

A close-up photograph of water flowing from a chrome faucet into a clear glass. The water is captured in motion, creating a blurred, dynamic effect. The background is a soft-focus blue. A repeating pattern of light blue water droplets is overlaid on the entire image.

Report 2013

The logo for ICRA, consisting of several blue circles of varying sizes and a small orange square with a white letter 'R' inside it.

ICRA^R
Institut Català
de Recerca de l'Aigua
Instituto Catalán
de Investigación del Agua
Catalan Institute
for Water Research

Report 2013

Contents

Annual report 2013 ICRA

01. PRESENTATION	04
02. ORGANISATION	06
> Organisation structure	06
> Board of trustees	07
> Committees	08
> Departments & staff	12
>> Director, Deputy Director, General Manager & Secretary	13
> R&D&i support services	14
>> Administration	14
>> R&D&i Office	15
>> Technical-scientific platforms: SCT & PLANTEA	17
03. RESEARCH AREAS	24
> General introduction	24
■ AREA I - Resources and ecosystems area	26
■ AREA II - Water quality area	34
■ AREA III - Technologies and evaluation area	44
04. PUBLICATIONS & CONGRESSES	54
05. PROJECTS	76
06. CONTRACTS	82
07. AGREEMENTS	84
08. ACTIVITIES	88
09. AWARDS	100
10. FINANCING	103
11. SELECTED NEWS & PRESS	104

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Report 2013

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Presentation

Damià Barceló
Director of the ICRA

In this preface, I would like to review the most notable activities performed by ICRA last year.

2013 has been a year of success for proposals submitted to the European Union. While ICRA has obtained several projects in the past and taken part in others, in autumn 2013, in the 7th Framework Programme of the European Union, the EU awarded ICRA €1.3 million for **three projects**: €630,000 for understanding the impact of water scarcity on aquatic ecosystems, €422,000 for the promotion of innovative technologies that make it possible to close the water cycle in tourist facilities, and €273,000 to demonstrate solutions that support the transition from a wastewater treatment plant to a unit that produces different valuable assets.

Sergi Sabater, Head of the Resources and Ecosystems Area of ICRA and associate research professor at the University of Girona is the lead researcher of **Globaqua**. **GLOBAQUA** seeks to identify and manage the effects of stress caused by the shortage of water in aquatic ecosystems, such as organic and inorganic pollution, geomorphological changes, changes in land use, water extraction and the existence of invasive species and pathogens.

The **demEAUmed** project, led by Ignasi Rodríguez-Roda, Head of the Technologies and Evaluation Area of ICRA and associate research professor at the University of Girona, and the researcher Gianluigi Buttiglieri will demonstrate the ability to integrate innovative technologies to close the water cycle of an optimal and secure manner in European Mediterranean tourist facilities. The case study chosen is the Hotel Samba Lloret de Mar on the Costa Brava. The demEAUmed project faces two fundamental challenges: the importance of the tourism economy and the scarcity of water, characteristic of the area. The project will provide a key platform to promote the use of sustainable technologies and innovative tourist facilities around the Mediterranean also under the umbrella of the global tourism market.

The researcher Lluís Corominas from the Technologies and Evaluation Area is the leader researcher of ICRA for the **R3-Water project**. The main objective of the project is to demonstrate solutions that support the transition from a treatment plant for urban wastewater to a production unit of different valuable assets, which will decrease the environmental impact of this activity. Current research and development shows that these plants can be converted and upgraded to production units to provide energy, nutrients, water for re-use and possibly other valuable assets. This is achieved by improved resource efficiency in the plant as well as new technologies and business models that allow the re-use of resources from the incoming water. In these fields, new and innovative

technologies will be tested and demonstrated in Belgium, Spain and Sweden. Part of this project involves innovative monitoring, state-of-the art modelling tools and advanced control strategies in order to increase resource efficiency in existing wastewater treatment plants.

Furthermore, I will personally coordinate the European projects **SEA-on-a-chip** and **Globaqua** from the Spanish National Research Council in the 7th Framework Programme of the European Union, which also involve ICRA researchers.

In recent years we have published several studies on the presence of antibiotics in Spanish rivers. Today, we provide evidence of how these antibiotics affect aquatic organisms, without posing any danger to people. Most of this work has been part of the doctoral thesis of Elisabet Martí, one of the first to be read at ICRA. Also, with my collaborators from IDAEA, we published an article in one of the most prestigious journals in the world on environmental matters, **Environmental Health Perspectives**, vol. **121 (4)** on the presence of flame-retardant pollutants in liver cells

ICRA researchers have contributed to remarkable publishing activity. Published books include **Global Risk -Based Management of Chemical Additives II** (The Handbook of Environmental Chemistry, vol. 23) and **Emerging Organic Pollutants in Sludges** (The Handbook of Environmental Chemistry, vol. 24). Sergi Sabater published with Arturo Elosegui, Professor of Ecology at the University of the Basque Country, a book titled **River Conservation: Challenges and Opportunities** (BBVA Foundation), which analyses the main threats to river ecosystems, the socio-economic factors underlying these threats, and opportunities for conserving and restoring our rivers.

In September 2013, a recent study published by the Resources and Ecosystems Area of ICRA was selected to appear in the official journal of the European Commission on policy/environmental legislation (online version of **Science for Environment Policy-News Alert**, 343). This article summarizes how the restoration of natural conditions and streams by intentionally adding logs of dead wood increases key ecosystem services. When calculating the value of these services, researchers have been able to show that increasing the amount of dead wood in rivers and streams in a watershed that drains to a reservoir of the Basque Country is economically viable and that the investment could be recovered within 20 years.

I would like to mention that we also registered a **patent**: "System for monitoring overflows in pipe networks". The authors are the ICRA researchers Lluís Corominas and Oriol Gutiérrez (from the area of Technologies and Evalu-

ation) and Vicenç Acuña (from the area of Resources and Ecosystems).

The **first doctoral thesis** of ICRA, by Manel Garrido Barberba was read on 4 March 2013 and two more theses were read, by Damià Murlà Tuyls on May 17 and Neus Collado Alsina on July 19, all of them from the Technologies and Evaluation Area.

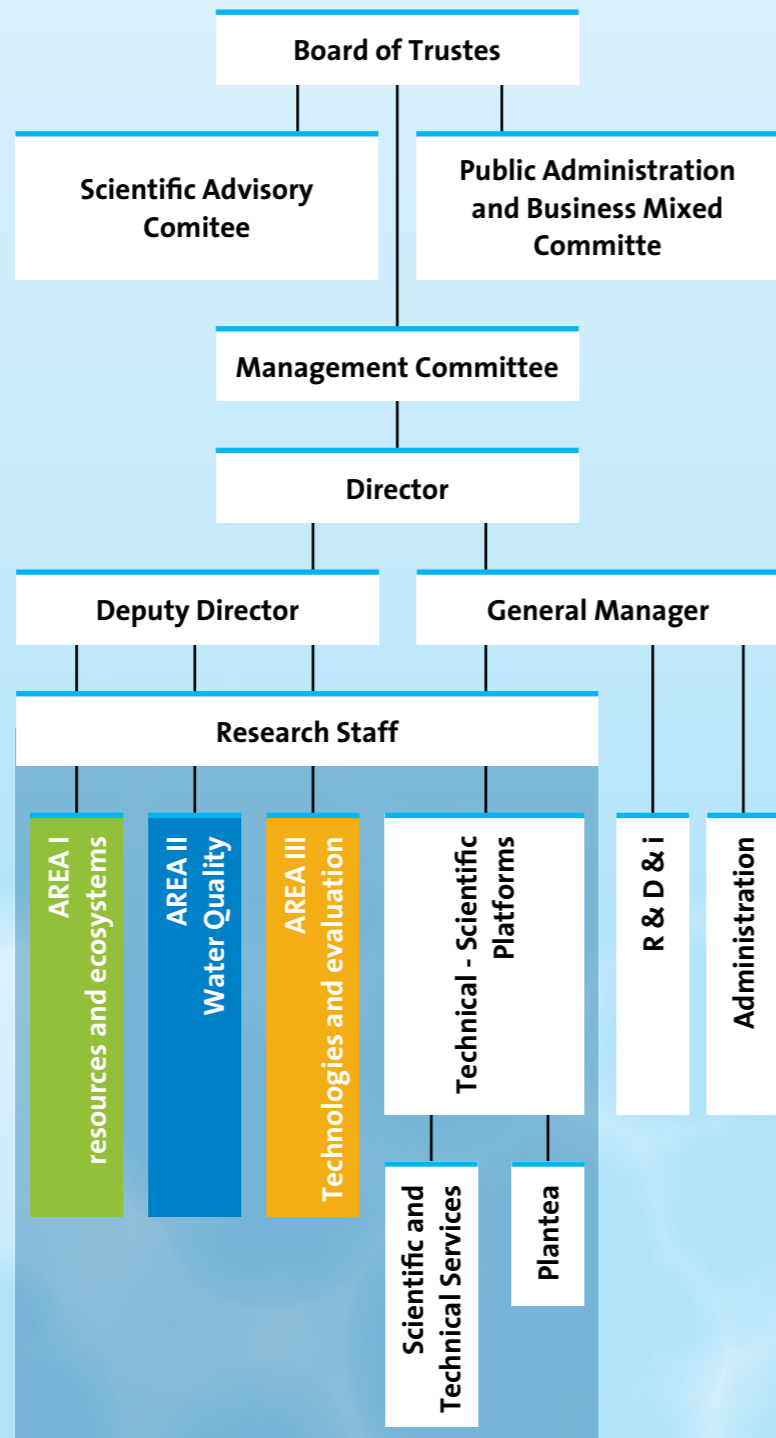
Also in October 2013, I received an **honorary doctorate** from the University of Ioannina (Greece).

Overall, our scientific and citizen communication activities have included **164 publications** in international scientific journals, books, and other publications, and 136 reports in the media.

One of the highlights for ICRA in 2013 was the inaugural meeting of the ICRA **Public administration and business mixed committee** on 15 January. The main goal of the committee is to guarantee the applicability and usefulness of the research done at ICRA, which is oriented toward the needs of the market. For four years, since the opening of the H2O building, ICRA has been carrying out an ongoing process of linking with the business fabric of the country. The results of the work carried out are beginning to be seen in business in the water industry.

I hope that the details of this report will help you to understand the efforts made at ICRA in finding resources, mostly in the European Community and is in line with its mission to be an international and multidisciplinary search of water. Anyway it would be appropriate in the coming years, and the supposed economic improvement of our country, possible growth of the critical mass of researchers ICRA incorporating new talent. Otherwise, we run the serious risk of being out of the premier league of institutes of EU research and water technology.

Damià Barceló
Director of ICRA



Board of trustees

The Board of Trustees is ICRA's highest governing body. In 2013, the trustees were the Catalan Regional Government's Ministry of Economy and Knowledge (DECO), the Catalan Water Agency (ACA) and the University of Girona (UdG). In 2013, the Board of Trustees held an ordinary general meeting on 10/06/2013.

Members

CHAIRMAN

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

DEPUTY CHAIRWOMAN

Anna M. Geli de Ciurana
Chancellor
University of Girona

MEMBERS

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Secretary for Universities and Research
Secretariat for Universities and Research
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Regional Government of Catalonia

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

Pere Condom
Managing Director
Science and Technology Park
University of Girona

Josep Calbó
Deputy Dean of Research and Transfer
University of Girona

Enrique Velasco
Appointed by the Catalan Water Agency
Catalan Water Agency
Ministry of Territory and Sustainability
Regional Government of Catalonia

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

NON-TRUSTEE DEPUTY SECRETARY

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



Committees

Scientific advisory committee

The **Scientific Advisory Committee** is appointed by the Board of Trustees and its members consist of an unspecified number of scientists of acknowledged repute and expertise in the field of water and all other related areas of science. This Committee's membership represents the ICRA's different priority areas of research. One of its most

significant tasks is to ensure the quality of the research carried out at the ICRA. Accordingly, it acts as an advisory body for all issues relating to the scientific activities submitted for its consideration, and, when requested, it will also act as an evaluating body for these activities.

In 2013 we renewed the terms of some of the scientists on the committee and we thank Nancy Grimm, Harindra Joseph S. Fernando and Juan Manuel Lema Rodicio for the work carried out during the 2010-2012 period and in part of 2013. We welcome Peter-Dietrich Hansen, Maria Reis, Peter Vanrolleghem and Paola Verlicchi.



**Bernd
Bilitewski**

Chair of the **Scientific Advisory Committee**, 2012-2014. General Commissioner for Foreign Affairs. Head of the Institute for Waste and Pollutant Management, Dresden University of Technology (DE)



**Clifford
Dahm**

Lead scientist of the Delta Science Program in Sacramento, California (USA). The mission of the Delta Science Program is to provide the best possible scientific information about water and to guide environmental decision making in the California Bay-Delta ecosystem (2013-2015)



**Gustaf
Olsson**

Emeritus Professor of Industrial Automation, Department of Industrial Electrical Engineering and Automation (IEA), Lund University, Lund (SE) (2013-2015)



**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) (2013-2015)



**Emilio
Custodio Gimena**

Emeritus Professor of the Department of Geotechnical Engineering and Geosciences, Groundwater Research Team of the Polytechnic University of Catalunya, Barcelona (ES). Correspondent member of the Royal Spanish Academy of Sciences. President of the Advisory Committee of the Fundación Centro Internacional de Hidrología Subterránea. (2013-2015)



**Georg
Teutsch**

Scientific Managing Director of the Helmholtz - Centre for Environmental Research (UFZ) at Leipzig, Germany (DE), Full Professor in Hydrogeology at the same centre, Member of the National Committee for Global Change Research, Member of the German Commission on Water Research (2012-2014)



**Jörg
Overmann**

Director of the Leibniz-Institute German Collection of Microorganisms and Cell Cultures (DSMZ) and Head of the Department Microbial Ecology and Diversity Research, Leibniz, Germany (DE) (2013-2015)



**Peter-Dietrich
Hansen**

Director of the Department of Ecological Impact Research and Ecotoxicology, Berlin Institute of Technology (BIT), Germany (DE) (2013-2015)



**Edward
Furlong**

Head of the Methods Research & Development Program, National Water Quality Laboratory, US Geological Survey, Denver Federal Center, Denver, CO (USA) (2012-2014)



**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) (2012-2014)



**Klement
Tockner**

Director of the Leibniz Institute of Freshwater Ecology and Inland Fisheries. Professor of Aquatic Ecology, Free University of Berlin (DE). Researcher at the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) (2012-2014)



**Jeanne
Garric**

Director of the Ecotoxicology Laboratory, Aquatic Ecosystems Biology Unit, Department of Water Quality and Pollution Prevention, IRISTEA (FR) (2012-2014)



**Maria
Reis**

Full Professor in Environmental Biotechnology, Department of Chemistry, Sciences and Technology Faculty, University Nova of Lisboa (UNL), Portugal (PT) (2013-2015)



**Peter
Vanrolleghem**

Holder of the Canada Research Chair on Water Quality Modeling (modelEAU) and Professor of the Department of Civil Engineering and Water Engineering, Université Laval, Quebec, Canada (CA) (2013-2015)



**Paola
Verlicchi**

Professor in Environmental and Sanitary Engineering, Engineering Faculty, Department of Engineering, University of Ferrara, Italia (IT) (2013-2015)

Public administration and business mixed committee



Manuel Farré Torras

Chair of the Public Administration and Business Mixed Committee. Director of the Products and Solutions Area of ADASA (Group COMSA EMTE) that integrates R&D&i departments.



Josep Arràez Escrig

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



Jaume Carol Pañach

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



Joan Gaya Fuertes

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



Jesús Gómez del Blanco

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



On 15 January 2013, the first meeting of the new Public Administration and Business Mixed Committee took place at ICRA, an advisory body of the new constitution, the main objective of which is to ensure the applicability and usefulness of the research done at ICRA, which is oriented toward the needs of the market. This committee is the body that allows the corporate sector to

participate in the Foundation. It can be consulted by the Trustees and the Director and can issue recommendations.

On 10 June 2013, in an ordinary meeting of the ICRA Board of Trustees, board members and President Manuel Farré Torras were appointed.



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. President of AQUA ESPAÑA association, that integrates the leading water treatment companies in Spain and Vice President of the Spanish Technology Platform for Water (PTEA).



Tomás A. Michel Mayer

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



Xavier Tristán Prat

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

Departments & staff

In 2013, 82 people contributed to ICRA's R&D&i activities

66 RESEARCH PERSONNEL

13 MANAGEMENT/ADMINISTRATION STAFF

3 R&D&i PERSONNEL



DIRECTOR



Damià Barceló

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

DEPUTY DIRECTOR



Sergi Sabater

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

GENERAL MANAGER



Iván Sánchez

General Manager

EXECUTIVE SECRETARY



Olga Corral

PA to Managing Director

R&D&i Support services

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

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

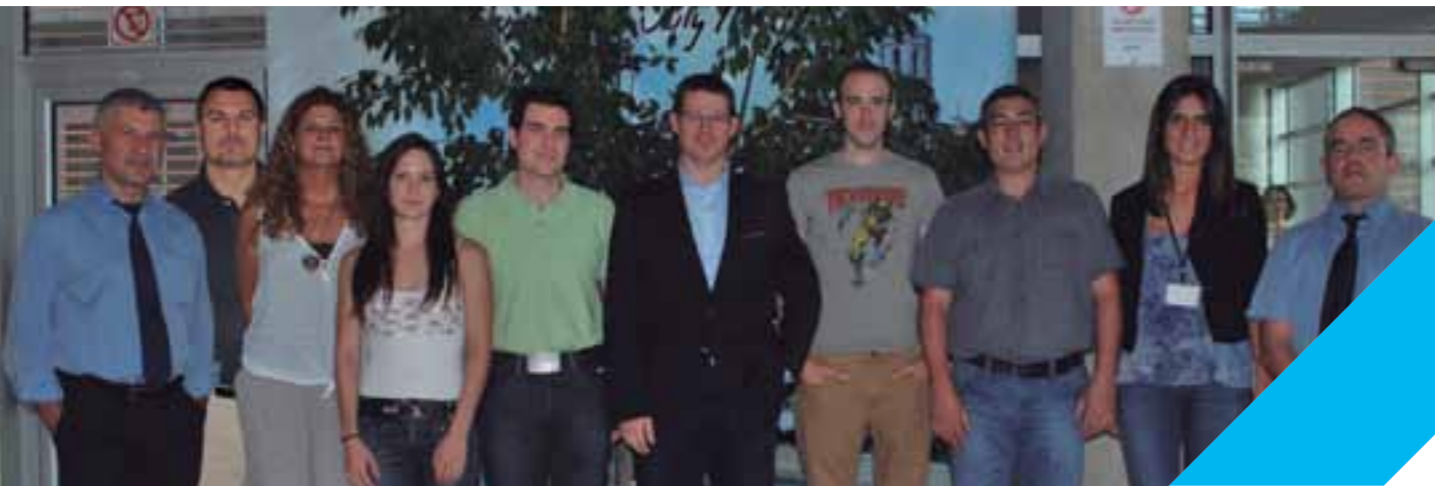
Administration

In 2013, the active administrative services that performed specific functions within each field of activity were:

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

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

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



From left to right:

Père Royo (Reception), Xavi Frigola (Eco-Fin Head), Olga Corral (PA to Managing Director), Lourdes Balmisa (Administration support to research), Isaac Graboleda (Accounting), Ivan Sánchez (General Manager), Rubén Díaz (IT), Ricard Zamora (Maintenance), Emma Collelldevall (Human Resources Head), Lluís Torné (Reception)

R&D&i office

Throughout 2013, the R&D&i Office has worked to identify funding opportunities, providing information, advice and technical and administrative support for the management of research projects and technology transfer.

The **first patent application** based on the results of research carried out entirely at ICRA was submitted in 2013. A patentability study was performed and the documentation was then prepared and an application was submitted to the Spanish Patent and Trademark Office for a "**System for monitoring overflows in pipe networks**". The ownership of the invention belongs to researchers at ICRA: from the area of Technologies and Evaluation (Lluís Corominas and Oriol Gutiérrez) and from the area of Resources and Ecosystems (Vicenç Acuña).

Moreover, in order to make greater contact with the productive sector and transfer research results, the R&D&i Office has been actively involved with leadership of the project CONNECT-EU Aigua. This is a network made up of water companies and research centers in Catalonia. The aim of the network is to identify the needs of the sector in R&D&i and lobby at European level for the internationalization of Catalan R&D&i companies. This project has been funded by ACCIÓ. A notable part of this activity was the organization in 2013 of the conference " International collaboration, public - private R&D&i: a tool to boost business competitiveness" with the aim of learning about strategies for the participation of European R&D&i companies. This event was attended by more than 50 people representing businesses, research centers and universities in Catalonia.

Finally, with regard to the activity of research management, in 2013 we processed 83 proposals for funding for new projects and contracts with companies. Of these, 60 proposals were submitted to various agencies for funding, and a total of 21 have been approved and are currently ongoing or due to start, while 15 are pending.



From left to right:

Anita Geiszinger (Technical Support for transfer),
Jaume Alemany (R&D&i Office Manager),
Zuria Aguilar (Project Manager)

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

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

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

This year, the activities have placed special emphasis on the European Framework Programme and HORIZON2020 that will start in 2014 and also on the economic and financial aspects of the research.



Technical-Scientific Platforms

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

In 2013, the technical and scientific platforms have been consolidated in order to provide a quality scientific and technical support service to researchers.

Also, the SCT has carried out continuous training and specialization of technicians.

These platforms are the following:

> SCIENTIFIC AND TECHNICAL SERVICES (SCT)

> WATER SCIENCE AND TECHNOLOGIES
R-RESEARCH PLATFORM (PLANTEA)

Scientific and Technical Services(SCT)

The Scientific and Technical Services (SCT) comprise a research platform that offers support to the ICRA staff as well as assisting with establishing relations with companies and other organizations, to be determined through the implementation of agreements and/or contracts.

Since the ICRA is a multidisciplinary center, specific organizations of SCT have been consolidated, as explained below: Chemical Analysis Unit, Mass Spectrometry Unit, Biological and Molecular Techniques Unit, Microscopy Unit.

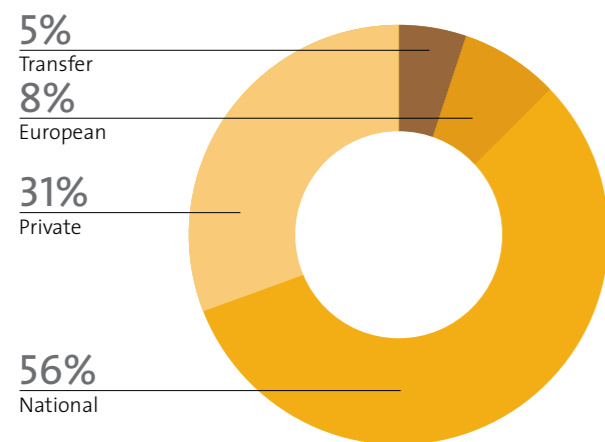


From left to right (stand up):
Natàlia Serón (Technician CAU unit),
Marta Villagrasa (ICRA Head of SCT),
Olga Montojo (Technician CAU unit)
From left to right (sitting):
Àlex Sánchez (Technician BMTU and MU units),
Sara Insa (ICRA Head of SCT)

Chemical Analysis Unit (CAU)

To offer optimal solutions in terms of water characterization, the Chemical Analysis Unit (CAU) has implemented a wide range of innovative technologies to meet the customer's requirements. Chemical tests are carried out using advanced state-of-the-art instrumentation managed by experienced personnel, who adapt methodologies based on international guidelines as well as developing new procedures to meet new analytical challenges. As a result, the CAU can provide a comprehensive analysis service for aqueous matrices, from natural to wastewater samples.

During 2013, more than 6000 samples were processed by CAU. These customized chemical analyses were distributed in the following projects:



As a representation of the portfolio of CAU services, we highlight the following applications:

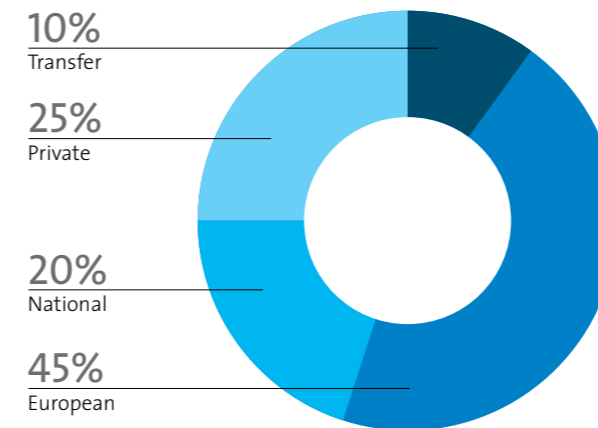
- > Quantification of nitrogen species (nitrites, nitrates and ammonium) implicated in both nitrification and denitrification processes in laboratory scale wastewater treatment plants.
- > Determination of sulphide species generated in wastewater sewer systems.
- > Characterization of wastewater measuring different parameters such as Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Total Kjeldahl Nitrogen (TKN), alkalinity, anionic and cationic compounds, etc. for the evaluation of biological treatment and advanced oxidation processes of municipal and industrial samples.
- > Study of nutrient retention in river networks.
- > Analysis of Total Organic Carbon (TOC) and Total Nitrogen (TN) under research on carbon transport.
- > Elemental analysis (carbon, hydrogen and nitrogen) performed to characterize the ecological status of biofilm, and ecosystems, based on their stereochemical ratios.

Mass Spectrometry Unit (MSU)

The facilities included in the Mass Spectrometry Unit (MSU) offer a comprehensive service in environmental analysis ranging from development of analytical methodologies, quantification of target compounds (pharmaceuticals, antibiotics, their metabolites and endocrine disruptors compounds) to identification of unknowns. As a result, MSU provides both routine determinations and advanced research in a compliance with competitive or private projects:

Among the applications developed during 2013, the following are of note:

- > Evaluation of the efficacy of enzyme-based treatment processes and waste effluents/sludge samples treated by ligninolytic fungi, through the analyses of selected pollutants and some of their transformation products (TPs).
- > Assessment of food safety issues related to seafood contaminants by means of the analysis of several emerging pollutants in seafood.
- > Determination of greenhouse gases (methane and nitrous oxide) from either wastewater transport and treatment systems from the PLANTEA pilot plants as well as from full-scale facilities exposed to Mediterranean climate conditions or natural lentic systems.
- > N-nitrosamines (mainly N-Nitrosodimethylamine [NDMA]) quantification at extremely low concentration levels generated in the course of disinfection processes related to wastewater reuse.



BMTU

The activities and services carried out in the Biological and Molecular Techniques (BMTU) essentially fall within the framework of the field of molecular microbial ecology of aquatic systems. In line with this profile, the research is focused on the characterization and quantisation of microorganisms in environmental samples using DNA- and RNA-based molecular techniques. BMTU is conceived as a general service that brings together a series of installations, equipment and technical support needed for research.

The BMTU plays an important role in the research projects of ICRA, and also offers its services to external institutions:

The most remarkable applications carried out in BMTU during 2013 were:

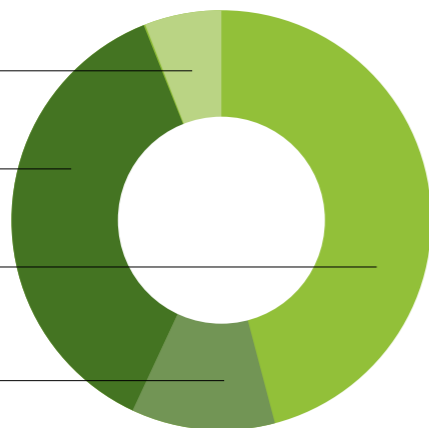
- > Detection and quantification of antibiotic resistant genes in river water samples.
- > Bacterial community characterization in biofilms under different water stress conditions.
- > Characterization and quantification of archaea Miscellaneous Chrenarchaeota Group (MCGs) in sediments and soils.
- > Analysis of acute toxicity of environmental samples.

6%
Private

37%
Transfer

46%
National

11%
European



MU

The Microscopy Unit (MU) provides ICRA researchers with the infrastructure and technical support needed for the application of microscopy in various fields of investigation. The equipment includes a confocal laser scanning microscope to carry out experiments using advanced microscopy techniques such as FRAP, FRET, gene expression studies, 3D analysis, co-localization, cell quantification, etc. The MU also includes an epifluorescence microscope, an inverted microscope and an optical stereoscopic microscope.

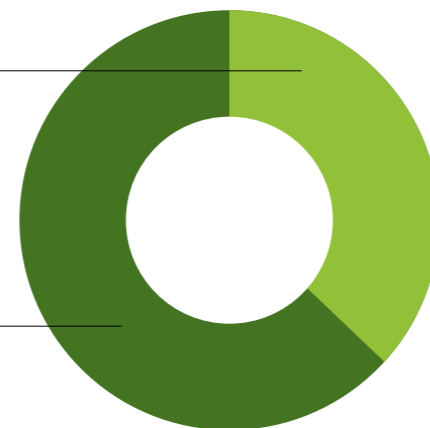
The research in UM has been involved in national and private projects:

The most common applications carried out in MU were:

- > Determination of viability of bacterial communities (Live/Dead).
- > Characterization of Diatom in water samples.
- > Identification and quantification by in situ hybridization of methanogenic archaea (methanogens) in sewage samples.
- > Quantification and spatial distribution analysis of ammonia-oxidizing bacteria populations present in nitrifying reactors by the use of specific labelled probes.
- > Localization of methanogens and bacteria in mesophilic sludge granules.

37%
National

63%
Private



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).

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

After its consolidation in 2013, The PLANTEA platform has continued with its initial structure, with two groups of research facilities with two different objectives:

- > **The study of wastewater transport and treatment systems in pilot scale installations mimicking full-scale systems.**
- > **The study of fluvial ecosystems under different conditions in an experimental streams facility.**

To explore the first objective, several pilot plants are currently in operation mimicking real wastewater transport and treatment systems. There are two pilot scale sewer systems simulating two rising mains from a sewer network, which are being operated to study the biochemical transformations occurring in these systems. The majority of the detrimental compounds produced during wastewater transport originate in the anaerobic zones of the sewer networks, the rising mains. The two most detrimental compounds produced are hydrogen sulphide, responsible for bad odours and toxic at certain concentrations, and methane, which, after carbon dioxide, is the most important greenhouse gas today. These sewer pilot plants allow the study of the chemical and microbiological transformations in these parts of the sewer networks which are very difficult to access in real facilities. These installations, which are the first at the European level, allow the researchers to investigate why and how these detrimental products form during wastewater transport and how their formation can be prevented.

Furthermore, seven sequencing batch reactors (SBR) are currently being operated to study different biological processes involved in the removal of pollutants occurring in wastewater treatment plants. The current investigations are focussing on two research lines: 1) Optimization of biological nitrogen removal from different wastewater streams while minimizing the production of nitrous oxide (N₂O), a potent greenhouse gas, and 2) Identifying the mechanisms involved in biodegradation of emerging micropollutants present in domestic wastewater (i.e. pharmaceutical compounds, endocrine disruptors, etc.) by different types of microbial communities present in wastewater treatment plants.



PLANTEA also includes two pilot plants at different scales (from 200 liters to 2 m³) that comprise several bioreactor units with submerged MF/UF and tertiary NF/RO membranes. These facilities are mainly used to study biological nutrient removal and the interaction between sludge filterability and membrane fouling. Degradation and the fate of micropollutants, disinfection by products generation and further reject stream treatment with advanced oxidation processes are also studied and optimized.

All these installations are 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 extensive monitoring equipment present in the PLANTEA installations such as dissolved oxygen, pH, redox, nitrate, dissolved N₂O and hydrogen sulfide sensors and also online gas analyzers for N₂O and nitric oxide (NO) monitoring connected to the SCADA system.

Finally, it is also worth mentioning that the PLANTEA laboratory has a direct connection to a sewage pumping station that collects the wastewater originating from the nearby neighbourhoods. This greatly facilitates the use of real wastewater for the experiments conducted in the PLANTEA pilot plants.

The projects that have benefited from the PLANTEA platform in 2013 are: SGHGEMS-Sulfide And Greenhouse Gas Emissions From Mediterranean Sewers (EU Marie Curie Reintegration grant), NITRI-GHG- Exploring novel nitrifying pathways to minimize greenhouse gas emissions from WWTPs (EU Marie Curie Career Integration Grant), GEISTAR- Greenhouse gas Emissions from wastewater transport and treatment systems (MINECO, Spanish Government), WATER FATE - The fate of micropollutants and disinfection by-products in membrane bioreactors and reverse osmosis or nanofiltration membranes followed by disinfection (MINECO, Spanish Government), Study of the mechanisms behind N₂O production during wastewater treatment processes (MINECO, Spanish Government, Proyectos de Internacionalización, Spanish Government), ITACA - Research of treatment, reuse and control of treatment technologies for a future sustainable wastewater treatment (CDTI, INNPRONTA - DEISA); SANITAS- Sustainable and integrated urban water system management (EU Initial Training Network Marie Curie), and MBRControl- Development and validation at full scale of an MBR air-scour control system (GS INIMA).

For the second goal, since the beginning of the Experimental Streams Facility (ESF) in May 2012 several studies have been performed. The facility allows the manipulation of different ecological variables and the characterization of the ecosystem response.



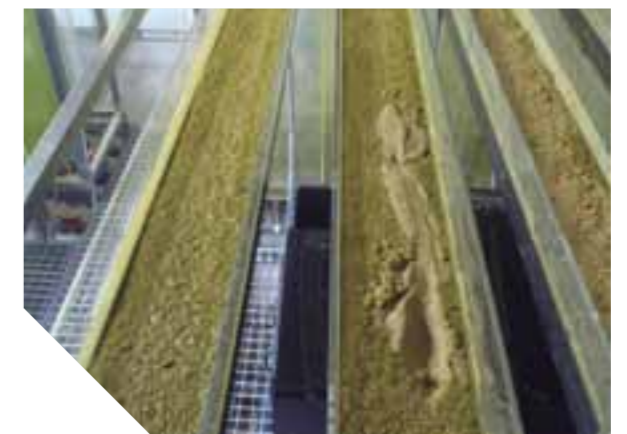
One of these ([photo experiment 1](#)) focused on ecotoxicology. It aimed to evaluate the long-term effects of exposure of a mixture of pharmaceutical compounds, when they are exposed alone or in combination in a drought period, on the structure and functioning of biofilms. In order to address these issues, an experiment was performed using 12 artificial streams. Pharmaceutical treatments were attained by exposing biofilm to a mixture of 9 pharmaceutical compounds at a nominal concentration of 5000 ng/L (environmental concentration). For the treatments including a dry period, the water column was removed for one week. Biofilm responses to these stressors were monitored over time. This study was performed in the framework of the SCARCE project (Consolider-Ingenio 2010 CSD2009-00065).



Another experiment ([photo experiment 2](#)) has been done to evaluate the effect of higher night-time water temperature on the carbon balance. Stream Carbon metabolism - primary production (P) and respiration (R) - is influenced by water temperature, which is increasing owing to climate change. Because of different activation energies, warming will likely decrease the P:R ratio. However, climate change also alters the daily temperature cycles, with warmer night-time temperatures. We assessed the effects of warmer night-time temperatures on the P:R ratio in 12 artificial streams subjected to 3 temperature treatments: control, warm-days and warm-nights. Study within the framework of the GWESCB project (Marie Curie European Reintegration Grant PERGo7-GA-2010-259219).



Regarding sediment transport, another experiment ([photo experiment 3](#)) has been conducted to assess the effect of biofilm on the starting sediment movement and on their transport rates. The experiment was performed on several artificial streams. Sediment transport rates were measured at different flow conditions in artificial streams colonized by biofilm and in those without biofilm.



In 2013, the facility was also improved by the inclusion of temperature and relative humidity sensors of the air in the control system. Another advance was the introduction of the Cryo-Compact circulators into the control system, which allows us to use them individually and to have them fully monitored. One more improvement was the installation of data processing modules to obtain water temperatures more accurately. And the addition of more LED's in the artificial rivers, in order to cover all along the channels, so to have more useful area.

Research Areas 03.

6 people were recruited to the ICRA's 3 research areas in 2013 (3 at Resources and Ecosystems Area, 2 at Water Quality Area and 1 at Technologies and Evaluation Area).

In the **Resources and Ecosystems Area**, under competitive calls we have recruited 1 predoctoral student (**Gemma Piqué**) and 2 research technicians (**Lorenzo Proia** and **Cristina Buendía**).

In the **Water Quality Area**, under competitive calls we have recruited 2 postdoc researchers (**Diana Álvarez** and **Aleksandra Jelic**).

Olga Auguet, research technician at ICRA, obtained a grant in 2013 under the Research Training Grant of AGAUR (2013FI-Boo434), Ministry of Economy and Knowledge (DECO) of the Catalan Regional Government.

Also during 2013 we have obtained funding to recruit in this area in 2014: as postdoc researchers **Jelena Radjenovic** (GA NUM: 623041) and **Maria José Farré** (GA NUM: 623711) under the European Union's IIF (international incoming fellowship Marie Curie Programme, and as a predoctoral student **Sergi Compte** under the Ministry of Economy and Competitiveness (MINECO) Subprogram Basic Research Projects unoriented (BES-2013-065664).

In the **Technologies and Evaluation Area**, under competitive calls we have recruited 1 IT technician (**Lluís M. Bosch**).

Also during 2013 we have obtained funding to recruit in this area in 2014 as a research scientist **Wolfgang Gernjak** (RYC-2012-12181) under the Ministry of Economy and Competitiveness (MINECO) Ramon y Cajal Program.

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



AREA I Resources and Ecosystems

LINES

- AI1** Hydrological processes
- AI2** Lacustrine and reservoir systems
- AI3** Fluvial systems
- AI4** Modelling of ecosystems and basins

AREA II Water Quality

LINES

- AI11** Chemical contamination of water bodies
- AI12** Pollutants in waste water
- AI13** Quality and Microbial diversity
- AI14** Ecotoxicological response of biota to pollutants

AREA III Technologies and evaluation

LINES

- AI111** Purification and distribution
- AI112** Treatment/reuse of waste water
- AI113** Modelling and management systems
- AI114** Unit operations

AI Resources and Ecosystems Area

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

- AI1** Hidrological processes
- AI2** Lacustrine and reservoir systems
- AI3** Fluvial systems
- AI4** Modelling of ecosystems and basins

All four lines have been working in 2013. We would highlight the recruitment of Josep Mas-Pla as a University of Girona associate research professor in the line AI4.

22 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 scientist
Vicenç Acuña
Rafael Marcé
- 3** postdoc researcher
Laurie Boithias
Natàlia Corcoll
Albert Ruhí
- 2** postdoc researcher (Juan de la Cierva)
Daniel VonSchiller
Marta Terrado
- 5** predoctoral student
Rosana Aguilera Becker
Lidia Ponsatí
Gemma Piqué
Xisca Timoner
Joan Pere Casas
- 4** research technician
Carmen Gutiérrez
Maria Casellas
Lorenzo Proia
Cristina Buendía
- 1** postdoc researcher UdG
Elisabet Tornés
- 1** predoctoral student UB
Lluís Gómez
- 1** research technician UdG/UB
Jordi-René Mor

From left to right (stand up): Sergi Sabater, Cristina Buendia, Daniel von Schiller, Maria Casellas, Elisabet Tornés, Jordi-René Mor, Marta Terrado, Lidia Ponsatí, Rosana Aguilera Becker, Josep Mas-Pla, Ramon J. Batalla, Laurie Boithias, Rafael Marcé. From left to right (sit down): Natàlia Corcoll, Joan Pere Casas, Gemma Piqué, Xisca Timoner, Carmen Gutiérrez, Lorenzo Proia, Vicenç Acuña.

The Resources and Ecosystems (RiE) research area continued its research during 2013 on the implications of water scarcity and human pressure on the ecosystem dynamics of Mediterranean freshwater ecosystems. This was done mostly through two major research projects. The first one is the CONSOLIDER-INGENIO 2010 Project (SCARCE), now in its fourth year, which has provided wonderful examples on the relevance of water scarcity on water quality, ecosystem functioning and ecosystem services. SCARCE will have its continuation in the GLOBAQUA project, a 7th EU-Framework Research recently awarded to ICRA and to which RiE researchers will have a strong involvement. This project includes a 21-partner consortium, and aims to understand the responsibility of climate, land use, and management, on the ecological status of water bodies. The dynamics of carbon in fluvial systems has continued with the CARBONET Project, now in its third year. CARBONET studies the implications of global change on carbon transport and processing dynamics in river networks. This project is already contributing good understanding on the organic carbon dynamics, and on the implications of the lentic and lotic compartments to the overall river functioning. Other ongoing research has involved collaboration with administrations such as the Ebro Water Authority (CHE), as well as private companies (TRAGSA, ENDESA, ATLL).

Four predoctoral theses are currently underway in the area, some of them close to completion. Two post-doctoral researchers joined the RiE team during 2013; these were Cristina Buendia (HIDSOS) and Lorenzo Proia (CARBONET).



A11

Hydrological processes

Instrumentation and monitoring of fluvial processes in the River Muga have continued to be the main tasks undertaken by the Hydrological Processes Line in 2013. The main activities encompass the maintenance of flow and turbidity probes in five measuring sections along the basin's drainage network. Sections were selected owing to their relative position in relation to the Muga Reservoir. Probes measure water depth (i.e. discharge) and turbidity (i.e. suspended sediment load, both mineral and organic). Regular samples are taken at all sections for calibration purposes. Water samples are taken to the laboratory where suspended sediment concentrations are determined. In addition, topographic measurements of the river channel have been performed for the hydraulic modelling of selected river stretches; whereas radiofrequency tagged particles have been deployed in the riverbed to analyse bedload entrainment. Databases are compiled with the objective of constructing the water and the sediment budget of the catchment, and analysing the impact of the Boadella Dam on the downstream water and solid load transfer. An analysis of the hydrological characteristics of the basin is also being carried out. These activities are the central part of the PhD project of Gemma Piqué, which is being completed in the framework of the Carbonet Project. Support has also been given for the preparation of the European Globaqua Project and the Research Contract –HIDSOS between ICRA and Endesa Generación S.A. The group has also participated in the analysis of the impacts of the Margalef and Siurana dams on the ecosystem dynamics of the rivers Montsant and Siurana, respectively.





A12

Lacustrine and reservoir systems

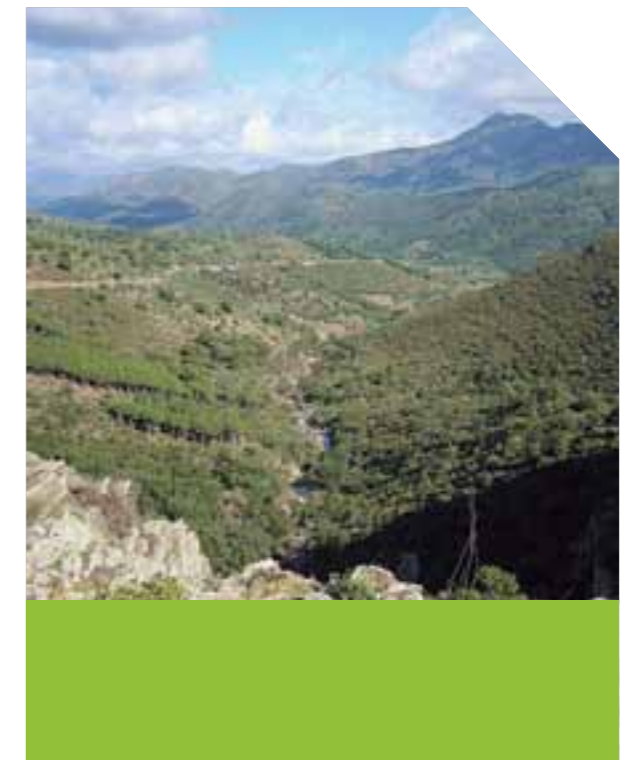
In 2013 the activities in this line focused on 1) understanding the carbon cycle in Mediterranean reservoirs and weirs, 2) the effect of global changes on the water quality of these storage systems, and 3) the presence of antibiotics in reservoirs and their effects on planktonic communities. The first two objectives are addressed in coordination with the research lines A13 (Fluvial systems) and A14 (Modelling of ecosystems and basins), within the project CARBONET. Activities in the third block consisted of finalization of the project RES2 funded by ICRA, which studied the effect of antibiotics on planktonic communities in reservoirs with an interdisciplinary approach, including analytical chemistry, sequencing techniques in microbiology, and ecology. Currently, we are investigating the carbon cycling in lentic ecosystems and in an integrated perspective, taking into account their place in river networks and their interactions with the rest of environments. This year we were fully involved in the COST action "Networking Lake Observatories in Europe" (NETLAKE), where we coordinate the working group devoted to the application of high frequency measurements in lake and reservoir management.



A13

Fluvial systems

This research line has pursued the research lines already active in 2012: 1) The effects of flow intermittency on the stream biota and biogeochemistry, 2) the effects of the alteration of flow and temperature regimes on the organic carbon processing, i.e., on carbon metabolism, and 3) the effects of global change on ecosystem services. Furthermore, other research lines have also been developed, such as 4) Pharmaceutical compounds in fluvial ecosystems, and 5) integration of ecosystem services in environmental management. Most of the research carried out within these lines has been done in the framework of the CONSOLIDER-INGENIO 2010 project (SCARCE, CSD2009-00065), as well as in the project of the Spanish Ministry of Economy and Competitiveness (CARBONET, CGL2011-30474-Co2), and in a Marie Curie European Reintegration grant (PERGo7-GA-2010-259219). The experimental work of the SCARCE project was completed in 2013; this consisted mainly of an intensive field experiment in a combined WWTP-River system in Puigcerdà, where teams of different disciplines and research institutions worked together on the characterization of the pharmaceutical dynamics from the WWTP influent to the end of a 5 km long river segment. Moreover, a study on the water supply and demand within the ecosystem services framework at the Ebro basin under different scenarios has been also completed.



A14

Modelling of ecosystems and basins

In 2013, the modelling research line continued the activities within the CONSOLIDER-INGENIO 2010-SCARCE Project and the CARBONET project. Within SCARCE, we are working on 1) the modelling of emerging pollutants at the watershed scale using the GREAT-ER model, with special emphasis on the processes occurring at the river reaches and the wastewater treatment plants; 2) the inclusion of the in-stream processes in the watershed-scale model InVEST, an ecosystem services evaluation model platform, in close collaboration with its developers (Natural Capital Project, Stanford); 3) the study of nutrient retention in river networks including impaired streams using the SPARROW model; and 4) the study of vulnerable regions in terms of water quality changes under conditions of scarcity across the Iberian Peninsula, using state-of-the-art, computing-intensive statistical tools (MINE and DFA) in Undarius, our High Performance Computing cluster. Within the CARBONET project, we finished the ambitious fieldwork program to collect the necessary data to build watershed-scale models devoted to understanding carbon cycling in Mediterranean river networks.

With regard to groundwater resources, multilinear regression models have been applied to simulate their vulnerability to nitrate pollution in the Osona region, so management actions affecting both unconfined and confined aquifers can be considered based on the knowledge of vulnerability maps and the factors that govern nitrate occurrence. Furthermore, groundwater monitoring in the Empordà area, in the framework of a Spanish national research project, has made it possible to determine the hydrochemical status of these resources, referred to nitrate as well as emergent contaminants concentrations, based on the aquifer hydrodynamics described by means of hydrochemical and isotopic data.



AI - Ongoing PhD dissertations

Candidate: Gemma Piqué

Title: Sediment transport and associated biophysical processes in a Mediterranean regulated river.

Candidate: Lidia Ponsatí

Title: Stressed biofilms: responses to global change.

Candidate: Roberto Merciai

Title: Effects of global change on fish assemblages and other organization levels in Mediterranean riverine ecosystems.

Candidate: Xisca Timoner

Title: Stream biofilm responses to flow intermittency.

Candidate: Rosana Aguilera Becker

Title: Effects of land uses and climate variability on the water quality of Mediterranean Rivers: towards a regional vision of global change.

Candidate: Joan Pere Casas

Title: Carbon Dynamics in a Mediterranean Regulated Watershed.

AI – Stays Abroad

Vicenç Acuña

(research scientist). Centre: Facultad de Ciencias, Universidad Nacional de Colombia, Villa de Leyra, Colombia (5/3/2013 to 19/3/2013).

Daniel von Schiller

(postdoc researcher Juan de la Cierva). Centre: Helmholtz Centre for Environmental Research (UFZ), Leipzig, Germany and Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany (5/5/2013 to 12/5/2013).

Rosana Aguilera Becker

(predoctoral student). Centre: Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany (1/7/2013 to 31/8/2013).

AI – Visitors

Albert Serra

Internship student, Biology Grade, University of Girona, Girona, Spain (January-May 2013).

Anna Freixa

Predoctoral student, Institute of Aquatic Ecology of the University of Girona, Girona, Spain (January-November 2013).

Josep M. Brossa

Internship student, Biology Degree, University of Girona, Girona, Spain (February-June 2013).

Gemma Urrea

Research technician, Institute of Aquatic Ecology of the University of Girona, Girona, Spain (April-December 2013).

Aurore Prats

Internship student, National School for Water and Environmental Engineering of Strasbourg (Ecole Nationale du Génie de l'Eau et de l'Environnement de Strasbourg - ENGEEES), University of Strasbourg, Strasbourg, France (July 2013).

Victor Carbajal

Internship student, Ecology, Management and Restoration of the Environment MSc, Faculty of Biology, University of Barcelona, Barcelona, Spain (July-September 2013).

Adrià Bosch

Internship student, Construction Engineering Degree, Polytechnic University of Catalonia, Barcelona, Spain (July-September 2013).

Lina Tyroller

Predoctoral Researcher, Swiss Federal Institute of Aquatic Science and Technology (EAWAG), Environmental Isotope Groupe, Department of Water Resources and Drinking Water, Dübendorf, Switzerland (October 2013).

Joaquim Antoni Pla

Internship student, Marine Sciences MSc, University of Barcelona, hired by the University of Girona, Girona, Spain (December 2013-May 2014).

AI1 Water Quality Area

The Water Quality area lines of research are:

- AI1** Chemical contamination of water bodies
- AI2** Pollutants in waste water
- AI3** Quality and Microbial diversity
- AI4** Ecotoxicological response of biota to pollutants

During 2013, the AI1, AI2 and AI3 lines have been working.

16 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
Sara Rodríguez-Mozaz
- 3** postdoc researcher
Marta Llorca
Diana Álvarez
Aleksandra Jelic
- 4** predoctoral student
Laura Ferrando
Belinda Huerta
Daniel Lucas
Elisabet Marti
- 2** research technician
Núria Càceres
M. Jesús García-Galán
- 2** predoctoral student UdG
Imma Noguerola
Mireia Fillol



From left to right: José Luis Balcázar, Elisabet Marti, Daniel Lucas, Belinda Huerta, Sara Rodríguez-Mozaz, Mira Petrovic, Marta Llorca, Laura Ferrando, Diana Álvarez, Núria Càceres, Carles Borrego, Mireia Fillol, Damià Barceló



Research in the area is related to chemical contamination of water, particularly contamination by emerging organic micropollutants and to the microbiological aspects of water quality. In 2013 the research lines *Chemical contamination of water bodies and Pollutants in waste water* continued their activities aimed at better understanding the sources and processes that control the distribution and the potential effects of contaminants on ecosystems and human health, the first one focusing on the study of contaminants in the aquatic environment and the second one focusing on chemical quality of water in wastewater and drinking water treatment processes. A notable result is the development of an analytical methodology for the determination of pharmaceutical compounds and endocrine disruptors (EDCs) in macroinvertebrates and biofilm, which made it possible to conduct a study on bioaccumulation of these contaminants in aquatic organisms and better assessment of the impact of chemical pollution in the ecosystem. Different treatment technologies (such as biotreatment using lignolytic fungi

and different advanced oxidation processes (AOPs) were assessed regarding their potential to eliminate emerging contaminants. Considering the potential hazards of by-products generated during these treatments, the main reaction mechanisms were elucidated and transformation products were identified.

Research in the line of *Water Quality and Microbial Diversity* focuses on the study of the structure, abundance and activity of microbial communities in relation to environmental gradients and chemical stressors. We combine different state-of-the-art molecular techniques to identify and quantify key bacterial and archaeal groups in both natural and artificial water systems, from lakes and reservoirs to sewer systems. Our research is aimed to resolve the pivotal role of certain microbial groups in biogeochemical cycles and to investigate how these microbial communities respond and adapt to both emergent chemical pollutants (e.g. antibiotics) and environmental stressors (e.g. seasonal anoxia and water intermittency) that seriously impair ecosystem functioning.

A111

Chemical contamination of water bodies

In 2013, the main activities of this research line were:

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

Within this multidisciplinary project, the group is involved in determining the environmental quality of the Mediterranean river basins regarding the presence of emerging contaminants in different environmental compartments including biota. In 2013 we developed specific analytical methods for the determination of pharmaceutical compounds and endocrine disruptors (EDCs) in macroinvertebrates and biofilm. The study of the occurrence of the target contaminants in these aquatic organisms allows us to better assess the impact of chemical pollution in the ecosystem and therefore to evaluate the current condition of Mediterranean rivers, which are particularly affected by global climate change. These rivers are characterized by having periods of water shortage, which makes them very vulnerable from the point of view of water quality.

- **Non conventional degradation treatment by fungi of selected pharmaceuticals from effluents: process development, monitoring and risk assessment (DEGRAPHARMAC). Ministerio de Economía y Competitividad (MINECO)-CTQ2010-21776-CO2-02.**

This project proposes the development of a treatment process of sewage and sludge using real lignolytic fungi, which possess a powerful non-specific enzymatic system capable of degrading a wide range of xenobiotic compounds. During 2013 we tested the efficiency of these treatment technologies regarding the removal of emerging contaminants such as endocrine disruptors, and several families of drugs (antibiotics, analgesics, anticancer drugs, etc.) from real effluents and discharges such as reverse osmosis concentrate, wastewater from an urban hospital, a veterinary hospital and a university residence, as well as from wastewater treatment plant

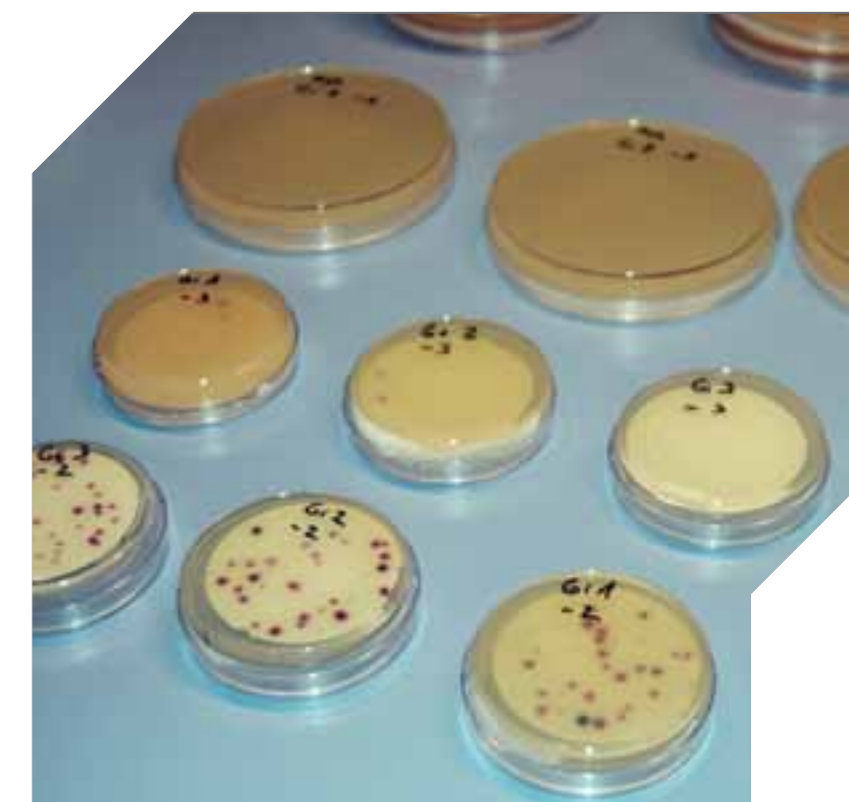
(WWTP) sludge. These systems based on lignolytic fungi open up the possibility of reuse by industry or agriculture of effluent and sludge treated with these alternative treatments

- **ENZymatic DEcontamination TEChnology (ENDETECH). FP7-ENV-2011-Eco-innovation(282818).**

ENDETECH aims at promoting a novel decontamination technology based on enzymes, able to eradicate pharmaceutical compounds and EDCs pollutants from water. ENDETECH partners work to develop this technology and apply it in bio-reactors specially designed for wastewater treatment. The envisioned bioreactors will be optimized by using tailored immobilization supports to enhance stability and efficiency of the catalytic enzymes. During the past year we evaluated the efficacy of enzyme-based treatment processes by means of combining both chemical analyses and ecotoxicological hazard assessment of selected antibiotics and some of their transformation products (TPs).

- **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 2013 (first year of the project) ICRA has collaborated in the elaboration



of a database with relevant information required for risk assessment gathered from literature and national monitoring programmes as well as in the refining of analytical methods for the analysis of emerging pollutants (pharmaceuticals and EDCs) in seafood. These methods will be applied in the following years to the monitoring of these pollutants in seafood from different origins using an ambitious sampling strategy following the recommendations of the Marine Strategy Framework Directive.

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

SEA-on-a-CHIP project just started December 2013 and will aim to develop and implement automatic sensors operated by remote control in seawater. The sensors to be developed will act like little “floating laboratories” to detect various chemical contaminants that exist in marine waters. Over the next nearly four years the project will work on the development and validation of this sensor with a specific application in aquaculture facilities, including rapid assessment of 8 contaminants related to aquaculture activities and that may affect the environment and human health, such as antibiotics and pesticides. Although the system will be evaluated for this particular application, it will easily adapt to other target compounds or other situations such as coastal waters.

Internal collaborations at ICRA

Resources and Ecosystems Area:

We have been working in collaboration with this area on different studies that aim to the study of natural attenuation of emerging pollutants in rivers, with particular emphasis on their impact in ecosystems. These studies have been performed both in artificial controlled streams and in a selected river watershed.

Technologies and Evaluation Area:

We have collaborated with the researchers in this area on different projects related to the fate and transformation of emerging pollutants in wastewater systems: we have evaluated the occurrence and removal of pharmaceuticals in a 7.6 km long pressure sewer pipeline in order to study in-sewer transformation of pharmaceuticals before arriving to the wastewater treatment plant. Furthermore, we have studied in depth the degradation of different pharmaceutical compounds in wastewater treatment processes focusing on the generation of transformation products of these contaminants.



AI12

Pollutants in waste water

In 2013 the main activities of this line were the following:

• **Study of occurrence and distribution of wastewater-derived emerging contaminants in Iberian rivers. Project SCARCE. Ministerio de Economía y Competitividad (MINECO) 2010 CSD2009-00065.**

During 2013 a synthesis and critical evaluation of levels for 244 organic emerging contaminants found in water samples collected at 77 selected locations in the Llobregat, Ebro, Júcar and Guadalquivir River Basins have been performed, providing a basis for assessing the risk of exposure to these contaminants. In order to gain a better insight into the spatial distribution of contaminants and to pinpoint hot spots impacted by human and agricultural waste sources, a site-specific Geographical Information Systems (GIS) model was created, combining sampling site locations and analytical data from each of those sampling points. The study confirmed the presence of complex mixtures of unregulated contaminants of various origins in Iberian rivers, thus raising concern about their potential interactive effects.

• **Transformation of contaminants during wastewater treatment. Bilateral collaborations with University of Nicosia, Cyprus and Plataforma Solar, CIEMAT, Almería, respectively.**

In attempts to reduce the discharge of emerging contaminants into the environment, different advanced treatments based on biodegradation and chemical oxidation have been designed and tested individually or in combination. Some of these processes have proved to render persistent and even toxic intermediates, so disappearance of the parent contaminant does not imply that the treatment was efficient. Considering the potential hazards of by-products generated during treatment, the main reaction mechanisms were elucidated and transformation products identified for a series of advanced oxidation processes (AOP) such as solar Fenton treatment, sonolysis, TiO₂-based heterogeneous photocatalysis under UV-A and simulated solar irradiation, and by the combined use of UV-A and ultrasound irradiation (i.e. sonophotocatalysis). The main intermediate transfor-



mation products of ofloxacin (antibiotic) and carbamazepine (psychiatric drug) were identified using advanced UPLC-QToF-MS. In case of carbamazepine several recalcitrant hydroxy- and keto-derivatives were tentatively identified. A *Daphnia magna* bioassay was used to evaluate the potential toxicity of the samples collected at different time points showing that the mixtures were highly toxic to *D. Magna*.

Internal collaborations at ICRA

Resources and Ecosystems Area:

We have continued our collaboration in the framework of the project SCARCE aimed at establishing links between chemical quality (occurrence of emerging and priority pollutants in water and sediment) in Iberian rivers and biodiversity and ecosystem functioning.

AII3

Pollutants in waste water

In 2013, the main activities of this research line were:

- Effect of antibiotics on the diversity and resistome of aquatic microbial **communities**. Members of this research line have been involved in studying the effect of some discharges from wastewater treatment plants and hospital facilities on the aquatic ecosystem. Particular emphasis has been made on the effect of these discharges on the prevalence of antibiotic resistance genes and bacterial community composition. We have used culture-independent approaches such as real-time PCR to determine the prevalence of these resistance genes in the bacterial DNA fraction as well as the phage DNA fraction. The composition of bacterial communities has also been examined using a 16S rRNA gene-based pyrosequencing approach. Our results have demonstrated a significant increase in the relative abundance of antibiotic resistance genes in samples collected downstream of the urban treated discharges. We have also found significant differences with respect to community structure and composition between upstream and downstream sites. Moreover, we have demonstrated the presence of genes conferring resistance to beta-lactam antibiotics and fluoroquinolones in phage DNA from different hospital and WWTP effluents. These studies are expected to contribute significantly to our understanding of the environmental distribution of these resistance genes and how anthropogenic inputs affect their spread. These activities have been supported by a Ramon y Cajal grant (RYC-2011-08154) from the Spanish Ministry of Economy and Competitiveness (MINECO).



- In the framework of project ARCOS (Ref. CGL2012-33033) we have studied the diversity and abundance of uncultured MCG archaea in sediments collected from different freshwater ecosystems in Spain. A total of 27 sediments (22 lagoons and 5 reservoirs) were collected during sampling campaigns of projects ARCANOX and CARBONET (RiE Area) and by the collaboration of the research group led by Dr. Antoni Rosell at the ICTA-UAB. These sediment samples were analysed by 16S rRNA gene fingerprinting and qPCR using specific primers for MCG archaea. Also, massively parallel sequencing was used to finely resolve the structure of archaeal communities in these systems. Preliminary results show a prevalence of MCG archaea affiliated to subgroups MCG-6 and MCG-15 in all studied sediments with abundances varying in relation to anoxic conditions and sulfide concentration. Interestingly, high abundance of MCG archaea have been measured in biofilms developed on leaf litter accumulated in these sediments. We are currently studying the activity of these biofilm-associated MCGs on the potential degradation of aromatic compounds through a combination of state-of-the-art molecular techniques, stable isotope probing using ¹³C-labelled organic compounds, and lipidomics.

We have started a collaboration with Dr. Laura Villanueva, member of the Organic Marine Biochemistry at the Royal NIOZ (Royal Netherlands Institute for Sea Research, <http://www.nioz.nl/bgc-en>), to investigate the structure, distribution and abundance of archaeal membrane lipids along depth profiles of sediments cores collected at lakes where MCG archaea were dominant. Of particular interest is the identification of membrane lipids specifically associated with MCG archaea to use as biomarkers for their presence and abundance.

- After the identification of a freshwater member of the Genus *Arcobacter* (*Epsilonproteobacteria*) involved in sulfide oxidation and autotrophic carbon fixation processes in oxic-anoxic interphases of lake Banyoles, we have focused our efforts on its enrichment and isolation. This study is carried out in collaboration with Dr. Rémy Guyo-

neaud and Dr. Marisol Goñi from the EEM Team (Equipe Environnement et Microbiologie) at the University of Pau et des Pays de l'Adour (Pau, France). Since no freshwater members of sulfide-oxidizing *Epsilonproteobacteria* have been brought into culture yet, the isolation of this freshwater *Arcobacter* could be considered a milestone, allowing further studies aimed at resolving its physiological traits and genome characterization.



Internal collaborations at ICRA

Resources and Ecosystems Area: After unravelling the effect of flow intermittency on the structure and functioning of streambed biofilm bacterial communities in Mediterranean streams, we have moved one step forward to investigate how archaeal communities in these biofilms respond to water stress. By using a similar approach combining massively parallel sequencing, functional gene fingerprinting and qPCR we plan to identify prevalent archaeal groups in epilithic, epipsammic and hyporheic compartments of a Mediterranean river and how these groups vary in response to changes in the hydrological regime.

Technologies and Evaluation Area: We have continued our collaboration in the framework of the project “**Sulfide and Greenhouse Gas emissions from Mediterranean Sewers (SGHGEMS)**” led by Dr. Oriol Gutiérrez to investigate biofilm colonisation in anaerobic sewers by sulfate-reducing bacteria (SRB) and methanogenic archaea (MA) and how wastewater conditions affect sulfide and methane emissions, respectively. Current investigations are now focused on determine the impact of nitrate addition—a usual strategy used to mitigate methane emission from sewers—on the diversity, abundance and activity of both SRB and MA.

Dr. José Luis Balcázar has also participated in the project entitled “**Greenhouse gases in transport systems and sewage treatment: Assessment of emissions (GEISTAR)**”, supported by the Spanish Ministry of Economy and Competitiveness (MINECO) and led by Dr. Maite Pijuan (Ramon y Cajal Research Scientist at ICRA). She has been involved in activities related to the identification of bacterial communities (structure and function) in lab-scale sequencing batch reactors.



All - Ongoing PhD dissertations

Candidate: Elisabet Marti

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

Candidate: Belinda Huerta

Title: Determinación de contaminantes emergentes en aguas naturales y en biota y evaluación de su riesgo ambiental.

Candidate: Laura Ferrando

Title: Estudio de la presencia de fármacos y sus productos de transformación, en aguas residuales y de su eliminación a través de procesos avanzados de depuración.

Candidate: Daniel Lucas

Title: Eliminación y degradación de contaminantes orgánicos emergentes mediante tratamientos convencionales y avanzados de aguas residuales.

Candidate: Mireia Fillol

Title: Archaeal lineages in stratified karstic lakes: habitat segregation and activity in relation to C and S cycles.

Candidate: Imma Noguerola

Title: Chemolithotrophic activity in relation to microbial sulphur transformations in oxic/anoxic interfaces of stratified karstic lakes.

All – Stays Abroad

Laura Ferrando

(predoctoral student). Centre: Norwegian Institute for Water Research (NIVA), Oslo, Norway, (1/7/2013 to 31/12/2013).

All – Scientific Collaborators

Meritxell Gros

Postdoc researcher, Commonwealth Scientific and Industrial Research Organization (CSIRO), Adelaide, Australia (June-July 2013).

All – Visitors

Íngrid Cuesta

Internship student, Molecular Biology and Biomedicine MSc, University of Girona, Girona, Spain (January-September 2013).

Andrea Perales

Internship student, Biology Grade, University of Girona, Girona, Spain (February-April 2013).

Ivan Dekkers

Internship student, University Thomas More Kempen, Belgium, in the frame of Lifelong Learning Erasmus EU Community Programme (February-May 2013).

Christina Nannou

Internship student, University of Ioannina, Greece, in the frame of Lifelong Learning Erasmus EU Community Programme (February-May 2013).

Eleni Variatza

Internship student, University of Ioannina, Greece, in the frame of Lifelong Learning Leonardo da Vinci EU Community Programme (April-August 2013).

Lucialine Valéria De Souza Santos

Predocctoral student, Sanitary and Environmental Engineering Department, Federal University of Minas Gerais, Brazil (May-October 2013).

Laura Martinoy

Internship student, Environment MSc, University of Girona, Girona, Spain (May-July 2013).

Gemma Casas

Internship student, Environmental Sciences Grade, University of Girona, Girona, Spain (June-July 2013).

Mireia Font

Internship student, Biotechnology Grade, University of Girona, Girona, Spain (June-July 2013).

Vincenzo Donnarumma

Internship student, Environmental Sciences, Università degli Studi di Genova, Genova, Italy, in the frame of ERASMUS EU Community Programme of the University of Girona, Girona, Spain (September 2013-March 2014).

Jèssica Subirats

Internship student, Molecular Biology and Biomedicine MSc, University of Girona, Girona, Spain (October 2013-July 2014).

Marina Bubalo

Predocctoral student, Department of Soil Amelioration, Faculty of Agriculture, University of Zagreb, Zagreb, Croatia (November-December 2013).

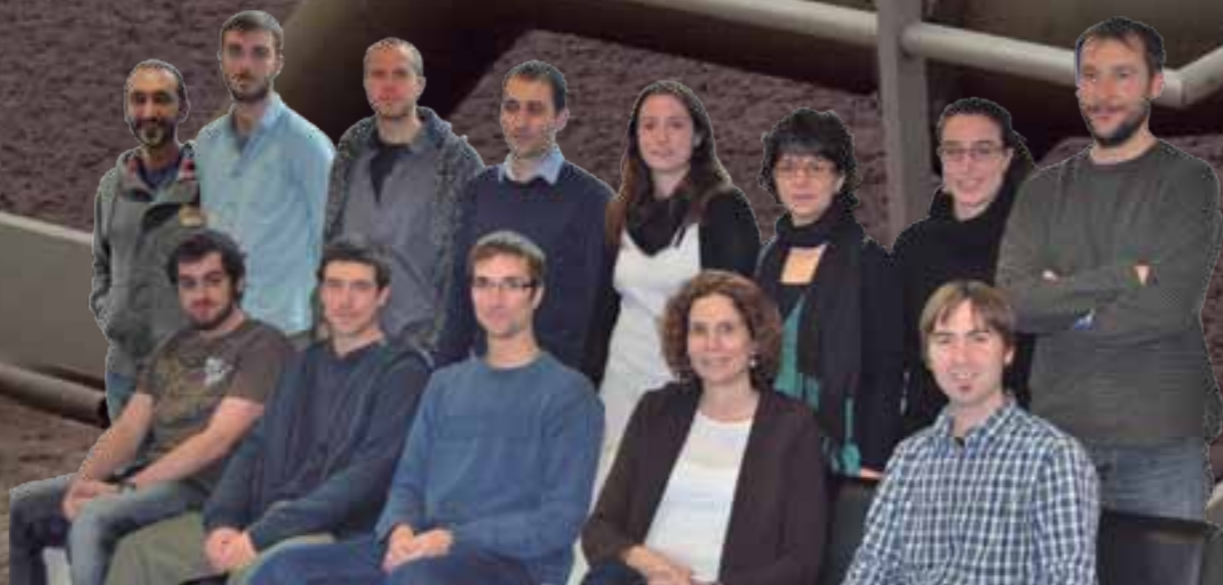
AIII Technologies and evaluation

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

- AIII1 Purification and distribution**
- AIII2 Treatment/reuse of waste water**
- AIII3 Modelling and management systems**
- AIII4 Unit operations**

During 2013, the AIII2 and AIII3 lines have been working.

This area has presented 3 PhD dissertations, that of Manel Garrido the first ICRA tesis, begun in 2009, and those of Damià Murlà and Neus Collado, started in 2010.



From left to right (stand up): Gianluigi Buttiglieri, Ignasi Aymerich, Adrián Rodríguez, Oriol Gutiérrez, Olga Auguet, Gemma Noguera, Anna Ribera, Ignasi Rodríguez-Roda. From left to right (sit down): Lluís M^a Bosch, Albert Montserrat, Xavier García, Maite Pijuan, Lluís Corominas

23 researchers

- 1** research professor (UdG associated) and group leader
Ignasi Rodríguez-Roda
- 1** research professor (UdG associated)
Manel Poch
- 1** research scientist (Ramon y Cajal)
Maite Pijuan
- 1** postdoc researcher (Juan de la Cierva)
Lluís Corominas
- 3** postdoc researcher
Oriol Gutiérrez
Esther Llorens
Gianluigi Buttiglieri
- 4** predoctoral student
Albert Montserrat
Adrián Rodríguez
Anna Ribera
Ignasi Aymerich
- 1** predoctoral student (ESR)
Joana Batista Marques
- 3** research technician
Gemma Noguera
Joshua Obradors
Olga Auguet
- 1** research auxiliar
Adrià Rubirola
- 1** IT technician
Lluís M^a Bosch
- 1** postdoc researcher YRA
Xavier García
- 1** postdoc researcher GS INIMA Environment SA
Hèctor Monclús
- 3** predoctoral student UdG
Neus Collado
Damià Murlà
Michele Stefani
- 1** research technician USC
Albert Benzal

AIII2

Treatment/reuse of waste water

The research activities of the Technologies and Evaluation Area during 2013 have been focused on optimization of the different urban wastewater systems components, from wastewater transport to its treatment and reuse with a multidisciplinary approach. Priority has been given to the integrated management and operation of the different parts, minimizing their environmental impacts (uncontrolled greenhouse gas emissions, conventional and micropollutant removal) and optimizing their energy consumption. Our research in sewer networks has included optimization of mitigation strategies to control odors and corrosion and have also moved to the sewage epidemiology domain. We have also focused our efforts on wastewater treatment processes, optimizing biological nutrient removal and providing solutions to emerging challenges. This has been tackled with biological and physicochemical processes which interact among themselves (membrane bioreactors, reverse osmosis and advanced oxidation processes). Finally, an assessment of the integrated management of sewer networks, wastewater treatment plants and receiving water bodies has been conducted in view of the Water Framework Directive implementation. Our tools are based on deterministic and data-driven models and life cycle assessment to provide integrated solutions to complex environmental water related problems. This knowledge is encapsulated and structured in Decision Support Systems to compare alternatives in a multi-criteria decision analysis way.

This research has been mainly done in the framework of 3 national and 4 EU research projects. The results have provided an advance in scientific knowledge (via publications in prestigious peer-reviewed journals), technology transfer to the private sector (via patents) and training of early stage researchers (MSc and PhD thesis). This has consolidated our involvement with national stakeholders and prestigious international research groups and leading edge companies, which is a key step towards our consolidation at national and international level.

Our scientific activities conducted in recent years have allowed us to enlarge our research scope, transferring the knowledge obtained at laboratory and pilot scale to full scale demonstration sites. Two European funded projects have been awarded within the Water and Inno&Demo FP7 call focusing on: i) demonstrating integrated innovative technologies for an optimal and safe closed water cycle in Mediterranean tourist facilities and ii) innovative solutions for Reuse of water, Recovery of valuables and Resource efficiency in urban wastewater treatment (R3Water). The implementation of these projects together with the recruitment of two prestigious researchers in the field of water reuse and drinking water during 2014 will allow us to cover all the areas related to the entire urban water cycle.

This research line aims at optimizing the different parts of the urban water system to achieve better treatment performance while reducing detrimental emissions. In particular, the research projects carried out during 2013 have been tackling some of the current problems found in sewer networks and wastewater treatment plants. While the first ones are considered as wastewater transport facilities, biological reactions can also occur, originating detrimental emissions that require control. On the other hand, research on wastewater treatment processes in the last decades has been mainly focused on removal of nutrients and energy optimisation. However, wastewater treatment plants are facing new challenges such as minimization of their carbon footprint or removal of emerging pollutants which require specific research to achieve the stringent requirements of wastewater treatment today, especially in those cases where water reuse is implemented. In this regard, tertiary systems that integrate membranes with advanced oxidation processes have been studied to minimize fouling, the formation of disinfection by-products, and the impact of reject streams.

• **GEISTAR: Understanding Fugitive Greenhouse Gas Emissions from Wastewater Transport and Treatment Systems. Ministry of Economy and Competitiveness (MINECO) CTM 2011-27163.**

Urban wastewater systems (UWS) contribute to greenhouse gas (GHG) emissions not only through their significant energy consumption but also through their direct emissions of methane (CH₄) and nitrous oxide (N₂O), two of the most potent GHGs. The objective of this project is to reliably quantify the emissions of these two gases in wastewater transport and treatment systems. Also, the biological mechanisms leading to the production of these gases are being studied. During 2013, several pilot plants were operated at the ICRA PLANTEA facility. Two pilot plants mimicking a rising main section of a sewer system were used to optimize mitigation strategies to minimise H₂S and CH₄ production, and lab-scale sequencing batch reactors (SBR) were operated to

identify the mechanisms involved in N₂O production during nitrification and denitrification. In parallel, the first full-scale monitoring of the GHG direct emissions from a Spanish WWTP has been conducted and results indicate that these emissions are linked to process disturbances.

• **PRI-AIBPT: Assessment of biological nitrous oxide production mechanisms for the management of greenhouse gas (GHG) emissions in urban wastewater treatment systems. Ministry of Economy and Competitiveness (MINECO) PRI-AIBPT-2011-1232.**

This project, linked to the previous one, funds the collaboration between the research group of Dr. Adrian Oehmen at the Department of Chemistry at the University Nova de Lisboa (UNL) and our GHG group at ICRA. This collaboration brings together different expertise of both centers to target research questions aiming to minimize GHG emissions from wastewater treatment systems. During 2013, this research collaboration has focussed on demonstrating the application of a novel N₂O gas microsensor to continuously describe the N₂O emission dynamics from different pilot reactors present in the PLANTEA installations at ICRA. A PhD student from the UNL conducted a 3-month research stage at ICRA while several researchers from ICRA visited UNL.



• **NITRI-GHG: Exploring novel nitrifier pathways to minimise direct greenhouse gas emissions from WWTPs. (EU PEOPLE-2011-CIG 303946)**

The NITRI-GHG project aims to provide fundamental understanding of pathways leading to nitrous oxide (N₂O) production in ammonia oxidizing bacteria (AOB). This group of microorganisms is believed to be the principal contributors to N₂O emissions from wastewater treatment systems. This project, which started in April 2012, applies a multidisciplinary methodology that combines microbial ecology tools (FISH, gene expression and activity etc) with environmental-process engineering systems (BNR pilot treatment plants) to generate knowledge immediately applicable to WWTP management, to reduce N₂O emissions from nitrifying systems. During this year, experiments have been conducted with two different nitrifying cultures present at the ICRA laboratories, representative of the main groups of AOB present in our wastewater treatment plants. Different process parameters are currently under study to identify their effect on N₂O production from these two groups of AOB.

• **WATERFATE: The fate of micropollutants and disinfection by-products in integrated membrane systems followed by disinfection. The potential of indirect and direct potable reuse (MINECO) CTM2012-38314-Co2-01. MINECO.**

The aim of the project is to deepen the research on basic aspects of the removal of pharmaceuticals and disinfection by-products (DBPs) in all the steps involved in the water recycling systems that can transform municipal wastewater into high quality reclaimed water. The case study selected involves an MBR coupled to NF/RO, followed by disinfection (chemical, physical and physico-chemical). The fate of targeted pharmaceuticals and the corresponding transformation products (degradation, adsorption, rejection or retention by the membranes), and potential further treatment with advanced oxidation processes is being studied at lab and pilot-plant scale, both with synthetic and real wastewater. The study is complemented with the monitoring of DBPs that are generated during the disinfection process (either at the end of the process or as pre-treatment for RO/NF filtration) and with microbiological quality monitoring.

• **ITACA: Pharmaceutical removal in WWTP (within CDTI INNPRONTA "Research of treatment, reuse and control of treatment technologies for a future sustainable wastewater treatment"). DEISA.**

ICRA's role in the project is to improve the knowledge on pharmaceutical removal from wastewater by means of biological treatments investigating removal, transformation products, operative conditions influence, etc. During this year a pharmaceutical compound, metoprolol (MTP), has been selected due to its high consumption,

pseudopersistence and potential ecotoxicity. Activated sludge batch experiments were performed to evaluate the biological transformation of MTP and the formation of transformation products under different treatment conditions. Total MTP removal was obtained, in aerobic conditions, and the formation of MTP known metabolites and unknown transformation products was investigated. Metoprolol acid had the major ratio formation for the transformation products identified throughout the experiments and its persistence through biological treatment was proved.



AIII2

Treatment/reuse of waste water

The research line on modelling and management systems aims to contribute to the achievement of the objectives established by the Water Framework Directive, with a focus on reaching good chemical status of rivers. The focus is on integrated management of urban wastewater systems (UWWS) and rivers, by proposing ecosystem-based management strategies which contribute to achieve environmental, societal and economic benefits. Firstly, understanding the underlying interactions between UWWS and rivers will help to reduce the environmental effects of nutrients (e.g. decrease eutrophication in European streams) and microcontaminants (e.g. decrease toxicity) discharged from UWWS to the rivers. Secondly, new concepts for monitoring (i.e. combined sewer overflows) and controlling water quality (i.e. from an immission-based perspective) have opened a new set of solutions to manage European streams. These concepts are applied to both sewer systems and wastewater treatment plants to minimize overall environmental impact and optimize operational costs. There is also a social benefit by improving the ecosystem services to human security and well-being (recreation, food security, carbon sequestration, etc.). The inclusion of a Life-cycle perspective for evaluating the operational strategies in UWWSs is a priority for optimal management.

• **SANITAS-ITN: Sustainable and Integrated Urban Water System Management, Marie Curie Initial Training Network – ITN – 289193.**

SANITAS was created to meet the deficiencies in human resources in European Urban Water System management, the need for applications of technology and for sustainability through development of an integrated technology, knowledge and action base. SANITAS aims to introduce new methodologies for Europe-wide training in the technical and complementary skills that the next generation of UWS professionals requires, to extend the knowledge base and application of innovations with the resilience to cope with future climate change scenarios and that are driven by industry needs and societal con-



cerns. In 2013 the AIII:3 Line contributed to SANITAS on different topics including the assessment and control of detrimental sewer emissions for optimal Mediterranean UWS management, the advanced research for water reuse systems and impact on receiving media and the improved modelling and the design and control of granular sludge reactors in future energy-positive WWTPs.

• **EcoMaWat: Ecosystem-based management of urban wastewater systems), EU-PEOPLE-PCIG9-GA-2011-293535.**

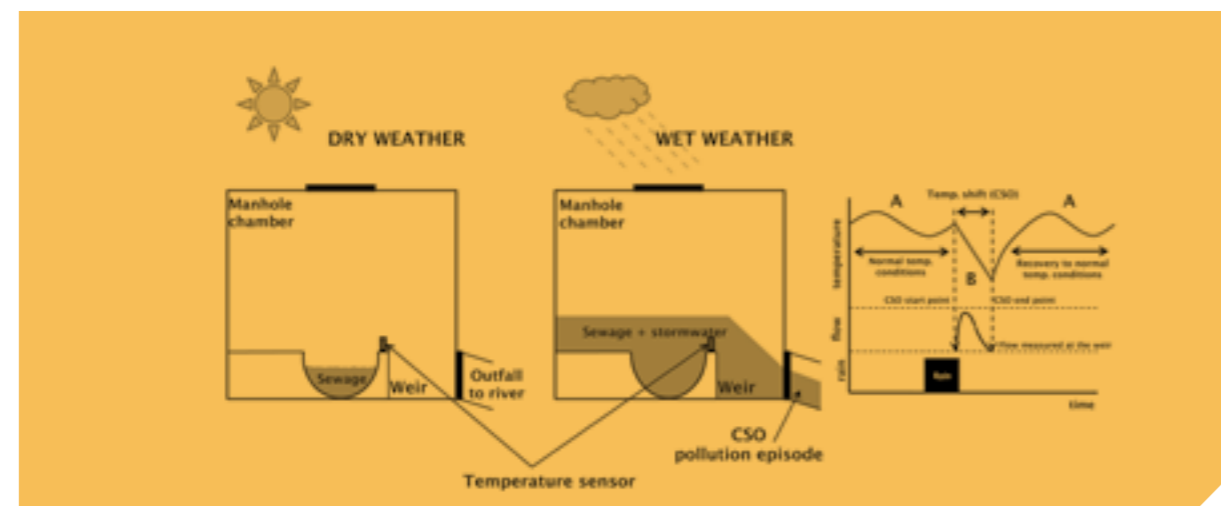
The main objective of this project is to increase knowledge of the interactions between urban wastewater systems (UWWS) and rivers in order to propose strategies to maximize ecosystem services, while minimizing operating costs of the UWWS. The project methodology combines experimental field work, dynamic modelling and Environmental Decision Support Systems (EDSS) tools. After finalizing the experimental work of the project, the modelling task of the project started in 2013 with the final goal of obtaining an integrated model of the UWWS and the river describing carbon, nitrogen and pharmaceuticals (together with their transformation products) fate and removal processes. By using the developed integrated model we have demonstrated that there is a gap between EU Directive 91/271/ECC and EU WFD for wastewater treatment and that current wastewater treatment legislation should be updated to take into account an integrated perspective.

• **SGHGEMS: Sulfide and greenhouse gas emissions from Mediterranean sewers, EU-PEOPLE-PIRGo8-GA-2010-277050.**

The SGHGEMS project studies the production of sulfide and greenhouse gas emissions from sewers exposed to Mediterranean climate conditions and aims to develop the mitigation strategies for its control. The project

methodology combines extensive experimental work on real sewers with advanced mathematical modelling to provide effective applicable control measures. 2013 has seen the release of the experimental results from the campaigns carried out in the previous year. The results were presented both in international conferences and invited seminars in several European institutions. These included the study of sewer biofilm development including the interactions of Sulfate-reducing bacteria and Methanogenic populations. In addition, the scope of the project was also expanded to the study of pharmaceutical active compounds in anaerobic sewer systems, with very interesting results demonstrating the degree of pharmaceutical biotransformation not reported to date.

PATENT: Combined sewer overflow (CSO) events produced in combined sewer systems (CSS) during wet weather conditions are a threat for the receiving water bodies. In terms of legislation, the transpositions of the urban wastewater treatment directive are being updated to account for CSO regulations. For instance in the Spanish case, the law RD 1290/2012 establishes a framework to limit the pollution of receiving water bodies by controlling runoff waters, which requires CSO monitoring. The large number of weirs normally present in a CSS make that the monitoring of the complete CSO network would drastically increase the investment costs (minimum of 1000€/unit). ICRA developed a new methodology which aims at characterizing the occurrence and duration of CSO events by means of low-cost temperature sensors. Hence, a large number of weirs can be simultaneously monitored and the system can be characterized as a whole. The method assumes temperature differences between the overflowing wastewater and the sewer gas phase, so the temperature shift produced during a rainfall event is related to a CSO event occurrence.



AIII – PhD dissertations defense

Thesis by Manel Garrido, defended on 4/3/2013. Development of an environmental decision support system for the selection and integrated assessment of process flow diagrams in wastewater treatment.

Directors: Manel Poch (research professor UdG associated of the Technologies and Evaluation Research Area of ICRA and full professor of Chemical Engineering at University of Girona) and Luis Larrea (research professor of Centro de Estudios y Investigación Técnicas de Guipuzcoa, University of Navarra).

This thesis links environmental science and computer science to create an Environmental Decision Support Systems (EDSS), which responds to the increasing complexity in design and selection of wastewater treatment plants. The thesis is the result of the compilation of several research articles that Manel Garrido wrote about the capabilities and advantages of the designed EDSS.

Thesis by Damià Murlà, defended on 17/5/2013. Coordinated management of Urban Wastewater Systems by means of advanced Environmental Decision Support Systems

Directors: Manel Poch (research professor UdG associated of the Technologies and Evaluation Research Area of ICRA and full professor of Chemical Engineering at University of Girona) and Oriol Gutiérrez (postdoc researcher of the Technologies and Evaluation Research Area of ICRA). This thesis develops and tests a new Environmental Decision Support System (EDSS) that integrate the management of the urban wastewater system and WWTP taking into account the water quality of the receiving body.

Thesis by Neus Collado, defended on 19/7/2013. Multi-scale investigation of occurrence, fate, removal and biodegradation of pharmaceutical contaminants in wastewater treatment and river systems.

The method has been tested and rigorously validated in La Garriga CSS (Spain) where the temperature at 13 weirs was monitored for a period of 1 year (57 rainfall episodes). The cost of the proposed solution is 5 times lower compared to current technologies. The result of this research led to a patent application (P4103/2012) and afterwards, the publication of the results in a scientific journal. The exploitation of the patent is currently under negotiation with selected companies.

Reference: Lluís Corominas, Oriol Gutiérrez, Vicenç Acuña. **Sistema de monitorización de desbordamientos en redes de tuberías** (“System for monitoring overflows in pipe networks”). Número solicitud de patente: P4103/2012. País de prioridad: España. Código de registro: P4103/2012.

Directors: Gianluigi Buttiglieri (postdoc researcher of the Technologies and Evaluation Research Area of ICRA) and Joaquim Comas (Chemical and Environmental Engineering Laboratory –LEQUIA- of the University of Girona).

This thesis aims to tackle the problem of pharmaceuticals in wastewater in a multidisciplinary way. The main objective of the thesis is to acquire and provide knowledge not only on the occurrence of pharmaceutical compounds in wastewater, but on their biodegradation within WWTPs and their discharge into the receiving media.

AIII - Ongoing PhD dissertations

Candidate: Adrián Rodríguez

Title: Understanding nitrous oxide emissions from wastewater treatment during nitrification.

Candidate: Anna Ribera

Title: Unrevealing the mechanisms of N₂O formation during denitrification in wastewater treatment processes.

Candidate: Albert Montserrat

Title: Integrated Modelling of urban wastewater systems.

Candidate: Olga Auguet

Title: Microbial transformations in anaerobic sewer environments.

Candidate: Ignasi Aymerich

Title: Modelling and control of urban wastewater systems.

AIII – Stays Abroad

Maite Pijuan

(research scientist, Ramon y Cajal). Centre: Advanced Water Management Centre, University of Queensland, Australia (6/3/2013 to 13/5/2013).

Oriol Gutiérrez

(postdoc researcher). Centre: Advanced Water Management Centre, University of Queensland, Australia (6/3/2013 to 13/5/2013).

Joana Batista Marques

(predoctoral student-early stage researcher). Centre: Yarqon River Authority, Tel Aviv, Israel (1/9/2013 to 22/10/2013).

AIII – Scientific Collaborators

Sudip Chakraborty

Research scientist, Membrane Separation Laboratory, Chemical Engineering Department, Jadavpur University (JU), India (January 2013).

Ricardo Marçalo Da Silva Marques

Predocctoral student, Sciences and Technology Faculty, Lisboa Nova University (UNL), Lisboa, Portugal (January-April 2013).

Peter Vanrolleghem

Professor at Université Laval, Canada (May 2013).

Zhiguo Yuan

Professor of Advanced Water Management Centre, University of Queensland, Australia (September 2013).

AIII – Visitors

Laura Estorch

Internship student, Industrial Engineering, Technical College of the University of Girona, Girona, Spain (January-September 2013)

Selena Gismeros

Internship student, Biology Degree, Sciences Faculty, University of Girona, Girona, Spain (January-September 2013).

Eric Santos

Internship student, Environmental Sciences Grade, Sciences Faculty, University of Girona, Girona, Spain (January-June 2013).

Joan Llitas

Internship student, Environmental Sciences Grade, Sciences Faculty, University of Girona, Girona, Spain (January-June 2013).

Celia Maria Castro

Predocctoral student, Bioscience Engineering Faculty, University of Ghent, Belgium (February-July 2013).

Lluís Luján

Internship student, Chemistry Grade, Sciences Faculty, University of Girona, Girona, Spain (March-September 2013).

Elissavet Kassotaki

Internship student, University of Ioannina, Greece, in the frame of Lifelong Learning Leonardo da Vinci EU Community Programme (April-August 2013).

Antonis Kotzamanoglou

Internship student, University of Ioannina, Greece, in the frame of Lifelong Learning Leonardo da Vinci EU Community Programme (April-August 2013).

Natàlia Gil

Internship student, Water Science and Technology MSc, University of Girona, Girona, Spain (May-September 2013).

Julie Delage

Internship student, National Engineering School of Limoges (Ecole Nationale Supérieure d'Ingénieurs de Limoges - ENSIL), Limoges, France (June-September 2013).

Úrsula Cárdenas

Internship student, Environmental Sciences Grade, Sciences Faculty, University of Girona, Girona, Spain (June-September 2013 and December 2013-May 2104).

Giulia Mearelli

Internship student, Environmental Sciences Grade, Sciences Faculty, University of Girona, Girona, Spain (June-July 2013).

Manel Cot

Internship student, Industrial Technologies Engineering Grade, Technical College, University of Girona, Girona, Spain (June-September 2013).

Helena Guasch

Internship student, Water Science and Technology MSc, University of Girona, Girona, Spain (July 2013-March 2014).

Cèlia Miró

Internship student, Environmental Sciences Grade, Sciences Faculty, University of Girona, Girona, Spain (September 2013-May 2014).

Jacquelin Jimena Silva Silvera

Internship student, Chemistry Grade, Sciences Faculty, University of Girona, Girona, Spain (September 2013-February 2014).

Guillem Iriondo

Internship student, Environmental Sciences Degree, Autonomous University of Barcelona, Bellaterra, Barcelona, Spain (November 2013-January 2014).



Total publications: 164

04. Publications and congresses

Resources And Ecosystems Research Area

> **SCI PUBLICATIONS**
(Science Citation Index)
(Ordered by impact index JCR 2010)

Acuña, V., Díez, J.R., Flores, L., Meleason, M., Elosegi, A. **Does it make economic sense to restore rivers for their ecosystem services?** *Journal of Applied Ecology*, 50 (2013), 988-997.

Graba, M., Sauvage, S., Moulin, F.Y., Urrea, G., Sabater, S., Sánchez-Pérez, J.M. **Interaction between local hydrodynamics and algal community in epilithic biofilm.** *Water Research*, 47 (2013), 2153-2163.

Batzer, D., Ruhí, A. **Is there a core set of organisms that structure invertebrate assemblages in freshwater wetlands?** *Freshwater Biology*, 58 (2013), 1647-1659.

Tornés, E., Ruhí, A. **Flow intermittency decreases nestedness and specialisation of diatom communities in Mediterranean rivers.** *Freshwater Biology*, 58 (2013), 2555-2566.

Aldekoa, J., Medici, Ch., Osorio, V., Pérez, S., Marcé, R., Barceló, D., Francés, F. **Modelling the emerging pollutant diclofenac with the GREAT-ER model: Application to the Llobregat River Basin.** *Journal of Hazardous Materials*, 263P (2013), 207-213.

Ruhí, A., Boix, D., Gascón, S., Sala, J., Batzer, D.P. **Functional and Phylogenetic Relatedness in Temporary Wetland Invertebrates: Current Macroecological Patterns and Implications for Future Climatic Change Scenarios.** *PLoS ONE*, 8 (11) (2013), e81739.

Proia L., Vilches C., Boninneau C., Kantiani L., Farrè M., Romani, A., Sabater S., Guasch, H. **Drought episode modulate biofilm response to pulses of Triclosan.** *Aquatic Toxicology*, 127 (2013), 36-45

Proia, L., Osorio, V., Soley, S., Köck-Schulmeyer, M., Pérez, S., Barceló, D., Romani, A.M., Sabater, S. **Effects of pesticides and pharmaceuticals on biofilms in a highly impacted river.** *Environmental Pollution*, 178 (2013), 220-228.

Artigas, J., García-Berthou, E., Bauer, D.E., Castro, M.I., Cochero, J., Colautti, D.C., Cortelezzi, A., Donato, J.C., Elosegi, A., Feijóo, C., Giorgi, A., Gómez, N., Leggieri, L., Muñoz, I., Rodrigues-Capítulo, A., Romani, A.M., Sabater, S. **Global pressures, specific responses: effects of nutrient enrichment in streams from different biomes.** *Environmental Research Letters*, 8 (1) (2013), 1-13.

Mussmann, M., Ribot, M., von Schiller, D., Merbt, S., Augspurger, C., Kaurwautz, C., Winkel, M., Battin, T., Martí, E., Daims, H. **Colonization of freshwater biofilms by nitrifying bacteria from activated sludge.** *Microbiology Ecology*, 85 (2013), 104-115.

Ruiz-González, C., Proia, L., Ferrera, I., Gasol, J.M., Sabater, S. **Effects of large river dam-regulation on bacterioplankton community structure.** *Microbiology Ecology*, 84 (2) (2013), 316-331

Bonet, B., Corcoll, N., Acuña, V., Sigg, L., Behra, R., Guasch, H. **Seasonal changes in antioxidant enzyme activities of freshwater biofilms in a metal polluted Mediterranean stream.** *Science of the Total Environment*, 444 (2013), 60-72.

Boy-Roura, M., Menció, A., Mas-Pla, J. **Temporal analysis of spring water data to assess nitrate inputs to groundwater in an agricultural area (Osona, NE Spain).** *Science of the Total Environment*, 452-453 (2013), 433-445.

Delconte, C.A., Sacchi, E., Racchetti, M., Bartoli, J., Mas-Pla, J., Re, V. **Nitrogen inputs to a river course in a heavily impacted watershed: a combined hydrochemical and isotopic evaluation (Oglio River Basin, N Italy).** *Science of the Total Environment*, 466-467 (2013), 924-938.

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

Barceló, D. – Associate editor of *Trends in Analytical Chemistry* (Elsevier, Amsterdam, Netherlands) 1993 to present.

Barceló, D. – Associate editor of *Environment International* (Elsevier, Amsterdam, Netherlands) 2009 to present.

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

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Balcázar, J.L. - Academic Editor of *Public Library of Science – PLOS-ONE* Veterinay Microbiology Topic (San Francisco, California, USA) 2012 to present.

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

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PRESENTATIONS AT CONGRESSES

GUEST LECTURES

Barceló, D. **Fate and Risk of Pharmaceuticals and Illicit Drugs in the Iberian River Basins of Ebro and Llobregat. Challenges and Solutions using Advanced Treatment Technologies.** Congress: *5th International Conference on Water Resources and Arid Environments*. Riyadh, Saudi Arabia (January 2013).

Barceló, D., **Fate, Risk and Removal of Pharmaceuticals and Illicit Drugs in Waste Water Treatment Plants. Challenges and Management Solutions using Advanced Treatment Technologies.** Congress: *Joint Programming Initiative Water-Kick off meeting*. Madrid, Spain (February 2013).

Barceló, D. **Fate, Risk and Removal of Pharmaceuticals and Illicit Drugs in Waste Water Treatment Plants. Challenges and Management Solutions using Advanced Treatment Technologies.** Congress: *UEE Seminar Series*. Ulsan National Institute of Science and Technology. Ulsan, South Korea (February 2013).

Barceló, D. **The Joint Programming Initiative on Water.** Congress: *Joint Programming Conference 2013*. Dublin, Ireland (February 2013).

Barceló, D. **L'ús sostenible de l'aigua: el problema dels contaminants emergents.** Congress: *Santa Llúcia: el 2013, de què parlarem?. De l'aigua*. Institut d'Estudis Catalans, Barcelona, Spain (March 2013).

Barceló, D. **Destino, Riesgo y Eliminación de Contaminantes Emergentes (fármacos) en aguas de EDAR.** Congress: *Tecnología y Gestión del Ciclo Integral del Agua*. Polytechnic University of Catalonia, School of Professional and Executive Development. Barcelona, Spain (March 2013).

Barceló, D. **Challenges under Global Change Scenario of Water Scarcity on Mediterranean Rivers. Effects of Emerging Organic Contaminants on the Aquatic Biota.** Congress: *Seminario Internacional Universidade Federal do Rio Grande do Sul (UFRGS)*. Porto Alegre, Brazil (April 2013).

Petrovic, M. **Emerging Environmental Contaminants: Analysis, Fate and Effects.** Congress: *XXIII Croatian meeting of chemists and chemical engineers*. Osijek, Croatia (April 2013).

Barceló, D., Sabater, S. **Temporary rivers on Mediterranean rivers functioning and effects on communities** (Guest Key note). Congress: *4th Water Research Horizon Conference: Water Scarcity and Global Change*. Berlin, Germany (June 2013).

Barceló, D. **Occurrence and fate of carbamezapine and five metabolites in an urban aquifer under different redox conditions.** Congress: *246th American Chemical Society National Meeting & Exposition. Chemistry in Motion*. Indianapolis, USA (September 2013).

Barceló, D. **Fate and risk of perfluorinated alkyl substances in environmental and food samples across the world (Spain, Brazil, Saudi Arabia and Serbia).** Congress: *246th American Chemical Society National Meeting & Exposition. Chemistry in Motion*. Indianapolis, USA (September 2013).

Petrovic, M., Gorga, M., López-Serna, R., Barceló, D. **Recent advances in on-line sample preparation methods coupled to LC-tandem MS for the analysis of emerging contaminants in environmental samples.** Congress: *19th International Symposium on Separation Sciences - New Achievements In Chromatography*. Porec, Croatia (September 2013).

Barceló, D. **LC tandem MS analysis, Characterization, Fate and Risk of Fullerenes and Other Carbon-Based Nanomaterials in the Total Environment.** Congress: *29th Asilomar 2013 conference on Mass Spectrometry. Environmental Chemistry, Toxicology and Health*. Asilomar, California, USA (October 2013).

Rodríguez-Mozaz, S., Huerta, B., Osorio, V., Gorga, M., Jakimska, A., de Castro, N., Ponsatí, L., Muñoz, I., Pérez, S., Petrovic, M., Sabater, S., Barceló, D. **Uptake and Bioaccumulation of Endocrine Disruptors and Pharmaceutical compounds in Biofilm, Macroinvertebrates, and Fish in four Mediterranean Rivers.** Congress: [4th SCARCE Annual Conference: Towards a better understanding of the links between stressors, hazard assessment and ecosystem services under water scarcity](#). Cádiz, Spain (November 2013).

Balcázar, J.L. **Health and nutritional properties of probiotics in fish.** Congress: [V International Symposium on Nutrition and Fish Health](#). Brazil (November 2013).

Petrovic, M. **Desafíos metodológicos en análisis de fármacos en muestras ambientales.** Congress: [leLAB workshop](#). Barcelona, Spain (December 2013).

PLENARY LECTURES

Barceló, D., Sabater, S. **Aigua, recurs o bé natural?. Hi ha contaminants?.** Congress: [Fira del Coneixement 2013. Exploratori dels recursos de la Natura](#). Berga, Barcelona (April 2013).

Barceló, D. **Challenges under Global Change Scenario of Water Scarcity. Effects of Pharmaceutical Discharges on Aquatic Biota.** Congress: [AQUACONSOIL 2013. 12th International UFZ-Deltares Conference on Groundwater-Soil-Systems and Water Resource Management](#). Barcelona, Spain (April 2013).

Barceló, D. **New Frontiers in Trace Analysis of Contaminants of Emerging Concern: LC-tandem MS applications in Environmental, Food and Human Biological Samples.** Congress: [9th Annual Workshop on LC/MS/MS Applications in Environmental Analysis and Food Safety](#). Burlington, Ontario, Canada (May 2013).

Barceló, D. **Challenges under Global Change Scenario of Water Scarcity. Effects of Pharmaceutical Discharges on Aquatic Biota.** Congress: [Pharmaceuticals in the Environment: Overview and Future](#). Coimbra, Portugal (June 2013).

Barceló, D., Farré, M. **Toward a better understanding of the fate, behaviour and risk of fullerenes and other carbon-based nanomaterials such as carbon nanotubes in the total environment.** Congress: [14th EuCheMS International Conference on Chemistry and the Environment \(ICCE\)](#). Barcelona, Spain (June 2013).

Barceló, D., Farré, M. **Analysis, fate and risk of fullerenes and other carbon-based nanomaterials in the total environment.** Congress: [Euroanalysis 2013](#). Warsaw, Poland (August 2013).

Barceló, D. **Contaminantes Emergentes: Aparición, Medición y Remediación.** Congress: [Escuela de Doctorado de la Universidad de Las Palmas de Gran Canaria](#). Las Palmas de Gran Canaria, Islas Canarias, Spain (October 2013).

Barceló, D. **Emerging Organic Compounds in Groundwater: Occurrence, Challenges and Trends.** Congress: [EMCON Forum 2013](#). Kaohsiung, Taiwan (October 2013).

ORAL PRESENTATIONS

Barceló, D. **Ciencia e Innovación en Agua: el Joint Programming Initiative de la UE.** Congress: [Coloquios del Observatorio del Agua, Fundación Botín](#). Madrid, Spain (February 2013)

Barceló, D., Farré, M., Eljarrat, E. **New Persistent Organic Pollutants in Environmental and Biological Samples by LC and GC-Tandem MS systems.** Congress: [Korean POPs Forum 2013 \(POPs and Mercury\)](#). Muju, Korea (February 2013).

Barceló, D., Farré, M., Petrovic, M., López de Alda, M.J. **LC-MS-MS (QqQ, QTOF, QTRAP and Orbitrap) of endocrine disruptors pharmaceuticals, illicit drugs and nanomaterials in the environment.** Congress: [Pittcon 2013](#). Orlando, Florida, USA (March 2013).

Barceló, D. **Understanding the fate, behaviour and risk of fullerenes in the total environment.** Congress: [96th Canadian Chemistry Conference and Exhibition](#). Quebec, Canada (May 2013).

Barceló, D., Petrovic, M., Pérez, S., Rodríguez-Mozaz, S., Llorca, M., Picó, Y., Gorga, M., Zonja, B., Farré, M., Pérez, F. **New Frontiers in Trace Analysis of Contaminants of Emerging Concern: LC-tandem MS applications in Environmental, Food and Human Biological Samples.** Congress: [9th Annual Workshop on LC/MS/MS Applications in Environmental Analysis and Food Safety](#). Burlington, Ontario, Canada (May 2013).

Marti, E., Jofre, J., Balcázar, J.L. **Efecto de los efluentes de una estación depuradora de aguas residuales sobre la prevalencia de los genes que confieren resistencia a quinolonas.** Congress: [XXIV Congreso Sociedad Española de Microbiología](#). L'Hospitalet de Llobregat, Barcelona, Spain (June 2013).

Llorca, M., Rodríguez-Mozaz, S., De Cazes, M., Belleville, M.P., Sánchez-Marcano, J., De Gunzburg, J., Barceló, D. **Post Conference Workshop Pharmaceutical residues: parent compounds, metabolites and transformation products as environmental contaminants.** Congress: [International Congress on Pharmaceutical Products in the Environment: Is there a problem?](#). Nîmes, France (June 2013).

Gros, M., Cruz-Morato, C., Marco-Urrea, E., Longree, P., Singer, H., Sarrà, M., Rodríguez-Mozaz, S., Hollender, J., Vicent, T., Barceló, D. **Non-conventional biodegradation of pharmaceuticals by the white rot fungus *Trametes versicolor* in hospital wastewaters; study of iopromide and ofloxacin as model compounds.** Congress: [14th EuCheMS International Conference on Chemistry and the Environment \(ICCE\)](#). Barcelona, Spain (June 2013).

Badia-Fabregat, M., Cruz-Morató, C., Lucas, D., Gros, M., Rodríguez-Mozaz, S., Marco-Urrea, E., Sarrà, M., Vicent, T., Barceló, D., Caminal, G. **Fungal biodegradation of pharmaceuticals in hospital effluents.** Congress: [Micropol & Ecohazard 2013; 8th IWA Specialized Conference on "Assessment and control of micropollutants and hazardous substances in water"](#). Zurich, Switzerland (June 2013).

Becker, D., Schoevaart, R., Llorca, M., Rodríguez-Mozaz, S., Oehlmann, J., Wagner, M. **Ecotoxicological evaluation of a new enzymatic decontamination technology for the degradation of micropollutants in wastewater.** Congress: [6th International Conference on Water Resources and Environment Research. Water and Environmental Dynamics](#). Koblenz, Germany (June 2013).

Marti, E., Balcázar, J.L. **Effects of wastewater treatment plant effluents on bacterial populations and antibiotic resistance in a river.** Congress: [5th Congress of European Microbiologists \(FEMS\)](#). Leipzig, Germany (July 2013).

Becker, D., Schoevaart, R., Llorca, M., Rodríguez-Mozaz, S., Barceló, D., De Cazes, M., Belleville, M.P., Sánchez, J., Oehlmann, J., Wagner, M. **Decontamination of micropollutants in wastewater: Ecotoxicological evaluation of a new enzymatic technology.** Congress: [SETAC German Language Branch](#), Essen, Germany (September 2013).

Noguerola, I., Lliros, M., Picazo, A., Camacho, A., Borrego, C.M. **Autotrophic activity and phylogenetic diversity of the sulfide-oxidizing bacterial guild in the redoxcline of a karstic lake.** Congress: [13th Symposium on Aquatic Microbial Ecology \(SAME13\)](#). Stresa, Italy (September 2013).

Lliros, M., Crowe, S.A., García-Armisen, T., Darchambeau, F., Morana, C., Borrego, C.M., Triadó-Margarit, X., Bouillon, S., Borgese, A.V., Servais, P., Canfield, D., Descy, J.P. **Photoferrotrophy and Fe-cycling in a freshwater column.** Congress: [13th Symposium on Aquatic Microbial Ecology \(SAME13\)](#). Stresa, Italy (September 2013).

Barceló, D., Eljarrat, E. **First report of pyrethroids in river fish: a case study in Iberian river basins (Spain).** Congress: [SETAC 34th Annual Meeting in North America](#). Nashville, TN, USA (November 2013).

Petrovic, M., Kuzmanovic, M., Barceló, D., Ginebreda, A. **Chemicals of emerging concern in Iberian rivers. Analysis of sources, and environmental exposure and risk.** Congress: [4th SCARCE Annual Conference: Towards a better understanding of the links between stressors, hazard assessment and ecosystem services under water scarcity](#). Cádiz, Spain (November 2013).

POSTERS

Huerta, B., Osorio, V., Jakimska, A., Rodríguez-Mozaz, S., Pérez, S., Barceló, D. **Bioaccumulation of pharmaceutical compounds and metabolites in aquatic organisms from Mediterranean rivers.** Congress: [SETAC 23rd Europe Annual Meeting 2013](#). Glasgow, United Kingdom (May 2013).

Llorca, M., Rodríguez-Mozaz, S., De Cazes, M., Belleville, M.P., Sánchez-Marcano, J., De Gunzburg, J., Barceló, D. **Enzymatic degradation of tetracycline and generation of transformation products.** Congress: [International Congress on Pharmaceutical Products in the Environment: Is there a problem?](#). Nîmes, France (June 2013).

Ferrando, L., Rodríguez-Mozaz, S., Barceló, D. **Incidence of ten anticancer drugs and its metabolites in the aquatic environment: targeted and non targeted analysis.** Congress: [International Congress on Pharmaceutical Products in the Environment: Is there a problem?](#). Nîmes, France (June 2013).

Ferrando-Climent, L., Cruz-Morató, C., Marco-Urrea, E., Sarrà, M., Vicent, T., Rodríguez-Mozaz, S., Barceló, D. **Incidence of chemotherapy drugs in the aquatic environment and their elimination by non conventional wastewater treatment by *Trametes Versicolor*.** Congress: [14th Eu-CheMS International Conference on Chemistry and the Environment \(ICCE\)](#). Barcelona, Spain (June 2013).

Moreno-González, R., Rodríguez-Mozaz, S., Gros, M., Barceló, D., León V.M. **Seasonal occurrence and distribution of pharmaceuticals in surface waters from littoral watercourses.** Congress: **14th EuCheMS International Conference on Chemistry and the Environment (ICCE).** Barcelona, Spain (June 2013).

Jakimska, A., Huerta, B., Barganska, Z., Kot-Wasik, A., Rodríguez-Mozaz, S., Barceló, D. **Determination of endocrine disrupting compounds in fish from Mediterranean rivers using QuEChERS-UPLC-MS/MS.** Congress: **The International Symposium on High Performance Liquid Phase Separations and Related Techniques.** Amsterdam, Netherlands (June 2013).

Becker, D., De Gunzburg, J., Schoevaart, R., Llorca, M., Rodríguez-Mozaz, S., Barceló, D., De Cazes, M., Belleville, M.P., Sánchez, J., Oehlmann, J., Wagner, M. **Ecotoxicological evaluation of a new enzymatic decontamination technology for the degradation of micropollutants in wastewater.** Congress: **Micropol & Ecohazard 2013; 8th IWA Specialized Conference on "Assessment and control of micropollutants and hazardous substances in water"**. Zurich, Switzerland (June 2013).

Noguerola, I., Picazo, A., Camacho, A., Borrego, C.M., **Dinámica, diversidad y actividad de Epsilonproteobacteria en una cubeta lacustre meromictica.** Congress: **XXIV Congreso de Microbiología de la SEM.** L'Hospitalet de Llobregat, Barcelona, Spain (July 2013).

Jakimska, A., Huerta, B., Barganska, Z., Kot-Wasik, A., Rodríguez-Mozaz, S., Barceló, D. **Development of a multi-class procedure for the simultaneous determination of 19 EDCs in fish homogenates.** Congress: **Euroanalysis 2013.** Warsaw, Poland (August 2013).

Borrego, C.M., Timoner, X., Acuña, V., Sabater, S. **Compositional and functional changes of streambed microbial communities during desiccation in an intermittent stream.** Congress: **13th Symposium on Aquatic Microbial Ecology (SAME13).** Stresa, Italy (September 2013).

Fillol, M., Gich, F., Cuesta, I., Sánchez, A., Borrego, C.M. **Vertical distribution, abundance and segregation of active miscellaneous crenarchaeotic subgroups in lacustrine anoxic sediments.** Congress: **13th Symposium on Aquatic Microbial Ecology (SAME13).** Stresa, Italy (September 2013).

Ferrera, I., Borrego, C.M., Salazar, G., Gasol, J.M. **Seasonal dynamics in abundance and diversity of aerobic anoxygenic phototrophic bacteria in northwestern mediterranean waters.** Congress: **13th Symposium on Aquatic Microbial Ecology (SAME13).** Stresa, Italy (September 2013).

Alvarez-Muñoz, D., Huerta, B., Rodríguez-Mozaz, S., Barceló, D. **Evaluation of a simple method for the analysis of pharmaceuticals in seafood.** Congress: **4th SCARCE Annual Conference: Towards a better understanding of the links between stressors, hazard assessment and ecosystem services under water scarcity.** Cádiz, Spain (November 2013).

Díaz-Cruz, S., Rodríguez-Mozaz, S., Sarrà, M., Caminal, G., Vicent, T., Barceló, D. **Emerging pollutants biodegradation by the fungus *Trametes Versicolor*.** Congress: **1st NaWaTech International Workshop.** Barcelona, Spain (November 2013).

Huerta, B., Jakimska, A., Rodríguez-Mozaz, S., Barceló, D. **Bioaccumulation of Pharmaceutical Compounds and Endocrine Disruptors in Fish from four Mediterranean Rivers.** Congress: **SETAC 34th Annual Meeting in North America.** Nashville, TN, USA (November 2013).

Technologies and Evaluation Research area

> SCI PUBLICATIONS (Science Citation Index) (Ordered by impact index JCR 2010)

Vargas, M., Yuan, Z., Pijuan, M. **Effect of long-term starvation conditions on polyphosphate and glycogen accumulating organisms.** *Bioresource Technology*, 127 (2013), 126-131.
<http://dx.doi.org/10.1016/j.biortech.2012.09.117>

Ye, L., Pijuan, M., Yuan, Z. **The effect of free nitrous acid on key anaerobic processes in enhanced biological phosphorus removal systems.** *Bioresource Technology*, 130 (2013), 382-389.

Rodríguez-Caballero, A., Ribera, A., Balcázar, J.L., Pijuan, M. **Nitritation versus full nitrification of ammonium-rich wastewater: Comparison in terms of nitrous and nitric oxides emissions.** *Bioresource Technology*, 139 (2013), 195-202.

Caballero, A., Pijuan, M. **N₂O and NO emissions from a partial nitrification sequencing batch reactor: Exploring dynamics, sources and minimization mechanisms.** *Water Research*, 47 (2013), 3131-3140.

Verawaty, M., Tait, S., Pijuan, M., Yuan, Z., Bond, P. **Breakage and growth toward a stable aerobic granule size during the treatment of wastewater.** *Water Research*, 47(14), (2013), 5338-5349.

Corominas, L., Foley, J., Guest, J. S., Hospido, A., Larsen, H. F., Morera, S., Shaw, A. **Life cycle assessment applied to wastewater treatment: State of the art.** *Water Research*, 47 (15), (2013), 5480-5492.

Gutiérrez, O., Sudarjanto, G., Ren, G., Ganigue, R., Jiang, G., Yuan, Z. **Assessment of pH shock as a method for controlling sulfide and methane formation in pressure main sewer systems.** *Water Research*, 48 (1), (2013), 569-578.

Poater, A., Solà, M. **Complete sigma(star) intramolecular aromatic hydroxylation mechanism through O-2 activation by a Schiff base macrocyclic dicopper(I) complex Beilstein.** *Journal of Organic Chemistry*, 9 (2013), 585-593.

Falivene, L., Poater, A., Cazin, C. S. J., Slugovc, C., Cavallo, L. **Energetics of the ruthenium-halide bond in olefin metathesis (pre)catalysts.** *Dalton Transactions*, 42 (2013), 7312-7317.

Dalmau, M., Rodríguez-Roda, I., Ayesa, E., Odriozola, J., Sancho, L., Comas, J. **Development of a decision tree for the integrated operation of nutrient removal MBRs based on simulation studies and expert knowledge.** *Chemical Engineering Journal*, 217 (2013), 174-184.

Llorens, E., Obradors, J., Alarcón-Herrera, M.T. **Modelling the non-biogenic steps of arsenic retention in horizontal subsurface flow constructed wetlands.** *Chemical Engineering Journal*, 223 (2013), 657-664.

Corominas, L., Acuña, V., Ginebreda, A., Poch, M. **Integration of freshwater environmental policies and wastewater treatment plant management.** *Science of the Total Environment*, 445-446 (2013), 185-191.

Sudarjanto, G., Gutiérrez, O., Ren, G., Yuan, Z. **Laboratory assessment of bioproducts for sulfide and methane control in sewer systems.** *Science of the Total Environment*, 443 (2013), 429-437.

Mburu, N., Rousseau, D.P.L., van Bruggen, J.J.A., Thumbi, G., Llorens, E., García, J., Lens, P.N.L. **Reactive transport simulation in a tropical horizontal subsurface flow constructed wetland treating domestic wastewater.** *Science of the Total Environment*, 449 (2013), 309-319.

Montserrat, A., Gutiérrez, O., Poch, M., Corominas, L. **Field validation of a new low-cost method for determining occurrence and duration of combined sewer overflows.** *Science of the Total Environment*, 463-464 (2013), 904-912.

Collado, N., Buttiglieri, G., Kolvenbach, B.A., Comas, J., Corvini, P.F.X., Rodríguez-Roda, I. **Exploring the potential of applying proteomics for tracking bisphenol A and non-ylphenol degradation in activated sludge.** *Chemosphere*, 90 (8) (2013), 2309-2314.

Collado, N., Buttiglieri, G., Marti, E., Ferrando-Climent, L., Rodríguez-Mozaz, S., Barceló, D., Comas, J., Rodríguez-Roda, I. **Effects on activated sludge bacterial community exposed to sulfamethoxazole.** *Chemosphere*, 93 (1) (2013), 99-106.

Rich, J., Rodríguez, M., Romero, I., Fontrodona, X., van Leeuwen, P.W. N. M., Freixa, Z., Sala, X., Poater, A., Solà, M. **N-Tetraentate SPANamine Derivatives and Their Mn-II-Complexes as Catalysts for Epoxidation of Alkenes.** *European Journal of Inorganic Chemistry*, 2013 (7), (2013), 1213-1224.

Corominas, L., Larsen, H. F., Flores-Alsina, X., Vanrolleghem, P. A. **Including Life Cycle Assessment for decision-making in controlling wastewater nutrient removal systems.** *Journal of Environmental Management*, 128 (2013), 759–767.

García, N., Moreno, J., Cartmell, E., Rodríguez-Roda I., Judd, S. **The cost and performance of an MF-RO/NF plant for trace metals removal.** *Desalination*, 309 (2013), 181–186

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Jeppsson, U., Alex, J., Batstone, D. J., Benedetti, L., Comas, J., Copp, J. B., Corominas, L., Flores-Alsina, X., Gernaey, K.V., Nopens, I., Pons, M.N., Rodríguez-Roda, I., Rosen, C., Steyer, J.P., Vanrolleghem, P.A., Volcke, E.I.P., Vrecko, D. **Benchmark simulation models, quo vadis?.** *Water Science and Technology*, 68 (1) (2013), 1–15.

Benedetti, L., Langeveld, J., Comeau, A., Corominas, L., Daigger, G., Martin, C., Mikkelsen, P.S., Vezaro, L., Weijers, S., Vanrolleghem, P. A. **Modelling and monitoring of integrated urban wastewater systems: review on status and perspectives.** *Water Science and Technology*, 68 (6) (2013), 1203–1215.

BOOKS CHAPTERS

Rodríguez-García, G., Molinos-Senante, M., Gabarrón, S., Alfonsín, C., Hospido, A., Corominas, L., Hernández-Sancho, F., Omil, F., Feijoo, G., Sala-Garrido, R., Rodríguez-Roda, I., Moreira, M.T. Chapter 8. **Cost benefit and environmental life cycle assessment.** In *Membrane Biological Reactors Theory, Modeling, Design, Management and Applications to Wastewater Reuse*. Eds: Faisal I. Hai, Kazuo Yamamoto and Chung-Hak Lee. International Water Association (2013). London United Kingdom.

OTHERS BOOKS AND JOURNALS

Gutiérrez, O., Sharma, K., Batista, J., Pijuan, M., Poch, M. **Monitorización y predicción de las emisiones de sulfhídrico y metano en sistemas de alcantarillado en ciudades mediterráneas.** *Special article in www.aguas residuales.info* (30/10/2013).

OTHERS BOOKS AND JOURNALS

Gutiérrez, O., Sharma, K., Batista, J., Pijuan, M., Poch, M. **Monitorización y predicción de las emisiones de sulfhídrico y metano en sistemas de alcantarillado en ciudades mediterráneas.** *Special article in www.aguas residuales.info* (30/10/2013).

EDITORIAL BOARDS OF BOOKS AND SCIENTIFIC JOURNALS

Corominas, L. – Editor of the journal *Water Practice & Technology*, (IWA publishing (London, United Kingdom) 2013 to present.

PRESENTATIONS AT CONGRESSES

GUEST LECTURES

Corominas, L. **IWA working group: LCA in wastewater plants.** Congress: *Symposium on ecoinnovation in the sudoe region*. Toulouse, France (June 2013).

Gutiérrez, O. Seminar: **Overview of the sulfide and methane production in sewer systems.** *Institute National des Sciences Appliquées (INSA)*. Toulouse, France (July 2013).

Pijuan, M. **Mechanisms of aerobic granular sludge formation.** Congress: *WEF/IWA Nutrient removal and recovery: trends in resource recovery and reuse*. Vancouver, Canada (July 2013).

Gutiérrez, O. Seminar: **Sewer systems research at ICRA.** *Swiss Federal Institute of Aquatic Science and Technology (EAWAG)*. Zurich, Switzerland (September 2013).

Gutiérrez, O. Seminar: **Recerca en Control d'olors i de desbordaments en sistemes col·lectors d'aigües residuals.** *Consorci Besòs*, Barcelona, Spain (October 2013).

Gutiérrez, O. Seminar: **Research synergies between SAC and ICRA.** *Advanced Control System research group (SAC-UPC)*. Terrassa, Barcelona, Spain. (October 2013).

Gutiérrez, O. Seminar: **Sewer and WWTP research activities carried out at ICRA, 2010-2013.** *Instituto Superior Técnico (IST) School of engineering of the University of Lisboa*, Lisboa, Portugal. (November 2013).

PLENARY LECTURES

Pijuan, M. **Key factors determining N₂O production by ammonia oxidizing bacteria: current state of the art.** Congress: *10th IWA Leading Edge Conference on Water and Wastewater Technologies*, Bordeaux, France (June 2013).

Olsson, G., Carlsson, B., Comas, J., Copp, J., Gernaey, K.V., Ingildsen, P., Jeppsson, U., Kim, C., Rieger, L., Rodríguez-Roda, I., Steyer, J.P., Takács, I., Vanrolleghem, P.A., Vargas Casillas, A., Yuan, Z., Åmand, L. **Instrumentation, Control and Automation in wastewater - what happened from London 1973 to Narbonne 2013.** Congress: *11th IWA conference of instrumentation, control and automation*, Narbonne, France (September 2013).

ORAL PRESENTATIONS

Stefani, M., Rodríguez-Mozaz, S., Aumatell, J., Adroer, N., Rodríguez-Roda, I., Borrego, C.M., Cortada, E., Comas, J. **Fouling control in an integrated membrane system for wastewater reuse.** Congress: *1st International Conference on Desalination using Membrane Technology*, Sitges, Barcelona, Spain (April 2013).

Batista, J., Auguet, O., Pijuan, M., Borrego C.M., Gutiérrez, O. **Biofilm colonisation in sewer start-up.** Congress: *9th International Conference on Biofilm Reactors (IWA)*. Paris, France (May 2013).

Tora, J., Pijuan, M., Rodríguez-Caballero, A., Carrera, J., Pérez, J. **Use of process control as a strategy to reduce N₂O emissions in the nitrification of reject wastewater.** Congress: *9th International Conference on Biofilm Reactors (IWA)*. Paris, France (May 2013).

Collado, N., Buttiglieri, G., Marti, E., Ferrando-Climent, L., Rodríguez-Mozaz, S., Barceló, D., Comas, J., Rodríguez-Roda, I. **Influence of sulfamethoxazole on activated sludge bacterial community and removal efficiencies.** Congress: *14th EuCheMS International Conference on Chemistry and the Environment (ICCE)*. Barcelona, Spain (June 2013).

Dalmau, M., Atanasova, N., Gabarrón, S., Rodríguez-Roda, I., Comas, J. **Membrane bioreactor modelling: deterministic vs data driven models.** Congress: *14th EuCheMS International Conference on Chemistry and the Environment (ICCE)*. Barcelona, Spain (June 2013).

Collado, N., Buttiglieri, G., Rodríguez-Mozaz, S., Rubirola, A., Gros, M., Barceló, D., Comas, J., Rodríguez-Roda, I. **Micropol Integrated study on pharmaceuticals occurrence in a WWTP with significant industrial contribution and the impact into the river system.** Congress: *Micropol & Ecohazard 2013; 8th IWA Specialized Conference on "Assessment and control of micropollutants and hazardous substances in water"*. Zurich, Switzerland (June 2013).

Pijuan, M., Chandran, K., van Loosdrecht, M., Yuan, Z. **Key factors determining N₂O production by ammonia oxidizing bacteria- the known and unknown.** Congress: Congress: *10th IWA leading Edge conference on Water and Wastewater Technologies*. Bordeaux, France (June 2013).

Pijuan, M., Tora, J., Rodríguez-Caballero, A., Carrera, J., Pérez, J. **Nitrous oxide and methane emissions during nitrification of reject wastewater in a granular airlift reactor: effect of process parameters and operational mode.** Congress: *International Water Association (IWA), Nutrient Removal and Recovery 2013*. Vancouver, Canada (July 2013).

Batista, J., Auguet, O., Pijuan, M., Borrego C., Gutiérrez, O. **Colonisation of Sulfide and Methane-producing biofilms during sewer start up.** Congress: *7th International Conference on Sewer Processes and Networks*. Sheffield, United Kingdom (August 2013).

Montserrat-Royuela, A., Gutiérrez, O., Poch, M., Corominas, L. **Low cost method for determining occurrence and duration of combined sewer overflows.** Congress: *7th International Conference on Sewer Processes and Networks*, Sheffield, United Kingdom (August 2013).

Gutiérrez, O., Roux, P., Risch, E., Boutin, C., Corominas, L. **Life Cycle Assessment of urban wastewater systems: identifying the importance of the environmental impacts of sewer systems.** Congress: *7th International Conference on Sewer Processes and Networks*, Sheffield, United Kingdom (August 2013).

Gutiérrez, O., Batista, J., Sharma, K., Pijuan, M. **Effect of sewer network enlargement on sulfide and methane emissions: a case study.** Congress: *7th International Conference on Sewer Processes and Networks*, Sheffield, United Kingdom (August 2013).

Maere, T., Dalmau, M., Rodríguez-Roda, I., Comas, J., Nopens, I. **Model-based optimisation of a full-scale hybrid MBR**. Congress: **7th IWA Specialised Membrane Technology Conference and Exhibition for Water and Wastewater Treatment and Reuse**. Toronto, Canada (August 2013).

Montserrat-Royuela, A., Benzal, A., Gutiérrez, O., Poch, M., Corominas, Ll. **Low-cost method for monitoring sewer overflows in an entire network: from manual to automatic data analysis**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Gutiérrez, O., Roux, P., Risch, E., Boutin, C., Corominas, Ll. **Evaluating the environmental impacts of sewer systems in the Life Cycle Assessment of the entire urban wastewater system**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Villez, K., Vanrolleghem, P.A., Corominas, Ll. **Sensor fault detection and diagnosis based on bilinear mass balances in waste water treatment systems**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Hadjimichael, A., Corominas, Ll., Poch, M., Comas, J. **Towards a decision support system to assess environmental and socio-economical impacts of Urban Wastewater Systems (UWS)**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Aymerich, I., Pellicer, N., Poch, M., Corominas, Ll. **Model-based evaluation of cost saving strategies using real market variable energy tariffs**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Marques, R., Oehmen, A., Pijuan, M. **A novel microelectrode based system for monitoring N₂O emissions during wastewater treatment**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Monclus, H., Casas, S., Rovira, S., Canals, J., Comas, J., Rodríguez-Roda, I. **Full-scale validation of a control system for energy saving in membrane bioreactors**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Odriozola, J., Beltrán, S., Sancho, L., Dalmau, M., Comas, J., Rodríguez-Roda, I., Ayesa, E. **Model-based optimisation of MBR plants for C and N removal**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Dalmau, M., Castellà, M., Gabarrón, S., Odriozola, J., Sancho, L., Ayesa, E., Rodríguez-Roda, I., Comas, J. **Integrated control of MBRs: effects of aeration**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Isgren, M., Anderson, P., Gustavson, D., Gutiérrez, O., La Cour Jansen, J. **Methane formation in Malmö sewer systems**. Congress: **Nordiwa 2013 - 13th Nordic Wastewater Conference**. Malmö, Sweden (October 2013).

POSTERS

Stefani, M., Rodríguez-Mozaz, S., Aumatell, J., Adroer, N., Rodríguez-Roda, I., Comas, J. **Fouling control in an integrated membrane system for wastewater reuse. Best poster award**. Congress: **1st International Conference on Desalination using Membrane Technology**. Sitges, Barcelona, Spain (April 2013).

Buttiglieri, G., Collado, N., Rodríguez-Caballero, A., Rodríguez-Mozaz, S., Ferrando-Climent, L., Rodríguez-Roda, I., Comas, J., Barceló, D., Pijuan, M. **Evaluating partial nitrification capability to degrade Sulfamethoxazole and greenhouse gases emissions**. Congress: **Micropol & Ecohazard 2013; 8th IWA Specialized Conference on "Assessment and control of micropollutants and hazardous substances in water"**. Zurich, Switzerland (June 2013).

Pijuan, M., Tora, J., Rodríguez-Caballero, A., Carrera, J., Pérez, J. **Nitrous oxide emissions during reject wastewater treatment via partial nitrification: effect of process control and operational mode. Best poster award**. Congress: **10th IWA leading Edge conference on Water and Wastewater Technologies**. Bordeaux, France (June 2013).

Buttiglieri, G., Collado, N., Rodríguez-Caballero, A., Rodríguez-Mozaz, S., Ferrando-Climent, L., Rodríguez-Roda, I., Comas, J., Barceló, D., Pijuan, M. **Evaluating partial nitrification capability to degrade Sulfamethoxazole and their greenhouse gases emissions**. Congress: **14th EuCheMS International Conference on Chemistry and the Environment (ICCE)**. Barcelona, Spain (June 2013).

Collado, N., Buttiglieri, G., Marti, E., Ferrando-Climent, L., Rodríguez-Mozaz, S., Comas, J., Rodríguez-Roda, I. **Shifts in bacterial community and removal efficiencies on a SBR with sulfamethoxazole continuous feeding**. Congress: **Micropol & Ecohazard 2013. Congress: Micropol & Ecohazard 2013; 8th IWA Specialized Conference on "Assessment and control of micropollutants and hazardous substances in water"**. Zurich, Switzerland (June 2013).

Rodríguez-Caballero, I., Ribera, A., Pijuan, M. **Nitritation versus Full Nitrification of Ammonium-Rich Wastewater: Comparison in terms of Nitrous and Nitric Oxides Emissions**. Congress: **International Water Association (IWA), Nutrient Removal and Recovery 2013**. Vancouver, Canada (July 2013).

Villez, K., Vanrolleghem, P.A., Corominas, Ll. **Structural observability and redundancy classification for sensor networks in wastewater systems. Best poster award**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

Dalmau, M., Maere, T., Nopens, I., Rodríguez-Roda, I., Comas, J. **Multi-objective control of a MBR/CAS full-scale plant**. Congress: **11th IWA conference of instrumentation, control and automation**, Narbonne, France (September 2013).

05. Projects

Resources and Ecosystems Research Area

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	GHGs emissions from weirs in the Fluvià River (COLOT)
Funding agency	Fundació Eiximenis, Girona, Spain
Duration	2013-2014
Coordinator	Biel Obrador
Leader researcher	Rafael Marcé
Amount for ICRA	€0

Project	CO ₂ emissions from temporary ponds in Menorca Island (CARBASSES)
Funding agency	Menorca Research Institute, Menorca, Spain
Duration	2013-2014
Coordinator	Biel Obrador
Leader researcher	Rafael Marcé
Amount for ICRA	€0

Project	Impactos del cambio climático en la cuenca del Guadalquivir (LICUA)
Funding agency	Gobierno de Andalucía, Spain
Duration	2013-2015
Coordinator	M.J. Esteban
Leader researcher	Rafael Marcé
Amount for ICRA	€0

Project	Interactions between flow hydrodynamics and biofilm attributes and functioning in streams
Funding agency	German Research Foundation (DFG)
Duration	2013-2015
Coordinator	M. Weitere (UFZ) and A. Lorke (UKL)
Leader researcher	Daniel von Schiller
Amount for ICRA	€1.800

Project	Respuesta del metabolismo y la diversidad del biofilm algal al aumento de temperatura: efecto del calentamiento por cambio climático en un arroyo altoandino
Funding agency	Banco Nacional de Colombia, Colombia
Duration	2013-2014
Coordinator	John Charles Donato, Departamento de Biología, Universidad Nacional de Colombia
Leader researcher	Sergi Sabater
Amount for ICRA	€0

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

Project	Marie Curie Actions – European Reintegration Grant: Global warming effects on the stream carbon balance (GWESCB)
Funding agency	European Union PERGo7 GA-2010-259219
Duration	2011-2013
Coordinator	ICRA
Leader researcher	Vicenç Acuña
Amount for ICRA	€045.000

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

Water Quality Research Area

Project	Transporte y procesado del Carbono en la red fluvial: relevancia del cambio global (CARBONET)
Funding agency	Ministerio de Economía y Competitividad (MINECO), Convocatoria de ayudas de Proyectos de Investigación Fundamental no orientada.(CGL2011-30474-Co2-01)
Duration	2011-2014
Coordinator	ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€177.870

Project	Priority Environmental Contaminants in seafood: safety assessment, impact and public perception (ECsafeSEAFOOD)
Funding agency	European Union FP7-KBBE-2012-6-singlestage Project N°: 311820
Duration	2013-2017
Coordinator	Antonio Marqués, Instituto de Investigación 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	Damià Barceló
Amount for ICRA	€179.152

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



Technologies and Evaluation Research area

Project	Tratamiento no convencional de degradación por hongos de fármacos en efluentes: desarrollo de proceso, monitorización y evaluación del riesgo (DEGRAPHARMAC)
Funding agency	Ministerio de Economía y Competitividad (MINECO). (CTQ2010-21776-CO2-02)
Duration	2010-2013
Coordinator	Universitat Autònoma de Barcelona (UAB)
Leader researcher	Sara Rodríguez-Mozaz
Amount for ICRA	€131.100

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

Project	From grey to green. How to improve the sustainability of wastewater and drinking water treatment (GREEN-TECH)
Funding agency	Ministerio de Economía y Competitividad (MINECO) - NEW INDIGO (Initiative for the Development and Integration of Indian and European Research - DST1-013 - ERA NET) – EUREKA Program
Duration	2012-2014
Coordinator	ICRA
Leader researcher	Mira Petrovic
Amount for ICRA	€35.000

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	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	Eliminación de microcontaminantes y productos de desinfección en sistemas integrados de membranas seguidos de desinfección. Potencial para la reutilización directa o indirecta (WATER-Fate)
Funding agency	Ministerio de Economía y Competitividad (MINECO) – CTM2012-38314-Co2-01
Duration	2012-2015
Coordinator	ICRA
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€127,535

Project	Proyecto Específico para identificar oportunidades tecnológicas y de I+D en el tratamiento y reutilización de agua en el sector químico-farmacéutico para las empresas del sector del agua, Catalan Water Partnership.
Funding agency	Ministerio de Industria Energía y Turismo-AEI-010300-2012-67
Duration	2012-2013
Coordinator	Catalan Water Partnership (CWP)
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€5,400

Project	Proyecto específico para identificar retos tecnológicos y oportunidades de I+D+i en el sector turístico para las empresas del sector del agua, Catalan Water Partnership.
Funding agency	Ministerio de Industria Energía y Turismo-AEI-010300-2012-45
Duration	2012-2013
Coordinator	Catalan Water Partnership (CWP)
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€3,000

Project	Sulfide and GreenHouse Gas emissions from Mediterranean Sewers (SGHGEMS)
Funding agency	European Union PIRGo8-GA-2010-277050 Marie Curie Actions – International Reintegration Grant.
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Oriol Gutiérrez
Amount for ICRA	€100,000

Project	Ecosystem-based Management strategies for urban wastewater systems (EcoMaWat)
Funding agency	European Union PCIG09-GA-2011-293535
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Lluís Corominas
Amount for ICRA	€100,000

Project	Ab initio Statics and Molecular Dynamics Simulation of Olefin Metathesis Catalysts for Pharmacological purposes (Compute DRUG)
Funding agency	European Union PCIG09-GA-2011-293900
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Albert Poater
Amount for ICRA	€100,000

Project	Sustainable and integrated urban water system management (SANITAS) Funding agency: European Union PITN-GA-2011-289193
Funding agency	European Union PITN-GA-2011-289193
Duration	2011-2015
Coordinator	LEQUIA-Universitat de Girona
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€256,387

Project	Gases de efecto invernadero en los sistemas de transporte y tratamiento de aguas residuales: evaluación de las emisiones (GEISTAR)
Funding agency	Ministerio de Economía y Competitividad (MINECO) – CTM2011-27163
Duration	2011-2014
Coordinator	ICRA
Leader researcher	Maite Pijuan
Amount for ICRA	€110,110

Project	Problemática y remoción de arsénico del agua de uso doméstico en comunidades de Latinoamérica (ARSENIC II)
Funding agency	Agencia Española de Cooperación Internacional para el Desarrollo (AECID). 2ª Convocatoria CAP 2011(11-CAP2-1583)
Duration	2011-2013
Coordinator	ICRA
Leader researcher	Esther Llorens
Amount for ICRA	€85,000

Project	Estudio de los mecanismos de producción del óxido nítrico en los procesos de tratamiento de aguas residuales para el control de estas emisiones en depuradoras (EMPN2O)
Funding agency	Ministerio de Economía y Competitividad (MINECO). Programa de Internacionalización de la I+D (PRI-AIBPT-2011-1232)
Duration	2011-2013
Coordinator	ICRA
Leader researcher	Maite Pijuan
Amount for ICRA	€85,000



06. Contracts

Resources and Ecosystems Research Area

Contract	Sostenibilidad de recursos hídricos bajo el cambio global (HIDSOS)
Contracting Agency	ENDESA
Duration	2013
Coordinator	ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€45,950,41
Contract	Estudio, seguimiento y evaluación de alternativas de minimización ante la posible presencia de mejillón cebra en los embalses e instalaciones del ámbito de ATLL, concesionaria de la Generalitat de Catalunya
Contracting Agency	ATLLc (Aigües Ter Llobregat, concesionaria de la Generalitat de Catalunya)
Duration	2013-2014
Coordinator	ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€2.000
Contract	Adaptación de la métrica de fitobentos IPS a los tipos de masas de agua 16 y 17 correspondientes a grandes ríos. Análisis del grado de correlación de la métrica de fitobentos IPS con el multimétrico de diatomeas MDIAT
Contracting Agency	TRAGSA
Duration	2013-2014
Coordinator	Coordinator: ICRA
Leader researcher	Sergi Sabater
Amount for ICRA	€9,813

Technologies and Evaluation Research area

Contract	Investigación de tecnologías de tratamiento, reutilización y control para la sostenibilidad futura de la depuración de aguas residuales (ITACA)
ICRA Subcontract	Pharmaceutical removal in WWTP)
Contracting Agency	DEISA (Programa INNPRONTA, CDTI)
Duration	2011-2015
Coordinator	Coordinator ADASA SISTEMAS, S.A.
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€131.000
Contract	Treballs de modelització de l'EDAR de FRISELVA. Fases I (pre-instal·lació) i Fase II (post-instal·lació)
Contracting Agency	FRISELVA
Duration	2013
Coordinator	SISLtech
Leader researcher	Lluís Corominas
Amount for ICRA	€8.750

Contract	Estudi de quantificació de sulfhídric i de metà en el sistema de sanejament de Sant Pere Pescador, proposta de mesures correctores per reduir la concentració i els impactes del sulfhídric
Contracting Agency	Consorci de la Costa Brava (CCB) and Empresa Mixta d'Aigües Costa Brava S.A. (EMACBSA)
Duration	2013-2014
Coordinator	ICRA
Leader researcher	Oriol Gutiérrez
Amount for ICRA	€10.000
Contract	Assess the effect of temperature on multiple N ₂ O microsensors to characterize and predict its effect under real environment
Contracting Agency	UNISENSE A/S, Denmark
Duration	2013-2014
Coordinator	UNISENSE A/S, Denmark
Leader researcher	Maite Pijuan
Amount for ICRA	€6,955

07. Agreements

01/01/2103

Catalan Water Partnership (CWP)

Contract to provide CWP services to its members, among which is ICRA, mainly to boost R & D & i projects and pooled internationalization among members, and the promotion of cooperative projects with other clusters.

25/01/2013

University of Catania

Cooperation agreement with the University of Catania (Italy) in the framework of the Lifelong Learning-ERASMUS Programme of the European Union in order to accommodate students from the university.

01/02/2013

University of Lleida

Scientific collaboration between the University of Lleida (UdL) and ICRA regarding the collaboration of Dr. Ramon J. Batalla with the Institute. The purpose of this private agreement is to establish the nature and conditions under which Dr. Batalla, Professor at the UdL, becomes collaborating researcher for the development of the Hydrological Processes research line at the ICRA's Resources and Ecosystems Area.

04/03/2013

Lifelong Learning Programme – LEONARDO DA VINCI of the European Union

Cooperation agreement with the European Union to provide an internship for **Eleni Variatza**, Biology Degree of Ioannina University (Greece) during the period from 4/4/2013 to 1/8/2013, in the Water Quality Area, Quality and Microbial diversity line, under the supervision of José Luis Balcázar, ICRA research scientist (Ramon y Cajal).

04/03/2013

Lifelong Learning Programme – LEONARDO DA VINCI of the European Union

Cooperation agreement with the European Union to provide an internship for **Elissavet Kassotaki**, Environmental Engineering Degree of Ioannina University (Greece) during the period from 1/4/2013 to 31/7/2013, in the Technologies and Evaluation Area, Treatment/reuse of waste water line, under the supervision of Maite Pijuan, ICRA research scientist (Ramon y Cajal).

04/03/2013

Lifelong Learning Programme – LEONARDO DA VINCI of the European Union

Cooperation agreement with the European Union to provide an internship for **Antonis Kotzamanoglou**, Environmental Physics Degree of Ioannina University (Greece) during the period from 2/4/2013 to 2/8/2013, in the Technologies and Evaluation Area, Modelling and management systems line, under the supervision of Lluís Corominas, ICRA postdoc researcher (Juan de la Cierva).

25/04/2013

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Laura Martinoy Guerrero**, Environmental MSc student, during the period from 2/5/2013 to 28/6/2013, in the Water Quality Area, Chemical Contamination of Water Bodies line, under the supervision of Sara Rodríguez-Mozaz, ICRA research scientist. On 20/6/2013, the agreement was extended until 31/7/2013.

25/04/2013

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Natàlia Gil Tenorio**, Water Science and Technology MSc student, during the period from 1/5/2013 to 14/9/2013, in the Technologies and Evaluation Area, Treatment/reuse of waste water line, under the supervision of Ignasi Rodríguez-Roda, ICRA research professor (University of Girona associated).

09/05/2013

LEQUIA, University of Girona and Girona Water Company, Salt and Sarrià de Ter

Scientific collaboration agreement with the Chemical and Environmental Engineering Laboratory, (LEQUIA), University of Girona, Department of Electronics, Informatics and Automation of the University of Girona and Girona Water Company, Salt and Sarrià de Ter for a characterization of the water distribution network of Girona, using techniques related to graph theory and a study of environmental assessment of the WWTP of Montfullà and its distribution network.

13/05/2013

Lifelong Learning Programme-ERASMUS of the European Union

Cooperation agreement with the European Union to provide an internship for **Julie Delage**, Engineering student, Water and Environment speciality, from the Advanced Engineering School in Limoges (ENSIL, France), during the period from 3/6/2013 to 3/9/2013, in the Technologies and Evaluation Area, Treatment/reuse of waste water line, under the supervision of Ignasi Rodríguez-Roda, ICRA research professor (University of Girona associated).

14/05/2013

National School for Water and Environmental Engineering

Cooperation agreement with the National School for Water and Environmental Engineering of Strasbourg (ENGEES, France) to provide an internship for **Aurore Prats**, Engineering student during the period 1/7/2013 to 28/7/2013 in the Resources and Ecosystems Area, under the supervision of Sergi Sabater, ICRA Research Professor (University of Girona Associated) ICRA.

16/05/2013

University of Girona

Specific cooperation agreement with the University of Girona (UdG) for the performance of external academic practices in collaborator institutions.

The purpose of the agreement is to establish a framework for cooperation in order to jointly carry out the external practical training of students in the fields of undergraduate and Master studies of the Faculty of Sciences of the UdG and how it is determined in the respective curricula.

22/05/2013

Fundació EMYS

Specific cooperation agreement with EMYS Foundation (Foundation of the study, preservation and promotion of natural heritage, Riudarenes, Girona) to frame and coordinate the activities of the Foundation and ICRA in EMYS advice, information exchanges and achievements in the fields of research and technology in the field of conservation of biodiversity associated with wetlands.

06/06/2013**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Lluís Luján Quesada Zamora**, Chemistry Grade student, during the period from 12/6/2013 to 14/9/2013, in the Technologies and Evaluation Area, Treatment/reuse of waste water line, under the supervision of Ignasi Rodríguez-Roda, ICRA research professor (University of Girona associated).

07/06/2013**University of Girona (Polytechnic School)**

Specific cooperation agreement with the University of Girona (UdG) for the performance of external academic practices in collaborator institutions.

The purpose of the agreement is to establish a framework for cooperation in order to jointly carry out the external practical training of students in the fields of undergraduate and Master studies of the Faculty of Sciences of the UdG and how it is determined in the respective curricula.

11/06/2013**University of Girona**

Annex to the regulation agreement between the Catalan Institute for Water Research, Private Foundation (ICRA) and the University of Girona (UdG) on secondment from the activity research of **Dr. Josep Mas Pla**. The purpose of this annex is to collect all of the particular conditions arising from the total activity research of Dr. Josep Pla Mas at ICRA and the complementary to those already established in the agreement dated 27 July 2007. The assignment of the research that will be done at the Resources and Ecosystems Research Area of ICRA begin on June 12, 2013 and end on 11 June 2017, with a duration of 4 years.

01/07/2013**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Helena Guasch Balcells**, Water Science and Technology MSc student, during the period from 1/7/2013 to 14/9/2013, in the Technologies and Evaluation Area, Treatment/reuse of waste water line, under the supervision of Maite Pijuan, ICRA research scientist (Ramon y Cajal).

On 23/9/2013, the agreement was extended until 31/3/2014.

10/07/2013**Educational cooperation agreement of external experimental works of the University of Barcelona students in collaborating organizations**

The purpose of the agreement is the development of external academic practice of University of Barcelona students through collaborating organizations, such as companies, institutions and public and private entities. The ICRA hosts **Victor Carbajal Perelló**, Ecology, Management and Restoration of Natural Environment MSc student, Faculty of Biology, University of Barcelona, for internship during the period from 4/7/2013 to 14/9/2013 in the Resources and Ecosystems Area, Lacustrine and reservoir systems line, under the supervision of Rafael Marcé, ICRA research scientist.

18/07/2013**Educational cooperation agreement for the performance of external academic practices in collaborator institutions**

The purpose of the agreement is the development of external academic practice of Polytechnic University of Catalonia students through collaborating organizations, such as companies, institutions and public and private entities.

The ICRA hosts **Adrià Bosch Bou**, Construction Engineering student at the Barcelona School of Civil Engineering, Polytechnic University of Catalonia, for internship during the period of 23/7/2013 to 13/9/2013 in the Resources and Ecosystems Area, Modelling of Ecosystems and basins line, under the supervision of Josep Mas Pla, ICRA research professor (University of Girona associated).

28/10/2013**Catalunya-La Pedrera Foundation**

Cooperation agreement with the Catalunya-La Pedrera Foundation to set the framework within which the project will be approved by the Foundation in the 5th edition of Teachers and Science programme that aims to inform secondary school teachers of Catalonia of the research activities that are carried out in Catalan research centers.

20/11/2013**Educational cooperation agreement for the performance of external academic practices in collaborator institutions**

The purpose of the agreement is the development of external academic practice of University of Girona students through collaborating organizations, such as companies, institutions and public and private entities.

ICRA hosts **Ikram Arrahaoui Douiri**, Biology Grade student at the Faculty of Sciences, University of Girona, for internship during the period from 13/1/2014 to 14/3/2014 in the Water Quality Area, Quality and Microbial diversity line, under the supervision of Carles Borrego, ICRA research professor (University of Girona associated).

28/11/2013**Educational cooperation agreement for the performance of external academic practices in collaborator institutions**

The purpose of the agreement is the development of external academic practice of University of Girona students through collaborating organizations, such as companies, institutions and public and private entities.

The ICRA hosts **Núria Puigmal Domínguez**, Biotechnology Grade student at the Faculty of Sciences, University of Girona, for internship during the period from 20/1/2014 to 30/4/2014 in the Water Quality Area, Quality and Microbial diversity line, under the supervision of Carles Borrego, ICRA research professor (University of Girona associated).

11/12/2013**Educational cooperation agreement for the performance of external academic practices in collaborator institutions**

The purpose of the agreement is the development of external academic practice of University of Girona students through collaborating organizations, such as companies, institutions and public and private entities.

The ICRA hosts **Úrsula Cárdenas Moreno**, Environmental Sciences Grade student at the Faculty of Sciences, University of Girona, for internship during the period from 12/12/2013 to 30/5/2014 in the Technologies and Evaluation Area, Treatment/reuse of waste water line, under the supervision of Gianluigi Buttiglieri, ICRA postdoc researcher.

17/12/2013**Educational cooperation agreement for the performance of external academic practices in collaborator institutions.**

The purpose of the agreement is the development of external academic practice of University of Girona students through collaborating organizations, such as companies, institutions and public and private entities.

The ICRA hosts **Laura Pérez Remon**, Biology Grade student at the Faculty of Sciences, University of Girona, for internship during the period from 27/1/2014 to 4/4/2014 in the Resources and Ecosystems Area, Lacustrine and reservoir systems line, under the supervision of Rafael Marcé, ICRA research scientists.

08. Activities

03/01/2013

Seminar at ICRA of Rutger De Wit (CNRS-France) ICRA, Girona

ICRA Resources and Ecosystems Research Area invites Rutger De Wit, Research Director of the Centre National de la Recherche Scientifique (CNRS) – attached at Ecosym Laboratory (Ecology of coastal marine systems), University of Montpellier, France - to give the seminar: *Management of the hypersaline lake La Salada de Chirrana (Aragon) - what can we learn from the decadal variability of the Coelofasciculus (Microcoleus) chthonoplastes microbial mats?*



06/01/2013

Ceremony of Prince Sultan Bin Abdulaziz International Prize for Water 5th Award 2012 of Saudi Arabia

Riyadh, Saudi Arabia

Damià Barceló, director of ICRA, collected the 2012 prize. The prize is awarded in the category of **Water Management and Protection** by the work done at the leading edge of water science in understanding the effect of pharmaceuticals in the water environment, developing new methods for future risk assessment and management of emerging contaminants and the investigation of water quality in intensively-used basins.



15/01/2013

First meeting of the ICRA Public Administration and Business mixed Committee ICRA, Girona

For four years, since the opening of the building H2O, ICRA has an ongoing relationship with the businesses of the country. Now we begin to see the fruits of our work in businesses in the water sector. The first meeting of the new Public Administration and Business mixed Committee, whose main objective is to ensure the applicability and usefulness of the research done at ICRA, in order to highlight the needs of the market, was attended by **Jorge J. Malfeito, Jaume Carol, Manuel Farré, Joan Gaya, Tomás A. Michel, Sergi Martí, Xavier Tristán, Josep Arráez and Jesús Gómez. Luís Rovira**, director of CERCA and Josep Calbó, Deputy Dean of Research and Transfer of the University of Girona were invited to the meeting. During the meeting, all the new members of the Public Administration and Business mixed Committee spoke on issues of primary interest to ICRA and to the socio-economic sector of water in Catalonia. The program also included a presentation of the current reality of ICRA and a visit to the center.



23/01/2013 - FOTO DAMIA RECOLLINT PREMI ok

Ceremony of RECIPHARM International Environmental Award 2012

ICRA, Girona

Damià Barceló, director of the ICRA, collected the 2012 award at a ceremony held in ICRA. Jesús Gómez, the managing director of Recipharm Parets, S.LU., gave the prize for his career in the world of emerging pollutants and pharmaceutical that affect the environment. RECIPHARM AB, the Swedish pharmaceutical manufacturer, leader in Europe, has given an annual international

award since 2008 for the best environmental performance or environmental best practice and innovation within the pharmaceutical industry or the academic world. *Photo left to right: Sergi Sabater (deputy director of the ICRA), Jesús Manuel Vega (Recipharm), Jesús Gómez, Damià Barceló, Josep M. Sans (Recipharm) and Joan Grimalt (director of the IDAEA-CSIC).*



24/01/2013

ICRA added to the sensor network of Catalonia IDEC - Institut Cartogràfic de Catalunya, Barcelona

ICRA added to the list of organisms that provide data for the Sensor Web Catalog of IDEC (Spatial Data Infrastructure of Catalonia). The research group RIVERS: Fluvial Dynamics Research Group at the University of Lleida, commissioned by ICRA, installed 11 new sensors for turbidity, temperature and height of the water. Sensor networks (weather, pollution, waves, satellite images, radar, traffic, wave forecast, etc.) are a way of capturing information in real time on an almost unlimited number of events.

<http://www.geoportal-idec.cat/geoportal/sensors/cat/>



28/01/2013

Business visit of ROCA INNOVATION LAB ICRA, Girona

ICRA welcomed representatives of ROCA Innovation Lab: Josep Congost, director of ROCA Design Center, Jordi Corral, ROCA Innovation Lab project manager and Xavier Torras, managing director of the We Are Water Founda-

tion to visit our facilities.

Photo left to right: Jordi Corral, Josep Congost, Ignasi Rodríguez-Roda (Head of ICRA Technologies and Evaluation research area), Xavier Torras, Damià Barceló (director of the ICRA), Ramon Moreno (ICRA's Consultant on external relations with companies) and Sergi Sabater (deputy director of the ICRA).



30/01/2013
Conference of the Group Connect-EU Aigua: International Public-Private Collaboration on R&D&i: a tool to boost business competitiveness
 ICRA, Girona

ICRA, leader of Connect-EU Aigua or Water.Cat group, held this informative seminar to promote the participation of companies in the water sector in R&D&i European projects.

Many experts consider it necessary to take advantage of the crisis to refocus the business and achieve greater competitiveness. This is where there have been, among others, the concepts of cooperation, internationalization, innovation and public-private collaboration.

At this conference, several people directly involved in the European Innovation Partnership (EIP) on Water explained what to expect and how to approach the participation of companies and research institutions and innovation.



26/02/2013
Seminar: Desalination by membrane distillation: design of new-generation membranes
 ICRA, Girona

ICRA invited Mohamed Khayet from the Department of Applied Physics, Faculty of Physics, University Complutense of Madrid to give this seminar. Mohamed Khayet was awarded with the Prince Sultan Bin Abdulaziz International Water Prize for Water 5th Award 2012 of Saudi Arabia in the category of alternative water resources. Damià Barceló, director of the ICRA also was awarded with this prize but in the category of water management and protection.



04/03/2013
Manel Garrido PhD Thesis defense
Title: Development of an environmental decision support system for the selection and integrated assessment of process flow diagrams in wastewater treatment.
 ICRA, Girona

This thesis was the first to be defended at ICRA. The Directors were: Manel Poch (ICRA research professor attached to the University of Girona, of the ICRA Technologies and Evaluation Research Area and full professor of Chemical Engineering at the University of Girona) and Luis Larrea (research professor of the Center for Technical Studies and Research of Guipuzcoa, University of Navarra). This thesis links environmental science and computer science to create an Environmental Decision Support System (EDSS), which responds to the increasing complexity in design and selection of wastewater treatment plants.



12/03/2013
Visit of the Castell d'Estela Institute
 ICRA, Girona

A group of 13 students in 1st and 2nd year at high school accompanied by teachers Montserrat Roca and Marta Cos from the Castell d'Estela Institute of Amer (Girona) visit ICRA facilities to learn about the experimental research that is conducted by ICRA.



14/03/2013
ICRA collaborates with the University of Girona in their research
 ICRA, Girona

ICRA has collaborated on the results of investigations carried out by a team of researchers from the Chemical and Environmental Engineering Laboratory (LEQUIA), of the University of Girona, directed by Jesús Colprim, who have developed a system capable of solving nitrate pollution of groundwater, reducing the energy consumption needed and without generating additional waste.



10/04/2013
ICRA's presentation at "Reinvent the Toilet Challenge Grantees and Partners Convening"
 Roca Barcelona Gallery, Barcelona

NO hi ha versió en CATALÀ
 Ignasi Rodríguez-Roda (ICRA research professor attached to the University of Girona and Head of ICRA Technologies and Evaluation research area) presented ICRA in this event organised by Bill & Melinda Gates Foundation. Roca, We Are Water Foundation and the Bill & Melinda Gates Foundation host a meeting of about 60 partners,

representatives of multinational industries and research institutions with the aim of promoting innovative solutions to the problem of the lack of sanitation in developing countries.



11-12/04/2013
Knowledge Fair 2013: Exploratory Resources of Nature
 Berga, Barcelona

Damià Barceló, director of ICRA, opened this fair that aims to present the leading research projects related to science and technology of the Polytechnic University of Catalonia and the University of Barcelona, and those dealing with different topics, from natural resources to medicine.

It is about increasing the interest of young people and society in general in these areas, encouraging the spirit of learning based on research and scientific vocations, and showing that science is within reach of everyone who strives to approach society.



24-25/04/2013
Working Day: Constructed wetlands for high arsenic waters treatment
 ICRA, Girona

The conference was organized by ICRA's Modelling and Management Systems research line, the CIMAV of Mexico and the CETA of Argentina. The conference was attended by thirty scientists and six teachers from different centers: M^a Teresa Alarcón of CIMAV, Alicia Fernández Cirelli and Alejo Pérez Carrera of CETA, Esther Llorens (ICRA postdoc researcher) and Joshua Obradors (ICRA research technician) and Enriqueta Anticó from the University of Girona. Among the topics discussed were the problem of arsenic

in Latin America and the identification of its origin, the problems in Catalonia and new methods of determination, conventional technologies for the treatment of water contaminated with arsenic, the application of new sustainable technologies and modelling constructed wetlands treating wastewater with high concentrations of arsenic.



24/04/2013
Graduate Program in Chemistry
 Universidade Federal do Rio Grande do Sul (UFRGS), Brazil

The Institute of Chemistry of the UFRGS received Damia Barceló, director of ICRA, to participate in the course of the Graduate Program in Chemistry from 24 April to 2 May 2013, as an expert in the field of emerging contaminants in surface water, wastewater and groundwater. The course is dedicated to Special Topics in Environmental Analysis of endocrine disruptors, pharmaceuticals and drugs of abuse, perfluorinated compounds and nanomaterials.



14/05/2013 - LOGO
Presentation of Campus e-MTA (The Euro-mediterranean Tourism and Water Campus) Strategic Plan
 Caixa Forum, Girona

In the framework of the university campus and Economic Growth Program of Obra Social "la Caixa", the action plan of the International Excellence Campus e-MTA (formed by ICRA, University of Girona -UdG-, the University of the Balearic Islands -UIB- and the Spanish National Research Council -CSIC-) was presented as a catalyst in the region,

with the aim of restoring the main actors in the economic and social prospects of cooperation that must mutually benefit us and must involve progress for the country in areas such as strategic determinants such as water and tourism.

The event included the chancellor of the University of Girona, Anna M. Geli; Jaume Carot, Vice chancellor of teachers and postgraduate p.s.r. of the UIB; Enric Banda, director of the Department of Science, Research and Environment of the "la Caixa" Foundation; Manel Poch, scientific coordinator of Campus e-MTA (UdG); Antoni Riera, scientific coordinator of the CEI e-MTA (UIB) and head of the Tourism line of the UIB; Ignasi Rodríguez-Roda, head of the Water Line (UdG-ICRA); Jaume Montserrat, vice president of TurisTEC; Manuel Cermeron, president of Aqualogy; and Felip Puig, Minister of Business and Employment of the Government of Catalonia, who closed the session.

Ignasi Rodríguez-Roda, ICRA research professor (University of Girona associated) of ICRA Technologies and Evaluation Research Area, presents the conference: Water, and limiter enhancer element of economic activity.



16/05/2013
Coordination of IWA Working Group for Life Cycle Assessment of Water and Wastewater Treatment (LCA-Water WG)
 ICRA, Girona

ICRA participated in the coordination of the IWA Working Group for Life Cycle Assessment of Water and Wastewater Treatment (LCA-Water WG), a new working group of the International Water Association (IWA). The aim of the working group is to develop a good practice guide to facilitate the application of LCA in the field of water treatment.

Lluís Corominas (postdoc researcher Juan de la Cierva of ICRA Technologies and Evaluation Research Area) with Almudena Hospido (researcher at the University of Santiago de Compostela - USC) leads this international working group.

17/05/2013
Damià Murià PhD Thesis defense
Title: Coordinated management of Urban Wastewater Systems by means of advanced Environmental Decision Support Systems
 ICRA, Girona

This thesis is the second one read at ICRA. The Directors were: Manel Poch (ICRA research professor, University of Girona associated of ICRA Technologies and Evaluation Research Area and full professor of Chemical Engineering at the University of Girona) and Oriol Gutiérrez (postdoc researcher of ICRA Technologies and Evaluation Research Area).

This thesis developed a new system of environmental decision support (EDSS) that integrates the management of urban drainage systems and sewage treatment plants considering the water quality of the receiving environment.



20/05/2013
Seminar: Monitoring, modelling and control of environmental systems: from the activated sludge process to the integrated management of river
 ICRA, Girona

Lluís Corominas, postdoc researcher Juan de la Cierva of ICRA Technologies and Evaluation Research Area invites professor Peter Vanrolleghem, holder of the Canada Research Chair on Water Quality Modeling (modelEAU) and Professor of the Department of Civil Engineering and Water Engineering, Université Laval, Quebec (Canada) to give this seminar.



27/05/2013
ICRA joined the Water supply and sanitation Technology Platform (WssTP)
 European Union, Brussels, Belgium

ICRA joined WssTP as a member of the e-MTA Campus. The WssTP (Water supply and sanitation Technology Platform) is a Technology Platform for the water supply and sanitation. It was initiated by the European Commission in 2004 to promote coordination and collaboration in research and technological development in the water industry. WssTP has a strong network of members and partners involved in their activities, including delivery of the strategic vision research and the development of evidence-based reports identifying future research needs. From fundamental research to implementation, WssTP is proactive in identifying future challenges.



15-16/06/2013
Science and Technology Festival
 Parc de la Ciutadella, Barcelona



This festival is organized by the Institute of Culture of Barcelona of Barcelona City Council that aims to bring science to the public. ICRA took part in collaboration with Catalan Association of Research Institutions (ACER) and Catalan Research Centres (CERCA) to spread the youngest research and innovation taking place in Catalonia. ICRA was present in the stand of ACER.

21/06/2013

Seminar: A decade of TOF (Time-of-Flight) for Environmental Analysis

ICRA, Girona

**Diputació de Girona**

Damià Barceló, director of the ICRA and Head of ICRA's Water Quality Research Area invited professors Michael Thurman and Imma Ferrer from The Center for Environmental Mass Spectrometry (CEMS - University of Colorado, Boulder, USA) give this seminar. The CEMS was established at this University by them.

Professor Thurman is a 30-year veteran of the United States Geological Survey (USGS) who has focused his research on water testing.

Professor Imma Ferrer is the chief analyst of CEMS and is responsible for the highest quality accuracy measurements and operation of the laboratory.

21/06/2013

ICRA wins the 2013 fellowship in natural sciences
Girona Regional Council, Girona

The Francesc Eiximenis Board of Trustees of the Girona Regional Council has granted another year Research Fellowship in Social Sciences and Humanities and Natural Sciences.

Prizes were awarded to research projects "The Great War in the Girona counties. The cultural and political impact (1914-1918)", of Maximiliano Fuentes (in the category of Social Sciences and Humanities), and "Presence in the environment and ecological impact of biocides in the Girona counties", of Marta Llorca, Sara Rodríguez-Mozaz and Damià Barceló, from the Water Quality ICRA's Research Area (in the category of Natural Sciences).

27/06/2013 – FOTO OK

Seminar: The use of experimental catchments to understand ecosystems function and their response to environmental change

ICRA, Girona

ICRA Resources and Ecosystems Research Area invited Susana Bernal from the Centre for Advanced Studies of Blanes (Centre d'Estudis Avançats de Blanes CEAB-CSIC) to give this seminar.

Since the 1960's, experimental catchments have been

used as a basic unit of study for understanding the functioning of terrestrial ecosystems. Despite its limitations, this empirical approach has become popular in ecology because it provides useful ecological information on water and nutrient use at relevant spatial scales based on simple mass balance principles. When combined with well-designed long-term monitoring, the experimental catchment's approach can help us to understand the response of forest ecosystems to past and present environmental changes such as climate change or chronic N deposition.



27/06/2013

Closing ceremony of the Master of Applied Chromatographic Techniques

Sciences Faculty - University of Girona, Girona



The Master's Degree in Applied Chromatographic Techniques is organized by the University of Girona, the University Rovira i Virgili and the University Jaume I. This year Damià Barceló, director of the ICRA, gives the closing conference: "New Frontiers in Trace Analysis of Contaminants of Emerging Concern: LC-tandem MS Applications in Environmental, Food and Human Biological Samples."

19/07/2013

Neus Collado PhD Dissertation defense
Title: Multi-scale investigation of occurrence, fate, removal and biodegradation of pharmaceutical contaminants in wastewater treatment and river systems.

ICRA, Girona



This thesis is the third one read at ICRA. The Directors were: Gianluigi Buttiglieri, postdoc researcher of ICRA Technologies and Evaluation Research Area and Joaquim Comas of the Chemical and Environmental Engineering Laboratory (LEQUIA) of the University of Girona. This thesis aims to tackle the issue of pharmaceuticals in wastewater from a multidisciplinary approach.

30/07/2013

Water Quality presentation: Detection of antibiotic resistance genes in the bacterial and bacteriophage DNA fractions of environmental samples

ICRA, Girona

Eleni Variatza, Biology degree and ICRA Internship Student from the University of Ioannina (Greece) presents her work carried out at ICRA during her stay from April to August 2013, in the ICRA Water Quality Research Area and in the framework of Lifelong Learning-LEONARDO DA VINCI Program of European Union.



17/09/2013

25th Anniversary Conference of the Academia Europaea
Wroclaw, Poland

The Barcelona Knowledge Hub (BKH), operating in Barcelona since January 2013, is the Southern European and Mediterranean Office of the **Academia Europaea**. The Academia Europaea is a European association of scientists and professors from all disciplines who are experts and leaders in their field. The BKH works to promote activities of interest to members of the Academy and to the scientific community in general, with special emphasis on multidisciplinary activities that include the perspective of the social sciences and humanities. The BKH took part in this conference where the Catalan research centers were presented, to help international promotional of Catalonia as a major hub for research in Europe. ICRA is present at the stand of BKH.



11/10/2013

Seminar: Modelling the fate of trace metals in large river
ICRA, Girona

ICRA Resources and Ecosystems Research Area, invited Cyril Garneau, predoctoral student at EcoLab laboratory at Paul-Sabatier University (Toulouse, France) on the modelling of trace metals in rivers, to present this seminar. Trace metals can reach concentration levels that can put strong pollution pressure on ecosystems. This is particularly true in fluvial systems, as these are the major transport pathways from land to ocean. A modelling approach, even based on limited field data, can provide important insight on their fate.



17/10/2013

Visit of Pavia University researchers ICRA, Girona

Oriol Gutiérrez and Gianluigi Buttiglieri both postdoc researchers of ICRA Technologies and Evaluation Research Area, received three researchers of the Pavia University (Italy), Department of Civil Engineering and Architecture. They showed ICRA's facilities with the aim of exploring the possibility of future collaboration and cooperation projects. They were: Andrea Capodaglio, associate professor expert in innovative technologies for wastewater treatment, modelling and risk assessment; Arianna Callegari, Sanitary Engineering researcher with particular expertise in water, air and soil quality modelling, and Daniele Mologni working on MFC (Microbial Fuel Cell) technology and its application to wastewater treatment. *(Photo from left to right: Gianluigi Buttiglieri, Daniele Mologni, Oriol Gutiérrez, Andrea Capodaglio, Arianna Callegari)*



24/10/2013

Visit of Universidade Federal do Rio Grande do Sul, Brazil ICRA, Girona

NO CATALÀ (si cal traduir)
Sara Rodríguez-Mozaz, research scientist, Marta Llorca, postdoc researcher and Lucilaine Valeria do Santos, scientific collaborator, all of ICRA Water Quality Research Area, received Professors Irene Külkamp and Louise Marguerite Jeanty de Seixas of the Pharmacy Faculty of the Universidade Federal do Rio Grande (Brazil). They showed ICRA's facilities with the aim of exploring the possibility of future collaboration and cooperation projects. *(Photo from left to right: Irene Külkamp, Sara Rodríguez-Mozaz, Marta Llorca, Lucilaine Valeria do Santos and Louise Marguerite Jeanty de Seixas).*



05/11/2013

Institutional Visit of the British Consulate-General Barcelona ICRA, Girona

Sergi Sabater, deputy director of ICRA, receives Cristina H. Valiñani, Director of Trade and Investment Catalonia, Aragon, Balearic Islands and Andorra (UK Trade and Investment) from the British Consulate-General in Barcelona and Pere Condom, director of the Science and Technology Park (PCiT) of the University of Girona. The purpose of the visit is to show the facilities of the ICRA and the research carried out at ICRA to establish possible collaborations with the UK.

(Photo from left to right: Àlex Brossa (Project Manager of the PCiT), Mireia Centelles (Innovation Area of the PCiT), Pere Condom, Cristina H. Valiñani, Sergi Sabater).



06-13/11/2013

Working Days: Catalunya-La Pedrera Teachers and Science Programme ICRA, Girona

NO CATALÀ
The Fundació Catalunya-La Pedrera, as part of its cultural and educational activities, has created the Teachers and Science programme, targeting secondary school teachers to improve their science background. In 2011, ICRA was the first research centre to start this

type of collaboration. In 2012, ICRA organized the third edition of this programme and in 2013, ICRA organized the fifth edition.

The programme consists of two conferences (assessment days) when 10 teachers are actively involved with ICRA, which presents its activities and how the research is carried out in its three areas of research. Teachers come from different secondary schools in the province of Girona, Barcelona and Tarragona. The Scientific and Technical Services of ICRA coordinated the participation of the teachers on this day.



11/11/2013

Visit of University Sains Malaysia ICRA, Girona

Maite Pijuan, Ramon y Cajal research scientist, and Oriol Gutiérrez, postdoc researcher, both of the ICRA Technologies and Evaluation Research Area, received Vel Vadivelu Murugan and Gobi Kanadasan researchers of the University Sains Malaysia (Malaysia) <http://www.usm.my>. They showed ICRA's facilities with the aim of exploring the possibility of future collaboration and cooperation projects. *(Photo from left to right: Maite Pijuan, Vel Vadivelu Murugan, Gobi Kanadasan and Oriol Gutiérrez).*



18-19/11/2013

Advanced course on Ecosystem Services Chemical Engineering School, University Rovira i Virgili, Tarragona

Within the framework of ICRA's project Consolider-Engenio 2010 (SCARCE), ICRA collaborates in this course, organized by the University Rovira i Virgili, TECNATOX group and University of Valencia. This course reflects the different approaches that can be used to characterise and assess ecosystem services.

One of the participants is Vicenç Acuña, research scientist of the **ICRA Resources and Ecosystems Research Area**.



20/11/2013

Participation in the 18th Science Week Central Services Hall of the Department of Education, Barcelona

This edition was held between 15 and 24 November. It is an initiative coordinated by the Catalan Foundation for Research and Innovation. The Department of Education of the Government of Catalonia, together with the Foundation, promotes Science Week in schools with the basic goal of awakening and strengthening the interest of young people in science and technology. The event celebrates the event "Science in the First Person" which consists of a hundred talks, taking place simultaneously throughout the country, aimed at students in the 4th year of secondary school and Baccalaureate students. These sessions were led by researchers who explained their work from a scientific perspective and from a human point of view. On November 20, Sergi Sabater, deputy director of ICRA, gave the keynote talk: "Water: resources, people, ecosystems."



22/11/2013

Conference: 20 years of Environmental Sciences at the University of Girona
Faculty of Sciences Aula Magna,
University of Girona, Girona

The University of Girona has a history of two decades of professional environmental training and it commemorates this trajectory by organizing with the Association of Environmentalists of Catalonia (COAMB) and the Catalan Association of Environmental Sciences (ACCA), a day dedicated to past, present and future of Environmental Science studies and its protagonists: students, alumni, teachers and professionals. The environmental sector, by definition, has been and is an innovative professional sector. In the present context, environmental professionals are more necessary than ever.

Sergi Sabater, deputy director of the ICRA, took part in the round-table discussion: "New powers for environmental professionals."



26/11/2013

Conference: XIII Conference Enric Casassas
Universitat Autònoma de Barcelona, Bellaterra,
Barcelona

This conference is dedicated to doctor Enric Casassas, who always sought to further scientific knowledge of the main physical-chemical processes that regulate the our planet's environmental functioning.

This year ICRA supported these conference with the theme "Theranostics: new challenges for clinical diagnosis", organized by the Catalan Society of Chemistry, the Institute of Catalan Studies' Department of Science and Technology, the Department of Chemistry of the Autonomous University of Barcelona, with the support of the Department of Chemistry of the University of Girona, Department of Environmental Chemistry of the IDAEA-CSIC in Barcelona, Department of Chemical Engineering of the Polytechnic University of Catalonia, Department of Analytical Chemistry of the University of Barcelona, Department of Chemistry of the Autonomous University of Barcelona, Department of Analytical and Organic Chemistry of the Rovira i Virgili University, Department

of Chemistry of the University of Lleida and Applied Statistics Group of the Chemical Institute of Sarrià, Ramon Llull University.

Theranostics is a new term from the world medicine and clinical practice, created by the contraction of the terms therapy (therapy) and diagnostics. "As such, theranostics refers to the new possibilities that are opening up in personalized medicine to fully and accurately adapt the most appropriate drug treatment to the specific characteristics of the disease by integrating diagnostic tests and treatment in a joint strategy for therapy and diagnosis. In this edition, the thirteenth Enric Casassas Conference was devoted to the new challenges of analytical chemistry in exploiting modern diagnostic tools.



25-26/11/2013

4th SCARCE Annual Conference: Towards a better understanding of the links between stressors, hazard assessment and ecosystem services under water scarcity.

Aulario La Bomba, Cádiz

In the framework of SCARCE project of the CONSOLIDER-INGENIO Ingenio 2010 Program of the Ministry of Economy and Competitiveness (MINECO), the Institute of Environmental Assessment and Water Studies (IDAEA) of the Spanish National Research Council (CSIC), and the Institute of Marine Sciences of Andalusia of the Spanish National Research Council (CSIC), organized this 4th Scarce Annual Conference, in collaboration with the ICRA. It was attended by 108 scientists from around the world, and 32 papers and 54 posters were presented.

This SCARCE conference provides a multi-disciplinary forum in which to present and discuss the many issues affecting water resources today. The meeting encourages transdisciplinary communication on issues related to the toxicants and stressors in water and how they affect water use and exploitation by society under conditions of scarcity.



10/12/2013

Institutional visit of Sant Hilari Sacalm Council, Girona
ICRA, Girona

Damià Barceló, director of ICRA, Manel Poch, scientific coordinator of e-MTA Campus and Oriol Gutiérrez, postdoc researcher of the ICRA Technologies and Evaluation Area received Albert Santaugini, Mayor of Sant Hilari Sacalm and Laura Pagespetit, Councillor for Culture and Leisure of Sant Hilari Sacalm Council. They showed ICRA's facilities with the aim of exploring the possibility of future collaboration. Recently, this council has created the Chair of Water.

(Photo from left to right: Oriol Gutiérrez, Damià Barceló, Laura Pagespetit, Manel Poch and Albert Santaugini).



Awards 09.

Honoris Causa Award

In October 2013, Damià Barceló, director of the ICRA, was named Doctor Honoris Causa by the University of Ioannina (Greece) at the proposal of the Department of Chemistry of the University. The official award ceremony will take place on 19 September 2014.

ICRA began collaboration with the University of Ioannina in early 2010 through an invitation of the Stavros Niarchos Vocational Training Center of the University to participate as a receiving center as part of the Leonardo da Vinci Programme, entitled "Mobility for People in the Labour Market (PLM) - Work Experience in the European Labour Market", in which schools from eleven different European countries participated, including ICRA.

In 2011, ICRA hosted two graduates of the UOI, under the tutelage of Sara Rodríguez-Mozaz of ICRA's Water Quality Area and Vicenç Acuña of the ICRA's Resources and Ecosystems Area. And in 2013, it hosted 3 degrees of UOI, under the tutelage of Maite Pijuan and Lluís Corominas of ICRA's Technologies and Evaluation Area and José Luis Balcázar of ICRA's Water Quality Area.



Membrane System Award

On 7 April 2013, **Ignasi Rodríguez-Roda**, research professor (University of Girona associate) of the Treatment/reuse of wastewater line in the ICRA Technologies and Evaluation research Area, received the award for the **Best poster presentation** with the title: **Fouling control in an integrated membrane system for wastewater reuse** (authors: Stefani, M., Rodríguez-Mozaz, S., Aumatell, J., Adroer, N., Rodríguez-Roda, I., Comas, J.) during the congress: 1st International Conference on Desalination using Membrane Technology. Sitges, Barcelona, Spain (April 2013).



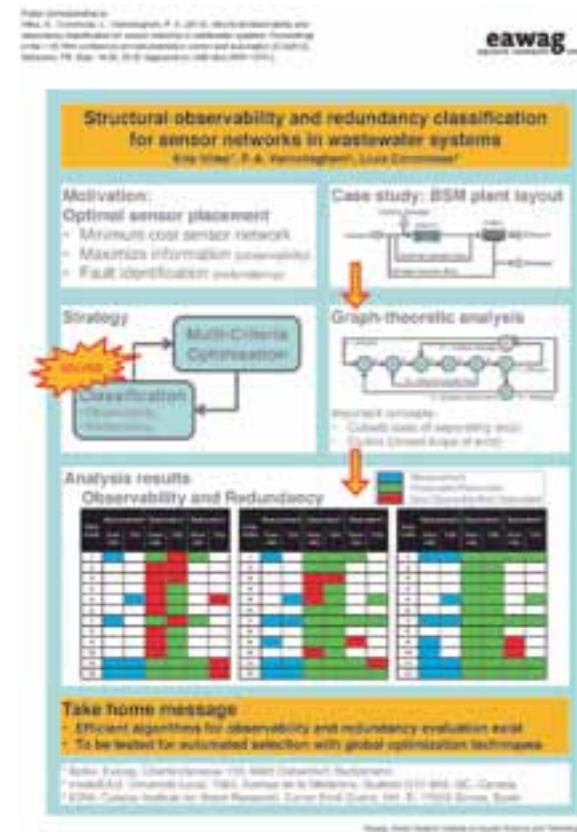
Wastewater Treatment Award

On 2 June 2013, **Maite Pijuan**, Ramon y Cajal research scientist at the Treatment/reuse of wastewater line in the ICRA Technologies and Evaluation research Area, received the award for the **Best poster presentation** with the title: **Nitrous oxide emissions during reject wastewater treatment via partial nitrification: effect of process control and operational mode** (authors: Pijuan, M., Tora, J., Rodríguez-Caballero, A., Carrera, J., Pérez, J.) during the congress: 10th IWA leading Edge conference on Water and Wastewater Technologies. Bordeaux, France (June 2013).



Wastewater Systems Award

On 18 September 2013, **Lluís Corominas**, postdoc researcher of the Modelling and Management systems line in the ICRA Technologies and Evaluation research Area, received the award for the **Best poster presentation** with the title: **Structural observability and redundancy classification for sensor networks in wastewater systems** (authors: Villez, K., Vanrolleghem, P.A., Corominas, L.) during the congress: 11th IWA conference of instrumentation, control and automation, Narbonne, France (September 2013).



10. Financing

Contribution of the Catalan Regional Government's Ministry of Economy and Knowledge (DECO)	€1,811,904.28
Competitive projects (Catalan Regional Government)	€34,272.14
Competitive projects (Ministry of Economy and Competitiveness)	€591,200.87
Competitive projects (European Union)	€331,755.76
Transfer projects	€104,026.82
Financial income	€3,627.00
Other income	€2,451.14
TOTAL INCOME 2013	€ 2,879,238.01

In November 2011 the Ministry of Science and Innovation (MICINN) became the Ministry of Economy and Competitiveness (MINECO)

Selected news & press



11/01/2013

Rivers threaten with CO2

An ICRA experiment that recreates experimental small-scale river streams concluded that in long periods of drought, rivers emit more CO2 and favour climate change.

The results of the investigations are just beginning to emerge. The ICRA researcher Vicenç Acuña says that early data makes it possible to advance a clear conclusion: as the drought continues, the river emits more CO2 and thus accelerates climate change.



05/03/2013

Removal of emerging contaminants by MBR + RO System

The Journal INFOENVIRO published this article by Davor Dolar, Meritxell Gros, Sara Rodríguez-Mozaz, Jordi Moreno, Joaquim Comas, Ignasi Rodríguez-Roda and Damià Barceló, researchers from Institut Català de Recerca de l'Aigua (ICRA), Chemical and Environmental Engineering Laboratory (LEQUIA), University of Girona, the Costa Brava Consortium (CCB), and Empresa Mixta d'Aigües de la Costa Brava S.A.

The presence of emerging contaminants, such as pharmaceuticals, in the aquatic environment and their potential effects on living organisms has become an issue of increasing concern for scientists, water managers and the public. One of the most promising advanced treatments involves integrated membrane systems, which combine membrane bioreactor technology (MBR) and reverse osmosis (RO). In order to demonstrate its effectiveness, the Spanish research group has developed a pilot project in one Municipal WWTP in Catalonia. The results show that the combination of MBR and RO can remove over 99% of the drugs present in wastewater.



20/03/2013

A new multiresistant bacteria of the genus aeromonas is isolated in the river Ter in Ripoll (Girona)

Elisabet Marti and José Luis Balcázar, researchers of the Quality and Microbial diversity line of the Water Quality Area of ICRA, published a study on the characterization of a novel multiresistant bacteria of the genus *Aeromonas* isolated in the River Ter in Ripoll (Girona) in *Clinical Microbiology and Infection*.

The study entitled "Multidrug resistance-encoding plasmid from *Aeromonas*" presents the characterization of a new bacterial species of the genus *Aeromonas* isolated in the River Ter as it passes through Ripoll (Girona). This bacterium is resistant to most antibiotics commonly used in hospitals and outpatient departments, including aminoglycosides (Kanamycin and gentamicin), beta-lactams (amoxicillin and ceftazidime), fluoroquinolones (ciprofloxacin, enrofloxacin, norfloxacin and ofloxacin) and sulfonamides (sulfamethoxazole), among others. The presence of resistant bacteria in the environment therefore represents an added concern because of the resulting environmental and clinical implications. These include increasing limitations on the use of effective drugs and the need to use more expensive antibiotics with a broader spectrum of action. Ultimately, a greater and more accurate understanding of the pathways involved in the dissemination of this resistance, the regulation and the factors that stimulate it are key strategies for establishing effective control and countering the emergence of resistance in pathogenic bacteria.

Clinical Microbiology and Infection, 18 (2012), E366-E368
Multidrug resistance-encoding plasmid from *Aeromonas* sp. strain P2G1

07/05/2013

Publishing of a special online issue of nanomaterials in the environment

The Science of the Total Environment Review published a Virtual Special Issue of **Nanomaterials in the Environment**. The articles are in open access. The Review is edited by Damià Barceló, director of the ICRA and other researchers



03/10/2013

ICRA obtains €1,300,000 in European research projects

The European Commission awarded ICRA research projects 630,000 euros to determine the significance of water scarcity in aquatic ecosystems, 422,000 euros for the promotion of innovative technologies in a closed loop optimal and safe water cycle in tourist facilities, and 273,000 euros for the conversion of water-treatment plants into reclaimed water production systems, producing energy and products with direct market value.



References to the ICRA in the communication media in 2013 (not translated)

Data	Titular	Mitjà
nov/des.2012	Revista Tecnología del Agua - nº 344-345 - article sobre META/Damià Barceló conf. invitada	
gen/febr.2013	Revista Infoenviro n.81 (article osmosis inversa)	
09/01/2013	TV Saudi KSA Channel 2 - Programa Bridges (Premi Damià Barceló - Arabia)	TV Saudi
11/01/2013	Els rius amenacen amb CO2	La Vanguardia
14/01/2013	El llarg camí per ser el Massachusetts d'Europa	Ara
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	Terra
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	Europa Press
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	Qué.es
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	20 minutos (digital)
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	Te interesa.com
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	La Información Digital.com
15/01/2013	El Instituto Catalán de Investigación del Agua constituye su consejo empresarial y social	Gentedigital.es
16/01/2013	L'ICRA constitueix el consell social i empresarial	El Punt Avui
16/01/2013	L'ICRA impulsa un consell assessor empresarial i social	Diari de Girona
21/01/2013	Constitución de un consejo empresarial	Expansión
22/01/2013	TVE Delegació Girona - fàrmacs en rius (Sara R.) i osmosis (IRR) - filmació per informatius	TV Girona
23/01/2013	Premi Recipharm -	web de recipharm
17/02/2013	Els ansiolítics als rius alteren els peixos	Ara
26/02/2013	¿Y por casa cómo andamos?	eldiaonline.com
28/02/2013	Eliminación de contaminantes emergentes mediante un sistema MBR+OI	Infoenviro
01/03/2013	La UB lidera un projecte de cooperació amb la Universitat Nacional del Vietnam per protegir el medi ambient	UBWeb
12/03/2013	Un nuevo sistema de ósmosis elimina los fármacos de las aguas residuales	Qel
14/03/2013	La UdG crea un sistema per eliminar la contaminació de nitrats en aigües subterrànies	Diari de Girona
19/03/2013	Un equip d'investigació de l'ICRA detecta un nou bacteri multiresistent als antibiòtics	Catalunya Ràdio
20/03/2013	Hallan una bacteria del género 'Aeromonas' en España	Medblog.es
20/03/2013	Hallan una bacteria del género 'Aeromonas' en España	Diario Médico
20/03/2013	Identificat un nou bacteri al Ter a Ripoll, molt resistent als antibiòtics	Nació digital
20/03/2013	La presència d'antibiòtics causa l'aparició d'un bacteri multiresistent al Ter	Europa Press
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	Te interesa.com
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	20 minutos (digital)
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	La Información Digital.com
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	Gentedigital.es
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	Ecoticias.com
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	Terra
20/03/2013	La presencia de antibiòtics causa la aparición de una bacteria multiresistente en el Ter	El Economista (digital)
20/03/2013	La presencia de antibiòtics incide en la aparición de una nueva bacteria resistente a ellos	Discapnet
20/03/2013	La presencia de antibiòtics incide en la aparición de una nueva bacteria resistente a ellos	45minutos.net
20/03/2013	La presencia de antibiòtics provoca la aparición de una nueva bacteria en el río Ter	La Vanguardia (digital)
20/03/2013	La presencia de antibiòtics provoca la aparición de una nueva bacteria en el río Ter	Biocat.cat
20/03/2013	l'AquaConSoil Barcelona 2013 espera rebre més de 600 professionals de la tecnologia ambiental	Notícies Sirius
20/03/2013	L'ICRA detecta al Ter un bacteri multiresistent als antibiòtics	Diari de Girona
20/03/2013	L'Institut Català de l'Aigua detecta al Ter un bacteri multiresistent als antibiòtics	Diari de Girona (digital)
20/03/2013	L'Institut Català de l'Aigua detecta al Ter un bacteri multiresistent als antibiòtics	ACN
20/03/2013	L'Institut Català de Recerca de l'Aigua prova la presència d'un bacteri multiresistent als antibiòtics al riu Ter	Directe.cat
20/03/2013	L'Institut Català de Recerca de l'Aigua prova la presència d'un bacteri multiresistent als antibiòtics al riu Ter	Vilaweb
20/03/2013	L'Institut Català de Recerca de l'Aigua prova la presència d'un bacteri multiresistent als antibiòtics al riu Ter	324.cat
20/03/2013	L'Institut Català de Recerca de l'Aigua prova la presència d'un bacteri multiresistent als antibiòtics al riu Ter	Empordà Info
20/03/2013	Provada la presència d'un bacteri multiresistent als antibiòtics al Ter	Compromiso RSE
21/03/2013	El derecho humano al agua determina el resto de derechos fundamentales	El Periódico de Catalunya - Pàgines
21/03/2013	We Are Water alerta del repartiment desigual dels recursos hídrics	especials
22/03/2013	Espanya: l'aigua com la política, més de la meitat està contaminada	Notícies Sirius
22/03/2013	La mitad de las aguas españolas se encuentra en mal estado	Madrid+D
22/03/2013	La mitad de las aguas españolas se encuentra en mal estado	45minutos.net
22/03/2013	La mitad de las aguas españolas sufren algún tipo de deterioro	El País
22/03/2013	Súmate a la Fundación We Are Water para un reparto más justo del agua	La Vanguardia - Especiales

03/04/2013	L'ICRA prova la presència d'un bacteri multiresistent als antibiòtics al riu Ter	Parc Científic i Tecnològic Universitat de Girona
04/04/2013	Detectat un bacteri al riu Ter	Tv Ripollés
04/04/2013	Troben un bacteri al riu Ter a l'alçada de Ripoll	elripollesdigital.com
08/04/2013	Butlletí electrònic Dep. Territori i Sostenibilitat, notícia rius artificials	DTES
08/04/2013	Nou Bacteri al Riu Ter	Tv Girona
09/04/2013	L'ACA descarta que el bacteri del Ter suposi un problema de salut pública	Tv Ripollés
09/04/2013	L'Agència Catalana de l'Aigua descarta que el bacteri del Ter suposi un problema per a la salut pública	elripollesdigital.com
11/04/2013	El llegat de Montserrat Casas	Diario de Mallorca
11/04/2013	Evaluación de contaminantes en pescado y marisco	Eroski Consumer
12/04/2013	Ripoll fa una crida a la calma pel bacteri identificat al Ter	Ripolles.info
13/04/2013	Paradojas alimentarias	La Vanguardia - Especiales
13/04/2013	Paradoxes alimentàries	La Vanguardia - Especiales
16/04/2013	La depuradora eres tú	deverdadaddigital.com
16/04/2013	La Fira del Coneixement de Berga incentiva la recerca i la investigació davant d'uns 800 estudiants	dbergueda.cat
16/04/2013	Troben al riu Ter, a l'altura de Ripoll, un bacteri resistent als antibiòtics	El Punt Avui
16/04/2013	Troben al riu Ter, a l'altura de Ripoll, un bacteri resistent als antibiòtics	El Punt Avui (digital)
18/04/2013	I+D+i: Encontrada una nueva bacteria multiresistente, del género Aeromonas, aislado en el río Ter en Ripoll (Girona) por investigadores del ICRA.	Aguas Residuales.info
23/04/2013	Un total de 800 estudiants i estudiantess de secundària visiten la 3ª Fira del Coneixement a Berga	Upc.edu
24/04/2013	Investigadores del ICRA hallan una nueva bacteria multiresistente, del género aeromonas, aislada en el río Ter	iAgua.es
08/05/2013	Las universidades - Islas Baleares	El Mundo - Suplemento especial
14/05/2013	Article d'opinió: Manel Poch - Turisme i aigua de primera	El Punt Avui
14/05/2013	Presentació del Pla Estratègic del Campus d'Excel·lència Internacional Euromediterrani del Turisme i l'Aigua com a element dinamitzador del Territori	Uib.es
15/05/2013	El sector privat ajuda la UdG en la nova direcció del seu campus d'excel·lència	El Punt Avui
15/05/2013	Els empresaris demanen a la universitat rendibilitat de la inversió en innovació	Diari de Girona
17/05/2013	El conseller d'Empresa i Ocupació clou les jornades de presentació del Pla Estratègic del Campus d'Excel·lència de Turisme i l'Aigua de la Universitat de Girona	Gencat
19/05/2013	Al servei del territori, un gran focus d'atracció	El Punt Avui
27/05/2013	El problema de las aguas contaminadas	Consumer.es
27/05/2013	Qué hacer con las aguas contaminadas	agromeat.com
27/05/2013	Un estudio confirma la presencia de contaminantes de retardantes de llama en células hepáticas y alerta sobre sus efectos tóxicos en humanos	Noticias Médicas
28/05/2013	Hallan un compuesto químico tóxico en células hepáticas humanas	La Razón (digital)
28/05/2013	Hallan un compuesto químico tóxico en células hepáticas humanas	Menéame
28/05/2013	Troben retardants de flama en cèl·lules hepàtiques d'humans	Nació digital
28/05/2013	Un estudi confirma la presència de contaminants de retardants de flama en cèl·lules hepàtiques	gdiari.cat
28/05/2013	Un estudi confirma la presència de contaminants de retardants de flama en cèl·lules hepàtiques	ACN
28/05/2013	Un estudi confirma la presència de contaminants de retardants de flama en cèl·lules hepàtiques	Vilaweb
13/06/2013	Màster Tecnologia de l'Aigua (UdG) http://www.youtube.com/watch?v=uPWZ6CoOLoI	Tv GIRONA
21/06/2013	Ja hi ha guanyadors de les beques 2013 del Patronat Francesc Eiximenis	Diputació de Girona
22/06/2013	Un estudi revela la simpatia gironina pels Aliats en la I Guerra Mundial	Diari de Girona
26/06/2013	Beca Eiximenis per a 'La Gran Guerra a les comarques gironines'	El Punt Avui
11/07/2013	demEAUmed: Proyecto de investigación sobre el ciclo cerrado del agua en instalaciones turísticas mediterráneas	iAgua.es
11/07/2013	Entrevista a Marta Llorca a la televisió de Girona referent al projecte de la beca Francesc Eiximenis	Tv Girona
18/07/2013	L'ICRA aportarà les seves tecnologies al turisme de la Costa Brava	Parc Científic i Tecnològic Universitat de Girona
19/07/2013	Una tesis doctoral estudia el problema de los fármacos en aguas residuales de manera multidisciplinaria	iAgua.es
22/07/2013	Una tesi doctoral estudia el problema dels fàrmacs en aigües residuals de manera pluridisciplinària	Presspeople.com
26/07/2013	Tornen a denunciar l'impacte dels purins a Osona	Nació digital
28/07/2013	El nou 'balneari' del GDT	El 9 Nou (digital)
07/08/2013	Reportatge Que és el ICRA a www.aguasresiduales.info	Aguas Residuales.info
24/09/2013	Cataluña independiente: día uno	ABC (digital)
24/09/2013	Model de referència internacional	El Periódico de Catalunya
24/09/2013	Modelo de referencia internacional	El Periódico de Catalunya
30/09/2013	Animals d'avui i ahir, al Museu de l'Esquerda	El 9 Nou
02/10/2013	La consellera d'Ensenyament afirma que "no hi ha equitat si no hi ha eficàcia en el sistema"	Gencat
02/10/2013	La consellera d'Ensenyament afirma que "no hi ha equitat si no hi ha eficàcia en el sistema"	Presspeople.com

10. Selected news & press

02/10/2013	La consellera d'Ensenyament afirma que "no hi ha equitat si no hi ha eficàcia en el sistema"	GironaNoticies.com
02/10/2013	Los contaminantes emergentes, protagonistas en unas jornadas organizadas por la ULPGC	universocanario.com
03/10/2013	La Comisión Europea destina 1,3 millones de euros a la investigación del ciclo del agua	iAqua.es
04/10/2013	El ICRA recibe 1,3 millones de fondos europeos para impulsar tres proyectos	Finanzas.com
05/10/2013	1,3 millones de la CE per a tres projectes	La Vanguardia
05/10/2013	1,3 millones de la CE para tres proyectos	La Vanguardia
07/10/2013	Inyección de 1,3 millones de Europa	Expansión
08/10/2013	L'ICRA, soci de la UdG en el Campus e-MTA, aconsegueix 1,3 MEUR en projectes de recerca europeus	Universitat de Girona
08/10/2013	L'ICRA, soci de la UdG en el CEI e-MTA, aconsegueix 1,3 MER en projectes de recerca europeus	Presspeople.com
11/10/2013	El repte local de la sostenibilitat	Diari de Sant Cugat
14/10/2013	L'Entrevista del Notícies Vespre amb Sergi Sabater, subdirector de l'ICRA	Tv Girona
24/10/2013	Jornada de presentació del Ecosistema Innovador del Agua del Campus e-MTA	iAqua.es
27/10/2013	L'ICRA demana ajut al Parlament Europeu	Ara
14/11/2013	L'Institut Català de la Recerca de l'Aigua forma professorat de Secundària	Diari de Girona
16/11/2013	Las instalaciones del ICRA financiadas por la UE funcionan 'a pleno rendimiento'	ABC.es
17/11/2013	El 47% de los acuíferos catalanes está contaminado	elquiosco.net
17/11/2013	El 47% de los acuíferos catalanes está contaminado	El País
17/11/2013	Ensenyament promourà la divulgació científica amb més d'un centenar de conferències durant la Setmana de la Ciència	Gencat
22/11/2013	Experts en sostenibilitat	El Punt Avui
25/11/2013	El director del ICRA nombrado Doctor Honoris Causa por la Universidad Griega de Ioánima.	Aguas Residuales.info
27/11/2013	El Ieridano Damià Barceló Honoris Causa en Grecia	Segre
27/11/2013	El lleidetà Damià Barceló, 'honoris causa' a Grècia	Segre
27/11/2013	Las charcas también respiran	Menorca
27/11/2013	Las empresas catalanas del sector del agua unen fuerzas para ganar peso internacional	Interempresas.net
28/11/2013	Las empresas catalanas del sector del agua unen fuerzas para ganar peso internacional	Construnario.com
03/12/2013	Canvis turístics en el tercer curs en línia, a la UdG	El Punt Avui
12/12/2013	Investigadors de l'ICRA participen en un projecte europeu de sensors marins	Diari de Girona
15/12/2013	ICRA - Projecte europeu de laboratoris flotants	La Vanguardia
15/12/2013	ICRA - Proyecto europeo de laboratorios flotantes	La Vanguardia
19/12/2013	Entrevista a Sara Rodríguez, investigadora de l'ICRA, sobre el projecte europeu de laboratoris flotants	RNE



www.icra.cat

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