-EID **TreatREC** project, we developed a non-targeted approach for the analysis of wastewater using liquid chromatography–high resolution mass spectrometry (LC–HRMS) data. The method considers all of the available data (typically, 103 – 105 mostly unknown signals) obtained by LC–Orbitrap–MS. The approach demonstrated is a step towards a more comprehensive monitoring of dissolved organics in wastewater and contributes to understanding current treatment technologies. Furthermore, it makes it possible to shift the somewhat reactive targeted monitoring approach to a proactive non-targeted one, where bulk wastewater organics are considered and not just a select few priority substances.

Fate and transformation of contaminants during advanced wastewater treatment

Research conducted at ICRA as part of the FP7 MC **ELECTRO-HOSPITAL** project (until March 2016) and J. Radjenovic's **Ramon y Cajal** project (since April 2016) has

focused on the application of electrochemical oxidation as an attractive alternative to chemical-based processes for removing persistent organic contaminants. Our recent studies have demonstrated that boron-doped diamond (BDD) anodes are also capable of forming another strong oxidant species, sulfate radicals ($SO_4^{\cdot-}$), directly from sulfate ions and at sulfate concentrations as low as 150 mg L-1. Electrochemical activation of sulfate may be of particular importance for groundwater remediation technologies. In situ, chemical oxidation (ISCO) with persulfate has received significant attention for the treatment of contaminated groundwater. However, a major challenge for this technology is the lack of practical persulfate activation methods, as known activation methods such as UV, thermal, base and transition metal activation are impractical for field applications.

Environmental risks of swine manure reuse in agriculture

This research line started with the **Beatriu de Pinó**s project (2015-2017) by Dr Meritxell Gros, which aims at broadening the knowledge of the possible environmental risks associated with swine manure reuse as fertilizer in agriculture. The project has a special focus on: i) assessing the occurrence of veterinary antibiotics and pharmaceuticals in manure; ii) evaluating the performance of on-site manure treatment techniques in removing target antibiotics and pharmaceuticals; and iii) studying their persistence and fate in manure amended soils and transport to groundwater bodies of hot-spot areas in Catalonia with intensive livestock activities. Results indicated that repeated fertilizations contribute to the build-up of persistent residues of antibiotics that accumulate in the top layers of soil over time. Moreover, the analysis at different depths identified antibiotics with the highest mobility and, therefore, those that are more liable to leach to groundwater bodies and ultimately deteriorate the quality of aquifers. Additionally, the performance of three different full-scale manure treatment techniques (anaerobic digestion combined with reverse osmosis; nitrification–denitrification and composting) in removing antibiotics and pharmaceuticals is being evaluated.

AI13
Quality and Microbial Diversity

The main activities of this research line in the 2016 period are listed below:

Antibiotic resistance in inland waters

We investigated the impact of anthropogenic activities on the prevalence of antibiotic resistance in the environment. Our latest results indicated that wastewater treatment plant (WWTP) effluents strongly modify the hydrology, physico-chemistry and biological characteristics of the receiving environments and favour the persistence and spread of antibiotic resistance in microbial benthic communities. It was also shown that the magnitude of these effects depended on the relative contribution of each WWTP to the receiving system. In particular, a significant increase of antibiotic resistance genes (ARGs) was observed in biofilms collected downstream of WWTP discharge points. We also investigated the abundance of ARGs before and after treatment in different WWTPs. Although the relative concentration of ARGs was generally found to be similar between samples collected before and after the wastewater treatment, the abundance of some ARGs was higher in WWTP influents, suggesting that conventional wastewater treatment does not efficiently reduce ARGs. Moreover, we observed that bacteriophages, viruses that infect bacteria, may contain a large reservoir of ARGs, noting that they might play a part in the spread of antibiotic resistance. In the same line of investigation, we have designed a set of real-time PCR primers for the detection and quantification of carbapenemase genes (bla_{KPC}, bla_{NDM} and bla_{OXA-48}) in environmental samples, thus expanding our repository of molecular tools targeting ARGs of environmental and clinical relevance.

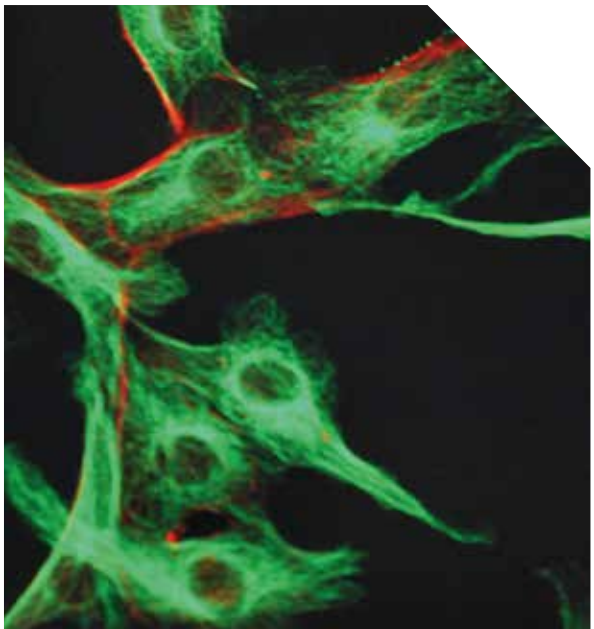
We are currently involved in four projects dealing with the effects of antibiotic pollution on aquatic microbial communities. We are using a combination of genomic and metagenomic approaches to study the prevalence and diversity of resistance genes in aquatic organisms and the changes in the composition and structure of microbial communities exposed to these pollutants.

Two of the above-mentioned projects received funding from the first joint call of the Water Joint Programming Initiative (JPI) on "Emerging Water Contaminants – Anthropogenic Pathogens and Pollutants", namely the TRACE and PERSIST projects. These projects started in September 2014 and ended in December 2016.

TRACE Project: Tracking and assessing the Risk from Antibiotic resistance genes using Chip technology in surface water Ecosystems (JPIW2013-129)

This project aims to develop multiplex chip-based DNA analysis to detect antibiotic resistance genes in both environmental bacteria and aquatic pathogens. The TRACE team comprises Dr Carles Borrego (PI), Dr José Luis Balcázar, Dr Itziar Lekunberri, Dr Marta Villagrasa and Dr Alex Sanchez. The rest of the partners of the TRACE consortium are the Leibniz Institute for Photonics Technology (Germany), University College Dublin (Ireland), the New University of Lisbon (Portugal) and the Sapienza University, Rome (Italy).

In 2016, chemical and molecular analyses were performed to characterize antibiotic pollution and ARG abundance in environmental samples collected upstream and downstream of WWTP discharge points into the Ter river (Girona) and the Saale river (Germany). Our results showed that WWTP discharges promote the persistence and spread of antibiotic resistance in microbial communities. It was also shown that the magnitude of the effects depends on the season, because autumn and spring showed greater differences before and after receiving WWTP discharges into the Saale river, compared to summer and winter. Moreover, the water samples from the Saale river showed greater differences between upstream and downstream sampling points than sediment samples. Likewise, higher copy numbers of ARGs were detected after the WWTP discharge into the Ter river than upstream sampling points, showing significant differences for most resistance genes. These investigations al-



lowed us to identify the proper ARGs to be included in the DNA chip, the design and validation of which has been driven by our partner group in Portugal (New University of Lisbon).

On 27 June 2016, members of our team participated in the second meeting of the TRACE project, held in Rome, Italy. For two days, members of the consortia presented their results and the tasks they had performed and discussed several issues regarding sampling campaigns and analytical procedures relating to project goals.

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 (Ref. JPIW2013-118)

This project aims to determine the occurrence and persistence of emerging pollutants, especially antibiotics, and multidrug-resistant bacteria in surface water and groundwater in an agricultural area. During 2016, we investigated the prevalence and abundance of eight ARGs that encode resistance to the main antibiotic families used to treat human and animal infections (e.g. beta-lactams, fluoroquinolones, tetracyclines, sulphonamides and macrolides) in eight wells and two river water samples collected seasonally in the Fluvià river basin (Catalonia). To assess the effects of anthropogenic pollution on groundwater microbiota, the composition of bacterial communities was analyzed by high-throughput sequencing of the 16S rRNA gene. Also, the hydrogeological characteristics of the aquifer were properly monitored by field measurements of main physico-chemical variables as well as the analysis of major chemical components and distinct environmental isotopes ($\delta^{34}S$, $\delta^{15}N$, water isotopes: $\delta^{18}O$, $\delta^{2}H$ and tritium). So far, results suggest a major influence of surface water as a source of pollutants coming from urban wastewater and lixiviates from agricultural fields fertilized with animal manure to groundwater. The consistent prevalence of gene *intI1* in all wells, which has been proposed as a proxy for anthropogenic pollution, agrees with the influence of urban wastewater on groundwater microbiota.

GLOBAQUA Project: Managing the effects of multiple stressors on aquatic ecosystems under water scarcity (ENV-2013-603629).

In 2016, we continued our activity within the GLOBAQUA multidisciplinary project. Our tasks in GLOBAQUA are related to the effect of chemical (antibiotic pollution) and environmental (desiccation) stressors on streambed microbial communities. We have particularly been interested in deciphering the effect of wastewater discharges on the streambed resistomes considering that these inputs introduce not only antibiotic residues but also antibiotic-resistant bacteria (ARB) into surface waters. Both inputs directly affect the streambed resistome, either by exerting a selective pressure that favours the proliferation of resistant phenotypes or by enriching the resident communities with wastewater-associated ARB. We then compared the impact of raw and treated wastewater discharges on streambed biofilms at three levels, namely: i) on the composition of bacterial communities; ii) on the abundance of antibiotic resistance genes (ARGs); and iii) on the occurrence of wastewater-associated putative bacterial pathogens and their potential linkage to targeted ARGs. We measured more acute effects of raw sewage than treated wastewater at the three studied levels. This effect was especially noticeable in epilithic biofilms, which showed a higher contribution of ARB and potential pathogens than in epipsammic biofilms. Comparison of correlation coefficients obtained between target ARGs and OTUs classified into potential pathogens and non-pathogens yielded significant higher correlations between the former and several ARGs. Our results suggest that wastewater-associated microorganisms, including potential pathogens, may persist into the streambed and contribute to maintaining the local resistome.

Antibiotic Resistance in Sewer Systems

SEWAGENE Project: Accumulation, spread and removal of antibiotic resistance in sewer systems (MINECO, Ref. CTM2016-75653-R)

This multidisciplinary project has recently been funded by the Ministry of Economy and Competitiveness (December 2016), and it aims to investigate how the sewer resistome is affected by chemical treatments commonly used to mitigate noxious sulfide and methane emissions. Our main goal is to assess the extent to which these chemical stressors stimulate the spread of antibiotic resistance among sewage microbes and, especially, if they are effective in their removal. The SEWAGENE team comprises Dr Carles Borrego (PI), Dr José Luis Balcázar (co-PI), Dr Oriol Gutierrez (TaE Area) and Dr Alexandre Sanchez (STS). SEWAGENE started on 30 December 2016 and it will end by December 2019.

Ecology of Uncultured Archaea in Freshwater Sediments

Project ARCOS: Contribution of uncultured Archaea in organic carbon recycling in anoxic sediments (MINECO, Ref. CGL2012-33033).

This project aims to determine the contribution of uncultured archaeal lineages in the organic matter mineralization processes taking place in freshwater sediments. We have conducted a general survey across Spain collecting surface sediments from 21 waterbodies (ponds, lakes and reservoirs) differing in their trophic status and limnological features. The analysis of the composition of archaeal communities in these sediments revealed the predominance of Bathyarchaeota in sediments from karstic lakes characterized by euxinic water layers whereas sediments

from reservoirs were characterized by methanogens and a large contribution of Thermoplasmata. This study also provided sound data on the co-distribution of members of the latter lineage and the Bathyarchaeota, reinforcing the idea of a potential syntrophic relationship between both groups. We have also investigated the effect of metal pollution on the composition and abundance of archaea in sediments collected in 18 high mountain lakes in the Pyrenees. This work was conducted in collaboration with Dr Jean-Christophe Auguet from the University of Montpellier.

In collaboration with Dr Laura Villanueva from the Royal Netherlands Institute for Sea Research (Royal NIOZ), our group has discovered that archaea thriving in biofilms developed on the surface of leaf litter in anoxic sediments possess a characteristic composition of their membrane lipids that may be useful for identification purposes (i.e. lipid biomarkers). This biofilm material has been subjected to a metagenomic analysis to try to identify genes related to organic carbon metabolism in uncultured archaea. The reconstruction and annotation of several archaeal genomic fragments allowed us to identify several genes related to heterotrophic metabolism, reinforcing the hypothesis that sedimentary archaea are mainly heterotrophic anaerobes that feed on buried organic C. These results provide clues about the metabolic traits and genomic potential of these uncultured archaeal groups in the sediment and biofilm compartments of continental freshwater bodies.

PhD dissertations

BELINDA HUERTA
(PhD student, ICRA)
Pharmaceuticals and endocrine disruptors: accumulation in aquatic biota and environmental effects.
Supervisors: Damià Barceló & Sara Rodríguez-Mozaz

LAURA FERRANDO
(PhD student, ICRA)
Analysis of chemotherapy drugs and related compounds in aquatic environment: removal, transformation and risk evaluation in eco-friendly and advanced technologies.
Supervisors: Damià Barceló & Sara Rodríguez-Mozaz

G.A. DE VERA
(PhD student, University of Queensland)
Reducing disinfection by-product formation potential using ozonation and biological drinking water treatment.
Director: Maria Jose Farré, Wolfgang Gernjak & Jürg Keller (University of Queensland)

Visiting Scientist

DIANA NARA RIBEIRO DE SOUSA
Visiting Scientist from Federal University of Sao Carlos
(May 2015–December 2016)

ROLF HALDEN
Visiting Scientist from Arizona State University
(July–December 2016)

IKBEL DENDEN RAFRA
Assistant Professor, Higher Institute for Biotechnology of Monastir (March 2016–May 2016).

Visiting Students

EMNA NASRI
PhD Student, University of Manouba
(May–July 2016)

JELENA TOPIC
Erasmus Internship Student, University of Ljubljana
(January–May 2016)

MACARENA GISELE ROJO
PhD Student, National University of La Plata
(March–May 2016)

ALBERT ARNAU VILA
Internship Student, University of Girona
(June–July 2016)

TOMAS ANDRES VAN EECKHOUT CARTER
Internship Student, University of Girona
(June–July 2016)

ADELAIDA BOSCACOMA ARMORA
Internship Student, University of Girona
(June–September 2016)

ARIADNA VIÑAS JURADO
Internship Student, University of Girona
(October 2015–June 2016)

NOELIA LOPEZ VIDAL
Internship Student, University of Girona
(June–September 2016)

MALEK HARRAB
PhD Student, National Engineering School of Sfax (ENIS) (April–June 2016)

ELENA ROYO RUBIO
Internship Student, University of Girona
(November 2015–July 2016)

AIII Technologies and Evaluation

The Technologies and Evaluation Area's research lines are:

AIII1 Water Supply and Advanced Treatment
AIII2 Wastewater Treatment, Reuse and Resource Recovery
AIII3 Modelling and Management Systems
AIII4 Unit Operations

This area has 22 researchers

1 research professor (UdG associate) and group leader
IGNASI RODRÍGUEZ-RODA

1 research professor (UdG associate)
JOAQUIM COMAS

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 postdoctoral researchers
ORIOL GUTIÉRREZ
MEHLIKA AYLA KISER
MARK SANTANA
SORAYA ZAHEDI

4 research technicians
ELENA ARAN
MARC BALCELLS
LLUÍS BOSCH
FELIX HILL

8 predoctoral students
OLGA AUGUET
IGNASI AYMERICH
FEDERICO FERRARI
PAU GIMENO
ELISSAVET KASSOTAKI
ANNA RIBERA
MARC SAUCHELLI
NATALIA SERGIENKO

From left to right (stand up): Mireia Fillol, Matteo Spinelli, Inmaculada Velo, Giuseppe Pellegrino, Mireia Pla, Sílvia Busquets, Anna Ribera, Gianluigi Buttiglieri, Zhiyuan Bao, Elissavet Kassotaki, Natalia Sergienko, Federico Ferrari, Mark Santana, Maite Pijuan, Jelena Radjenovic, Oriol Gutiérrez, Marc Sauchelli, Wolfgang Gernjak, Albert Darnés, Lluis Corominas, Ignasi Rodríguez-Roda, Joaquim Comas.

The research activity of the Technologies and Evaluation Area focusses on the complete urban water cycle, from water supply to wastewater collection and treatment and the recovery, recycling and reuse of products. It analyses in detail the interaction with the environment and society, and the potential local and global impact on future scenarios.

2016 was an important year for the area, with the consolidation of the researchers who joined the previous year and of recently initiated research lines. It was also a key year for the European R3water and demEAUmed demonstration projects that end next year. Furthermore, several national R&D projects and contracts with companies were achieved. Overall, the main outputs of our activity are summarized in the next section, with over 34 papers published in the first quarter (average impact factor over 4), 4 PhD defences and several prestigious awards for on-going research and technology transfer projects.

The coordination of the JPI waterworks2014 WATINTECH project (Smart decentralized water management through dynamic integration of technologies) is also significant. This will develop effective decentralized treatment concepts for sewage and urban run-off to recover water, energy (methane) and value-added products (caustic, oxygen). The three research lines of the area are involved in this European project, which also interacts with the other areas of ICRA and with the four international partners (DTU from Denmark, the University of Catania from Italy, the University of Lisbon from Portugal and Acciona Agua SA from Spain).

AIII1
Water Supply and Advanced Treatment

This research line was in its second year in 2016 and so is still a new activity for ICRA.

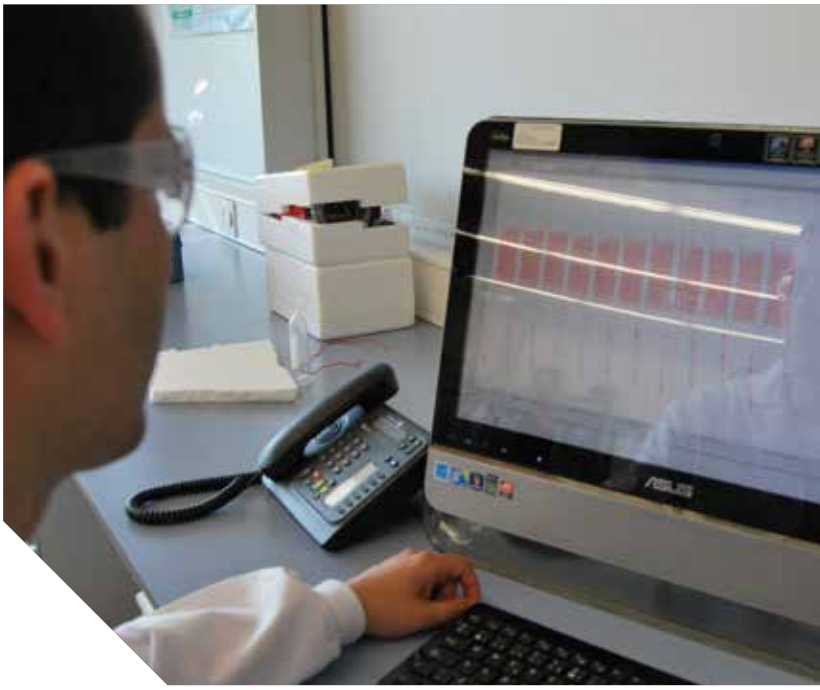
Its activities can be grouped under three overarching themes:

- **New 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 is 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, Marc Sauchelli started his PhD on operational and water quality aspects of forward osmosis. Also in 2016, a MINECO Retos project (TRICERATOPS) started 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 technological solutions to water quality challenges related to contaminants of emerging concern, disinfection by-products, and dissolved organic matter, making use of existing and developing novel analytical capabilities where necessary. Examples of activities in 2016 include evaluating the performance of electrodialysis reversal for the removal of trace organic contaminants and disinfection by-product precursors in collaboration with ATLL concessionary of the Regional Government of Catalonia.

The third theme implements a broader perspective of water management including interactions of management solutions within the contexts of urban or watershed scales. As an example, we aim to connect activities regarding 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 approval of funding for the ICRA co-ordinated WatInTech proposal in the 2015 JPI Water call. This project started in 2016 and investigates 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
Wastewater Treatment, Reuse and Resource Recovery

Research conducted under this line aims to improve current technologies and develop novel tools for treating wastewater and reusing it in centralized and decentralized systems. Achieving better treatment performance, recovering energy and nutrients and reducing detrimental emissions including organic micropollutants are the goals of this line. The experimental approach ranges from fundamental to applied research, with most of the projects involving strong involvement and participation by industry partners.

The main activities focus on the following themes:

- **Minimising the carbon footprint and detrimental emissions of the urban wastewater system as a whole (sewers, wastewater treatment plants and receiving water bodies).**
- **Improving biogas production during anaerobic sludge digestion through innovative and environmentally friendly sludge pre-treatment methods.**
- **Monitoring organic micropollutants 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.**

Regarding the minimising of detrimental gas emissions, research conducted during 2016 has moved towards an integrated assessment of these emissions in the overall urban water system (UWS). A new research project was started at the beginning of the year (funded by the Spanish Government MINECO challenges project (REACH)) to assess how environmental stressors (e.g. storms, seasonal variability) affect direct GHG emissions in different UWS sections. Monitoring campaigns are under way in the UWS of the municipality of Girona, including the sewer network, WWTP and its rivers.

The second block of activities aims to enhance energy recovery from wastewater treatment by improving methane production during anaerobic digestion of sludge and wastewater. Part of this research was 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). Within this project, a novel and more sustainable sludge pre-treatment technology, based on free nitrous acid, was explored and optimized in 2016 and its full-scale implementation will occur during 2017. Also in 2016, a project funded by the EU WaterWorks call (Water JPI) was initiated, focussing on decentralized wastewater treatment for water reuse. Within this project, ICRA is investigating how to improve methane production during anaerobic treatment of concentrated wastewater coming from a forward osmosis process, and a novel electro chemical system to avoid H_2S inhibition in anaerobic treatment combined with the generation of value-added products that are applied to the sewer to avoid corrosion and odours.

The third block aims to monitor organic micropollutants (pharmaceutical and endocrine disrupting compounds) in full scale municipal and industrial WWTPs as well as expanding knowledge of their removal/biodegradation mechanisms in conventional activated sludge systems, SBR and nitrifying biomass, MBRs, constructed wetlands, swimming pools, etc. The scenarios consider not only the parent compounds but also their transformation products. The removal of disinfection by-products (DBPs) has also been studied in the framework of the European demEAUmed project (swimming pool disinfection technology) and other R&D projects. Experiments were carried out in a MBR + NF/RO pilot plant and at lab 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.

The fourth research topic within this line focusses on treatment technologies for water reuse. The integration

AIII3
Modeling and Management Systems

of innovative technologies to achieve a closed water cycle in a tourist installation is being pursued within the framework of a European demonstration project (demEAUmed with ICRA as project scientific coordinator). After previous trials at the PLANTEA laboratories at ICRA, a semi-industrial scale low energy requirement membrane bioreactor (Smart Air MBR) is being applied at an EU project demonstration site (Hotel Samba, Lloret de Mar) for greywater and wastewater treatment. The ICRA technology is being tested in comparison and in combination with other demEAUmed treatment technologies under the supervision of ICRA, both at experimental and simulation level including centralized/decentralized scenarios, technology scaling up, energy requirements, etc.

The main activities focus on the following three areas:

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

Regarding the integrated management of urban wastewater systems and rivers, research conducted during 2016 contributed to a better understanding of attenuation of pharmaceuticals and some of their transformation products in a WWTP and its receiving river ecosystem by using a comparative approach. On the same lines, we provided some recommendations to design measuring campaigns better, so that uncertainties in the estimation of attenuation are minimized through proper sampling modes. In addition, research has been conducted to develop a framework to deliver truly integrated management of the different elements of the urban water system, using the ecosystem service concept in a practical way to make better use of both financial and water resources while continuing to preserve the environment. A link has been made with line AIII2 to run efficiently the REaCH project on measuring GHG emissions in sewers, WWTPs and rivers.

A new research project relating to the maintenance and upgrade of urban wastewater systems started: GESTOR Development of an advanced tool for proactive management and for the efficiency of water resources in urban wastewater infrastructure" (RTC-2016-4876-5) funded by the Spanish Ministry of Economy, Industry and Competitiveness and ERDF. GESTOR is in close cooperation with the FACSA and ABM companies. The main goal of GESTOR is to develop an information and technology tool that helps with making decisions about urban wastewater systems management. The tool has three pillars: 1) monitoring combined sewer overflows, 2) detection of infiltration/exfiltration and 3) determination of corrosion-life-

time of sewer pipes. Within the same theme, the research work in the TreatRec project has resulted in a model that describes the fate and removal of pharmaceuticals along WWTPs and the river network, which has been used to evaluate the influence that the magnitude of uncertainty has on the selection of wastewater treatment plant upgrade measures to reduce microcontaminant loads in rivers. Part of this research is dedicated to increasing the resilience of current systems to adapt to climate change and other stressors.

The third theme aims to develop multi-criteria decision support systems (DSS) for complex UWS-related decision-making. Line III.3 is involved in the development of DSS for several purposes in wastewater management. During 2016, activity focused on the development of the DSS for (i) the demEAUmed project for the selection of technologies for decentralized water reclamation in hotels, (ii) for energy-efficient WWTP upgrading and resource recovery within the Water_2020 COST Action network and (iii) for adaptive and sustainable UWS management in the face of uncertainty. There also some preliminary results of the DSS for the selection of centralized versus decentralized scenarios in the JPI Watintech project. A PhD thesis that will make it possible to improve Life Cycle Assessment studies in urban wastewater systems has also been completed. Cooperation started with the International Water Association and GIZ, within the WaC-Clim project (Water & Wastewater Companies for Climate Mitigation) to develop a web version of the ECAM tool, a platform for utilities to monitor their GHG emissions and energy use. Research cooperation continued with inCTRL Solutions Inc. to develop models in SIMBA to compare fault detection methods and models for calculating energy cost using various energy tariff structures.

Technologies and Evaluation area Technolgy Tranfer

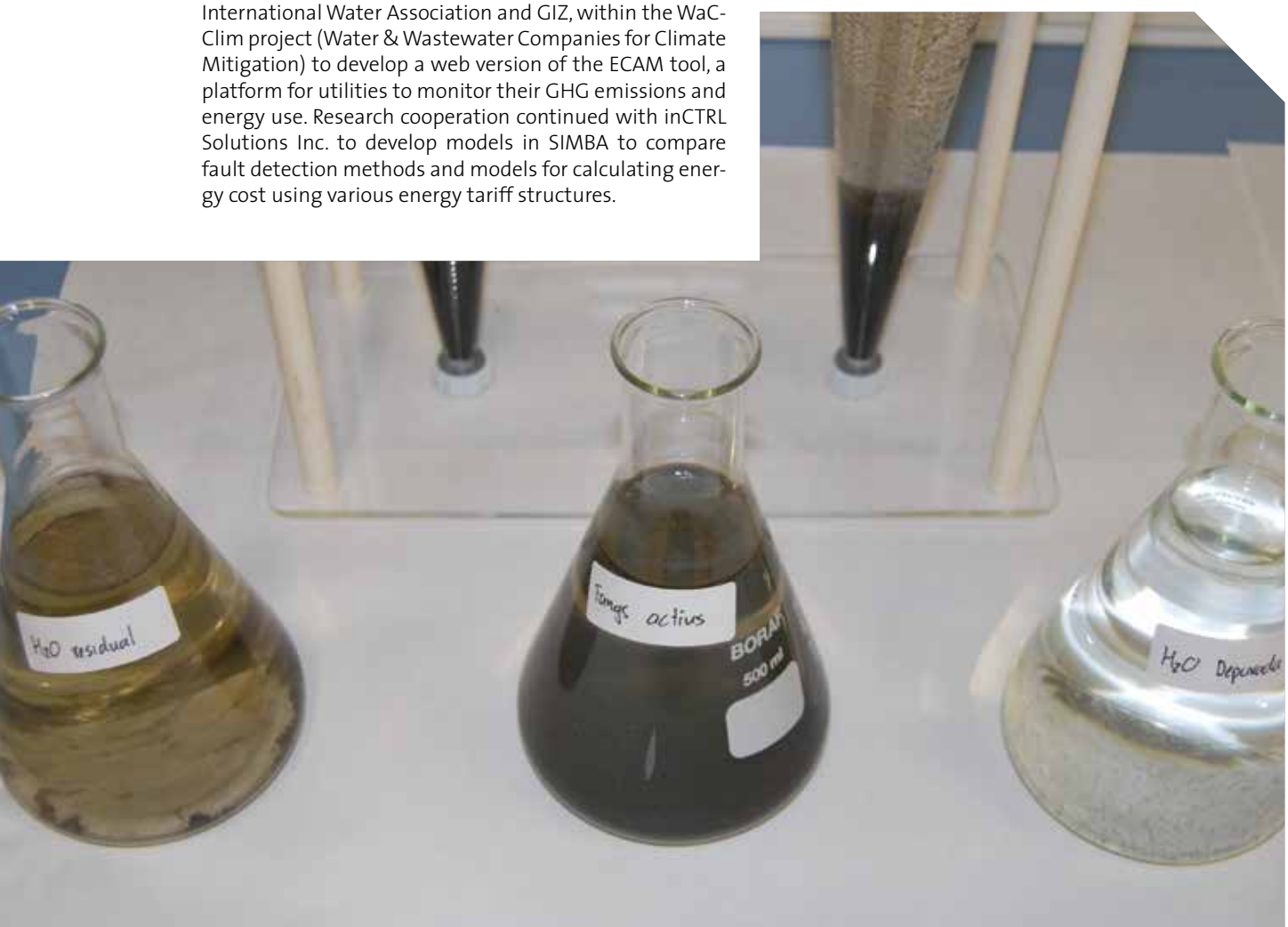
The TaE Area has provided several cases of direct technology transfer during 2016.

- Study of sulfide emission in the sewer system of Palamós. Analysis of current strategies to reduce sulfide and optimise dosing of chemicals.
Dr Oriol Gutierrez.

- H2SOCA Project. Study of odour and corrosion reduction in the sanitation system of Castelldefels. Analysis of the current measures for the reduction of sulfide and optimisation of the dosage of chemical products.
Dr Oriol Gutierrez.

- Project AMBITERR. Characterization and modelling of two industrial (food sector) wastewater treatment plants.
Dr Joaquim Comas.

- Project with ATLL concessionary of the Regional Government of Catalonia, S.A. studying performance with regards to the removal of organics by the electrodialysis process.
Dr Wolfgang Gernjak.



PhD dissertations

OLGA AUGUET
(PhD student, ICRA).
Sulfide and methane production in anaerobic sewer pipes: from microbial community characterization to effective mitigation strategies.
Supervisors: Oriol Gutierrez, Carles Borrego & Maite Pijuan.

ANTONIA HADJIMICHAEL
(PhD student, University of Girona)
Decision-support for adaptive and sustainable urban wastewater system management in the face of uncertainty.
Supervisors: Joaquim Comas & Lluís Corominas.

SADURNÍ MORERA
(PhD student University of Girona)
Comprehensive inventories for Life Cycle Assessment in urban wastewater.
Supervisors: Joaquim Comas & Lluís Corominas.

PENG LIU
(PhD student University of Queensland).
Novel chemical and biological pre-treatments to improve water quality in drinking water treatment.
Supervisors: Jurg Keller (University of Queensland) & Wolfgang Gernjak.

Visiting Scientist

FELIX HILL VINYALS
Visiting Scientist, University of Girona
(January–July 2016)

PAU JOAN GARCIA
Visiting Scientist, Atkins Global (TreatRec Project fellow) (July–2016 – June 2017)

Visiting Student

MARC BALCELLS ROVORA
Internship Student, University of Girona
(September 2015–February 2016)

RAIMON CANAL PEREZ
Internship Student, University of Girona (
February–June 2016)

MACIA BARDES JOLONCH
Internship Student, University of Girona
(May–July 2016)

GUILLEM ROS ROLDAN
Internship Student, University of Girona
(December 2015–May 2016)

DORINE GLAUTIER
Internship Student, University of Girona
(April–September 2016)

ERNEST UBASART CLARA
Internship Student, University of Girona
(December 2015–June 2016)

MARC PONS MORENO
Internship Student, University of Girona
(April–July 2016)

ROGER SAGRISTA JUBANY
Internship Student, University of Girona
(April–July 2016)

CARLOS VILA REUS
Internship Student, University of Girona
(December 2015–May 2016)

OSCAR GONZALEZ MARIN
Internship Student, University of Girona
(February 2015–June 2016)

CRISTINA REXACH TADEO
Internship Student, University of Girona
(January–June 2016)

ALBERT GALIZIA AMORAGA
Internship Student, University of Girona
(June–September 2016)

JOEL LOPEZ SANCHEZ
Internship Student, University of Girona
(February–July 2016)

LISA POLFLIET
Bachelor's Student, ODISEE (March–June 2016)

ZHIYUAN BAO
PhD Student, Beijing Forestry University
(September–December 2016)

04. Publications and congresses

Total publications: 203

Resources and Ecosystems Research area

> SCI PUBLICATIONS
(Science Citation Index)
(Ordered by impact index JCR 2015)

AGUILERA, R., D. M. LIVINGSTONE, R. MARCÉ, E. JENNINGS, J. PIERA AND R. ADRIAN. 2016. **Using dynamic factor analysis to show how sampling resolution and data gaps affect the recognition of patterns in limnological time-series**. *Inland Waters* 6: 284–294. IF: 1.776, Q2.

AGUILERA, R., S. SABATER AND R. MARCÉ. 2016. **A methodological framework for the analysis of river water-quality time-series**. *Journal of Environmental Informatics* DOI: 10.3808/jei.201600333. IF: 1.311, Q1.

ARISTI, I., M. CASELLAS, A. ELOSEGUI, S. INSA, M. PETROVIC, S. SABATER, V. ACUÑA. 2016. **Nutrients versus emerging contaminants - Or a dynamic match between subsidy and stress effects on stream biofilms**. *Environmental Pollution* 212: 208-215. IF: 4.839, Q1.

AYMERICH, I., V. ACUÑA, D. BARCELÓ, M.J. GARCIA, M. PETROVIC, M. POCH, S SABATER, S. RODRÍGUEZ-MOZAZ, I RODRÍGUEZ-RODA, D. VONSCHILER, LL- COROMINAS. 2016. **Attenuation of pharmaceuticals and their transformation products in a wastewater treatment plant and its receiving river ecosystem**. *Water Research* 100: 126-136. IF: 5.991, Q1.

BAE, M.J., MERCIAI R., BENEJAM L., SABATER S. & GARCÍA-BERTHOU E. 2016. **Small weirs, big effects: disruption of water temperature regimes with hydrological alteration in a mediterranean stream**. *Regulated Rivers: Research and Management* 32: 309-319.IF:1.766, Q1

BOITHIAS, L., M. TERRADO, LL. COROMINAS, G. ZIV, V. KUMAR, M. MARQUÉS, M. SCHUHMACHER, V. ACUÑA. 2016. **Analysis of the uncertainty in the monetary valuation of ecosystem services - A case study at the river basin scale**. *Science of the Total Environment* 543: 683-690. IF: 3.976, Q1.

BUENDÍA, C., BATALLA, R.J., SABATER, S., PALAU, A., MARCÉ,

R. 2016. **Runoff trends driven by climate and afforestation in a Pyrenean basin**. *Land Degradation and Development* 27, 823–838. IF: 8.145, Q1.

BUENDIA, C., HERRERO, A., SABATER, S., BATALLA, RJ. 2016. **An appraisal of the sediment yield in Western Mediterranean basins**. ***Science of the Total Environment*** 572 2016 538–553. IF: 3.976, Q1.

BUENDIA, C., R, J, BATALLA, S. SABATER, A. PALAU, AND R. MARCÉ. 2016. **Runoff Trends Driven by Climate and Afforestation in a Pyrenean Basin**. *Land Degradation and Development* 27: 823–838. IF: 8.145, Q1.

BUENDIA, C., VERICAT, D., BATALLA, R.J. GIBBINS, C. 2016. **Temporal dynamics of sediment transport and transient in-channel storage in a highly erodible catchment**. *Land Degradation and Development* 27, 1045–1063. IF: 8.145, Q1.

CASAS-RUIZ, J.P., J. TITTEL, D. VON SCHILLER, N. CATALÁN, B. OBRADOR, L. GÓMEZ-GENER, E. ZWIRNMANN, S. SABATER AND R. MARCÉ. 2016. **Drought-induced discontinuities in the source and degradation of dissolved organic matter in a Mediterranean river**. *Biogeochemistry* 127: 125–139. IF: 3.407, Q1.

CATALÁN, N., R. MARCÉ, D. KOTHAWALA AND L. TRANVIK. 2016. **Organic carbon decomposition rates controlled by water retention time across inland waters**. *Nature Geoscience* 9: 501–504.IF: 12.508, Q1.

GARCÍA, X., LL. COROMINAS, D. PARGAMENT, V. ACUÑA. 2016. **Is river rehabilitation economically viable in water-scarce basins?** *Environmental Science and Policy* 61: 154-164.IF: 2.972, Q2.

GIBBINS, C., VERICAT, D., BATALLA, R.J., BUENDÍA, C. 2016. **Elucidating invertebrate drift responses to river flow conditions: Which hydraulic variables should be used?** *Fundamental and Applied Limnology* 187(3), 191–205.IF: 0.786, Q3.

GÓMEZ-GENER, L., B. OBRADOR, R. MARCÉ, V. ACUÑA, N. CATALÁN, J. P. CASAS-RUIZ, S. SABATER, I. MUÑOZ AND D. VON SCHILLER. 2016. **When Water Vanishes: Magnitude and Regulation of Carbon Dioxide Emissions from Dry Temporary Streams**. *Ecosystems* 19: 710–723. IF: 3.751, Q1.

GÓMEZ-GENER, L., D VONSCHILLER, R. MARCÉ, M. ARROITA, J.P. CASAS-RUIZ, P.A. STAEHR, V. ACUÑA, S. SABATER, B. OBRADOR. 2016. **Low contribution of internal metabolism to carbon dioxide emissions along lotic and lentic environments of a Mediterranean fluvial network**. *Journal of Geophysical Research* 121: 3030-3044. IF: 3.318, Q1.

GUASCH H., M. RICART, J. LÓPEZ-DOVAL, C. BONNINEAU, L. PROIA, S. MORIN, I. MUÑOZ, A. M. ROMANÍ, S. SABATER. 2016. **Influence of grazing on triclosan toxicity to stream periphyton**. *Freshwater Biology* 61: 2002–2012 IF: 2.933, Q1.

HUERTA, B. S. RODRÍGUEZ-MOZAZ, C. NANNOU, L. NAKIS, A. RUHÍ, V. ACUÑA, S. SABATER, D. BARCELÓ. 2016. **Determination of a broad spectrum of pharmaceuticals and endocrine disruptors in biofilm from a waste water treatment plant-impacted river**. ***Science of the Total Environment*** 540: 241-249.IF:3.976, Q1.

IRIARTE, J.L., J. LEÓN-MUÑOZ, R. MARCÉ, A. CLÉMENT AND C. LARA. 2016. **Influence of seasonal freshwater streamflow regimes on phytoplankton blooms in a Patagonia fjord**. *New Zealand Journal of Marine and Freshwater Research* DOI: 10.1080/00288330.2016.1220955 IF: 0.824, Q3.

LICURSI, M., GÓMEZ, N., SABATER, S. 2016. **Effects of nutrient enrichment on epipelic diatom assemblages in a nutrient-rich lowland stream, Pampa Region, Argentina.** ***Hydrobiologia*** 766(1), 135-150 IF: 2.051, Q2.

LOBERA, G., MUÑOZ, I., LÓPEZ-TARAZÓN, J.A., VERICAT, R.J., BATALLA R.J. 2016. **Effects of flow regulation on river bed dynamics and invertebrate communities in a Mediterranean river**. *Hydrobiologia* 784, 1, 283–304. IF: 2.051, Q2.

MARTÍ, E., B. HUERTA, S. RODRÍGUEZ-MOZAZ, D. BARCELÓ, J.L. BALCÁZAR AND R. MARCÉ. 2016. **Effects of subinhibitory ciprofloxacin concentrations on the abundance of qnrS and composition of bacterial communities from water supply reservoirs**. *Chemosphere* 161: 470–474. IF: 3.678, Q1.

MAS-PLA, J., A. MENCIÓ, J. BACH, D. SOLER, M. ZAMORANO, D. BRUSI 2016. **Trace element groundwater pollution hazard in regional hydrogeological systems (Empordà basin, NE Spain).** *Water, Air & Soil Pollution* 227:218-240. IF:1.551, Q3

MENCIÓ A., MAS-PLA J., OTERO N., REGÀS O., BOY-ROURA M., PUIG R., BACH J., DOMÈNECH C., ZAMORANO M., BRUSI D., FOLCH A. 2016. **Nitrate pollution of groundwater; all right ..., but nothing else?** *Science of the Total Environment* 539C: 241251. IF: 3.976, Q1.

PIQUÉ, G., BATALLA, R.J., SABATER, S. 2016. **Hydrological characterization of dammed rivers in the NW Mediterranean region**. *Hydrological Processes* 30, 1691-1707. IF: 2.768, Q1.

PIQUÉ, G., VERICAT, D., SABATER, S., BATALLA, R.J. 2016: **Effects of biofilm on river-bed scour**. *Science of the Total Environment* 572, 1, 1033–1046. IF: 3.976, Q1.

PONSATÍ, L., PETROVIC, M., PICÓ, Y., GINEBREDA, A., TORNÉS, E., CORCOLL, N., GUASCH, H., BARCELÓ, D., SABATER, S. 2016. **Multiple stressor effects on river biofilms**. *Freshwater Biology* 61: 2012- 20115 IF: 2.933, Q1.

PROIA, L., D. VON SCHILLER, C. GUTIERREZ, J. P. CASAS-RUIZ, L. GÓMEZ-GENER, R. MARCÉ, B. OBRADOR, V. ACUÑA, AND S. SABATER. 2016. **Microbial carbon processing along a river discontinuum**. *Freshwater Science* 35(4):1133–1147 IF: 2.433, Q2.

PROIA, L., VON SCHILLER, D., SABATER, S., RODRIGUEZ-MOZAZ, S., SÁNCHEZ, A., BORREGO, C., BALCÁZAR, J.L. 2016. **Occurrence and persistence of antibiotic resistance genes in river biofilms after wastewater inputs in small rivers**. *Environmental Pollution* 210: 121–128 IF: 4.839, Q1.

ROFNER, C., P. HANNES, CATALÁN, N., DREWES, F., SOMMARUGA, R. AND PÉREZ, M.T. 2016. **Climate-related changes of soil characteristics affect bacterial community composition and function of high altitude and latitude lakes**. *Global Change Biology* DOI:10.1111/gcb.13545 IF: 8.444, Q1.

RUHÍ, A., I. MUÑOZ , E. TORNÉS, R.J. BATALLA, D. VERICAT, L. PONSATÍ, V. ACUÑA, D. VON SCHILLER, R. MARCÉ, G. BUSSI, F. FRANCÉS AND S. SABATER. 2016. **Flow regulation increases food-chain length through omnivory mechanisms in a Mediterranean river network**. *Freshwater Biology* 61: 1536–1549. IF: 2.933, Q1.

RUHÍ, A., V. ACUÑA, D. BARCELÓ, B. HUERTA, J.R. MOR, S. RODRÍGUEZ-MOZAZ, S. SABATER. 2016. **Bioaccumulation and trophic magnification of pharmaceuticals and endocrine disruptors in a Mediterranean river food web**. *Science of the Total Environment* 540: 250-259. IF: 3.976, Q1.

SABATER, S.; BARCELO, D.; DE CASTRO-CATALÀ, N.; GINEBREDA, A.; KUZMANOVIC, M.; PETROVIC, M.; PICO, Y.; PONSATI, L.; TORNÉS, E.; MUÑOZ, I. 2016. **Shared effects of organic microcontaminants and environmental stressors on biofilms and invertebrates in impaired rivers**. *Environmental Pollution* 210: 303-314. IF: 4.839, Q1.

SANPERA-CALBET, I., V. ACUÑA, A. BUTTURINI, R. MARCÉ AND I. MUÑOZ. 2016. **El Niño Southern Oscillation and seasonal drought drive riparian input dynamics in a Mediterranean stream**. *Limnology and Oceanography* 61: 214–226. IF: 3.660, Q1.

TENA, A., VERICAT D., GONZALO, L.E., BATALLA, R.J. 2016. **Spatial and temporal dynamics of macrophyte cover in a large regulated river**. *Journal of Environmental Management* dx.doi.org/10.1016/j.jenvman.2016.11.034. IF: 3.131, Q1.

TERRADO, M., S. SABATER, B. CHAPLIN-KRAMER, L. MANDLE, G. ZIV, V. ACUÑA. 2016**. Model development for the assessment of terrestrial and aquatic habitat quality in conservation planning**. *Science of the Total Environment* 540: 63-70. IF: 3.976, Q1.

TERRADO M., A. MOMBLANCH, M. BARDINA, L. BOITHIAS, A. MUNNÉ, S.SABATER, A. SOLERA, V. ACUÑA. 2016. **Integrating ecosystem services in river basin management plans**. *Journal of Applied Ecology* 53: 865-875. IF: 5.191, Q1.

TERRADO, M., S. SABATER, V. ACUÑA. 2016. **Identifying regions vulnerable to habitat degradation under future irrigation scenarios**. ***Environmental Research Letters*** 11: 114025. IF: 4.134, Q1.

VON SCHILLER, D., I. ARISTI, L. PONSATÍ, M. ARROITA, V. ACUÑA, A. ELOSEGI, S. SABATER. 2016. **Regulation causes nitrogen cycling discontinuities in Mediterranean rivers**. *Science of the Total Environment* 540: 168-177. IF: 3.976, Q1.

REVIEW ARTICLES

GARCIA, X., D. BARCELÓ, J. COMAS, LL. COROMINAS, A. HADJMICHAEL, T.J. PAGE, V. ACUÑA. 2016. **A recipe to place ecosystem services at the heart of urban water systems management**. *Science of the Total Environment* 563-564: 1078-1085. IF: 3.976, Q1.

MARCÉ, R., G. GEORGE, P. BUSCARINU, M. DEIDDA, J. DUNALSKA, E. DE EYTO, G. FLAIM, H.-P. GROSSART, V. ISTVANOVICS, M. LENHARDT, E. MORENO-OSTOS, B. OBRADOR, I. OSTROVSKY, D.C. PIERSON, J. POTUZAK, S. POIKANE, K. RINKE, S. RODRIGUEZ-MOZAZ, P.A. STAEHR, K. SUMBEROVA, G. WAAJEN, G.A WEYHENMEYER, K.C. WEATHERS, M. ZION, B.W. IBELINGS, E. JENNINGS. 2016. **Automatic high frequency monitoring for improved lake and reservoir management**. *Environmental Science & Technology***.** DOI: 10.1021/acs.est.6b01604. IF: 2.476, Q2.

SABATER, S., X. TIMONER, C. BORREGO, V. ACUÑA. 2016. **Stream biofilm responses to flow intermittency: from cells to ecosystems**. *Frontiers of Environmental Science & Engineering* (doi 10.3389/fenvs.2016.00014). IF: 1.799, Q3

BOOKS CHAPTERS

ACUÑA, V., R. MARCÉ AND X. TIMONER. 2016. **Ecosystem Metabolism in River Networks and Global Climate Change**. *In Climate Change and Microbial Ecology: Current Research and Future Trends*. Caister Academic Press, Giessen (Germany). ISBN: 978-1-910190-31-9.

ACUÑA V., I. ARISTI, I. AYMERICH, D. BARCELÓ, L. COROMINAS, M. PETROVIC, M. POCH, S. RODRÍGUEZ-MOZAZ, D. VON SCHILLER, S. SABATER, AND A. ELOSEGI. 2016. **Ecosystem responses to emerging contaminants: fate and effects of pharmaceuticals in a Mediterranean River**. In: M. Petrovic, S. Sabater, A. Elosegi, D. Barceló (eds.), ***Emerging Contaminants in River Ecosystems.*** Hdb Env Chem 46: 143–158, DOI 10.1007/698_2015_5009.

ALDEKOA, J., R. MARCÉ AND F. FRANCÉS. 2016. **Fate and Degradation of Emerging Contaminants in Rivers: Review of Existing Models**. In ***Emerging Contaminants in River Ecosystems. Occurrence and Effects Under Multiple Stress Conditions***. Springer International Publishing, Switzerland. DOI 10.1007/978-3-319-29376-9.

MANDARIC, L., M. CELIC, R. MARCÉ AND M. PETROVIC. 2016. **Introduction on Emerging Contaminants in Rivers and Their Environmental Risk**. In ***Emerging Contaminants in River Ecosystems. Occurrence and Effects Under Multiple Stress Conditions***. Springer International Publishing, Switzerland. DOI 10.1007/978-3-319-29376-9.

MAS-PLA J., BOY-ROURA M., MENCIÓ A., BRUSI D., VILLAGRASA M., PETROVIC M., GROS M., LEKUNBERRI I., FILLOL M., BORREGO C. 2016. **Interpretación de los resultados de.l estudio sobre la presencia y evolución de antibióticos en las aguas subterráneas del Baix Fluvià (Cuencas Internas) en el contexto de la planificación hidrológica**. In : Martínez Cortina, L., Martínez Santos, P. (eds.). ***Las aguas subterráneas y la planificación hidrológica***. Asociación Internacional de Hidrogeólogos – Grupo Español, pp. 289-296. ISBN : 978-84-938046-5-7.

MAS-PLA, J., R.J. BATALLA, A. CABELLO, F. GALLART, P. LLORENS, D. PASCUAL, E. PLA, L. POUGET, M. TERMES, L. VERGONYÓS. 2016. **Els recursos hídrics a Catalunya: diagnòstic i previsions per al segle XXI**. In: MARTÍN-VIDE, J., ed., ***Tercer Informe sobre el Canvi Climàtic a Catalunya***. Publicació del Consell Assessor per al Desenvolupament Sostenible i l'Institut d'Estudis Catalans, pp. 161-187 ISBN: 978-84-9965-317-4 (Institut d'Estudis Catalans) - 978-84-393-9448-8 (Generalitat de Catalunya).

MENCIÓ, A., A. FOLCH, J. MAS-PLA. 2016. **Identificació de fluxos regionals en la recàrrega d'aqüífers en depressions tectòniques mitjançant l'ús de dades geoquímiques: el cas de la Selva (Girona)**. A: Vilà, M.; Herms, I., Cirés, J., (eds.) ***Geoquímica Ambiental a Catalunya***. Recull d'articles. monografies tècniques de l'institut Cartogràfic i Geològic de Catalunya, núm 5, pp.125-142. ISBN: 978-84-393-9471-6.

MENCIÓ, A.; COMPTE, J.; BOIX, D.; GICH, F.; QUINTANA, X.D. Y MAS-PLA, J. 2016. **El comportamiento hidrogeológico de las lagunas de la Pletera. Análisis de la evolución hidroquímica de sus aguas**. A: Mas-Pla, J., L.J. Lambán, M. Valverde, eds., ***El papel del agua subterránea en el funcionamiento de los humedales*****.** Asociación Internacional de Hidrogeólogos – Grupo Español. Edición electrónica (http://www.fcihs.org) ISBN 978-84-938046-1-9.

MUÑOZ I., J. C. LÓPEZ-DOVAL, N. DE CASTRO-CATALÀ, M. KUZMANOVIC, A. GINEBREDA, & S. SABATER. 2016. **Effects of Emerging Contaminants on Biodiversity, Community Structure, and Adaptation of River Biota**. In: M. Petrovic, S. Sabater, A. Elosegi, D. Barceló (eds.), ***Emerging Contaminants in River Ecosystems***. Hdb Env Chem 46: 79–120, DOI 10.1007/698_2015_5013.

PUIG, R., N. OTERO, C. TORRENTÓ, G. VIDAL-GAVILÁN, R. CARREY, P. RODRÍGEZ-ESCALES, A. MENCIÓ, A. FOLCH, J. MAS-PLA, J. BACH I A. SOLER. 2016. **La geoquímica multi-isotòpica com a eina de control de l'origen i de l'atenuació natural o induïda de la contaminació per nitrats a les aigües subterrànies.** A: Vilà, M.; Herms, I., Cirés, J., (eds.) ***Geoquímica Ambiental a Catalunya***. Recull d'articles. monografies tècniques de l'institut Cartogràfic i Geològic de Catalunya, núm 5, pp. 187-206. ISBN: 978-84-393-9471-6.

SABATER S., V. ACUÑA, R.J. BATALLA, C. BORREGO, A. BUTTURINI, M. FELIP, E. GARCÍA-BERTHOU, S. GASCÓN, R. MARCÉ, E. MARTÍ, M. MENÉNDEZ, I. MUÑOZ, X. QUINTANA, F. SABATER. 2016. **Els ecosistemes aquàtics continentals.** In: MARTÍN-VIDE, J., ed., ***Tercer Informe sobre el Canvi Climàtic a Catalunya.*** Publicació del Consell Assessor per al Desenvolupament Sostenible i l'Institut d'Estudis Catalans, pp. 237-261. ISBN: 978-84-9965-317-4 (Institut d'Estudis Catalans) - 978-84-393-9448-8 (Generalitat de Catalunya).

SABATER S. & C. BORREGO. 2016. **Collection and processing of river organisms and water column organisms.** ***Hydrocarbon and Lipid Microbiology Protocols.*** HLMP-D-14-00135R2. 10.1007/8623_2015_171

SABATER S. & C. BORREGO. 2016. **Application of micro- and mesocosms experiments to pollutant effects in biofilms.** McGenity et al. (eds.), ***Hydrocarbon and Lipid Microbiology Protocols,*** Springer Protocols Handbooks, DOI 10.1007/8623_2015_170, Springer-Verlag Berlin Heidelberg 2015

SABATER S., ARTIGAS J., CORCOLL N., PROIA L., TIMONER X., AND TORNÉS E. 2016. **Ecophysiology of River Algae**. In: O. Necchi Jr. (ed.), ***River Algae***. Pp 197-217. DOI 10.1007/978-3-319-31984-1_9

TORNÉS E. & S. SABATER. 2016. **The use of diatoms to assess the ecological status in Catalan rivers: application of the WFD and lessons learned from the European Intercalibration Exercise**. In: A. Munné, A. Ginebreda and N Prat (Eds.), ***Experiences from Surface Water Quality Monitoring: The EU Water Framework Directive Implementation in the Catalan River Basin District (Part I)*.** Hdb Env Chem 42: 65-80. DOI 10.1007/698_2015_344.

VERICAT; D.; BATALLA; R.J. 2016. **Morfodinámica Fluvial**. En: BATALLA; R.J., TENA (eds): ***Processos Hidrosedimentarios Fluviales***. Editorial Milenio, Lleida, 19-74. ISBN 978-84-9743-732-5.

PUBLISHED BOOKS

BATALLA; R.J., TENA. 2016. ***Procesos Hidrosedimentarios fluviales***. Editorial Milenio, Lleida, 273 p. ISBN 978-84-9743-732-5.

MAS-PLA, J., L.J. LAMBÁN, M. VALVERDE, eds. 2016. ***El papel del agua subterránea en el funcionamiento de los humedales***. Asociación Internacional de Hidrogeólogos – Grupo Español. Edición electrónica (http://www.fcihs.org), ISBN 978-84-938046-1-9.

OTHER BOOKS AND JOURNALS

RODEA-PALOMARES I., M. GONZALEZ-PLEITER, S. GONZALO, R. ROSAL, F. LEGANES, S. SABATER, M. CASELLAS, R. MUÑOZ-CARPENA & F. FERNÁNDEZ-PIÑAS. 2016. **Low-dose pharmaceutical pollutants produce non-additive effects on microbial populations and communities**. ***Science Advances*** 2, 9: e1601272

EDITORIAL BOARDS OF BOOKS AND SCIENTIFIC JOURNALS

Vicenç Acuña. Associate Editor of ***Aquatic Sciences.***

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PRESENTATION AT CONGRESSES

ORAL PRESENTATIONS

Ramon J. Batalla. **"Las crecidas de mantenimiento como herramienta de restauración fluvial. El caso del río Ebro".** ***Universidad Austral de Chile. Valdivia***. August 2016.

Ramon J. Batalla. **"Respuestas hidro-sedimentarias de cuencas fluviales al cambio global. El caso del río Ebro"**. ***Pontificia Universidad Católica de Chile***. August 2016.

Ramon J. Batalla. **"Cuencas y cambio global: procesos, degradación y restauración".** ***Universidad Austral de Chile.*** Campus Patagonia. Coyhaique. September 2016.

Mercè Boy-Roura. **Antibiotic occurrence and transport in an alluvial aquifer: the case of the Fluvià River.** US Geological Survey, Virginia. July 2016.

Sergi Sabater. **Multiple stressors and complex responses in river ecosystems.** ***VII Congreso Argentino de Limnologia***. San Miguel de Tucumán. August 2016.

Sergi Sabater. "**Necesidad de Nuevos Desarrollos técnicos"**. ***Jornada técnica sobre Real Decreto, r.d. 817/2015 por el que se establecen los criterios de seguimiento y evaluación del estado de las aguas superficiales y las normas de calidad ambiental***. Reial Acadèmia de Farmacia de Catalunya, Barcelona. April 2016.

Sergi Sabater. "**Ecologia i valors ambientals del bosc de ribera"**. ***Jornada "Confluència d'usos al bosc de ribera".*** Casa de Cultura. Girona. October 2016.

Josep Mas-Pla. Member of the Scientific Commission. ***Toward Sustainable Groundwater in Agriculture - An International Conference Linking Science and Policy 2016.*** Organized by The Water Education Foundation (California), and The University of California-Davis. San Francisco, US. June 2016.

Josep Mas-Pla. Member of the Scientific and Organizing Commissions. ***6th International Ra-Rn Workshop: Rn and Ra Isotopes as Environmental Tracers.*** Organized by the Universitat Autònoma de Barcelona, Universitat de Girona, CEREGE, Centre de Recherche et d'Enseignement de Géosciences de l'Environnement (Université Aix-Marseille-CNRS-IRD), and LEGOS.Girona. July 2016.

Water Quality Research area

> SCI PUBLICATIONS

(Science Citation Index)
(Ordered by impact index JCR 2015)

Aristi I., M. Casella, A. Elosegi, S. Insa, M. Petrovic, S. Sabater, V. Acuña. 2016. **Nutrients versus emerging contaminants - or a dynamic match between subsidy and stress effects on stream biofilms.** *Environmental Pollution* 212, 208-215. IF: 4.839, Q1.

Auguet O., Pijuan M., Borrego C.M., Gutierrez O. 2016. **Control of sulfide and methane production in anaerobic sewer systems by means of Downstream Nitrite Dosage**. *Science of The Total Environment* 550, 1116-1125. IF: 3.976, Q1.

Aymerich I., V. Acuña, D. Barceló, M.J. García, M. Petrovic, M. Poch, S. Rodríguez-Mozaz, I. Rodríguez-Roda, S. Sabater, D. von Schiller and Ll. Corominas. 2016. **Attenuation of pharmaceuticals and their transformation products in a wastewater treatment plant and its receiving river ecosystem**. *Water Research* 100, 126-136. IF: 5.991, Q1.

Badia-Fabregat M., D. Lucas, M.A. Pereira, M. Alves, T. Pennanen, H. Fritze, S. Rodríguez-Mozaz, D. Barceló, T. Vicent and G. Caminal. 2016**. Continuous fungal treatment of non-sterile veterinary hospital effluent: pharmaceuticals removal and microbial community assessment.** *Applied Microbiology and Biotechnology* 100, 2401-2415. IF: 3.376, Q2.

Barón E., A. Dissanayake, J. Vilà-Cano, Ch. Crowther, J.W. Readman, A.N. Jha, E. Eljarrat and D. Barceló. 2016. **Evaluation of the genotoxic and physiological effects of decabromodiphenyl ether (BDE-209) and dechlorane plus (DP) flame retardants in marine mussels (*Mytilus galloprovincialis*).** *Environmental Science & Technology* 50, 2700-2708. IF: 5.393, Q1.

Becker D., S. Varela Della Giustina, S. Rodríguez-Mozaz, R. Schoevaart, D. Barceló, M. de Cazes, M-P. Belleville, J. Sánchez-Marcano, J. de Gunzburg, O. Couillerot, J. Völker, J. Oehlmann and M. Wagner. 2016. **Removal of antibiotics in wastewater by enzymatic treatment with fungal laccase-Degradation of compounds does not always eliminate toxicity.** *Bioresource Technology* 219, 500-509. IF: 4.917, Q1.

Blum K.M., P.L. Andersson, G. Renman, L. Ahrens, M.Gros, K. Wiberg, P. Haglund. 2016. **Non-target screening and prioritization of potentially persistent, bioaccumulating and toxic domestic wastewater contaminants and their removal in on-site and large scale sewage treatment plants**. *Science of the Total Environment* 575, 265-275. IF: 3.976, Q1.

Bodin H., A. Daneshvar, M. Gros, M. Hultberg. 2016. **Effects of biopellets composed of microalgae and fungi on pharmaceuticals present at environmentally relevant levels in water**. *Ecological Engineering* 91, 169-172. IF: 2.740, Q2.

Campo, M. Lorenzo, F. Pérez, Y. Picó, M. Farré and D. Barceló. 2016. **Analysis of the presence of perfluoroalkyl substances in water, sediment and biota of the Jucar River (E Spain). Sources, partitioning and relationships with water physical characteristics**. *Environmental Research* 147, 503-512. IF: 3.088, Q2.

Ccanccapa A., A. Masiá, A. Navarro-Ortega, Y. Picó and D. Barceló. 2016. **Pesticides in the Ebro River basin: Occurrence and risk assessment**. *Environmental Pollution* 211, 414-424. IF: 4.839, Q1.

Dallegrave A., T.M. Pizzolato, F. Barreto, E. Eljarrat and D. Barceló. 2016. **Methodology for trace analysis of 17 pyrethroids and chlorpyrifos in foodstuff by gas chromatography-tandem mas spectrometry**. *Analytical and Bioanalytical Chemistry* 408, 7689-7697. IF: 3.125, Q1.

de Castro-Catalá N., Kuzmanovic M., Roig N., Sierra J., Ginebreda A., Barceló D., Pérez S., Petrovic M., Picó Y., Schuhmacher M. and Muñoz I. 2016. **Ecotoxicity of sediments in rivers: Invertebrate community, toxicity bioassays and the toxic unit approach complementary assessment tools**. *Science of the Total Environment* 540, 297-306. IF: 3.976, Q1.

de Vera, G.A., J. Keller, W. Gernjak, H. Weinberg, M.J. Farré, **Biodegradability of DBP precursors after drinking water ozonation**, *Water Research* 106 (2016) 550-561. IF: 5.991, Q1.

Diaz-Jaramillo M., K.S.B. Miglioranza, M. González, E. Barón, J.M. Monserrat, E. Eljarrat and D. Barceló. 2016. **Uptake, metabolism and sub-lethal effects of BDE-47 in two estuarine invertebrates with different trophic positions**. *Environmental Pollution* 213, 608-617. IF: 4.839, Q1.

Ekowati Y., G. Buttiglieri, G. Ferrero, J. Valle-Sistac, M.S. Díaz-Cruz, D. Barceló, M. Petrovic, M. Villagrasa, M.D. Kennedy and I. Rodríguez-Roda. 2016**. Occurrence of pharmaceuticals and UV filters in swimming pools and spas**. *Environmental Science and Pollution Research* 23, 14431-14441. IF: 2.760, Q2.

Elersek T., S. Milavec, M. Korosec, P. Brezovsek, N. Negreira, B. Zonja, M. López de Alda, D. Barceló, E. Heath, J. Scancar and M. Filipic. 2016. **Toxicity of the mixture of selected antineoplastic drugs against aquatic primary producers.** *Environmental Science and Pollution Research* 23, 14780-14790. IF: 2.760, Q2.

Esteban S., L. Moreno-Merino, R. Matellanes, M. Catalá, M. Gorga, M. Petrovic, M. López de Alda, D. Barceló, A. Silva, J.J. Durán, J. López-Martínez and Y. Valcárcel. 2016. **Presence of endocrine disruptors in freshwater in the northern Antarctic Peninsula region.** *Environmental Research* 147, 179-192. IF: 3.088, Q2.

Etyemez M., Balcázar J.L. 2016. **Isolation and characterization of bacteria with antibacterial properties from Nile tilapia (*Oreochromis niloticus*).** *Research in Veterinary Science* 105, 62-64. IF: 1.504, Q1.

Farré M.J., S. Insa, J. Mamo and D. Barceló. 2016. **Determination of 15 *N*-nitrosodimethylamine precursors in different water matrices by automated on-line solid-phase extraction ultra-high-performance-liquid chromatography tandem mass spectrometry.** *Journal of Chromatography A* 1458, 99-111. IF: 3.926, Q1.

Farré, M.J., B.Lyon, G.A. de Vera, D. Stalter, W. Gernjak, **Assessing Adsorbable Organic Halogen Formation and Precursor Removal during Drinking Water Production**, *Journal of Environmental Engineering* 142 (2016) 04015087. If: 1.260, Q2.

Ferrando-Climent L., M.J. Reid, S. Rodríguez-Mozaz, D. Barceló and K.V. Thomas. 2016**. Identification of markers of cancer in urban sewage through the use of a supect screening approach**. *Journal of Pharmaceutical and Biomedical Analysis* 129, 571-580. IF: 3.169, Q1.

Ferrando-Climent L, Cruz-Morató C, Marco-Urrea E, Vicent T, Sarrà M, Rodriguez-Mozaz S, Barceló D (2016) **Non conventional biological treatment based on Trametes versicolor for the elimination of recalcitrant anticancer drugs in hospital wastewater.** *Chemosphere* 136:9-19. 3.698, Q1.

Ferre-Aracil J., Y. Valcárcel, N. Negreira, M. López de Alda, D. Barceló, S.C. Cardona, J. Navarro-Laboulais. 2016. **Ozonation of hospital raw wastewaters for cytostatic compounds removal. Kinetic modelling and economic assessment of the process.** *Science of the Total Environment* 556, 70-79. IF: 3.976, Q1.

Fillol M., Auguet J.C., Casamayor E.O., Borrego C.M. 2016. **Insights in the ecology and evolutionary history of the Miscellaneous Crenarchaeotic Group lineage.** *ISME Journal* 10, 665-677. IF: 9.328, Q1.

Gabarrón S., W. Gernjak, F. Valero, A. Barceló, M. Petrovic, I. Rodriguez-Roda. 2016**. Evaluation of emerging contaminants in a drinking water treatment plant using electrodialysis reversal technology**. *Journal of Hazardous Materials* 309, 192-201. IF: 4.836, Q1.

Garcia X., D. Barceló, J. Comas, Ll. Corominas, A. Hadjimichael, T.J. Page and V. Acuña. 2016. **Placing ecosystem services at the heart of urban water systems management.** *Science of the Total Environment* 563-564, 1078-1085. IF: 3.976, Q1.

García-Galán, M. J., A. Anfruns, R. Gonzalez-Olmos, S. Rodriguez-Mozaz and J. Comas 2016. **Advanced oxidation of the antibiotic sulfapyridine by UV/H2O2: Characterization of its transformation products and ecotoxicological implications**. *Chemosphere* 147: 451-459. IF: 3.698, Q1.

García-Galán MJ, Anfruns A, Gonzalez-Olmos R, Rodríguez-Mozaz S, Comas J (2016) **UV/H2O2 degradation of the antidepressants venlafaxine and O-desmethylvenlafaxine: Elucidation of their transformation pathway and environmental fate**. *Journal of Hazardous Materials* 311:70-80. IF: 4.836, Q1.

García-Galán M.J., M. Petrovic, S. Rodríguez-Mozaz and D. Barceló. 2016. **Multiresidue trace analysis of pharmaceuticals, their human metabolites and transformation products by fully automated on-line solid-phase extraction-liquid chromatography-tandem mass spectrometry**. *Talanta* 158, 330-341. IF: 4.035, Q1.

García-Hernández Y., Pérez-Sánchez T., Boucourt R., Balcázar J.L., Nicoli J.R., Moreira-Silva J., Rodríguez Z., Fuertes H., Nuñez O., Albelo N., Halaihel N. 2016. **Isolation, characterization and evaluation of probiotic lactic acid bacteria for potential use in animal production**. *Research in Veterinary Science* 108, 125-132. IF: 1.504, Q1.

Heath E., M. Cesen, N. Negreira, M. López de Alda, L. Ferrando-Climent, L. Blahova, T.V. Nguyen, M. Adahchour, A. Ruebel, N. Llewellyn, J. Scancar, S. Novakovic, V. Mislej, M. Strazar, D. Barceló and T. Kosjek. 2016. **First inter-laboratory comparison exercise for the determination of anticancer drugs in aqueous samples.** *Environmental Science and Pollution Research* 23, 14692-14704. IF: 2.760, Q2.

Holden, P.A., Gardea-Torresdey J.L., Klaessig F., Turco R.F., Mortimer M., Hund-Rinke K., Cohen Hubal E.A., Avery D., Barceló D., Behra R., Cohen Y., Deydier-Stephan L., Ferguson P.L., Fernandes T.F., Herr Harthorn B., Henderson W.M., Hoke R.A., Hristozov D., Johnston J.M., Kane A.B., Kapustka L., Keller A.A., Lenihan H.S., Lovell W., Murphy C.J., Nisbet R.M., Petersen E.J., Salinas E.R., Scheringer M., Sharma M., Speed D.E., Sultan Y., Westerhoff P., White J.C., Wiesner M.R., Wong E.M., Xing B., Steele Horan M., Godwin H.A., and Nel A.E. 2016. **Considerations of environmentally relevant test conditions for improved evaluation of ecological hazards of engineered nanomaterials**. *Environmental Science & Technology* 50, 6124-6145. IF: 5.393, Q1.

Huerta B., L. Margiotta-Casaluci, S. Rodríguez-Mozaz, M. Scholze, M.J. Winter, D. Barceló and J.P. Sumpter. 2016. **Anti-anxiety drugs and fish behavior: establishing the link between internal concentrations of oxazepam and behavioral effects**. *Environmental Toxicology and Chemistry* 35, 2782-2790. IF: 2.763, Q2.

Huerta B., Rodríguez-Mozaz S., Nannou C., Nakis L., Ruhí A., Acuña V., Sabater S. and Barceló D. 2016. **Determination of a broad spectrum of pharmaceuticals and endocrine disruptors in biofilm from a waste water treatment plant-impacted river.** *Science of the Total Environment* 540, 241-249. IF: 3.976, Q1.

Isidori M., M. Lavorgna, Ch. Russo, M. Kundi, B. Zegura, M. Novak, M. Filipic, M. Misík, S. Knasmueller, M. López de Alda, D. Barceló, B. Zonja, M. Cesen, J. Scancar, T. Kosjek and E. Heath. 2016. **Chemical and toxicological characterisation of anticancer drugs in hospital and municipal wastewaters from Slovenia and Spain.** *Environmental Pollution* 219, 275-287. IF: 4.839, Q1.

Khazri A., B. Sellami, M. Dellali, C. Corcellas, E. Eljarrat, D. Barceló, H. Beyrem and E. Mahmoudi. 2016. **Diastereomeric and enantiomeric selective accumulation of cypermethrin in the freshwater mussel *Unio gibbus* and its effects on biochemical parameters.** *Pesticide Biochemistry and Physiology* 129, 83-88. IF: 2.388, Q1.

Kosjek T., N. Negreira, E. Heath, M. López de Alda and D. Barceló. 2016. **Biodegradability of the anticancer drug etoposide and identification of the transformation products**. *Environmental Science and Pollution Research* 23, 14706-14717. IF: 2.760, Q2.

Kuzmanovic M., J.C. López-Doval, N. de Castro-Catalá, H. Guasch, M. Petrovic, I. Muñoz, A. Ginebreda and D. Barceló. 2016. **Ecotoxicological risk assessment of chemical pollution in four Iberian river basins and its relationship with the aquatic macroinvertebrate community status.** *Science of the Total Environment* 540, 324-333. IF: 3.976, Q1.

Lalander C., J. Senecal, M. Gros, L. Ahrens, S. Josefsson, K. Wiberg, B. Vinneras. 2016. **Fate of pharmaceuticals and pesticides in fly larvae composting.** *Science of the Total Environment* 565, 279-286. IF: 3.976, Q1.

Liu, P., M.J. Farré, J. Keller, W. Gernjak, **Reducing natural organic matter and disinfection by-product precursors by alternating oxic and anoxic conditions during engineered short residence time riverbank filtration: A laboratory-scale column study**, *Science of the Total Environment* 565 (2016) 616-625. IF: 3.976, Q1.

Llorca M., D. Lucas, L. Ferrando-Climent, M. Badia-Fabregat, C. Cruz-Morató, D. Barceló and S. Rodríguez-Mozaz. 2016. **Suspect screening of emerging pollutants and their major transformation products in wastewaters treated with fungi by liquid chromatography coupled to a high resolution mass spectrometry**. *Journal of Chromatography A* 1439, 124-136. IF: 3.926, Q1.

Llorens-Marés T., Triadó-Margarit X., Borrego C.M., Dupont C.L., Casamayor E.O. 2016. **High bacterial diversity and phylogenetic novelty in dark euxinic freshwaters analyzed by 16S tag community profiling**. *Microbial Ecology* 71, 566-574. IF: 3.232, Q1.

Lorenzo M., Campo J., Farré M., Pérez F., Picó Y. and Barceló D. 2016. **Perfluoroalkyl substances in the Ebro and Guadalquivir river basins (Spain).** *Science of the Total Environment* 540, 191-199. IF: 3.976, Q1.

Lucas D., D. Barceló and S. Rodríguez-Mozaz. 2016. **Removal of pharmaceuticals from wastewater by fungal treatment and reduction of hazard quotients.** *Science of the Total Environment* 571, 909-915. IF: 3.976, Q1.

Lucas D., M. Badia-Fabregat, T. Vicent, G. Caminal, S. Rodríguez-Mozaz, J.L. Balcázar and D. Barceló. 2016. **Fungal treatment for the removal of antibiotics and antibiotic resistance genes in veterinary hospital wastewater**. *Chemosphere* 152, 301-308. IF: 3.698, Q1.

Mamo J., S. Insa, H. Monclús, I. Rodríguez-Roda, J. Comas, D. Barceló and M.J. Farré. 2016. **Fate of NDMA precursors through and MBR-NF pilot plant for urban wastewater reclamation and the effect of changing aeration conditions**. *Water Research* 102, 383-393. IF: 5.991, Q1.

Marcé, R, George, G, Buscarinu, P, Deidda, M, Dunalska, J, de Eyto, E, Flaim, G, Grossart, H-P, Istvánovics, V, Lenhardt, M, Moreno-Ostos, E, Obrador, B, Ostrovsky, I, Pierson, DC, Potužák, J, Poikane, S, Rinke, K, Rodríguez-Mozaz, S, Staehr, PA, Šumberová, K, Waajen, G, Weyhenmeyer, GA, Weathers, KC, Zion, M, Ibelings, BW, Jennings, E. **Automatic High Frequency Monitoring for Improved Lake and Reservoir Management.** *Environmental Science & Technology* (2016) 50 (20), pp 10780–10794. IF: 5.393, Q1.

Margiotta-Casaluci L., S.F. Owen, B. Huerta, S. Rodríguez-Mozaz, S. Kugathas, D. Barceló, M. Rand-Weaver and J.P. Sumpter. 2016. **Internal exposure dynamics drive the Adverse Outcome Pathways of synthetic glucocorticoids in fish**. *Scientific Reports* 6, 21978. IF: 5.228, Q1.

Marti E., B. Huerta, S. Rodríguez-Mozaz, D. Barceló, J.L. Balcázar and R. Marcé. 2016. **Effects of subinhibitory ciprofloxacin concentrations on the abundance of *qnrS* and composition of bacterial communities from water supply reservoirs**. *Chemosphere* 161, 470-474. IF: 3.698, Q1.

Mastroianni N., M.J. Bleda, M. López de Alda and D. Barceló. 2016. **Occurrence of drugs of abuse in Surface water from four Spanish river basins: Spatial and temporal variations and environmental risk assessment**. *Journal of Hazardous Materials* 316, 134-142. IF: 4.836, Q1.

Mendoza A., B. Zonja, N. Mastroianni, N. Negreira, M. López de Alda, S. Pérez, D. Barceló, A. Gil and Y. Valcárcel. 2016. **Drugs of abuse, cytostatic drugs and iodinated contrast media in tap wáter from the Madrid región (central Spain): A case study to analyse their occurrence and human health risk characterization**. *Environment International* 86, 107-118. IF: 5.929, Q1.

Molins-Delgado D., M. Sílvia Díaz-Cruz and D. Barceló. 2016. **Ecological risk assessment associated to the removal of endocrine-disrupting parabens and benzophenone-4 in wastewater treatment**. *Journal of Hazardous Materials* 310, 143-151. IF: 4.836, Q1.

Molins-Delgado D., P. Gago-Ferrero, M.S. Diaz-Cruz and D. Barceló. 2016. **Single and joint ecotoxicity data estimation of organic UV filters and naomaterials toward selected aquatic organisms. Urban groundwater risk assessment**. *Environmental Research* 145, 126-134. IF: 3.088, Q2.

Moreno-González R., S. Rodríguez-Mozaz, B. Huerta, D. Barceló and V.M. León. 2016. **Do pharmaceuticals bioaccumulate in marine molluscs and fish from a coastal lagoon?** *Environmental Research* 146, 282-298. IF: 3.088, Q2.

Negreira N., J. Regueiro, M. Lopez de Alda and D. Barceló. 2016. **Reactivity of vinca alkaloids during water chloriantion processes: Identification of their disinfection by-products by high-resolution quadrupole-Orbitrap mass spectrometry**. *Science of the Total Environment* 544, 635-644. IF: 3.976, Q1.

Osorio V., J. Sanchís, J.Luís Abad, A. Ginebreda, M. Farré, S. Pérez and D. Barceló. 2016. **Investigating the formation and toxicity of nitrogen transformation products of diclofenac and sulfamethoxazole in wastewater treatment plants**. *Journal of Hazardous Materials* 309, 157-164. IF: 4.836, Q1.

Osorio V., Larrañaga A., Aceña J., Pérez S. and Barceló D. 2016. **Concentration and risk of pharmaceuticals in freshwaters systems are related to the population density and the livestock units in Iberian Rivers**. *Science of the Total Environment* 540, 267-277. IF: 3.976, Q1.

Ponsatí L., N. Corcoll, M. Petrovic, Y. Picó, A. Ginebreda, E. Tornés, H. Guasch, D. Barceló and S. Sabater. 2016. **Multiple-stressor effects on river biofilms under different hydrological conditions.** *Freshwater Biology* 61, 2102-2115. IF: 2.933, Q1.

Postigo C., C.I. Cojocariu, S.D. Richardson, P.J. Silcock and D. Barceló. 2016. **Characterization of iodinated disinfection by-products in chlorinated and chloraminated waters using Orbitrap based gas chromatography-mass spectrometry**. *Analytical and Bioanalytical Chemistry* 408, 3401-3411. IF: 3.125, Q1.

Proia L., von Schiller D., Sanchez-Melsió A., Sabater S., Borrego C.M., Rodríguez-Mozaz S., Balcázar J.L. 2016. **Occurrence and persistence of antibiotic resistance genes in river biofilms after wastewater inputs in small rivers.** *Environmental Pollution* 210, 121-128. IF: 4.839, Q1.

Rafraf I.D., Lekunberri I., Sanchez-Melsió A., Aouni M., Borrego C.M., Balcázar J.L. 2016. **Abundance of antibiotic resistance genes in five municipal wastewater treatment plants in the Monastir Governorate, Tunisia**. *Environmental Pollution* 219, 353-358. IF: 4.839, Q1.

Radjenovic J., M. Petrovic. 2016**. Sulfate-mediated electrooxidation of X-ray contract media on boron-doped diamond anode**. *Water Research* 94, 128-135 IF: 5.991, Q1.

Rivas D., A. Ginebreda, A. Elosegi, J. Pozo, S. Pérez, C. Quero and D. Barceló. 2016. **Using a polymer probe characterized by MALDI-TOF/MS to assess river ecosystem functioning: From polymer selection to field tests**. *Science of the Total Environment* 573, 532-540. IF: 3.976, Q1.

Rivas D., A. Ginebreda, S. Pérez, C. Quero and D. Barceló. 2016. **MALDI-TOF MS Imaging evidences spatial differences in the degradation of solid polycaprolactone diol in water under aerobic and denitrifying conditions**. *Science of the Total Environment* 566-567, 27-33. IF: 3.976, Q1.

Ruhí A., Acuña V., Barceló D., Huerta B., Mor J.R., Rodríguez-Mozaz S. and Sabater S. 2016. **Bioaccumulation and trophic magnification of pharmaceuticals and endocrine disruptors in a Mediterranean river food web.** *Science of the Total Environment* 540, 250-259. IF: 3.976, Q1.

Ryu Y., D. Barceló, L.P. Barron, L. Bijlsma, S. Castiglioni, P. de Voogt, E. Emke, F. Hernández, F.Y. Lai, A. Lopes, M. López de Alda, N. Mastroianni, K. Munro, J. O'Brien, Ch. Ort. B.G. Plósz, M.J. Reid, V. Yargeau, K.V. Thomas. 2016. **Comparative measurement and quantitative risk assessment of alcohol consumption through wastewater-based epidemiology: An international study in 20 cities.** *Science of the Total Environment* 565, 977-983. IF: 3.976, Q1.

Sabater S., D. Barceló, N. De Castro-Català, A. Ginebreda, M. Kuzmanovic, M. Petrovic, Y. Picó, L. Ponsatí, E. Tornés and I. Muñoz. 2016. **Shared effects of organic microcontaminants and environmental stressors on biofilms and invertebrates in impaired rivers**. *Environmental Pollution* 210, 303-314. IF: 4.839, Q1.

Sanchís J., M. Llorca, Y. Picó, M. Farré and D. Barceló. 2016. **Volatile dimethylsiloxanes in market seafood and freshwater fish from the Xúquer River, Spain**. *Science of the Total Environment* 545-546, 263-243. IF: 3.976, Q1.

Sanchís J., M. Olmos, P. Vincent, M. Farré and D. Barceló. 2016. **New insights on the influence of organic co-contaminants on the aquatic toxicology of carbon nanomaterials.** *Environmental Science & Technology* 50, 961-969. IF: 5.393, Q1.

Santín G., E. Eljarrat and D. Barceló. 2016**. Bioavailability of classical and novel flame retardants: Effect of fullerene presence**. *Science of the Total Environment* 565, 299-305. IF: 3.976, Q1.

Santín G., E. Eljarrat and D. Barceló. 2016. **Simultaneous determination of 16 organophosphorus flame retardants and plasticizers in fish by liquid chromatography-tandem mass spectrometry.** *Journal of Chromatography A* 1441, 34-43. IF: 3.926, Q1.

Schwanz T.G., Llorca M., Farré M. and Barceló D. 2016. **Perfluoroalkyl substances assessment in drinking waters from Brazil, France and Spain**. *Science of the Total Environment* 539, 143-152. IF: 3.976, Q1.

Serra-Roig M.P., A. Jurado, M.S. Díaz-Cruz, E. Vázquez-Suñé, E. Pujades and D. Barceló. 2016. **Occurrence, fate and risk assessment of personal care products in river-groundwater interface**. *Science of the Total Environment* 568, 829-837. IF: 3.976, Q1.

Snip L.J.P., X. Flores-Alsina, I. Aymerich, S. Rodríguez-Mozaz, D. Barceló, B.G. Plósz, Ll. Corominas, I. Rodríguez-Roda, U. Jeppsson and K.V. Gernaey. 2016. **Generation of synthetic influent data to perform (micro) pollutant wastewater treatment modelling studies**. *Science of the Total Environment* 569-570, 278-290. IF: 3.976, Q1.

Stalter, D., L.I. Peters, E. O'Malley, J.Y. Tang, M. Revalor, M.J. Farré, K. Watson, U. von Gunten, B.I. Escher, **Sample Enrichment for Bioanalytical Assessment of Disinfected Drinking Water: Concentrating the Polar, the Volatiles, and the Unknowns,** *Environmental Science and Technology* 50 (2016) 6495-6505. IF: 5.393, Q1

Subirats J., Sanchez-Melsió A., Borrego C.M., Balcázar J.L., Simonet P. 2016. **Metagenomic analysis reveals that bacteriophages are reservoirs of antibiotic resistance genes**. *International Journal of Antimicrobial Agents* 48, 163-167. IF: 4.097, Q1.

Thompson Brewster E., C.M. Mehta, J. Radjenovic, D.J. Batstone. 2016. **A mechanistic model for electrochemical nutrient recovery systems**. *Water Research* 94, 176-186. IF: 5.991, Q1.

Valdés M.E., B. Huerta, D.A. Wunderlin, M.A. Bistoni, D. Barceló and S. Rodríguez-Mozaz. 2016. **Bioaccumulation and bioconcentration of carbamazepine and other pharmaceuticals in fish under field and controlled laboratory experiments. Evidences of carbamazepine metabolization by fish**. *Science of the Total Environment* 557-558, 58-67. IF: 3.976, Q1.

Valle-Sistac J., D. Molins-Delgado, M. Díaz, L. Ibáñez, D. Barceló and S. Díaz-Cruz. 2016. **Determination of parabens and benzophenone-type UV filters in human placenta. First description of the existence of benzyl paraben and benzophenone-4.** *Environment International* 88, 243-249. IF: 5.929 Q1

Watson, K., M.J. Farré, N. Knight, **Comparing a silver-impregnated activated carbon with an unmodified activated carbon for disinfection by-product minimisation and precursor removal.** *Science of the Total Environment* 542 (2016) 672-684. IF: 3.976, Q1

Zonja B., A. Delgado, J.L. Abad, S. Pérez and D. Barceló. 2016. **Abiotic amidine and guanidine hydrolysis of lamotrigine-N2-glucuronide and related compounds in wastewater: The role of pH and N2-substitution on reaction kinetics**. *Water Research* 100, 466-475. IF: 5.991, Q1.

Zonja B., S. Pérez and D. Barceló. 2016. **Human metabolite lamotrigine-*N*²-glucuronide is the principal source of lamotrigine-derived compounds in wastewater treatment plants and surface water**. *Environmental Science & Technology* 50, 154-164. IF: 5.393, Q1.

> REVIEW ARTICLES

Giulivo M., M. López de Alda, E. Capri and D. Barceló. 2016. **Human exposure to endocrine disrupting compounds: Their role in reproductive sytems, metabolic síndrome and breast cancer**. A review. *Envrionmental Research* 151, 251-264. IF: 3.088, Q2.

Llorca M., M: Farré, E. Eljarrat, S. Díaz-Cruz, S. Rodríguez-Mozaz, D. Wunderlin and D. Barceló. 2016. **Review of emerging contaminants in aquatic biota from Latin America: 2002-2016**. *Environmental Toxicology and Chemistry* DOI: 10.1002/etc.3626 IF: 2.763, Q2.

> PUBLISHED BOOKS

Farré, M.J.; G.A. De Vera, B.A. Lyon, K. Doederer , H.S. Weinberg, W. Gernjak, J. Keller, *Engineering Solutions to Minimize Nitrogen-Containing DBPs. Water Research Founation*. Denver, CO. ISBN 978-1-60573-259-6

Perez S., P. Eichhorn and D. Barceló (Eds) *Application of Time-of-Flight and Orbitrap Mass Spectrometry in Environmental, Food, Doping and Forensic Analysis. Comprehensive Analytical Chemistry* Series, vol. 71, Elsevier, Amsterdam, NL, 2016, pp. 502.

Petrovic M., S. Sabater, A. Elosegi and D. Barceló (Eds) *Emerging Contaminants in River Ecosystems, Handbook of Environmental Chemistry,* vol. 46, Springer Verlag, Berlin, Germany, 2016, pp. 220

> BOOK CHAPTERS

Acuña V., I. Aristi, I. Aymerich, D. Barceló, L. Corominas, M. Petrovic, M. Poch, S. Rodríguez-Mozaz, D. von Schiller, S. Sabater, A. Elosegi. 2016. **Ecosystem Responses to Emerging Contaminants: Fate and Effects of Pharmaceuticals in a Mediterranean River**, in M. Petrovic, S. Sabater, A. Elosegi and D. Barceló (Eds) **Emerging Contaminants in River Ecosystems**, *Handbook o f Environmental Chemistry,* vol. 46, Springer Verlag, Berlin, Germany, pp. 143-158.

Alvarez-Muñoz D., M.Llorca, J. Blasco and D. Barceló. 2016. **Contaminants in the Marine Environment** in J. Blasco, P.M. Chapman, O. Campana and M. Hampel, **Marine Ecotoxicology: Current knowledge and future issues**, CRC Press Taylor and Francis, *Elsevier-Academic Press,* Amsterdam, NL, pp. 1-34.

Farré M., D. Bozobic and D. Barceló. 2016. **Analysis of Nanomaterials by Single Particle Methods** in S.Kaur Brar, T.C.Zhang, M.Verma, R.Y. Surampalli and R.D.Tyagi **Nanomaterials in the Environment**, *American School of Civil Engineers (ASCE),* Reston, Virgina, USA, pp. 107-128.

Ginebreda A., S. Perez, D. Rivas, M. Kuzmanovic and D Barceló. 2016. **Pollutants of Emerging Concern in Rivers of Catalonia: Occurrence, Fate and Risk,** in A. Munne, A. Ginebreda and N. Prat (Eds) **Experiences from Surface water Quality Monitoring. The EU Water Framewrok Directive implementation in the Catalan River basin District (Part I),** *Handbook of Environmental Chemistry,* vol. 42, Springer Verlag, Berlin, Germany, pp. 283-320.

Gonzalez O., B.Bayarri, J.Aceña, S.Perez and D Barceló. 2016. **Treatment Technologies for Wastewater Reuse: Fate of Contaminants of Emerging Concern,** in D. Fatta-Kassinos, D.D. Dionysiou and K. Kümmerer (Eds) **Advanced Treatment Technologies for Urban Wastewater Reuse**, *Handbook of Environmental Chemistry,* vol. 45, Springer Verlag, Berlin, Germany, pp. 5-38.

Hannemann M., B. Zonja, D. Barceló and S. Perez. 2016. **HRMS approaches for evaluating transformations of pharmaceuticals in the aquatic environment** in T. Letzel, J.E Drews: **Assessing Transformation Products of Chemicals by Non-Target and Suspect Screening - Strategies and Workflows,** *ACS Symposium Series*, vol. 1241. American Chemical Society. pp. 25-44.

Kuzmanovic M., A. Ginebreda, M. Petrovic, D. Barceló. 2016. **Contaminants of Emerging Concern in Mediterranean Watersheds**, in M. Petrovic, S. Sabater, A. Elosegi and D. Barceló (Eds) **Emerging Contaminants in River Ecosystems**, *Handbook of Environmental Chemistry,* vol. 46, Springer Verlag, Berlin, Germany, pp. 27-45.

Mandaric L., R. Marce, M. Petrovic. 2016. **Introduction on Emerging Contaminants in Rivers and Their Environmental Risk**, in M. Petrovic, S. Sabater, A. Elosegi and D. Barceló (Eds) **Emerging Contaminants in River Ecosystems**, *Handbook of Environmental Chemistry*, vol. 46, Springer Verlag, Berlin, Germany, pp. 1-25.

Postigo C., M.J. Garcia-Galan, M. Köch-Schulmeyer and D Barceló. 2016. **Occurrence of Polar Organic Pollutants in Groundwater Bodies of Catalonia**, in A. Munne, A. Ginebreda and N. Prat (Eds) **Experiences from Ground, Coastal and Transitional Water Quality Monitoring. The EU Water Framewrok Directive implementation in the Catalan River Basin District (Part II),** *Handbook of Environmental Chemistry*, vol. 43, Springer Verlag, Berlin, Germany, pp. 63-89.

Rodriguez-Mozaz S., B. Huerta, and D Barceló. 2016. **Bioaccumulation of Emerging Contaminants in aquatic Biota: Patterns of Pharmaceuticals in Mediterranean River Networks** in M. Petrovic, S. Sabater, A. Elosegui and D. Barceló (Eds) **Emerging Contaminants in River Ecosystems**, *Handbook of Environmental Chemistry,* vol. 46, Springer Verlag, Berlin, Germany, pp. 121-141.

Sanchis J., M. Farré and D. Barceló. 2016. **Analysis of Nanomaterials by Particle Size Distribution Methods,** in S. Kaur Brar, T.C. Zhang, M. Verma, R.Y. Surampalli and R.D. Tyagi **Nanomaterials in the Environment**, *American School of Civil Engineers (ASCE)*, Reston, Virgina, USA, pp. 129-157.

Voulvoulis N., D. Barceló and P. Verlicchi. 2016. **Pharmaceutical residues in sewage treatment works and their fate in the receiving environment** in R.E. Hesler and R.M. Harrisoni **Pharmaceuticals in the Environment**, *Issues in Environmental Science and Technology,* vol. 41, Royal Society of Chemistry, University of York, UK , 2016, pp. 120-179.

OTHER BOOKS AND JOURNALS

Barceló D.
Contaminantes emergentes: enemigos ocultos en casa
IAgua- Magazine, June 2016, pp. 64-66.

Cojocariu C., M.J. Farre, S. Insa, D. Barceló and P.Silcock.
Low level quantfication of NDMA and non-targeted contaminants screening in drinking wáter using GC Orbitrap mass spectrometry
Thermo Scientific Application Note, December 2016.

Rozman M., M. Petrovic.
Bquant – Novel script for batch quantification of LCMS data, *MethodsX*, 3 (2016), pp. 520-524.

Lorenzo M., M. Farré, C. Blasco, M. Onhgena, Y. Picó and D. Barceló. 2016. **Perfluoroalkyl substances in Breast milk, infant formula and baby food from Valencia Community (Spain).** *Environmental Nanotechnology, Monitoring & Management* 6, 108-115.

EDITORIAL BOARDS OF BOOKS AND SCIENTIFIC JOURNALS

Barceló, D. Editor. *Wilson & Wilson Comprehensive Analytical Chemistry*, book series (Elsevier, The Netherlands) 1997 to present.

Barceló, D. Co-Editor. *Handbook of Environmental Chemistry,* book series (Springer-Verlag, Germany) 2007 to present.

Barceló, D. Co-Editor-in-chief. *Science of the total Environment* (Elsevier, The Netherlands) 2012 to present.

Barceló, D. Associate Editor. ***Trends in Analytical Chemistry*** (Elsevier, The Netherlands) 1993 to present.

Barceló, D. Associate Editor. ***Environment International*** (Elsevier, The Netherlands) 2009 to present.

Barceló, D. Member of the Editorial Board. ***Analytical and Bioanalytical Chemistry*** (Springer Verlag, Germany) 2002 to present.

Petrovic, M. Editor-in-chief. ***TrEAC – Trends in Environmental Analytical Chemistry*** (Elsevier, The Netherlands) 2014 to present.

Petrovic, M. Member of the Editorial Board. ***Environmental Nanotechnology, Monitoring & Management*** (Elsevier, The Netherlands) 2014 to present.

Balcázar J.L. Associate Editor. ***BMC Microbiology*** (BioMed Central, United Kingdom) 2013 to present.

Balcázar J.L. Review Editor. ***Frontiers in Microbiology*** (Frontiers, Switzerland). 2016 to present.

Balcázar J.L. Member of the Editorial Board. ***Scientific Reports*** (Nature Publishing Group, United Kingdom) 2012 to present.

Balcázar J.L. Member of the Editorial Board. ***Environmental Science and Pollution Research*** (Springer, Germany). 2016 to present.

Balcázar J.L. Member of the Editorial Board. ***Journal of Applied Microbiology*** (Wiley, United States) 2016 to present.

Balcázar J.L. Member of the Editorial Board. ***Letters in Applied Microbiology*** (Wiley, United States) 2016 to present.

Rodriguez-Mozaz, S. Guest Editor. ***Food and Chemical Toxicology*** (Elsevier, The Netherlands) Special issue "European seafood safety" 2016

> *PRESENTATION AT CONGRESSES*

ORAL PRESENTATIONS

D.Barceló. **"Destí, efectes i gestió dels contaminants emergents i el seu risc en conques fluvials amb manca d´aigua."** ***Dilluns de la ciència: la química de la nostra vida***. CSIC Barcelona. January 2016.

D. Barceló, M Farré, M. Petrovic and MJ Lopez de Alda. **Fate and Risk of Pesticides, Pharmaceuticals, Illicit Drugs and Personal Care Products in the Iberian River Basins of Ebro and LLobregat: Challenges and Solutions using Advanced Treatment Technologies in a European context.** ***Workshop sobre qualidade de aguas e alimentos***. Porto Alegre, UFRGS, y Vitoria, Espiritu Santo, Brazil. January 2016.

D. Barceló. "**Mudanças climaticas o problema da escassez da agua e dos contaminantes emergentes."**Pro-Reitoria de Pesquisa Pos-Graduacao e Inovacao-UFMA Universidad Federal de Maranhao**.** San Luis de Maranhao, Brazil. February 2016.

D. Barceló and A.Navarro. **Presentation of the Globaqua project: interactions with Stawa.** ***Towards the assessment of ecological status of water bodies in the Sava river basin (STAWA).*** Ljubljiana, Slovenia. February 2016.

D. Barceló and A.Navarro. **Fate, Effects and Management of Emerging Contaminants abd Risks in River Catchments under Water Scarcity: the Globaqua Project**. ***Laudato SI-Congreso Internacional de Ecologia Integral y Medio Ambiente-Homenaje al Papa Francsico.*** Murcia, UCAM. March 2016.

D. Barceló, M Farré, M. Petrovic and MJ Lopez de Alda. **LC-MS-MS Analysis of Emerging Contaminants (EDCs, PPCPs and PFCs) and Nanomaterials in the environment.** ***Pittcon 2016***. Atlanta, GA, USA. March 2016.

D. Barceló and A.Navarro. **Recent achievements of the Globaqua project: interactions with Mars** - ***EU project MARS-Mid term all-partners project meeting.*** Fulda-Germany. March 2016.

D.Barceló. **"Canvi climàtic, sequera i altres factors d´estrés: amenaces i estrategies d´adaptacio"**. ***Dia Mundial de l'Aigua.*** Generalitat de Catalunya. Barcelona. March 2016.

D. Barceló, M Farré, M. Petrovic, MJ Lopez de Alda**. Fate and Risk of Pesticides, Pharmaceuticals, Illicit Drugs and Personal Care Products in the Iberian River Basins of Ebro and Llobregat: Challenges and Solutions using Advanced Treatment Technologies in a European context"**. ***Conferencias del Departamento di Scienze Chimiche et Farmaceutiche***, University of Ferrara, Ferrara, Italy, April 2016

D. Barceló, C.Postigo, SD Richardson. **Characterisation of iodine containing disinfection by-products in water using GC-Orbitrap-based MS.** ***64th Conference on Mass Spectrometry and Allied Topics***. San Antonio, Texas, USA, June 2016.

D. Barceló, **Real time monitoring of Sea contaminants by an autonomous lab-on-a-chip biosensor: Progress results of the EU funded project Sea-on-a-Chip.** ***6th International Multidisciplinary Conference on Optofluidics. Session on Sea-on-a-chip and Water-Peking University.*** Beijing, China. July 2016.

D. Barceló, M Farré, M. Petrovic, MJ Lopez de Alda. **Fate and Risk of Pesticides, Pharmaceuticals, Illicit Drugs and Personal Care Products in the Iberian River Basins of Ebro and LLobregat: Challenges and Solutions using Advanced Treatment Technologies in a European context.** ***VII Congreso AMEQA (Asociacion Mesoamericana de Ecotoxicologia y Quimica Ambiental).*** Ciudad de Mexico, Mexico. August 2016.

D. Barceló, M Farré, J Sanchis. **Metabolic responses of *Mytilus galloprovincialis* to fullerene soot in microcosmos exposure experiments.** ***252nd American Chemical Society National Meeting and Expostion.Division of Environmental Chemistry.*** Philadelphia, PA, USA. August 2016.

D. Barceló, B.Zonja, MLopez de Alda. **Detection of sartans, related compounds and TPs in real-world aqueous environmental samples using fragment ion search and HRMS.** ***252nd American Chemical Society National Meeting and Exposition. Division of Environmental Chemistry.*** Philadelphia, PA, USA. August 2016.

D. Barceló, B.Zonja, M.Lopez de Alda, M Farre. **LC-tandem MS and LC-HRMS Strategies for the Analysis of Contaminants of Emerging Concern and Carbon-based Nanomaterials in Water, Soil and Biota Samples: Exposure and Real-world Environmental samples.** ***20èmes Journees Scientifiques du Centre de Competences en Chimie et Toxicologie Analytique (ccCTA)***. Les Diablerets, Switzerland. September 2016.

D. Barceló, B.Zonja, MLopez de Alda, M Farre. **LC-tandem MS and LC-HRMS Strategies for the Analysis of Contaminants of Emerging Concern and Carbon-based Nanomaterials in Water, Soil and Biota Samples: Exposure and Real-world Environmental samples.** ***3rd MS ENVI Day- Societa Chimica Italiana-Divisione di Spectrometria dei Massa.*** Livorno, Italy. September 2016.

D. Barceló and A.Navarro. **The EU Globaqua project on Multiple Stressors on Aquatic Ecosystems under Water Scarcity and Global Change. A reconnaissance Study in Selected European River Basins**. ***RusaLCA International Conference- Development of small-scale wastewater treatment plants and sustainable management of the environment***. Ljubljiana, Slovenia. October 2016.

D. Barceló, B.Zonja, MLopez de Alda, M Farre. **Smart Suspect screening and Related HRMS Approaches for the Detection of Pharmaceuticals and Their Transformation Products in Real-world samples.** ***International Symposium on Persistent Toxic Substances -ISPTS 2016***. Leipzig, Germany. October 2016.

D. Barceló and B.Zonja. **Overview of leveld of pharmaceuticals and organic consumer chemical contaminants in sewage biosolids in Spain.** ***Workshop on Pharmaceuticals and organic chemicals in sewage biosolids: questions for recycling.*** Malmö, Sweden. October 2016.

D. Barceló and M Farré. **Quantitative and Qualitative analysis of microplastics in wastewaters, river and estuarine waters.** ***SETAC 37th Annual Meeting in North America-7th SETAC World Congress.*** Orlando, FL, USA. November 2016.

D. Barceló and M. Farré. **Analysis and occurrence of marine biotoxins in the Catalan coast of Spain at the Western Mediterranean Sea**. ***SETAC 37th Annual Meeting in North America-7th SETAC World Congress.*** Orlando, FL, USA. November 2016.

D. Barceló, A.Ginebreda and A.Navarro. **Impact in policy of RDI activities. Case studies and policy briefs of the SCARCE and GLOBAQUA projects.** ***Workshop on Alignment of On-going JPI Water Projects on "Emerging Pollutants, including pathogens."*** Viena, Austria. November 2016.

D. Barceló. **"Reutilización, salud pública y sanidad ambiental. El control de los contaminantes emergentes".** ***Agua y sostenibilidad. La reutilización de aguas en España y Europa: pasado, presente y futuro.*** Murcia, Universidad de Murcia. December 2016.

M. Gros. **Pharmaceuticals in wastewater: occurrence, removal and fate under conventional wastewater treatment.** ***"Jornades de Medi Ambient I Societat: pautes per a la gestió ambiental."*** Barcelona, Spain. June 2016.

Subirats, J., V. Acuña, S. Sabater and C.M. Borrego. **Effects of a combined regime of nutrients and pharmacs on the prevalence of antibiotic resistance genes in streambed biofilms.** ***1st Iberoamerican Congress of Limnology (CIL).*** Valdivia, Chile. November 2016.

Subirats J., Petrovic M., Acuña V., Sabater S and C.M. Borrego. **Prevalence and distribution of antibiotics resistance genes in pilithic and epipsammic biofilms impacted streams.** ***XVIII Congress of the Iberian Association of Limnology (AIL).*** Tortosa, Spain. July 2016.

Rodriguez-Mozaz, S., Huerta B., Alvarez, D., Valdés, M.E., Bistoni, M.A., Moreno, R., León, V, Wunderlin, D.A, Marques, A., Barceló, D. **Occurrence of pharmaceuticals in freshwater biota in field studies.** ***VI Congreso Argentino de la Sociedad de Toxicología y Química Ambiental.*** Córdoba, Argentina. July 2016.

Technologies and Evaluation Research area

SCI PUBLICATIONS

(Science Citation Index)
(Ordered by impact index JCR 2015)

Aymerich, I., Acuña, V., Barceló, D., García, M.J., Petrovic, M., Poch, M., Sabater, S., Rodriguez-Mozaz, S., Rodríguez-Roda, I., von Schiller, D., Corominas, L., 2016. **Attenuation of pharmaceuticals and their transformation products in a wastewater treatment plant and its receiving river ecosystem.** *Water Res*, 100, 126–136. I.F. 5.991, Q1.

De Vera, G.A.D., Keller, J., Gernjak, W., Weinberg, H.S., Farré, M.J., 2016. **Biodegradability of DBP precursors after drinking water ozonation**. *Water Research* 106, 550-561. I.F. 5.991, Q1.

Kassotaki, E., Buttiglieri, G., Ferrando-Climent, L., Rodriguez-Roda, I., Pijuan, M., 2016. **Enhanced sulfamethoxazole degradation through ammonia oxidizing bacteria co-metabolism and fate of transformation products**. *Water Research* 94, 111-119. I.F. 5.991, Q1.

Mamo, J., Insa S., Monclús H., Rodriguez-Roda I., Comas J., Barceló D., Farré MJ., 2016. **Fate of NDMA precursors through an MBR-NF pilot plant for urban wastewater reclamation and the effect of changing aeration conditions**. *Water Research*, 102, 383-393. I.F. 5.991, Q1.

Marques, R., Rodriguez-Caballero, A., Oehmen, A., Pijuan, M., 2016. **Assessment of online monitoring strategies for measuring N2O emissions from full-scale wastewater treatment systems**. *Water Research* 99, 171-179. I.F. 5.991, Q1.

Pype, M.L., Donose, B.C., Martí, L., Patureau, D., Wery, N., Gernjak, W., 2016. **Virus removal and integrity in aged RO membranes**. *Water Research* 90, 167-175. I.F. 5.991, Q1.

Villez, K., Vanrolleghem, P. a., Corominas, L., 2016. **Optimal flow sensor placement on wastewater treatment plants**. *Water Res.* 101, 75–83. I.F. 5.991, Q1.

Hadjimichael, A., Morera, S., Benedetti, L., Flameling, T., Corominas, L., Weijers, S., Comas, J., 2016. **Assessing urban wastewater system upgrades using integrated modeling, life cycle analysis and shadow pricing**. *Environ. Sci. Technol.* 50, 12548–12556. IF: 5.393, Q1.

Castro-Barros, C.M., Rodríguez-Caballero, A., Volcke, E.I.P., Pijuan, M., 2016. **Effect of nitrite on the N2O and NO production on the nitrification of low-strength ammonium wastewater**. *Chemical Engineering Journal* 287, 269-276. I.F. 5.310, Q1.

Morera, S., Corominas, L., Poch, M., Aldaya, M.M., Comas, J., 2016. **Water footprint assessment in wastewater treatment plants**. *J. Clean. Prod*. 112, 4741–4748. IF: 4.959, Q1.

Ribera-Guardia, A., Marques, R., Arangio, C., Carvalheira, M., Oehmen, A., Pijuan, M., 2016. **Distinctive denitrifying capabilities lead to differences in N2O production by denitrifying polyphosphate accumulating organisms and denitrifying glycogen accumulating organisms**. *Bioresource Technology* 219, 106-113. I.F. 4.917, Q1.

Zahedi, S., Icaran, P., Yuan, Z., Pijuan, M., 2016. **Assessment of free nitrous acid pre-treatment on a mixture of primary sludge and waste activated sludge: Effect of exposure time and concentration**. *Bioresource Technology* 216, 870-875. I.F. 4.917, Q1.

Zahedi, S., Icaran, P., Yuan, Z., Pijuan, M., 2017. **Effect of free nitrous acid pre-treatment on primary sludge at low exposure times**. *Bioresource Technology* 228, 272-278. I.F. 4.917, Q1.

Gabarrón, S., Gernjak, W., Valero, F., Barceló, A., Petrovic, M., Rodríguez-Roda, I., 2016. **Evaluation of emerging contaminants in a drinking water treatment plant using electrodialysis reversal technology**. *J. Hazard. Mater.* 309, 192-201. I.F. 4.836, Q1.

García-Galán, M.J., Anfruns, A., Gonzalez-Olmos, R., Rodríguez-Mozaz, S., Comas, J., 2016. **UV/H2O2degradation of the antidepressants venlafaxine and O-desmethylvenlafaxine: Elucidation of their transformation pathway and environmental fate.** *J. Hazard. Mater.*, 311, 70-80. I.F. 4.836, Q1.

Castillo, A., Cheali, P., Gómez, V., Comas, J., Poch, M., Sin, G., 2016. **An integrated knowledge-based and optimization tool for the sustainable selection of wastewater treatment process concepts**. *Environ. Model. Softw*. 84, 177–192. I.F. 4.207, Q1.

Auguet, O., Pijuan, M., Borrego, C.M., Gutierrez, O., 2016. **Control of sulfide and methane production in anaerobic sewer systems by means of Downstream Nitrite Dosage.** *Sci. Total Environ.* 550, 1116-1125. I.F. 3.976, Q1.

Boithias, L., Terrado, M., Corominas, L., Ziv, G., Kumar, V., Marqués, M., Schuhmacher, M., Acuña, V., 2016. **Analysis of the uncertainty in the monetary valuation of ecosystem services – a case study at the river basin scale**. *Sci. Total Environ.* 543, 683–690. I.F. 3.976, Q1.

Garcia, X., Barceló, D., Comas, J., Corominas, L., Hadjimichael, A., Page, T.J., Acuña, V., 2016. **Placing ecosystem services at the heart of urban water systems management. *Sci. Total Environ*.** 563–564, 1078–1085. I.F. 3.976, Q1.

Liu, P., Keller, J., Gernjak, W., 2016. **Enhancing zero valent iron based natural organic matter removal by mixing with dispersed carbon cathodes**. ***Sci. Tot. Environ*.** 550, 95-102. I.F. 3.976, Q1.

Liu, P., Farré, M.J., Keller, J., Gernjak, W, 2016. **Reducing natural organic matter and disinfection by-product precursors by alternating oxic and anoxic conditions during engineered short residence time riverbank filtration: A laboratory-scale column study. *Sci. Total Environ*.** 565, 616-625. I.F. 3.976, Q1.

Murla, D., Gutierrez, O., Martinez, M., Suñer, D., Malgrat, P., Poch, M. 2016. **Coordinated management of combined sewer overflows by means of environmental decision support systems**. ***Sci. Total Environ*.** 550, 256-264. I.F. 3.976, Q1.

Snip, L.J.P., Flores-Alsina, X., Aymerich, I., Rodríguez-Mozaz, S., Plósz, B.G., Corominas, L., Barceló, D., Rodríguez-Roda, I., Jeppsson, U., Gernaey, K.V., 2016. **Generation of synthetic influent data to perform (micro) pollutant wastewater treatment modelling studies**. ***Sci. Total Environ*.** 569-570,278-290. I.F. 3.976, Q1.

García-Galán, M.J., Anfruns, A., González-Olmos, R., Rodríguez-Mozaz, S., Comas, J., 2016. **Advanced oxidation of the antibiotic sulfapyridine BY UV/H2O2: Characterization of its transformation products and ecotoxicological implications**. ***Chemosphere***, 147, 451-459. I.F. 3.698, Q1.

Morera, S., Remy, C., Comas, J., Corominas, L., 2016**. Life cycle assessment of construction and renovation of sewer systems using a detailed inventory tool**. ***Int. J. Life Cycle Assess***. 21, 1–13. IF: 3.324, Q1.

Filloux, E., Gernjak, W., Gallard, H., Croue, J.P., 2016. **Investigating the relative contribution of colloidal and soluble fractions of secondary effluent organic matter to the irreversible fouling of MF and UF hollow fibre membranes**. ***Separ. Purif. Technol*.** 170, 109-115. I.F. 3.299, Q1.

Castillo, A., Porro, J., Garrido-Baserba, M., Rosso, D., Renzi, D., Fatone, F., Gómez, V., Comas, J., Poch, M., 2016. **Validation of a decision support tool for wastewater treatment selection. *J. Environ. Management***, 184, 409-418. doi: 10.1016/j.jenvman.2016.09.087. I.F. 3.131, Q1.

Garcia, X., Corominas, L., Pargament, D., Acuña, V., 2016**. Is river rehabilitation economically viable in water-scarce basins? *Environ. Sci. Policy*** 61, 154–164. IF: 2.972, Q2.

Ekowati, Y., Buttiglieri, G., Ferrero, G., Valle-Sistac, J., Diaz-Cruz, M.S., Barcelo, D., Petrovic, M., Villagrasa, M., Kennedy, M.D., Rodriguez-Roda, I. 2016. **Occurrence of pharmaceuticals and UV filters in swimming pools and spas. *Environmental Science and Pollution Research***. 23(14), 14431-41. I.F. 2.760, Q1.

Montserrat, A., Hofer, T., Poch, M., Muschalla, D., Corominas, L., 2016**. Using the duration of combined sewer overflow events for the calibration of sewer hydrodynamic models. *Urban Water J***. 9006, 1–7. IF: 1.478, Q2.

Farré, M.J., Lyon, B., de Vera, G.A., Stalter, D., Gernjak, W. (2016). **Assessing adsorbable organic halogen formation and precursor removal during drinking water production. *J. Env. Eng*.** 142(3), 04015087, doi: 10.1061/(ASCE)EE.1943-7870.0001022. I.F. 1.125, Q2.

REVIEW ARTICLES

Hadjimichael, A., Comas, J., Corominas, L., 2016. **Do machine learning methods used in data mining enhance the potential of decision support systems? A review for the urban water sector**. ***AI Commun*.** 29, 747–756. IF: 0.364, Q4.

Blandin, G., Verliefde, A., Comas, J., Rodriguez-Roda, I., Le-Clech P., 2016. **Efficiently combining water reuse and desalination through forward osmosis – reverse osmosis (FO-RO) hybrids: a critical review**. ***Membranes***, 6, 37. DOI: 10.3390/membranes6030037.

Pype M.L, Lawrence M.G., Keller J., Gernjak W., 2016. **Reverse osmosis integrity monitoring in water reuse: The challenge to verify virus removal – A review. *Water Res*.** 98, 384-395. I.F. 5.991, Q1.

BOOKS CHAPTERS

R. Lebrero, A. Oehmen, J. Porro, E. Volcke, R. Muñoz, M. Pijuan. Chapter 23. **Greenhouse gases and odour emissions. Book: Innovative Wastewater Treatment and Resource Recovery Technologies: Impacts on Energy, Economy and Environment**. ***IWA Publishing Group***. Editors: Juan Lema and Sonia Suarez.

C. Remy, L. Corominas, A. Hospido, H.F. Larsen, C. Teodosiu. Chapter 20. **Assessing environmental impacts and benefits of wastewater treatment plants. Book: Innovative Wastewater Treatment and Resource Recovery Technologies: Impacts on Energy, Economy and Environment**. ***IWA Publishing Group***. Editors: Juan Lema and Sonia Suarez.

A. Castillo, J. Comas, M. Garrido-Baserba, F. Hernández-Sancho, U. Jeppsson, I.Rodríguez-roda and M. Poch. Chapter 26. **Environmental Decision Support Systems. Book: Innovative Wastewater Treatment and Resource Recovery Technologies: Impacts on Energy, Economy and Environment**. ***IWA Publishing Group***. Editors: Juan Lema and Sonia Suarez.

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*****.** Editors: Anna M. Romaní, Helena Guasch M. Dolors Balaguer.

> OTHER BOOKS AND JOURNALS

O. Gutierrez. **Mitigación de olores, corrosión y emisiones de gases de efecto invernadero en redes de saneamiento mediante herramientas avanzadas**. ***TECNOAQUA***. N19 May-June 2016.

> EDITORIAL BOARDS OF BOOKS AND SCIENTIFIC JOURNALS

M. Pijuan is an Editorial Board member from the journal ***Scientific reports*** (I.F. 5.228) from the Nature Group.

J. Comas is member of the Editorial Board of the open access journal ***Global Challenges: Water.***

Ll. Corominas is editor for the journal ***Water Practice and Technology from IWA*****.**

W. Gernjak is member of the Editorial Board of ***Water Conservation Science and Engineering, Springer.***

> PRESENTATION AT CONGRESSES ORAL PRESENTATIONS

Wolfgang Gernjak. **The urban water cycle: How two plus two can sum three.** ***Environment: Challenges & Solutions. 1st ENMRI International Workshop.*** Alexandria, Egypt. April 2016.

Maite Pijuan. Chair of the session on **Management, Control, Evaluation and Optimisation.** ***3rd IWA Specialized International Conference on Ecotechnologies for wastewater***, Cambridge, England. June 2016.

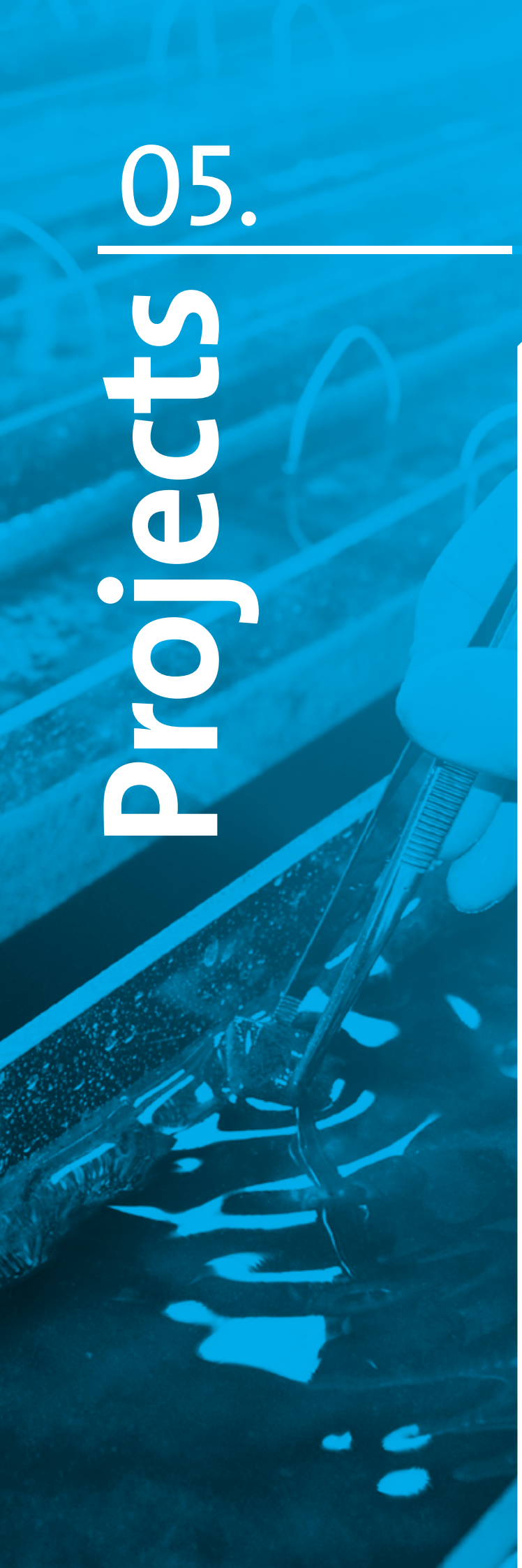
Oriol Gutierrez. Chair of the session on In-sewer processes. ***8th International Conference on Sewer Processes & Networks***. Rotterdam, Netherlands. August-September, 2016.

Ignasi Rodriguez-Roda. Invited lecture: **Can membrane bioreactors become conventional wastewater treatment?** ***Leading edge wastewater treatment seminar, Swedish Water and Wastewater Fair***. Elmia, Sweden. September 2016.

> PATENTS/PILOT PLANTS

European patent application: EP16382307.
Title: **Method for operating a membrane bioreactor of a water treatment system and corresponding membrane bioreactor and water treatment system**
Holder: University of Girona and the Catalan Institute for Water Research (ICRA)
Inventors: BLANDIN, Gaetan, RODRÍGUEZ-RODA LAYRET, Ignasi, COMAS i MATAS, Joaquim

05. Projects



Resources and Ecosystems Research Area

Project	**Transferencia de nanomateriales de carbono en el medio ambiente acuático (ERA-NET_NanoTransfer)**
Funding agency	Ministerio de Ciencia e Innovación
Duration	2015-2018
Coordinator	Esteban Abad (IDAEA-CSIC)
Leader researcher	Sergi Sabater
Amount for ICRA	€90.000

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	**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	**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	**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

Water Quality Research Area

Project	Acumulación, dispersión y eliminación de resistencias a antibióticos en colectores de agua residual (SEWAGENE-16)
Funding agency	Ministerio de Economía y Competitividad (MINECO) and FEDER.
Duration	2016-2019
Coordinator	ICRA
Leader researcher	Carles Borrego Moré
Amount for ICRA	€154.880

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 - 2017
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 Nº: 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 (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	Maria J. Farré
Amount for ICRA	€173.370,60

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	**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	**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	**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	**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

Technologies and Evaluation Research area

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 Rodriguez-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	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	€220.000

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	2016-2018
Coordinator	ICRA
Leader researcher	Wolfgang Gernjak
Amount for ICRA	€175.420

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	2016-2019
Coordinator	ICRA
Leader researcher	Lluís Corominas Tabares
Amount for ICRA	€123.420

Project	**Action Group del Water European Innovation Partnership (IEP): Real Time Water Quality Monitoring (RTWQM)**
Funding agency	European Union - EIP Action Groups
Duration	2015-2017
Coordinator	ADASA
Leader researcher	Lluís Corominas Tabares
Amount for ICRA	€0

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

Funding Agencies

06. Contracts

Resources and Ecosystems Research Area

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	2015-2016
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

Contract	**Sostenibilidad de recursos hídricos bajo el cambio global (HIDSOS IV)**
Contracting Agency	ENDESA
Duration	2016-2017
Leader researcher	Sergi Sabater Cortés

Water Quality Research area

Contract	**Los fármacos como contaminantes prioritarios: efectos toxicológicos, ambientales y riesgos para la salud humana. (URJCI_Salud)**
Funding Agency	Universidad Rey Juan Carlos I
Duration	2016-2017
Leader researcher	Sara Rodríguez Mozaz

Contract	**Evaluación del potencial de formación de nitrosaminas (específicamente N-Nitrosodimetilamina -NDMA-) como consecuencia de la cloraminación, y desarrollo de herramientas analíticas de prevención y alerta temprana en embalses de canal de Isabel II gestión**
Funding Agency	Canal de Isabel II Gestión S.A.
Duration	2015-2016
Leader researcher	Maria Jose Farré Olalla

Technologies and EvaluationResearch area

Contract	**Mejora de la producción de biogás mediante pretratamiento de lodos con ácido nitroso (SMART-GAS)**
Funding Agency	AQUALIA
Duration	2014-2017
Leader researcher	Maite Pijuan Vilalta

Contract	**IWA Consulting Services Energy and Carbon Assessment and Monitoring Tool for Water and Wastewater Utilities for Climate Mitigation**
Funding Agency	IWA The International Water Association
Duration	2016-2017
Leader researcher	Lluis Corominas Tabares

Contract	**Contrato de colaboración científica entre la Fundación Institut Català de Recerca de l'Aigua-ICRA y Fomento Agrícola Castellonense, S.A.**
Funding Agency	FACSA
Duration	2016
Leader researcher	Oriol Gutierrez

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)**
Funding Agency	Consorci de la Costa Brava (CCB)
Duration	2016
Leader researcher	Oriol Gutierrez García-Moreno

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)**
Funding Agency	ATLL
Duration	2015-2016
Leader researcher	Wolfgang Gernjak

Contract	**Seguiment analític de prova pilot d'electrodesnitrificació al municipi de Caldes de Malavella CPM_C 2015/75 (DIPSALUT_Caldes)**
Funding Agency	DIPSALUT
Duration	2015-2016
Leader researcher	Maite Pijuan Vilalta

Contract	**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
Leader researcher	Lluís Corominas Tabares

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: 433.368,97€

07. Agreements

29/01/216

Consortium of the Costa Brava

Collaboration agreement with AMBITERR for consultancy in the modelling of two industrial purification plants of the Grefacsa Company.

03/02/2016

Federal University of Maranho

The objective of this agreement is to establish the collaboration framework between UFMA and ICRA in all aspects relating to research, transfer and dissemination in regards to the management of the integral water cycle

15/02/2016

ICN2

Confidentiality agreement with ICN2, regarding the project proposal that Dr Jelena Radjenovic (ERC) will present and referring to the start of conversions for the use of graphite coverings in water treatment

21/04/2016

FACSA

Specific collaboration agreement between ICRA and FACSA (Agricultural Development of Castellón, S.A.), to study the potential of electrocoagulation with iron anodes to reduce H_2S in waste water from sewers.

05/05/2016

University of Girona

Specific agreement regarding the co-ownership conditions of the " OMBREUSE (MBR RETROFIT TO OMBR) patent relating to the results obtained and liable to be protected

31/05/2016

TECMA (Technology and Equipment for the Environment)

The objective of this framework agreement is to establish a framework for collaboration between the two institutions, in aspects of research, knowledge transfer and dissemination regarding innovative technological solutions applied to the sanitation, purification, water quality and management of water resources.

01/06/2016
AMBITERR
Collaboration contract with AMBITERR for consultation regarding the modelling of two industrial purifiers of the Grefacsa Company

06/06/2016
University of Girona
Affiliation agreement with the UdG for ICRA to become a University Research Institute affiliated to it, containing the terms of this affiliation, as well as initiating the actions and formalities required for the department of the Regional Government of Catalonia that is responsible for university matters to agree to and approve the affiliation.

24/06/2016
DCU (Dublin City University)
Framework collaboration agreement with Dublin City University, containing the general bases of the collaboration in scientific matters, seminars, projects, researcher exchanges, etc.

12/07/2016
UFZ
Framework collaboration agreement with UFZ (the Helmholtz Centre for Environmental Research GMBH) relating to scientific collaboration, researcher exchanges, organising events, planning and execution of projects, publication of results, etc.

23/09/2016
CLIQ (Chemical Industry Cluster Association)
Framework collaboration agreement to establish the cooperation framework between the two institutions to carry out activities to encourage and develop improved competitiveness in their respective areas of influence

01/10/2016
CETAQUA
Research and scientific services provision agreement with CETaqua Andalucía to perform a study project regarding reducing smells in the waste water system of Roquetas de Mar (Almería)

01/10/2016
CETAQUA
Research and scientific services provision agreement with CETaqua Barcelona to perform the study regarding reducing hydrogen sulphide and corrosion in the sewers of the waste water system of Castelldefels.

15/11/2016
CIATEC
Framework agreement for scientific and technological collaboration with CIATEC to perform joint activities that make it possible to attain the maximum development in the training and specialisation of human resources, joint research, technological development, information exchange, technical advice and publications in related fields.

01/12/2016
CETAQUA
Scientific collaboration and technical services provision contract with CETaqua-Galicia to perform analysis of pharmaceutic microcontaminants in water samples

08. Other dissemination activities

11/01/2016

Managing the effects of multiple stressors on aquatic ecosystems under water scarcity

Freising, Germany

ICRA participated in the 1st GLOBAQUA Conference which took place in Freising, Germany. Sergi Sabater, deputy director and research professor and also Vicenç Acuña, researcher from the Resources and Ecosystems Area, took part in it on behalf of ICRA. The conference focused on novel methods of environmental monitoring and modelling of various types.

01/02/2016

The quality of water in scenarios of scarcity

Vitória, Brazil

The director of ICRA, Dr Damià Barceló, participated in this event organised by the Aplysia Institute on 1 February, where different challenges of water resources were covered. He gave two presentations: "Managing the effects of contaminants in the aquatic ecosystem in a scenario of water scarcity: the European example" and "The dangers of pesticides, drugs, medications and cosmetics in rivers".

According to the president of the Aplysia institute, Tatiana Furley, the aim of the event was to start a debate about the quality of water in a situation of ever more critical scarcity.

11/02/2016

Workshop: "Ecosystem services and social conflict – The case of the management of the levels of the Ter river

ICRA, Girona

In this workshop, the researcher Dídac Jordà from the Institute of Environmental Science and Technology (ICTA) at the Autonomous University of Barcelona set out the results obtained in his doctoral thesis.

16/02/2016

Presentation by Damià Barceló in São Luís (Brazil) and signing of a collaboration agreement with the FUMA

São Luís, Brazil

The director of the Catalan Water Research Institute (ICRA), Damià Barceló, travelled on 3 February to the city of São Luís (Brazil) to give a presentation at the Federal University of Maranhão (FUMA) on "Climate change, the problem of water scarcity and emergent contaminants". After the talk had finished, he signed a collaboration agreement between ICRA and the UFMA to promote the mobility of students and staff from the two institutions as well as the realisation of joint projects and activities.

18/02/2016

Visit from the Castellarnau secondary school, Sabadell

ICRA, Girona

ICRA received a visit from first and second year students from the upper level of the Professional Training in Environmental Health course at the Castellarnau secondary school, Sabadell.

Some forty students were welcomed by Dr Sergi Sabater, deputy director of ICRA, who gave them an introduction to the world of water and a brief explanation of the centre's work. They then visited the different laboratories and distinctive spaces, the artificial rivers facility, small-scale reactors and purifiers and large analysis devices. This visit allowed them to interact with the doctors Sara Insa and Soraya Zahedi, the PhD students Olga Auguet and Ferran Romero and the research technician Maria Casellas.

25/02/2016

Workshop on water and climate change in Girona

ICRA, Girona

During the "Climate change and water: consequences for planning and management" conference, the director of the Catalan Water Agency (ACA), Jordi Agustí, noted the importance of "integrated management, saving and efficient and responsible use of water in the context of climate change which, sadly, is now a reality".

The conference, organised by Gabriel Borràs, head of the Adaptation Area of the Catalan Climate Change Office, was held in Girona and was organised by the ACA with the collaboration of the Water Campus of the University of Girona, the Catalan Water Research Institute (ICRA) and the Catalan Water Partnership.

03/03/2016

Laudato Si' International Conference on Integral Ecology and the Environment

Murcia, Spain

Dr Damià Barceló, Director of the Catalan Water Research Institute (ICRA), was invited to give a presentation at the Laudato Si' International Conference on Integral Ecology and the Environment which took place from 2 to 5 March. On Thursday 3 March, he was present at the round table and the next day, he gave the presentation: "Fate, Effects and Management of Emerging Contaminants and Risks in River Catchments under Water Scarcity: The GLOBAQUA Project".

06/03/2016

PITTCON Conference & Expo 2016

Atlanta, USA

A session delivered by the director of ICRA, Dr Damià Barceló, at the PITTCON Conference & Expo 2016, Atlanta (USA) on "LC-MS-MS Analysis of Emerging Contaminants (EDCs, PPCPs and PFCs) and Nanomaterials in the Environment".

08/03/2016

The impact of contamination on water resources, Laudato Si' Conference at the Catholic University of Murcia

Murcia, Spain

A report by PopularTV from the region of Murcia on the Laudato Si' International Conference on Integral Ecology and the Environment organised by the Catholic University of Murcia (UCAM) that included the statements by Damià Barceló, director of ICRA, about the impact of contamination on water resources.

15/03/2016

Master Class "Water and Jobs. The power to transform our lives"

Barcelona, Spain

On 15 March, the "Water and Jobs. The power to transform our lives" master class took place, organised by the We Are Water Foundation where Dr Damià Barceló was one of the speakers.

This master class was divided into three blocks:

- "Misuse of water: water and its sustainable use."
- "Women and children: towards the equality of opportunities."
- "Water, an industry of the future?"

17/03/2016

Open Day

ICRA, Girona

The Catalan Water Research Institute (ICRA) opened its doors on 17 March to secondary schools and vocational training centres, with the aim of publicising the activities performed at the centre.

The open day allowed visitors to understand the research relating to the integral water cycle. It was an opportunity to verify the close relationship between the environment and research and the need for interaction between different scientific disciplines to answer complex questions. Starting with the state of the Onyar river, often cited owing to the frequent impact it suffers, a tour through the different study areas covered in the centre was offered.
The open day programme took place over approximately two hours in different spaces at the ICRA. The content of the experience was based on the following scheme:

1. **Introduction to the ecological problems of the rivers.**
2. **Evaluation of biological and chemical contamination of the Onyar river**.
3. **Treating waste water.**

31/03/2016

Aquatic ecotoxicology seminars

University of Girona, Faculty of Sciences

Lídia Ponsatí and Sara Rodríguez took part in the Doctoral Program in Water Science and Technology on Thursday 10 March and Thursday 21 April.

The different seminars were:

- Thursday 10 March, Lídia Ponsatí, "Linking ecotox with ecosystem functioning"
- Thursday 31 March, Laura Barral, "Fate and effects of arsenic in aquatic systems"
- Thursday 14 April, Berta Bonet, "Nanoparticles in the environment and their effect on aquatic communities"
- Thursday 21 April, Sara Rodríguez, "Pharmaceuticals Environmental pollution. Sources, elimination in WWTP and impact on aquatic systems"

31/03/216

World Water Day lecture

Barcelona, Spain

The director of ICRA, Damià Barceló, gave a lecture on World Water Day, 21 March, at the Palau Robert in Barcelona. The lecture was about the influence of climate change on drought and its impacts in general.

06/04/2016

Fabrizio Bruner Memorial Workshop on the Environmental LC-MS

Urbino, Italy

The director of ICRA, Damià Barceló, took part in the Fabrizio Burner Memorial Workshop on 4 April. The aim of this workshop is to discuss the most innovative strategies in the field of modern environmental analysis and share them with the scientific community; this event is in memory of Prof. Fabrizio Bruner, one of the great minds and mentors of our university who dedicated a great part of his work to these themes.

07/04/2016

4th Biofilm Workshop: Basis and application of biofilms to assess the effects of environmental change in aquatic ecosystems

ICRA, Girona

The University of Girona's Institute of Aquatic Ecology organised the fourth Biofilm Workshop at ICRA's facilities. Its aim was to debate the range of methods and focusses that are currently used for monitoring and investigating the response of biofilms to artificial environmental changes such as hydrologic alteration, eutrophication, increased water temperature, contamination, etc.

12/04/2016

Thesis defence: Pharmaceuticals and endocrine disruptors: accumulation in aquatic biota and environmental effects

ICRA, Girona

The aim of this study by Belinda Huerta is to investigate the bioaccumulation and biomagnification potential of two groups of emergent contaminants – pharmaceutical products and endocrine disruptors – in the aquatic biota, including fish, invertebrates and river biofilms in the natural environment. A second objective of this thesis is to evaluate the impacts of exposure to some of these contaminants in organisms and the possible relationship between bioaccumulation and its effects.

25/04/2016

Training school – Modelling and decision support systems for sustainable wastewater treatment

ICRA, Girona

The Technology and Evaluation Area of ICRA organised this training school to introduce this short, intensive, specialised course focussed on modelling, control and decision-support tools for the complex issue of sustainable wastewater treatment systems. State-of-the-art and cutting-edge tools were presented and used in various hands-on exercises. This gave an opportunity to learn about tools that help provide consistency, time efficiency and integrated and optimum solutions for a wide range of wastewater treatment problems. The course was mainly aimed at PhD students who wanted to achieve a higher degree of specialization in this field, but also other students or professionals who had busy schedules but were interested in learning specifically about modelling and decision support tools for sustainable wastewater treatment system management.

27/04/2016

Video interview with Dr Barceló by the We Are Water Foundation

ICRA, Girona

The director of ICRA, Damià Barceló was interviewed by the We Are Water Foundation for publication in the foundation's new magazine and on the iAigua website. The article in iAigua was about the contamination that an inhabitant of a city like Barcelona flushes down the drain every day, from the moment they get up until they go to bed, how different contaminants affect the environment and how they are treated by the purifiers. The videos of the interview were posted on the foundation's website.

05/05/2016

The Water Campus, the innovative ecosystem of the water sector

Manel Xifra Boada auditorium, Narcís Monturiol building at the Science and Technology Park, Girona

The University of Girona suggested strengthening the relationship between businesses and institutions in the same sectors of activity. The Water Campus was the instrument chosen to facilitate this forum for meeting in the water sector. Among other talks, the programme included a dynamic setting with opportunities by Ignasi Rodríguez-Roda, the scientific director of the Water Campus and ICRA Research Professor (UdG Associate).

6/05/2016

Visit from the Pontifical Catholic Universidad of Peru

ICRA, Girona

ICRA welcomed a visit from the engineer Susana Rocío Gordillo and Dr Jean-Philippe Denux, representatives of the Pontifical Catholic University of Peru, who were interested in discovering first-hand the operation and structure of ICRA, in light of the Peruvian government's instruction to create the Scientific Water institute for the Ica region (southern Peru).

18/05/2016

Final Feedback Session

ICRA, Girona

The Catalan Water Agency (ACA) organised the feedback session to respond to each proposal made in the discussion of the Revision of the Management Plan for the Catalonia water catchment area. The session took place in the ICRA's facilities.

8/06/2016

CERCA Conference 2016

CCCB, Barcelona

Dr Sergi Sabater, representing ICRA, participated in the annual conference of CERCA Centres, setting out the directives of the centre, accompanied by a summary of the actions carried out during the year.

18/06/2016

10th edition of the Festival of Science

Barcelona, Spain

Two researchers took part in the tenth edition of the Festival of Science in Barcelona on behalf of ICRA. The researchers participated with the following talks:

- Dr Sara Rodriguez (Water Quality Area researcher): "Chemical contaminants in the environment. Impact on fish and seafood (ECsafeSEAFOOD Project)."
- Dr Jordi Rener Mor (Resources and Ecosystems researcher): "The impact of purifiers on aquatic organisms."

12/07/2016

Visit by students from the Youth Research Campus organised by the University of Girona

ICRA, Girona

In the framework of the workshops that the University of Girona organises annually, intended for baccalaureate students interested in scientific careers, ICRA received a visit from students organising a meeting with researchers and predoctoral students doing their doctorate at ICRA.

19/07/2016

Visit to ICRA by CliQ-IB

ICRA, Girona

The president of the Chemical Industry Cluster of the Balearic Islands, Joan Puig, met the management of ICRA to establish the bases for collaboration between the two institutions.

25/09/2016

Conference: IDA International Conference on Water Reuse and Recycling: Turning Vision into Reality

Nice, France

Conference Theme

This international conference on water reuse and recycling covered cutting-edge strategies and technology for advanced municipal and industrial water reuse programs. The two-day conference featured a range of panels and plenaries as well as technical papers focusing on advanced technologies for water reuse and recycling that will make water available to municipal and industrial users.

27/09/2016

5th International Conference on Industrial and Hazardous Waste Management

27–30 September 2016, Chania (Crete, Greece)

This Conference again focussed on innovative aspects of industrial and hazardous waste management (including organic waste, non-halogenated and halogenated solvents, hydrocarbons, pesticides, explosives, PCBs, PCDDs/Fs, heavy metals, plastic waste, WEEE, asbestos, nuclear waste, etc.), presenting new technologies, describing the state of the art and related case studies, discussing the main controversial subjects, sharing experience among different countries and evaluating social and financial balances. The Conference included oral presentations, poster sessions, special sessions and workshops.

04/10/2016

9th European Conference on Pesticides and Related Organic Micropollutants in the Environment and 15th Symposium on Chemistry and Fate of Modern Pesticides

Santiago de Compostela

Dr Damià Barceló participated in the 9th European Conference on Pesticides and Related Organic Micropollutants in the Environment and 15th Symposium on Chemistry and Fate of Modern Pesticides.

10/10/2016

10–13 October 2016 Training Course: The use of stable isotopes in investigations of hydrological processes and climate change

Ljubljana (Slovenia)

ICRA took part in this training course organised by the Jožef Stefan Institute as part of the GLOBAQUA Use of stable isotopes in investigations of hydrological process-

es and climate change project. This course introduced the basic principles of the modelling of isotopic and chemical tracers. The training course was designed by the researchers with a postgraduate qualification (master, doctorate and post-doctoral) and other scientists interested in the use of stable isotopes and other tracers in hydrological studies.

20/10/2016

Visit by National Water Authority (ANA–Peru) to ICRA

ICRA, Girona

ICRA received a visit from the delegation from the National Water Authority (ANA), Peru's state water agency, accompanied by members of the Catholic University of Peru, by the representative of the World Bank and a researcher from the University of Toulouse.
The reason for the second meeting this year was the fact that Peru is finalising the creation of the ICA (Scientific Water Institute). This project has the support of the World Bank. They showed much interest in the structure and ICRA's fields of investigation, as well as its transversality.

20/10/2016

15 years of the Water Framework Directive

Casa del Mar, Barcelona

On 20 October, a seminar took place organised by the Catalan Water Agency (ACA), to celebrate 15 years of the Water Framework Directive (WFD). The seminar covered the milestones reached and future challenges in the analysis of the status of bodies of water in Catalonia. Damià Barceló, director de ICRA, participated in it, presenting "The chemical status in the WFD. What do we still have to do?" Sergi Sabater, deputy director of ICRA, participated in the round table, speaking about the analysis of the ecologic status in epicontinental surface waters.

27/10/2016

Workshop on pharmaceuticals and organic chemical contaminants in sewage biosolids

Malmö. Sweden

Researchers from the ICRA participated in **The First Nordic Phosphorus Conference.**

Conference objectives: look at which pharmaceuticals and organic consumer chemicals are found in sewage biosolids, their concentrations, effects of composting, anaerobic digestion, whether there is a risk to soil, crops, consumer health or the environment when treated biosolids are used in agriculture, scientific risk assessments versus the public's perceived concerns, how levels can be reduced and what further data and research is needed. Blackwater and source separation and animal manures were not included in this conference but may be covered at a future date.

The workshop was organised in cooperation with **The First Nordic Phosphorus Conference.**

11/11/2016

XIII Advances in Ecology Seminar

Blanes Advanced Studies Centre

Rafael Marcé, a scientific researcher from ICRA, participated in the Advances in Ecology Seminar which took place in Blanes on 11 November, presenting "Freshwaters in the sun: how drying and damming in semiarid may shape global carbon cycle feedbacks".

14/11/2016

Official visit by representatives from Girona from the ERC political party

Teresa Jordá, a deputy in the Congress and Joaquim Ayats, a senator, visited ICRA, to find out about the centre's needs in order to put them forward in Madrid

15/11/2016

International Conference. Rivers Under Water Scarcity: Threats and Challenges

Barcelona, Spain

Damià Barceló (Director of ICRA), Sergi Sabater (Deputy Director) and Ramon J. Batalla (UdL Associate Research Professor) took part in the NET-SCARCE project conference, which in turn is the follow up of the SCARCE project. The NET-SCARCE conference was one of the central activities of the project and brought together the topics of the five conferences that had taken place as part of the SCARCE project over the last 5 years:

- Global change and water scarcity
- Linking chemical exposure and biological effects
- Hydrological modelling for water resources
- Ecological stressors and morphological changes
- Ecosystem services and integration in river basin management plans
- Risk assessment and socioeconomic aspects
- Translating science to management

It provided a multidisciplinary forum for presenting and discussing the many issues affecting water resources today.

15/11/2016

iWater contributes business, knowledge and international profile to the water sector

Barcelona, Spain

From 15 to 17 November Fira de Barcelona ran the first edition of iWater, an event that brought together on a single platform business, knowledge and networking for actors connected to the integral water cycle. The fair – with its commercial offer and activities – covered innovation, technology and sustainability challenges such as the efficient management of water, its reuse, water stress and scarcity of resources, funding infrastructure or the new public–private collaboration models. Furthermore, iWater includes a strategic international component, aligned with the interests of industry, that will contribute to the international profile of Spanish.

15/11/2016

R3Water Consortium meeting, workshop and site visits event

ICRA, Girona

In November 2016 ICRA hosted an R3water consortium meeting in which all project partners provided an update on the progress of their work. In addition to the consortium meeting, and in cooperation with ADASA and Teqma, ICRA organized a visit to the demo-sites which are part of R3water. Consequently, a group of 40 people (not restricted to project partners) visited the wastewater treatment plants of Castell-Platja d'Aro, Empuriabrava and la Bisbal d'Empordà. Participants had the chance to learn about the AquaBio, Aquatrack, doscontrol, optimEDAR and InnoWatt technologies.

22/11/2016

Visit from the Federal University of Rio Grande do Sul (Brazil)

Representatives and students from the FURGS visited ICRA, in the framework of a stay organised in Catalonia, to visit facilities and research centres connected to water resources.

28/11/2016

Doctoral thesis defence: Analysis of chemotherapy drugs and related compounds in aquatic environment: removal, transformation and risk evaluation in eco-friendly and advanced technologies. PhD Laura Ferrando

ICRA, Girona

Laura Ferrando Climent

Abstract: Pharmaceutical compounds are considered contaminants of emerging concern. Chemotherapy drugs are a specific group of pharmaceutical compounds used to treat cancer diseases. These **"anticancer drugs"** have been shown to have potent cytotoxic, genotoxic, mutagenic, carcinogenic, endocrine disruptor and/or teratogenic effects in several organisms, since they have mainly been designed to disrupt or prevent cellular proliferation, usually by interfering with DNA synthesis. There is currently a lack of information about the occurrence and fate of these substances in the environment although their consumption has increased in recent years and is expect to increase further in the future due to cancer incidence.

The main aim of this thesis was to fill knowledge gaps and provide tools for a better assessment of the presence and fate of anticancer drugs in the urban water cycle. This work includes three main objectives:

1. to develop analytical methodologies for target and non-target analysis of anticancer drugs in the aquatic environment,
2. to assess the occurrence of anticancer drugs in urban systems

3. to appraise different technological alternatives to remove anticancer drugs from polluted effluents.

Several analytical methodologies were developed for the quantification of 10 selected anticancer drugs and for the screening of substances related with cancer. *Tamoxifen and ciprofloxacin pose an environmental hazard to the aquatic environment* based on the risk characterization ratio (RCR) observed (>1).

The assessment of the presence of anticancer drugs in two urban models (Spain and Norway) was also performed. Significant differences were found when assessing the presence of cancer drugs in wastewater influents from Norway and Spain: *anticancer drugs found in Spain were less likely to be found in Norway*.

Finally, two different alternative wastewater treatments for anticancer-drug removal were evaluated: a) a non-conventional biological treatment using white rot fungi (WRF) and b) advanced oxidation processes (AOP) using the combination of ozone, UV radiation and/or hydrogen peroxide. *Cyclophosphamide and Ifosfamide are recalcitrant to degradation by conventional and non-conventional treatments*.

The occurrence of tamoxifen and its generated sub-products throughout the water treatments was assessed by high resolution mass spectrometry (HRMS). This data was correlated with the toxicity data obtained. Tamoxifen was selected as a model anticancer drug based on information collected throughout this project and the literature available regarding its occurrence, persistence, toxicity and potential bioaccumulation in the environment.

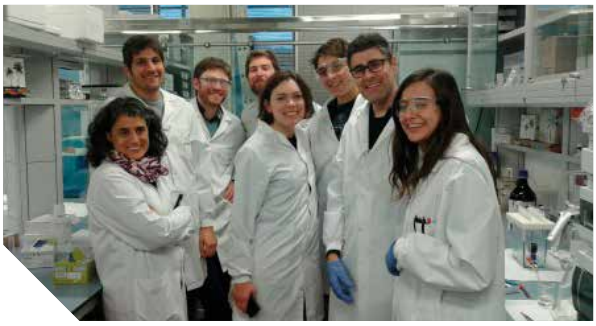
The results derived from this thesis provide a novel dataset about the occurrence of anticancer drugs in urban and natural environments. This is valuable information, principally as roadmap for further studies about the impact of anticancer drugs in the aquatic environment.

29/11/2016

TreatRec Advanced Training Course 3

ICRA, Girona

This 2-day training course comprised a variety of lectures and activities organized by ICRA. The topics concentrated on micro-contaminants, covering their detection, effects and fate in wastewater treatment.



01/12/2016

TreatRec Mid-Term Review Meeting

ICRA, Girona

In the MTR meeting, the management of and TreatRec project advances made by it were discussed. The TreatRec fellows presented their research, recent achievements and future prospects. A representative of the Research Executive Agency, E. Galeazzi, and an external scientific expert, T. Wintgen, followed the progress and the personal fellowship experiences of the fellows and gave their positive feedback on the quality and deliverables of the project, while outlining the importance of the industrial component of the project.

SEMINARS ORGANIZED BY ICRA AS PART OF THE SCIENCE DISSEMINATION PROGRAMME

16/03/2016
Seminar: Water Management as a Public Good
ICRA, Girona
Dr Renan Ulrich Goetz, University of Girona, Department of Economics. Knowledge area: fundamentals of economic analysis.

18/03/2016
Seminar: 'Modelling electrodialysis for nutrient recovery from wastewater' & 'In-sewer biotransformation of antibiotics'
ICRA, Girona
Emma Thompson Brewster and Ludwika Nieradzik, Advanced Water Management Centre, The University of Queensland (Brisbane, Australia)

14/04/2016
Seminar: 'Prevalence and distribution of antibiotic resistance genes between streambed compartments in two rivers impacted by different contamination sources'
University of Girona (Faculty of Science)
Jessica Subirats, Predoctoral Researcher, Quality Area

26/04/2016
Seminar: 'University Environment Institute (IUMA), University of A Coruña: Research lines'
ICRA, Girona

- Presentation of the IUMA: research lines. Dr Darío Prada Rodríguez. Analytic Chemistry Chair. Director of the IUMA
- Water quality research projects. The impact of regulated and emergent contaminants in the aquatic environment. Dr Soledad Muniategui Lorenzo. Analytic Chemistry Chair: Applied Analytic Chemistry Research Group (QANAP).
- Atmospheric research. Dr Purificación López Mahía. Analytic Chemistry Chair: Applied Analytic Chemistry Research Group (QANAP).

03/05/2016
Seminar: 'Nature-based technologies for wastewater treatment and reuse'
ICRA, Girona
Dr Cristina Àvila, Juan de la Cierva Fellow at Water Quality Area

11/05/2016
Seminar: Disinfection by-products (DBPs)
ICRA, Girona
Dr Maria José Farré, International Incoming Fellowships (IIF), Quality Area

Disinfection of drinking water is a successful measure for reducing water-borne diseases and protecting health. However, epidemiological evidence links bladder cancer to disinfection by-products (DBPs) formed during drinking water treatment. In particular, of the many DBPs currently investigated in drinking water, unregulated nitrogen-containing DBPs (N-DBPs) are considered to be among the most toxic ones. Dissolved organic nitrogen, which acts as precursor for these DBPs, is increasing in many drinking water sources due to usage of impaired waters and climate change. Therefore, there is a need for research to prepare water utilities for these changes, evaluate treatment strategies and consider the need for adaptation to more stringent regulations. This seminar will present the main results of the research carried out since 2014 at ICRA on this topic.

08/06/2016
Seminar: Enabling technologies for complete nitrogen removal in next-generation wastewater treatment plants
ICRA, Girona
Dr Jianhua Guo, Advanced Water Management Centre (AWMC), University of Queensland

04/07/2016
Seminar: Research on Urban Diagnostics at Arizona State University Biodesign Institute
ICRA, Girona
Prof. Rolf Halden. Professor & Director, Biodesign Center for Environmental Security, Biodesign Institute, Arizona State University

02/09/2016

Seminar: Function of decentralised systems in the new water management paradigms

ICRA, Girona

Dr Manel Poch, Director of the Environment Institute of the University of Girona.

09/09/2016

Seminar: Diatom species and DNA: a revolution in understanding and, soon, in barcode-based applications?

ICRA, Girona

Prof. David Mann, Royal Botanic Garden Edinburgh & IRTA.

14/10/2016

Seminar: Citizen Science, internet of things and environmental monitoring

ICRA, Girona

Luigi Ceccaroni, co-founder, research lead and external relations manager at 1000001 Labs.

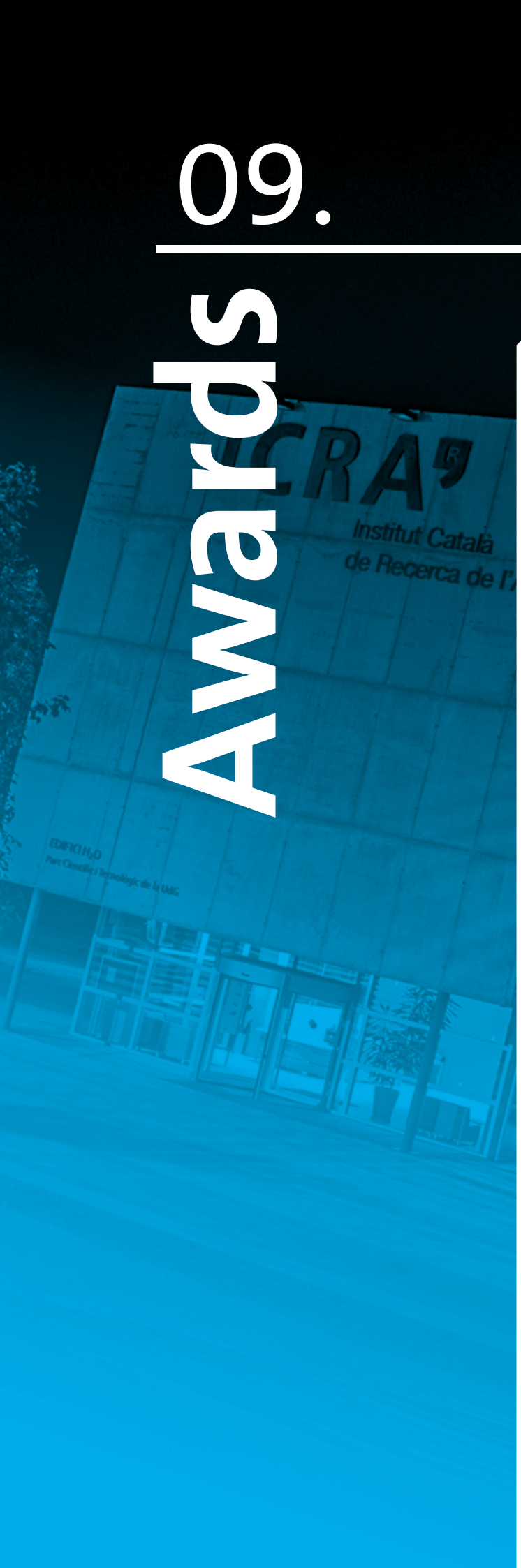
16/12/2016

Seminar: Determining the microcontaminant elimination performance of the reversible electrodialysis process at the Llobregat drinking water treatment station.

ICRA, Girona

Dr Wolfgang Gernjak, Research Professor (ICREA)

09. Awards



Best student oral presentation

1st prize. 12th Annual LC/MS/MS workshop on environmental applications and food safety, 5–6 July 2016, Barcelona, Spain. Yaroslav Verkh, Characterization of dissolved organic matter in wastewater using statistical non-target analysis of liquid chromatography-high resolution mass spectrometry (LC-HRMS) data

Best student oral presentation

2nd prize. 12th Annual LC/MS/MS workshop on environmental applications and food safety, 5–6 July 2016, Barcelona, Spain. Lucia Gusmaroli, Development of an online SPE-UPLC-MS/MS method for the multiresidue analysis of the WFD "Watch list" compounds

Dr Oriol Gutierrez **'2016 Water Award'** from the Catalan Association of Friends of Water for his work on applied research on the detection and reduction of corrosive compounds and greenhouse gasses from sewer systems. March 2016.

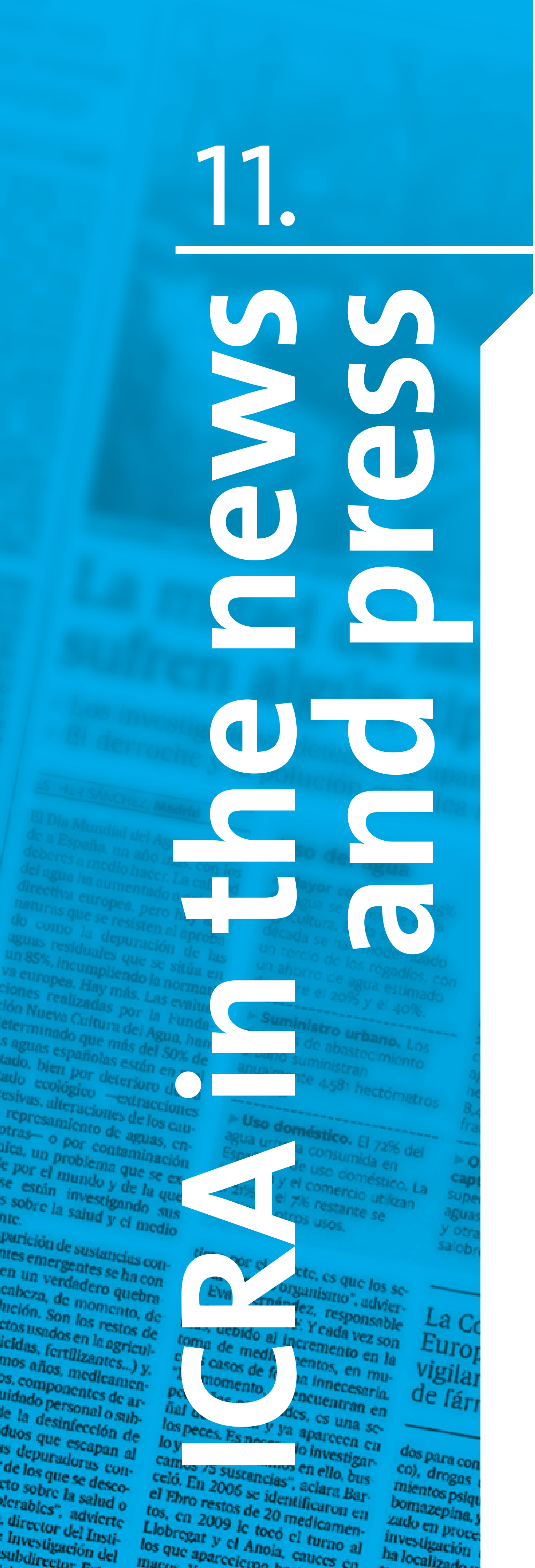
WATINTECH Project

Best Research project of the International Integrated Water Cycle Show, iWater Conference, for its potential to improve the efficiency of sanitation processes in both economic and environmental aspects. 15–17 November 2016, Barcelona.

10. Financing

FINANCING 2016

Ministry of Economy and Knowledge (DECO)	€1.812.000,00
Catalan Water Agency (ACA)	€316.817,00
Competitive projects	
Catalan Regional Government	€128.413,33
Ministry of Economy and Competitiveness	€842.309,46
European Union	€805.594,11
Transfer projects	€319.225,11
Financial income	€2.764,69
Other income	€10.373,06
TOTAL INCOME 2014	**€4.237.496,76**



11. ICRA in the news and press

12 | Comarques Gironines | GIRONÈS — EL PUNT AVUI, DIJOUS, 15 DE DESEMBRE DEL 2016

Identifiquen nous gens de resistència als antibiòtics

▪ Investigadors de l'ICRA han determinat que els bacteriòfags propaguen les resistències a aquest tipus de fàrmac en el medi ambient ▪ L'estudi ha estat publicat a la revista 'Enviromental Pollution'

N. Astorch
GIRONA

Investigadors de l'Institut Català de la Recerca de l'Aigua (ICRA) a Girona han identificat que els virus que infecten exclusivament bacteris (coneguts com a bacteriòfags) contenen gens de resistència als antibiòtics i, per tant, contribueixen també a la seva disseminació. Part d'aquestes investigacions, cofinançades per la iniciativa de programació conjunta (Water JPI) i pel Ministeri d'Econonomia i Competitivitat, s'han publicat a la revista científica *Environmental Pollution*. Amb l'objectiu d'analitzar tots els ambients on s'han detectat gens de resistència a antibiòtics, s'han estudiat els viromes (els gens de tots els virus en un determinat ambient) de femta humana i animals, i també d'aigües residuals, superficials i marines. De l'estudi d'aquestes mostres es dedueix que els bacteriòfags, sobretot els d'ambients d'aigua dolça i marins, contenen una gran varietat de gens de resistència a antibiòtics. Això implica una major dispersió en l'ambient i, en cas de ser transferits a bacteris patògens, un increment de les resistències davant l'arsenal d'antibiòtics disponible. La resistència als antibiòtics constitueix un greu problema per a la salut pública, ja que cada vegada amb més freqüència molts patògens bacterians són resistents al tractament amb aquests fàrmacs. Un informe recent elaborat per l'OMS assenyalava que al voltant de 700.000 persones moren a l'any per infeccions provocades per bacteris resistents als antibiòtics. La infecció per un patogen resistent implica més dies d'hospitalització i la necessitat d'utilitzar antibiòtics no convencionals. L'estudi de l'ICRA constitueix un pas endavant per conèixer amb més detall les vies implicades en la disseminació dels gens de resistència en l'ambient i permet dissenyar estratègies més eficaces a l'hora de fer front al problema de la resistència als antibiòtics. ■

Seu de l'Institut Català de la Recerca de l'Aigua (ICRA) a Girona ■ JOAN SABATER

SALUT

Premien un projecte de salut mental de l'IAS

El Departament de Salut va premiar ahir sis experiències innovadores en matèria de salut en el marc de la celebració dels 25 anys del Servei Català de la Salut (CatSalut) a Barcelona. Una de les experiències guardonades és *El desenvolupament d'un model d'atenció comunitària en salut mental i addiccions que ha tancat l'hospital psiquiàtric*, que va ser presentada per Claudi Camps, Jordi Cid, Margarita de Castro, Cristina Gisbert i Rosa Garcia, de l'Institut d'Assistència Sanitària (IAS). Camps, director de la xarxa de salut mental de les comarques gironines, va ser premiat dimarts amb una medalla Josep Trueta. ■ N.A.

GASTRONOMIA

Un estudiant gironí aspira a un premi d'alta cuina

Ezequiel Álvarez Barrosso, de l'Escola d'Hostaleria i Turisme de Girona, és un dels set catalans seleccionats per aspirar al premi Promeses d'Alta Cuina de Le Cordon Bleu Madrid. El premi, que arriba a la cinquena edició, és un dels més importants de l'Estat, amb una beca d'estudis valorada en més de 23.000 euros per al guanyador, una altra de més de 8.000 euros per al segon classificat i de 1.500 euros a l'escola del millor cuiner. Álvarez ha superat la primera fase i competirà amb participants de tot l'Estat per aconseguir un lloc en la final. Els concursants tindran fins al 31 de gener per presentar un vídeo amb la recepta. ■ I.B.

AGRICULTURA

Agrienergia i els pescadors de Roses, premi Pita

L'empresa Agrienergia SA, de Banyoles, i els Pescadors de Roses SLU reben avui els premis PITA. L'acte se celebrarà al Palau de l'Abat del Monestir de Poblet en el decurs de la jornada de referència Diada de la Innovació Agrària i Agroalimentària. Els premis tenen com a objectiu guardonar les empreses agràries, les agroindústries i les persones emprenedores i amb esperit innovador que hagin incorporat noves tecnologies, processos que assoleixin millores rellevants en la competitivitat, preservació ambiental i les bones pràctiques i que garanteixin la qualitat i la seguretat de les produccions. ■ I.B.

Tauler d'anuncis

118054-1152457w
Ajuntament de Castell-Platja d'Aro

02.- SECRETARIA
0317.- ÒRGANS DE PARTICIPACIÓ SECTORIAL
Expt.: 5378 /2016
Tema: Reglament per a la creació del Consell Local de Desenvolupament Econòmic de Castell-Platja d'Aro-s'Agaró

EDICTE

El Ple de l'Ajuntament en sessió ordinària tinguda el dia 16 de novembre de 2016 va aprovar inicialment el Reglament per a la creació del Consell Local de Desenvolupament Econòmic de Castell-Platja d'Aro-s'Agaró

L'esmentat acord d'aprovació inicial se sotmet a informació pública durant un termini de 30 dies hàbils, comptadors a partir de l'endemà de l'última publicació d'aquest anunci en el Butlletí Oficial de la Província, en el Diari Oficial de la Generalitat de Catalunya, en un dels diaris de comunicació escrita i en el tauler d'anuncis de la corporació, als efectes de poder examinar l'expedient i presentar-hi les al·legacions i reclamacions que es considerin oportunes. L'expedient pot ser consultat a l'àrea de Promoció Econòmica de l'Ajuntament en horari d'oficina, de dilluns a divendres de 09.00 h a 14.00 h.

Transcorregut l'anterior període sense que s'hi presentin cap mena d'al·legacions ni reclamacions, l'acord d'aprovació inicial esdevindrà definitiu a l'empara de l'article 178.1.c) del Text Refós de la Llei Municipal i de Règim Local de Catalunya, i l'esmentada Ordenança entrarà en vigor una vegada hagi transcorregut el termini de 15 dies a què fa referència l'article 70.2 de la Llei de Bases del Règim Local.

Castell-Platja d'Aro, 25 de novembre de 2016.

L'alcalde — Joan Giraut Cot
El Secretari — Tomàs Soler Navarro

118072-1152363w
Ajuntament de Tossa de Mar

ANUNCI

Negociat i signat el text inicial del conveni de gestió urbanística amb l'objectiu d'executar les previsions fixades en el Pla d'Ordenació Urbanística Municipal de Tossa de Mar (POUM), publicat al Diari Oficial de la Generalitat de Catalunya núm. 6914, de 16 de juliol de 2015 en l'àmbit del PAU MARTOSSA Porto Pi 1, per Provisió d'Alcaldia de data 25 de novembre de 2016, de conformitat amb l'article 11.1 del Reial decret legislatiu 2/2008, de 20 de juny, pel qual s'aprova el Text refós de la Llei del sòl, es sotmet a informació pública durant el termini de vint dies, a comptar des de la publicació del present anunci en el Butlletí Oficial de la Província de Girona.

Durant aquest termini, el text inicial del Conveni de gestió urbanística podrà ser examinat per qualsevol interessat a les dependències municipals indicades a l'encapçalament, per formular-hi les al·legacions que s'estimin pertinents.

118387-1152571w
Ajuntament de Viladasens

Expedient: 136/2016 Modificació puntual del POUM per a la reserva d'un terreny destinat a serveis tècnics per al nucli de Fellines
Assumpte: Edicte d'informació pública de l'expedient

EDICTE

El Ple d'aquest Ajuntament, en sessió celebrada en data 24 de novembre, ha adoptat l'acord següent:
1. Aprovar inicialment la modificació puntual del Pla d'ordenació urbanística municipal de Viladasens en l'àmbit de Fellines.
2. Exposar l'expedient a informació pública durant el termini d'un mes, mitjançant edicte al Butlletí Oficial de la Província, al diari El Punt Avui i al tauler d'anuncis de la corporació, durant els quals es podrà examinar i formular-hi les al·legacions o suggeriments que es considerin oportunes.
Mitjans per obtenir informació sobre el procediment:
Ajuntament de Viladasens
c/ Taronger, 1
17464 Viladasens
www.viladasens.org
Telèfon 972 496 150
Fax 972 496 285
Horari d'atenció al públic:
De dilluns a divendres de 10 a 15 hores
Viladasens, 30 de novembre de 2016
L'alcalde, Josep Massó Masós

118519-1153438w
Ajuntament de Susqueda

Edicte Modificació puntual núm. 1 POUM de Susqueda

El Ple de l'Ajuntament de Susqueda, en data 4 de novembre de 2016, ha acordat aprovar inicialment la modificació número 1 del POUM de Susqueda, per a la inclusió de la Masia El Sui i de la Masoveria Can Prat d'en Serra al Catàleg de masies i cases rurals incorporat a la normativa urbanística municipal, de conformitat amb la memòria redactada a l'efecte per l'arquitecte Xavier Vilalta Sabatés, i acordar la suspensió de tramitacions i llicències en els àmbits en què les noves determinacions comporten una modificació del règim urbanístic, d'acord amb el que estableix l'article 73.2 del TRLUC i el plànol de delimitació de l'àmbit subjecte a suspensió de tramitacions i llicències, que obra a l'expedient. I sotmetre a informació pública l'esmentat acord, per termini de 30 dies a comptar de l'endemà de l'última de les publicacions d'aquest edicte, per tal que qualsevol persona interessada pugui examinar la documentació de la modificació número 1 del POUM de Susqueda a les dependències municipals i a la pàgina web.

Susqueda, 22 de novembre de 2016
L'alcalde
Joan Mercader Arimany

COMARQUES

Un estudi confirma «l'impacte real» dels residus de medicaments als rius


14 | DIMARTS, 23 DE FEBRER DE 2016 | Diari de Girona
EL BAIX EMPORDÀ

Un estudi conclou que la maresma de la Pletera es nodreix de l'aqüífer

Fins a la realització d'aquest treball, els investigadors creien que eren les aigües subterrànies que determinaven el comportament de les llacunes

Imatge de la maresma de la Pletera.

Comencen a enderrocar els edificis del port de Sant Feliu de Guíxols

A l'esplanada que quedi lliure s'hi construiran els blocs de formigó que han de reforçar el dic de recer

El primer edifici enderrocat va ser la seu de Protecció Civil.

DEFUNCIONS


10 | DIMECRES, 2 DE MARÇ DE 2016 | Diari de Girona
Comarques

L'exdelegat del Govern Jordi Martinoy serà el director de Justícia

Torna a un càrrec polític després d'haver estat també regidor a Torroella de Montgrí

Predir efectes químics en sistemes biològics redueix els experiments animals

És el resultat d'un estudi que ha tingut la participació de l'ICRA i que també ha permès incloure aspectes mesurables, no només qualitatius

Llença una motxilla amb un quilo de marihuana al voral en veure un control policial

Acusen de 2 robatoris més un jove d'un grup de lladres de cases i botigues i entra a presó


Science for Environment Policy

Wastewater treatment plant discharges can promote the development of antibiotic resistance in streams

08 April 2016
Issue 452
Subscribe to free weekly News Alert

Source: Proia, L., von Schiller, D., Sànchez-Melsió, A., Sabater, S., Borrego, C.M., Rodríguez-Mozaz, S. & Balcázar, J. (2016). Occurrence and persistence of antibiotic resistance genes in river biofilms after wastewater inputs in small rivers. *Environmental Pollution*, 210, pp.121–128. DOI: 10.1016/j.envpol. 2015.11.035

Contact: proialorenzo@hotmail.it

Read more about: Chemicals, Environment and health, Sustainable consumption and production, Waste, Water

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. European Centre for Disease Prevention and Control (2009) The Bacterial Challenge: Time to React. http://ecdc.europa.eu/en/publications/Publications/0909_TER_The_Bacterial_Challenge_Time_to_React.pdf

Widespread use of antibiotics has led to pollution of waterways, potentially creating resistance among freshwater bacterial communities. A new study looked for antibiotic resistance genes in a river basin in Spain, revealing that wastewater discharges can promote the spread of antibiotic resistance in streams and small rivers.

Antibiotics are a cornerstone of modern medicine and have saved millions of lives. However, their extensive use has led to the development of widespread resistance, rendering them ineffective against some infections. Microorganisms resistant to commonly prescribed antibiotics are increasingly being found, leading the World Health Organization to declare antibiotic resistance a 'major threat to public health'. Already, approximately 25 000 European citizens die every year from infections caused by bacteria resistant to antibiotics[1].

Although some bacteria are intrinsically resistant to antibiotics, and resistant strains evolve naturally, the overuse of antibiotics accelerates this process. Drug-resistant bacteria can pass on resistance to other bacteria, via a process called 'horizontal gene transfer', which is thought to be the major cause of the spread of resistance among bacteria.

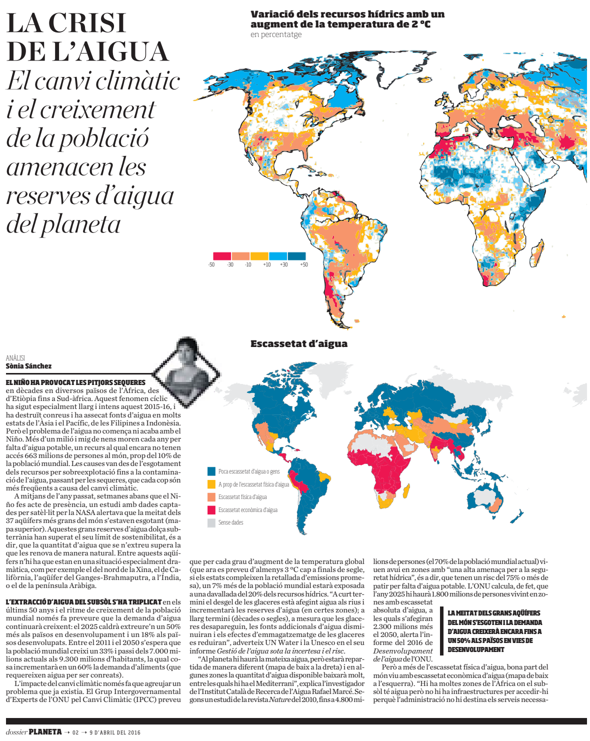
While the clinical side of this problem has been studied extensively, there is a less-studied environmental aspect. Antibiotics are not fully metabolised by animals (including humans), which means that residues can enter the aquatic environment via wastewater discharges. Recent studies have shown that concentrations of antibiotics found in aquatic environments could aid selection of resistant bacteria. Inputs from urban wastewater treatment plants (WWTPs) can also include antibiotic-resistant bacteria and resistance genes.

This study is one of very few to assess antibiotic resistance in river biofilms: the layer of slime composed of microbial organisms that is found on rocks, plants and other surfaces in rivers. Antibiotic-resistant bacteria can integrate into these biofilms, which may provide an optimal environment for the exchange of genetic material, including genes encoding resistance to antibiotics.

The researchers, who were part-funded by the European Regional Development Fund, evaluated the abundance of antibiotic resistance genes in the Tordera River Basin in northern Spain, which receives input from domestic WWTPs. They looked for genes conferring resistance to major families of antibiotics in biofilm samples collected upstream and downstream of WWTP discharge points in four streams.

The monitored genes confer resistance to antibiotics commonly used in hospitals and communities (such as fluoroquinolones, macrolides and sulfonamides). Previous studies have shown a high prevalence of these genes in water samples collected from Mediterranean rivers.

Continued on next page.


LA CRISI DE L'AIGUA

El canvi climàtic i el creixement de la població amenacen les reserves d'aigua del planeta

Variació dels recursos hídrics amb un augment de la temperatura de 2 °C
en percentatge

Escassetat d'aigua

ANÀLISI
Sònia Sánchez

dossier PLANETA · 02 · 9 D'ABRIL DEL 2016

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 year is the 288 news items appearing in the communication media (62 impacts in printed format, 209 in digital format, 8 on radio stations and 9 on TV).

ICRA has also committed to social networks over the last few years. On Twitter (@icrawater) it now has 186 followers and a total of 4326 visits to its profile. In 2016, ICRA opened its own Youtube channel, where institutional and project videos can be found.

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'aquïcultura, 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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