



Report 2012



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



Girona

GIRONA

POLÍGON DE SANT FELIU

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Cami Serra de Gestraça

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Cami de Mige

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Report
2012



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Report 2012

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Presentation 01.

Damià Barceló
Director of the ICRA

During this preface I would like to review the most relevant activities performed during 2012.

On 22 May 2012, ICRA set up a facility for artificial rivers. The installation consists of 24 experimental rivers assembled in the **Experimental Streams Facility (ESF)**. This facility is unique in Europe for its degree of automation and control, and is comparable to other facilities in Vienna, Berlin and London, and with that in the Environmental Protection Agency (EPA) in Cincinnati, Ohio, USA. The ESF will allow ecotoxicological tests to determine, for example, the concentrations of chemicals products that affect river ecosystems, as well as testing for experimental research in aspects of climate change. It will also make it possible to predict and manage more efficiently the effects of drought on organisms, and to improve the management of water quality after a sewage treatment plant. The importance of conducting experiments in mesocosms at laboratory level lies in the fact that they help to predict how environmental changes can affect the condition of rivers and ecosystem services that derive from these ecosystems, together with the corresponding economic impact. We believe that this experimental streams facility at ICRA can help to improve management of river basins.

In June 2012, the nine members of the Public Administration and Business Mixed Committee were proposed to enhance the **link between ICRA and the society and business network**.

On 5 and 12 June 2012, in Barcelona and Brussels, respectively, ICRA presented a **Strategic Research Agenda**, SRA from the ACC1Ó funded network led by our institute and named as Group Connect-EU Water or Water.cat. This group includes a total of 35 companies, 20 research groups and organizations and 6 administrations, and its main aim is to present the priorities and strategies on water and obtain European funding for Catalan R&D&i. Esther Llorens, postdoc researcher of the Technologies and Evaluation Area of ICRA and coordinator of Group Connect-EU Water, said during the presentation that "the SRA of Connect-EU is a reference document for decision-making in R&D&i policy on the subject of water, and also a tool for defending Catalan interests in Europe in this field."

We have also been actively **involved in national and international technological platforms** (PTEA, PLANETA, WssTP, META), contributing to the drafts of strategic implementation plans and future calls relating to different European initiatives in the field of water, and on the scientific board of the Catalan Water Partnership, an association with innovation companies in the field of water. Similarly, researchers of the institute became members of the management committees of different specialist and/or working groups of the IWA (International Water Association), such as MIA (Modelling and Integrated Assessment), LCA (Life Cycle Assessment), GHG (Greenhouse Gas Emission), BSM (Benchmarking of Control Strategies for Wastewater Treatment Plants), ICA (Instrumentation, Control and Automation), etc.

In spring 2012, following a study that began in 2010, together with researchers from the Institute of Environmental Assessment and Water Studies (IDAEA from CSIC) and the Polytechnic University of Catalonia, the journal ***Science of the Total Environment*, vol. 424** published a pioneering study on drugs of abuse in Barcelona urban groundwater. **This is the first worldwide study** on drugs in urban groundwater - a highly detailed study of wastewater that provides us with information on the status of Barcelona's wells in the event of drought. Also of note is **the publication for the first time** in Europe in the journal ***Science of the Total Environment*, vol. 431** together with researchers from the Institute of Environmental Assessment and Water Studies (IDAEA from CSIC), University of Valencia and Institute of Analytical Research of Idstein, Germany, the first results of perfluorinated compounds in tap water in Spain and Germany. These compounds are not yet regulated in Europe for drinking water, although they are regulated in the US, where a law has required monitoring of six perfluorinated compounds in tap water since 2013, applicable to all companies that supply drinking water.

The impact that some of our research output has had on society can be seen in the case of Johnson & Johnson, the largest personal hygiene products company in the world. Taking into account the results of our work and others, the company withdrew four of its products from the market. This initiative took place as a result of studies conducted and published in 2010 by ICRA researchers from the Resources and Ecosystems Area on a substance called triclosan— (*Triclosan persistence through wastewater treatment plants and its potential toxic effects on river biofilms*. ***Aquatic Toxicology*, vol. 100-4**, 2010). The study described how toxic effects of triclosan on the water cycle persist in river systems, even after processing in sewage treatment plants.

In November 2012, in Valencia, ICRA, the Institute of Environmental Assessment and Water Studies (IDAEA-CSIC), the University of Valencia, and the Polytechnic University of Valencia, as part of the project Consolider-Ingenuo 2010 SCARCE (2009-2014), organized the **3rd Annual Conference: Bridging toxicants, stressors and Risk-Based Management under water scarcity**. Also in the framework of the SCARCE project, two special issues in the journal ***Environmental Science and Pollution Research*, vol. 19-4** and in the journal ***Science of the Total Environment*, vol. 440**, were published.

Significant impact on the wastewater treatment research community was achieved by the publication of the research paper ***Automatic control systems for submerged MBR: a state-of-the-art review (Water Research, vol. 46)***. The paper was co-authored by Ignasi Rodríguez-Roda, head of ICRA's Technologies and Evaluation Research Area.

A comprehensive **field study in Spain and pioneer in Europe**, conducted at ICRA, **detected for the first time** pharmaceutical residue levels in various species of fish

from the Ebro, Llobregat Xúcar and Guadalquivir rivers. The accumulation of these drugs carries risks for long-term aquatic systems. This work, which has already been tested in the laboratory, is the result of the labour of ICRA researchers Belinda Huerta, (predoctoral student), Anna Jakimska (predoctoral student, University of Technology, Gdansk, Poland, and visiting ICRA), Meritxell Gros (postdoc researcher), and Sara Rodríguez-Mozaz (research scientist).

I would also emphasize the publication of the book ***The Llobregat: The Story of a Polluted Mediterranean River***, edited by Sergi Sabater (Deputy Director of the ICRA), Antoni Ginebreda (research professor IDAEA-CSIC) and myself in ***The Handbook of Environmental Chemistry*, vol. 21** from Springer Verlag. This book highlights the available information, with emphasis on the hydrological, chemical and biological elements interspersed in the river. Experts in the field discuss the main nutrient patterns and pollutant occurrence, and the responses of the biological quality elements as well as the river ecosystem to overall natural and man-made influences.

Another significant publication related to our long experience in developing environmental decision support systems (DSS) is the book ***Decisions on urban water systems: some support***, authored by Manel Poch (ICRA-UdG), Ulises Cortés (UPC), Joaquim Comas (UdG), Ignasi Rodríguez-Roda (ICRA-UdG) and Miquel Sánchez-Marré (UPC) and published within the framework of the NOVEDAR-Consolider research project. The book combines basic theory with personal comments of the authors and colleagues to summarize the numerous DSS developed and successfully applied for planning, design, operation and maintenance of urban and industrial wastewater treatment facilities.

In October 2012, I was awarded the 2012 **Prince Sultan Bin Abdulaziz International Prize for Water of Saudi Arabia** in the category of **Water Management and Protection** for 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.

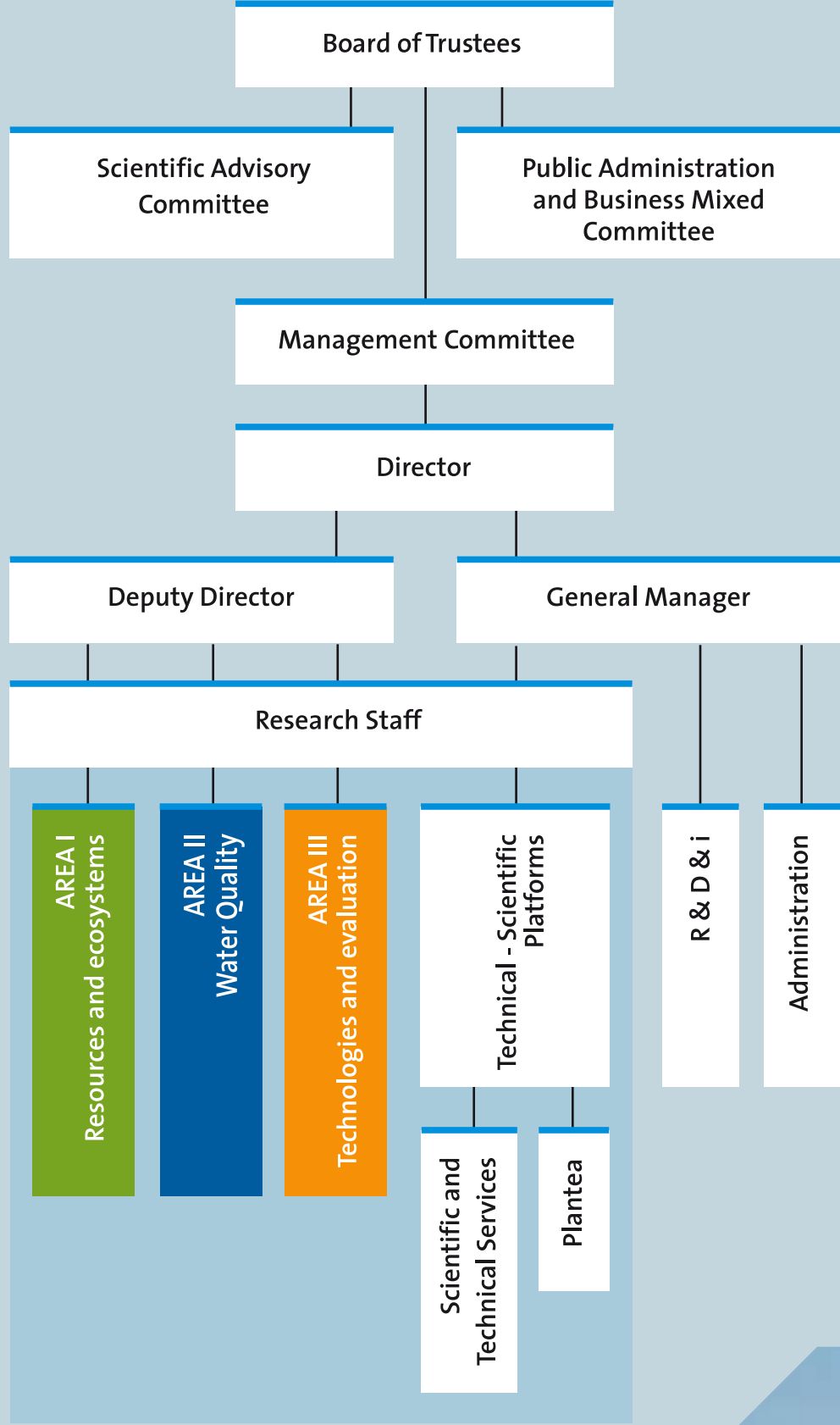
Overall, in 2012, ICRA scientific and citizen communication activities have included **162 publications** in international scientific journals, books and other publications, and **251 reports** in the media.

I hope that this report does full justice to the ICRA's achievements in furthering its mission to become an international, multidisciplinary water research centre.

Damià Barceló
Director of the ICRA

Organisation

02.



Board of trustees

The Board of Trustees is the ICRA's highest governing body. In 2012, 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 2012, the Board of Trustees held ordinary meetings on 01/06/2012 and 20/11/2012.

Members

CHAIRMAN

Andreu Mas-Colell

Minister for Economy and Knowledge
Ministry of Economy and Knowledge
Regional Government of Catalonia

DEPUTY CHAIRWOMAN

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Chancellor
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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

TRUSTEE SECRETARY

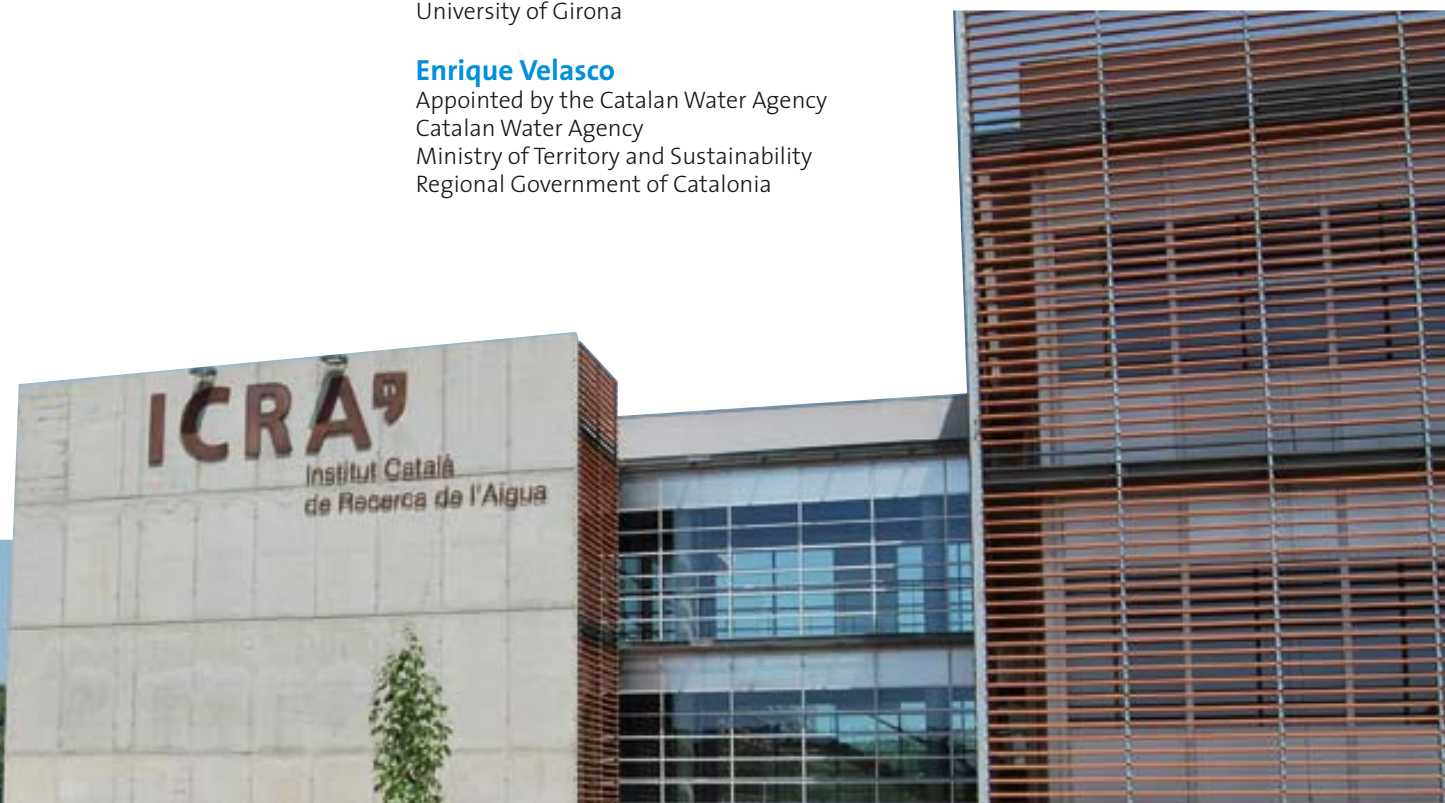
Lluís Rovira

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

NON-TRUSTEE DEPUTY SECRETARY

Josep M. Alcoberro

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



Committees

Scientific advisory committee

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

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



**Bernd
Bilitewski**

Chair of the Scientific Advisory Committee, 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 (2010-2012)



**Harindra Joseph S.
Fernando**

Director of the Environmental Fluid Dynamics Program, Department of Mechanical and Aerospace Engineering, Arizona State University, Tempe (USA) (2010-2012)



**Nancy
B. Grimm**

Former President of the American Ecology Association. Head of the Central Arizona-Phoenix Long Term Ecological Research (LT ER) Project. Professor of Life Sciences, School of Life Sciences, Science-Arizona State University, Tempe (USA) (2010-2012)



**Juan Manuel Lema
Rodicio**

Head of the Bioprocesses and Environmental Engineering Group. Faculty member of the Department of Chemical Engineering, Institute of Technological Research, University of Santiago de Compostela, Santiago de Compostela (ES) (2010-2012)



**Gustaf
Olsson**

Emeritus Professor of Industrial Automation, Department of Industrial Electrical Engineering and Automation (IEA), Lund University, Lund (SE) (2010-2012)



**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) (2010-2012)



**Edward
Furlong**

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

In 2012, we renewed some of the periods on the advice of scientists on the committee and we thank **Isabel Barcina López** and **Silvio Funtowicz** the work carried out during 2010-2011 and part of 2012. We also welcome a new member, **Jörg Overmann**, for 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, Cemagref/IRSTEA, Lyon (FR) (2012-2014)



**Emilio Custodio
Gimena**

Emeritus Professor at the Department of Geotechnical Engineering and Geosciences, Groundwater Research Team, Polytechnic University of Catalonia, Barcelona (ES). Correspondent member of the Royal Spanish Academy of Sciences. President of the Advisory Committee of the Fundación Centro Internacional de Hidrología Subterránea. (2010-2012)



**Georg
Teutsch**

Scientific Managing Director of the Helmholtz Centre for Environmental Research (UFZ) in Leipzig, Germany (DE), and Full Professor of 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) (2012-2014)



Public administration and business mixed committee

The Public Administration and Business Mixed Committee is the body for business participation in the Foundation. It may be consulted by the Board of Trustees and by the Director, and can give recommendations in an advisory capacity.

In 2012, nearly twenty consultations were made with companies and institutions to identify people who could

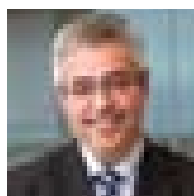
be proposed as members of the Business Committee and who meet the specified criteria and are widely acknowledged in the water sector. Its constitution is scheduled for 15 January 2013.

The proposed members are:



Sergi Martí Costa

Engineer specializing in Industrial Chemistry from the Polytechnic University of Catalonia (UPC), and Master in Environmental Management and Engineering (UPC) and in Business Administration (University of Nottingham and IESE). He is currently Managing Director of the company STENCO (water treatment sector), founded in 1965 by his family and where he has worked for 20 years. He also created the companies Aqua Ambient Ibérica and Training Industrial, of which he is also the Managing Director. He is the president of the association AQUA SPAIN, bringing together leading water treatment companies in Spain and Vice President of the Spanish Technology Platform for Water (PTEA).



Jaume Carol Pañach

Industrial engineer from the Polytechnic University of Catalonia (UPC). In 1991 he joined Fluidra to develop the technical and industrial area of the company. He was responsible for the industrial division of Europe and has designed and led the implementation and industrial expansion of FLUIDRA in China. When Fluidra went public, he was appointed acting Managing Director of the group, a position he currently holds. He collaborated actively in the creation of cluster policy in Catalonia. He is currently the president of the Catalan Water Partnership (CWP), the Catalan water cluster, and is a member of the board Cluster sport (Indecat).



Manuel Farré Torras

Industrial engineer from the Polytechnic University of Catalonia (UPC) and PDD, trained at the IESE business school of Barcelona. His professional career has always been linked to the field of water and began in 1992 with AQUATEC / AQUAPLAN (Agbar Group), specializing in engineering projects, cleansing treatments, industry and planning. He is currently the Director of the Products and Solutions Area of ADASA (Group COMSA EMTE) that integrates R&D&i, software solutions, marketing, after sales service and manufacturing products related with the cycle of water.



Tomás A. Michel Mayer

Managing Director of CETaqua and director of R&D&i at AGBAR. He was previously director of Export at DEISA (Grupo COMSA) and USF Station Manager. He trained as a microbiologist at the University of California, Davis. His professional specialties include microbiology, engineering, treatment of both urban and industrial drinking water, process and waste water. He is a manager with extensive business knowledge, including export markets, with extensive experience in the field of water treatment and industrial cities.





Jorge Juan Malfeito Sánchez

Director of R&D&i at ACCIONA Agua S.A. He has a degree in organic chemistry from the Universidad Complutense, Madrid, a master's degree in polymer science from the Autonomous University of Barcelona (UAB) and the Institute of Polymers Science and Technology, of the Spanish National Research Council (CSIC). He specializes in polymer reverse osmosis membranes. From 1994-2006 he was Director of R&D&i at PRIDESA.



Xavier Tristán Prat

Civil Transportation Engineer (1982) from the Polytechnic University of Catalonia (UPC). From 1 December 2011 to the present he has been the acting manager of CCB. In 1985, he joined the Consortium of the Costa Brava (CCB) as an engineer responsible for technical services, with jurisdiction over the areas of water supply and water treatment. This organization stands out for its work in planning infrastructure and services, management and control of facility maintenance, and project design and management. Between April 1999 and May 2000, he combined his work at the CCB with his work as head of civil engineering for Girona Provincial Government. He was recently appointed to the Advisory Council for the Sustainable Development of Catalonia (CADS).



Joan Gaya Fuertes

Industrial engineer from the School of Industrial Engineering of Barcelona, and Master in business administration and management from the Polytechnic University of Catalonia (UPC). He is currently an environmental consultant. He was manager of the Consortium for Integrated Management of Water of Catalonia (CONGIAC), until his retirement in 2012, and professor at the University of Girona (Girona), tasks that he combined with his role as advisor on environmental matters at the Federation of Municipalities of Catalonia. His career has been closely linked to water, waste management and the environment, and he has been an advisor on these subjects in various regional and municipal governments. He was a member of the Girona City Council (1983-91) and member of the Management Board of the Health Board and the Catalan Water Agency (1984-2005).



Jesús Gómez del Blanco

Managing Director of Recipharm Parets S.L.U., the Spanish subsidiary of Recipharm AB (Sweden). He graduated in Economics and Business from the University of Barcelona (1984) and has a Master's degree in Business Administration (MBA) from ESADE (1988). He was Plant Manager at Abbott Healthcare, S.A.U. from 2002 to 2010.



Josep Arráez Escrig

Graduate in Industrial Chemistry. Since 1993, he has been Manager of the Consortium for the Protection of the Besòs River Basin. Previously, he played a technical role HIDROMAR, S.A. construction company specializing in the installation of water treatment plants and industrial wastewater treatment (1973-1977). Senior engineer at AQUATEC, S.A./AQUAPLAN, S.A. an engineering consultancy specializing in drinking water, industrial water, wastewater, and sector plans (1977-1987), and area Director of SEAR, S.A., a company specializing in the operation and maintenance of sewage treatment plants and industrial work (1987-1993).



Departments & Staff

In 2012, 88 people contributed to the ICRA's R&D&i activities:

- 71 Research personnel
- 14 Management/Administration personnel
- 3 R&D&i Personnel



DIRECTOR



Damià Barceló

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

DEPUTY DIRECTOR



Sergi Sabater

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



GENERAL MANAGER



Iván Sánchez

General Manager

EXECUTIVE SECRETARY



Olga Corral

PA to Managing Director

R&D&i Support Services

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

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



From left to right: Iván Sánchez (General Manager), Pere Royo (Reception), Ricard Zamora (Maintenance), Rubén Díaz (IT), Emma Collelldevall (Human Resources Head), Isaac Graboleda (Accounting), Lourdes Balmisa (Administration support to research), Xavier Frigola (Eco-Fin Head), Lluís Torné (Reception), Olga Corral (PA to Managing Director), Anna Cornella (Communication)

In 2012, the active administrative services that have performed specific functions within each field of activity have been:

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

The **Outsourcing Service** has taken responsibility for 3 types of contract: services, supplies and construction, with the goal of providing the 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 also received funding from MINECO (The Spanish Ministry of Economy and Competitiveness), directly and through the Third Additional Provision (DA3ª) of the Catalan Statute of Autonomy.

R&D&i Office

Throughout 2012, 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.

In January 2012, we recruited **Anita Geiszing** as technical support for transfer. Her contract is financed by a grant awarded in 2011 by the Ministry of Economy and Competitiveness (PTA-2011-5380-T) for the 2012-2014 period. The aim is to generate awareness among the ICRA's researchers of the opportunities for scientific and business applications of the knowledge obtained from research.

The R&D&i Office has participated actively with the leadership of the project CONNECT-EU Water to enhance our contact with the production sector and to transfer the results from research. CONNECT-EU Water is a network made up of water companies and research centres in Catalonia. The aim of the network is to identify the needs in the R&D&i sector and to lobby at European level for the internationalization of Catalan companies in the water sector. This project has been funded by ACCIÓ (Exp. XCEU10-2-0001).

Within the framework of this project and as part of the professional practices of the Permanent Education Institute (IDEC) of University Pompeu Fabra, in 2012, **Joaquim Antolin Carol** has been doing practical work experience relating to his Master in Science, Medical and Environmental Communication.

Finally, with regard to the activity of research management, in 2012 we processed and managed 85 proposals for funding for new projects. Of these, 55 were submitted to various agencies for funding, and a total of 21 have been approved and are currently ongoing.



From left to right: Jaume Alemany (R&D&i Office Manager), Zuria Aguilar (Project Manager), Joaquim Antolin (Internship Student), Anita Geiszing (Technical Support for transfer).

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 offers a quality service to researchers by helping them in 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-ACCIÓ,-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 on the economic and financial aspects of the research.

Technical and scientific platforms

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

In 2012, the technical and scientific platforms have been consolidated in order to offer a quality scientific and technical support service to researchers. Also the SCT have made continuous training and specialization of technicians.

These platforms are:

- > Scientific and Technical Services (SCT)
- > Water Science and Technologies-Research Platform (PLANTEA)

Scientific and Technical Services (SCT)

Scientific and Technical Services (SCT) of ICRA provide comprehensive research support, from the design of experiment to the data processing. The services consist of core facilities, technical advanced equipment and experienced human resources on behalf of an overall analytical solution for both ICRA users and external institutions.

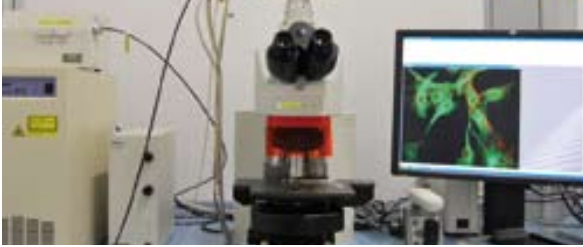
The aim of the Scientific and Technical Services (SCT) is to provide highly qualified scientific support as a response

to consultancy and testing requirements generated in the course of research and technology transfer projects, as well as the provision of services to companies and organizations.

The products and services offered by the SCT are conceptualized in spread sheets that allow dissemination of offered services.



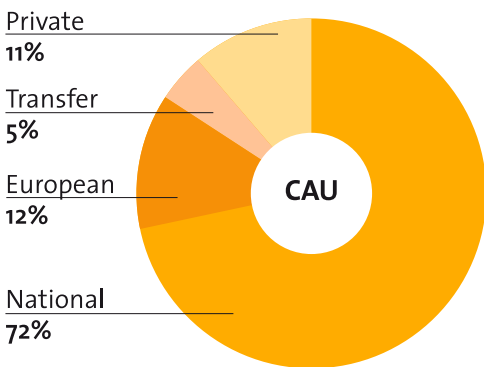
From left to right: Sara Insa (ICRA Head of SCT), Natàlia Serón (Technician CAU unit), Àlex Sànchez (Technician BMTU and MU units), Marta Villagrasa (ICRA Head of SCT) and Olga Montojo (Technician CAU unit).



2012 - SCT Report Services

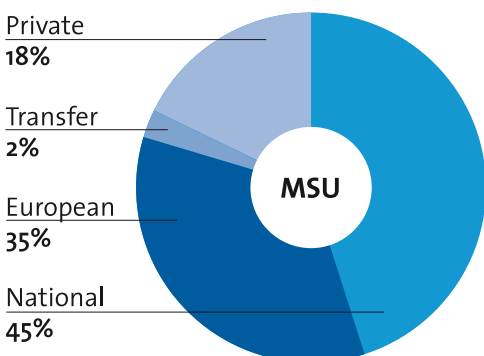
To meet the needs of the whole ICRA community, the SCT are organized in the following structures:

Chemical Analysis Unit (CAU)



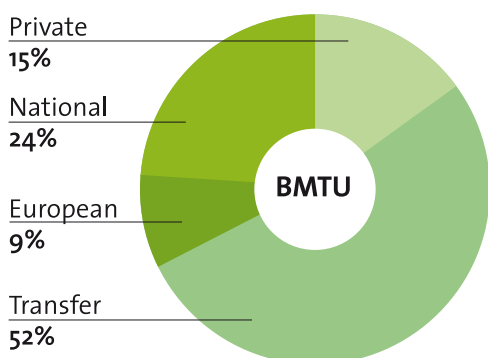
Water characterization is a valuable tool for making decisions about future uses, treatments and protection policies. In this regard, the Chemical Analysis Unit (CAU) offers high technology instrumentation combined with a professional staff for analytical measurements in different water matrices, which generally run according to standardized protocols.

Mass Spectrometry Unit (MSU)



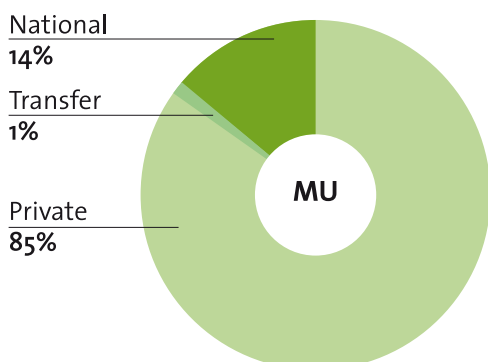
The Mass Spectrometry Unit (MSU) comprises state-of-the-art mass spectrometry expertise. Cutting-edge equipment is available for developing quantitative methodologies to determine priority organic compounds in environmental samples (pharmaceuticals, endocrine disruptors, etc.) as well as for identification purposes.

Biological and Molecular Techniques Unit (BMTU)



The Biological and Molecular Techniques Unit (BMTU) focuses on molecular characterization of microorganisms in environmental samples (AND and ARN extraction, detection, identification and quantification of phylogenetic and functional marker genes). The BMTU provides an analytical potential to meet the current challenges in the field of molecular microbial ecology of aquatic systems.

Microscopy Unit (MU)



The Microscopy Unit (MU) gives to ICRA researchers the infrastructure and technical support needed for the application of microscopy in various fields of investigation. The Unit's equipment makes it possible to perform experiments in advanced microscopy (gen expression studies, 3D analysis, cell quantifications, FRAPS FRET, etc.).



(Photo: the training day 15/11/2012, left Natàlia Serón (SCT-ICRA) in the center with some teachers from secondary schools and right Raquel Mallorquí, teacher of the Sant Jordi School, Palafrugell)

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 (DA3^a) of the Catalan Statute of Autonomy.

The PLANTEA platform was consolidated in 2012, with two groups of research facilities with two different objectives:

> **Study of the wastewater transport and treatment systems in pilot-scale installations mimicking full-scale systems.**

> **Study of fluvial ecosystems under different conditions in an Experimental Streams Facility (ESF).**

To explore the first objective, several pilot plants have been constructed and operated to mimic real wastewater transport and treatment systems. Two pilot-scale sewer systems simulating two rising mains from a sewer network have been operated in 2012. Most 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, which is responsible for bad odours and is toxic at certain concentrations, and methane, which, after carbon dioxide, is the most potent greenhouse gas today. These pilot sewer 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 facilities, 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.

Six sequencing batch reactors (SBRs) have been also constructed and operated in 2012. These reactors are completely controlled and monitored and allow the study of different biological processes occurring in wastewater treatment plants during the removal of nutrients. Current investigations focus on unravelling the mechanisms behind nitrous oxide (N₂O) production during nitrification and denitrification, key processes for removing nitrogen from wastewater. N₂O is a potent greenhouse gas, 310 times more powerful than carbon dioxide, and its

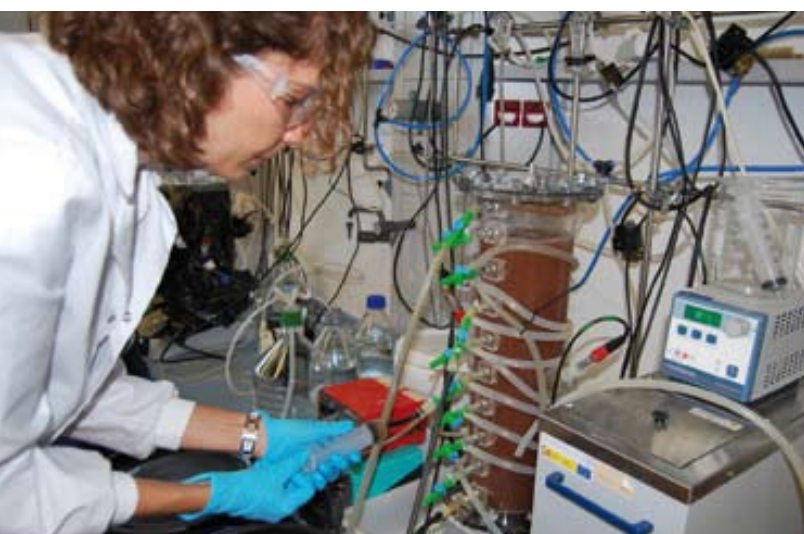
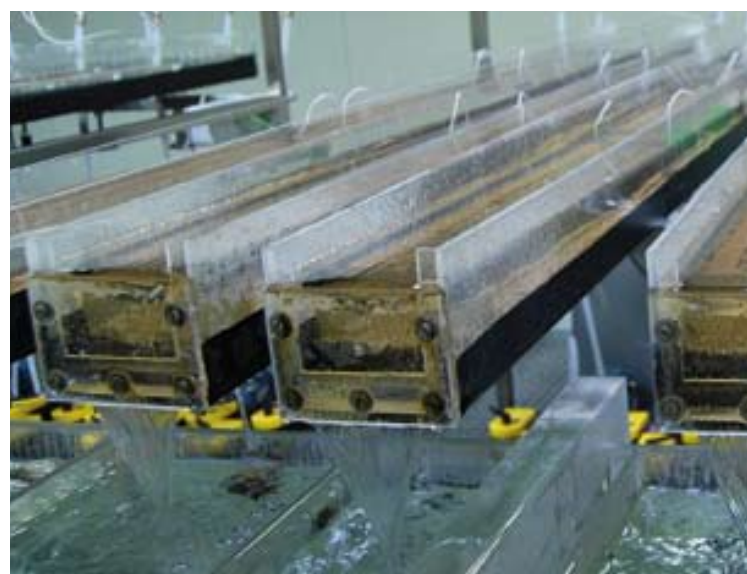


uncontrolled emission from wastewater treatment processes has been attracting the attention of the research community in recent years. The operation of these SBRs within the PLANTEA platform has made it possible to identify some of the main factors contributing to the formation and subsequent emission of N₂O during wastewater treatment. Currently, research focuses on the development of mitigation strategies that could be implemented in those wastewater treatment facilities that present high emissions of this greenhouse gas.

Finally, a membrane bioreactor pilot plant has been operating in 2012 to study a novel application of membrane technology focusing on sludge thickening.

The projects that have benefited from the PLANTEA platform during 2012 are: SGHGEMS-Sulfide And Greenhouse Gas Emissions From Mediterranean Sewers (EU Marie Curie Reintegration grant), NITRI-GHG- Exploring novel nitrifying pathways to minimize greenhouse gas emissions from WWTPs (EU Marie Curie Career Integration Grant), GEISTTAR - Gases de Efecto Invernadero en los Sistemas de Transporte y Tratamiento de Aguas Residuales: Evaluación de las Emisiones (MINECO, Gobierno Español), EMPN2o - Estudio de los mecanismos de producción del óxido nitroso en los procesos de tratamiento de aguas residuales para el control de estas emisiones en depuradoras (MINECO, Proyectos de Internacionalización, Gobierno Español), VITEMESP - Feasibility study of membrane technology for WAS thickening (CDTI - Acciona), Estudi de les emissions de gasos d'efecte hivernacle durant el procés de nitrificació (Ramon y Cajal, Ministerio de Ciencia e Innovación), and MBRControl - Development and validation at full scale of an MBR air-scour control system (OHL Medio Ambiente INIMA SAU).

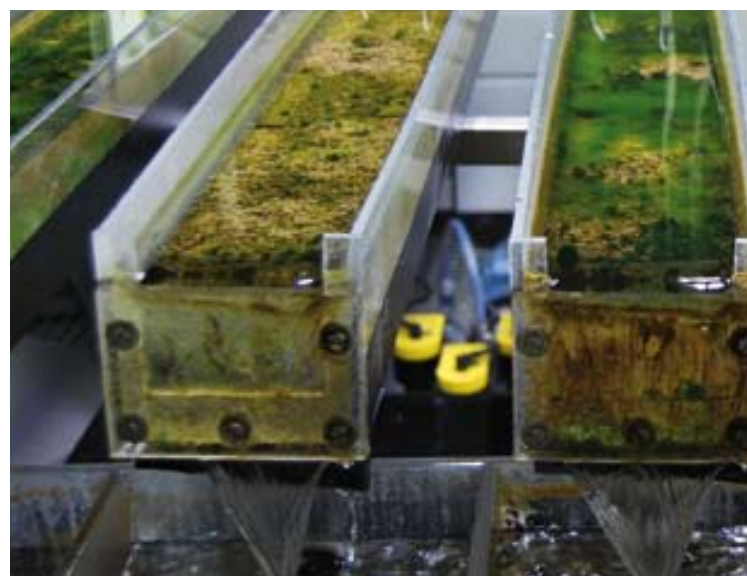
Different biofilm growth stages



For the second goal, on 22 May 2012, we set up a facility for artificial rivers.

This second section includes the study of the behaviour of ecosystems in different conditions throughout the installation of an **Experimental Stream Facility (ESF)**, which allows the manipulation of different ecological variables and the characterization of the ecosystem response.

A facility with 4 functional units with 6 artificial streams each has been designed and built at the ICRA, allowing experiments with 24 channels simultaneously, thereby providing great flexibility in experimental design (for example, 6 treatments with 4 replicates per treatment).





This facility allows the study of the behaviour of rivers in different situations, such as drought response in regard to chemical pollutants and/or biological fluctuations and temperature. It aims to play a key-role in the research activities performed by the research lines of stream ecosystems and ecotoxicology.

The facility has an automatic control system for all environmental variables: hydraulic, nutrient circulation type (recirculating or continuous), light and temperature cycles. There is also a set of sensors for monitoring environmental variables in the installation, such as water temperature, concentration of chlorine, dissolved oxygen, and light intensity.

To date, experiments have been conducted on ecological and ecotoxicological type. Specifically, we conducted an experiment to determine the effects of the long drought and the combined effect of pharmaceuticals and drought on the functioning and structure of stream biofilms within the framework of the SCARCE project (Consolider-Ingenio 2010 CSD2009-00065), as well as an experiment analysing the effect of higher night-time water temperature on the carbon balance within the framework of the GWESCB project (Marie Curie European Reintegration Grant PERG07-GA-2010-259219).

This facility is unique in Europe. We can find other similar systems in Vienna, Berlin and London, but the most similar one is in the USA, at the facilities of the Environmental Protection Agency (EPA) in Cincinnati, Ohio.

A background image showing laboratory glassware, including a pipette, a rack of test tubes, and several beakers containing liquids of different colors (red, yellow, blue). The text '03. Research Areas' is overlaid on the left side of the image.

03. Research Areas

20 people were recruited to the ICRA's 3 research areas in 2012 (9 at Resources and Ecosystems Area, 4 at Water Quality Area and 7 at Technologies and Evaluation Area). Grants have been provided to recruit researchers through competitive projects.

In the **Resources and Ecosystems Area**, **Rosana Aguilera Becker**, a predoctoral student at the ICRA, obtained a grant in 2012 under the Research Training Grant of AGAUR (2012FI-B01030).

We have recruited **Marta Terrado** as postdoc researcher with a grant awarded in 2011 under the Ministry of Economy and Competitiveness (MINECO) Juan de la Cierva Program (JCI-2011-09116).

We have recruited **Joan Pere Casas** as predoctoral student with a grant awarded in 2012 under the Ministry of Economy and Competitiveness (MINECO) Research Personnel Training Grant Subprogramme (BES-2012-059655).

Under competitive calls we have recruited: 2 postdoc researchers (**Natàlia Corcoll**, **Laurie Boithias**), 2 predoctoral students (**Gemma Piqué**, **Xisca Timoner**), 2 research technicians (**Laura Vergonyós**, **Maria Casellas**) and 1 research auxiliar (**Lluís Gómez**).

In the **Water Quality Area**, we have recruited **Daniel Lucas** as a predoctoral student with a grant awarded in 2010 under the Ministry of Education Training Programme for University Teachers (AP2010-4926).

Under competitive calls we have recruited: 3 research technicians (**M. Jesús García Galán**, **Marta Llorca**, **Sara Chamorro**).

In the **Technologies and Evaluation Area**, we have recruited **Joana Batista Marques** as an early-stage researcher with a grant awarded in 2011 under the European Project SANITAS (PITN-GA-2011-289193).

We have recruited **Anna Ribera** as a predoctoral student with a grant awarded in 2012 under the Ministry of Economy and Competitiveness (MINECO) Research Personnel Training Grant Subprogramme (BES-2012-052753).

Under competitive calls we have recruited: 1 postdoc researcher (**Anna Díaz**), 3 research technicians (**Joshua Obradors**, **Olga Auguet**, **Ignasi Aymerich**) and 1 research auxiliar (**Adrià Rubirola**).

The ICRA's Research Plan is structured in three main research areas, each one with a mission and a vision aligned with those of the ICRA. The 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:

LINES

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

During 2012, the four lines have been working.





23 researchers

1 research professor (UdG associated)
and group leader
Sergi Sabater

1 research professor (UdL associated)
Ramon J. Batalla

2 research scientists
Vicenç Acuña
Rafael Marcé

4 postdoc researchers
Marta Ricart
Elisabet Tornés
Natàlia Corcoll
Laurie Boithias

2 postdoc researchers (Juan de la Cierva)
Daniel von Schiller
Marta Terrado

6 predoctoral students
Rosana Aguilera Becker
Lidia Ponsatí
Gonzalo González
Gemma Piqué
Xisca Timoner
Joan Pere Casas

4 research technicians
Carmen Gutiérrez
Jordi Honey
Laura Vergoñós
Maria Casellas

1 research auxiliar
Lluís Gómez

1 postdoc researcher UdG
Albert Ruhí

1 predoctoral student UdG
Roberto Merciai

From left to right: in the second line, Rafael Marcé, Carmen Gutiérrez, Xisca Timoner, Ramon J. Batalla, Vicenç Acuña, Daniel von Schiller, Elisabet Tornés, Albert Ruhí, Laurie Boithias; in the first line, Joan Pere Casas, Natàlia Corcoll, Lidia Ponsatí, Gemma Piqué, Maria Casellas, Rosana Aguilera Becker, Marta Terrado, Sergi Sabater.



In 2012, the Resources and Ecosystems research area expanded its research 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 CONSOLIDER-INGENIO 2010 Project (SCARCE), now in its third year, is being carried out in collaboration with the University of Girona's Institute of Aquatic Ecology, the University of Lleida's Fluvial Dynamics Research Group, the Spanish National Research Council (CSIC), and various other research groups across Spain. Research on the dynamics of carbon in fluvial systems has continued with the CARBONET Project, now in its second year, which seeks to study the implications of global change for carbon transport and processing dynamics over networks, with a particular focus on its lentic and lotic aspects. Other research has involved collaboration with administrations such as the Catalan Water Agency (ACA) or the Ebro Water Authority (CHE), as well as with private companies (TRAGSA, ENDESA). Ongoing research is crystallizing in four predoctoral theses currently underway in the area, either directly supervised by the area's researchers or in collaboration with others; they constitute a part of ICRA's commitment to the training of advanced researchers. Furthermore, in 2012, several post-doc researchers joined the RiE Area. Natàlia Corcoll, PhD from the University of Girona, and Laurie Boithias, PhD from the University of Toulouse, became part of the staff attached to the project SCARCE. The staff of the Area was fully involved during 2012 in the preparation of several EU projects, to be decided in the coming year, and joined the COST action "Networking Lake Observatories in Europe" (NETLAKE).

AI1

Hydrological processes

Instrumentation and monitoring of fluvial processes in the River Muga have been the main tasks undertaken by the Hydrological Processes Line in 2012. Main activities encompass the installation of flow and turbidity probes in five measuring sections along the basin's drainage network. Sections have been selected owing to their relative position 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. A data base has been compiled with the primary 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 that is being completed under the CARBONET framework. Support has also been given for the preparation of the GLOBAQUA Project and the Research Contract between ICRA and Endesa S.A. The Line has also collaborated in the analysis of the impacts of the Margalef and Siurana dams on the ecosystem dynamics of the rivers Montsant and Siurana, respectively, within the Consolider-Ingenio 2010 (SCARCE) Project.



AI2

Lacustrine and reservoir systems

During 2012 the activities in this line has focused on 1) understanding the carbon cycle in Mediterranean reservoirs and weirs, 2) the effect of global changes on water quality of these storage systems, and 3) the presence of antibiotics in reservoirs and its effects on planktonic communities. The first two objectives were addressed in coordination with the research lines AI3 (Fluvial systems) and AI4 (Modelling of ecosystems and basins), through the project CARBONET. Activities in the third block was a product of the project RES2 funded by ICRA, which studied the effect of antibiotics on planktonic communities in reservoirs using an interdisciplinary approach including analytical chemistry, sequencing techniques in microbiology, and ecology. Currently, we are working on the detailed description of the effects of allochthonous organic matter on the metabolic balance in reservoirs, and the group joined 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.



AI3

Fluvial systems

This line of research has continued its work on 1) the effects of intermittent water flow in the river biogeochemistry and biota, 2) the effects of temperature regime alterations in processing of organic carbon, and 3) the effects of global change on ecosystem services. In 2012, we started working with the new facility at PLANTEA, the Experimental Streams Facility, where we performed 2 experiments in 2012. One of these studied the effect of the temporal extent of intermittency on the functioning of the stream ecosystems. The second experiment analysed the effects of warmer night-time temperatures on the daily C balance of stream ecosystems. As part of the SCARCE project, we completed several publications on the effects of climate extremes on the delivery of ecosystem services in the Llobregat and Ebro basins, and we assessed the balance between supply and delivery of the water provisioning service, a crucial issue in our climate. Furthermore, we performed a large field survey at the river segment downstream of the WWTP of Puigcerdà, in order to assess the chemical fate of several pharmaceutical compounds. In terms of the CARBONET project, we started with the field surveys at 21 sites within the Fluvià and Muga basins (NE Catalonia), and installed permanent monitoring equipment in several places within these basins, in order to achieve a detailed budget of carbon transport and processing.



15/11/2012 Training Day



AI4

Modelling of ecosystems and basins

Activities continued within the CONSOLIDER-INGENIO 2010-SCARCE Project and the CARBONET project. In SCARCE, work focused 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; 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 scarcity conditions across the Iberian Peninsula, using state-of-the-art, computing intensive statistical tools (MINE and DFA) in Undarius, the ICRA's High Performance Computing cluster. Within the CARBONET project, we started an ambitious fieldwork program to collect the necessary data to build watershed-scale models devoted to understanding carbon cycling in Mediterranean river networks.

AI Ongoing PhD dissertations at ICRA

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: Biofilm responses to water flow intermittency in Mediterranean streams.

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

Rafael Marcé

(research scientist). Centre: University of Aarhus Department of Bioscience, Marine Ecology, Roskilde, Denmark (11/8/2012 to 21/8/2012).

Rafael Marcé

(research scientist). Centre: Helmholtz Center for Environmental Research-UFZ, Magdeburg, Germany (16/12/2012 to 19/12/2012).

AI Scientific collaborators

Jhon Charles Donato-Rondón

Research professor, National University of Colombia (UNAL), Bogotá (July 2012).

Jorge Eduardo León

Predoctoral student, Instituto Acuicultura, Austral University of Chile, Chile (September-October 2012).



AI Visitors

Joana Aldekoa

Internship student, Civil Transportation Engineering Degree, Polytechnic University of Valencia, Valencia, Spain (April 2012).

Chelsea Burns

Internship student, International Affairs and Natural Resources and Sustainable Development MSc student, University for Peace (UPAZ), Costa Rica (June-August 2012).

Albert Serra

Internship student, Biology Degree, University of Girona, Girona, Spain (July-August 2012 and December 2012-May 2013).

Cristina Padullés

Internship student, Biology Degree, University of Girona, Girona, Spain (July-September 2012).

Anna Freixa

Predoctoral student, Institute of Aquatic Ecology, University of Girona, Girona, Spain (November-December 2012).



AI1 Water Quality Area

The Water Quality area's lines of research are:

LINES

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

During 2012, the AI1, AI2 and AI3 have been working.





16 researchers

- 1** research professor (CSIC associated) and group leader
Damià Barceló
- 1** research professor (UdG associated)
Carles Borrego
- 1** research professor (ICREA)
Mira Petrovic
- 1** research scientist (Ramon y Cajal)
José Luis Balcázar
- 1** research scientist
Sara Rodríguez-Mozaz
- 1** postdoc researcher
Meritxell Gros
- 4** predoctoral students
Belinda Huerta
Laura Ferrando
Elisabet Marti
Daniel Lucas
- 4** research technicians
Núria Càceres
M. Jesús García-Galán
Marta Llorca
Sara Chamorro
- 2** predoctoral students UdG
Imma Noguerola
Mireia Fillol

From left to right: Sara Rodríguez-Mozaz, Damià Barceló, Elisabet Marti, Carles Borrego, Imma Noguerola, Laura Ferrando, José Luis Balcázar, Belinda Huerta, Mira Petrovic, M. Jesús García-Galán, Núria Càceres, Daniel Lucas, Marta Llorca, Meritxell Gros.



Research in this area relates to chemical contamination of water, particularly contamination by emerging organic micropollutants and to the microbiological aspects of water quality. Regarding chemical contamination, advanced analytical methods for the determination of emerging pollutants in complex matrices such as wastewater, sediments and biota have been developed, optimized and validated using state of the art LC-MS/MS instrumentation. This has allowed the analysis of pollutants such as pharmaceuticals (including antibiotics), endocrine disruptors and anticancer drugs in various studies, within the framework of projects SCARCE and DEGRAPHARMAC, on the origin, fate, distribution and ecological impact of these pollutants in the environment and in water treatment processes. In this regard, a notable result is the pioneering study on the accumulation of pharmaceuticals in fish from Iberian rivers and widespread detection of diclofenac in fish tissue that captured much attention from the media nationwide. Special attention is also paid to the transformation processes occurring during wastewater treatment and in the aquatic environment that affect fate and behaviour of emerging contaminants. Also in relation to the elimination of micropollutants from wastewater and in the framework of the European Project ENDETECH, we are working on evaluating the efficiency of new enzymatic systems for the specific elimination of the most recalcitrant pharmaceutical compounds.

Regarding microbiological aspects, the researchers from the Area have been involved in studying how wastewater treatment plant effluents shape bacterial communities and, particularly, their effect on the prevalence of antibiotic resistance genes. The isolation of a multiresistant strain of the genus *Aeromonas* provided direct evidence that indigenous bacteria from aquatic environments affected by wastewater inputs constitute an active reservoir of antibiotic resistance genes. The conspicuous presence of antibiotics at sub-clinical concentrations in natural waters facilitates the emergence and dissemination of resistance genes among aquatic bacteria, posing a serious environmental problem, considering the different mechanisms by which microbes exchange genes. Other investigations have focused on the diversity and activity of microbial communities involved in cycling C and S in anoxic water layers and sediments of karstic lakes. In this regard, the application of different molecular techniques has permitted the study of key microbial players in relevant environmental processes such as sulphide detoxification, organic carbon recycling and biofilm formation in both natural and artificial systems.

AII1

Chemical contamination of water bodies

In 2012, the main activities of this line, within the framework of different projects were the following:

· Assessing and predicting effects on water quantity and quality in Iberian rivers caused by Global Change (SCARCE). Ministry of Economy and Competitiveness (MINECO) 2010 CSD2009-00065.

Within this multidisciplinary project, the group is actively involved in determining the environmental quality of the Mediterranean basin studied - the Llobregat, Ebro and Guadalquivir Jucar River basin - regarding to the presence of emerging contaminants. In 2012 we developed analytical methods based on the latest technology in order to provide the maximum information regarding the presence of a large number of drug compounds and endocrine disruptors, not only in water and sediments but also in biota. The evaluation of the presence of these contaminants in different environmental compartments makes it possible to assess the current condition of these Mediterranean rivers and the effect that global climate change, including climate change, could have on their chemical and ecological quality. These rivers are characterized by 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). Ministry of Economy and Competitiveness (MINECO) CTQ2010-21776-CO2-02.

This project proposes the development of a treatment process for drugs in sewage and sludge using real lignolytic fungi, which possess a powerful non-specific enzymatic system capable of breaking down a wide range of xenobiotic compounds.

In 2012, we applied the analytical methods developed for the determination of emerging contaminants such as endocrine disruptors and several families of drugs (antibiotics, analgesics, anticancer drugs, etc.) in order to evaluate the capacity of treatment technologies based on the above-mentioned fungi in real effluents, such as reverse

osmosis concentrate, wastewater from a urban hospital, a veterinary hospital, a university residence and in WWTP sludge.

The aim of this project is to test the efficiency of these systems based on lignolytic fungi to improve the quality of treated effluent and discharges, which can be free of organic micropollutants after their treatment with these fungi. The project contributes to environmental protection by providing tools to improve the quality of treated effluent discharges through the removal of organic micropollutants. It also opens up the possibility of reusing effluent and sludge treated with these fungi by industry or agriculture.

· ENzymatic DEcontamination TEChnology (ENDETECH). European Project FP7-ENV-2011-Eco-innovation. Project 282818.

ENDETECH aims to promote a novel decontamination technology based on enzymes, which can eradicate pharmaceutical compounds and EDC 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 the stability and efficiency of the catalytic enzymes.

In this project, we are evaluating the efficacy of enzyme-based treatment processes by means of combining both chemical analyses and ecotoxicological hazard assessment of the selected pollutants (antibiotics, anti-cancer drugs, hormones) and some of their transformation products (TPs).

The project will contribute to environmental protection by providing tools to improve the quality of treated effluent discharges through the removal of organic micropollutants. It also opens up the possibility of reusing effluent treated with these enzymatic systems by industry or agriculture.





AII2

Pollutants in waste water

In 2012, the main activities of this line were the following:

- **Improving sustainability of water treatment (GREEN-TECH project). New-Indigo Indian-EU partnership programme through the Ministry of Economy and Competitiveness (MINECO).**

Green-Tech is a networking project, whose objectives are to critically overview/evaluate existing green technologies and applicability of design approaches and technical standards to local conditions in India as well as in Europe, to identify most promising technologies that are still in the experimental stage and define research needs, and to facilitate efficient dissemination/exploitation of information and to improve the effectiveness in the transfer of knowledge on green technologies for wastewater treatment between EU and India. With the objective of providing a networking platform to share knowledge and experiences in sustainable water treatment technologies an international workshop *Sustainable water treatment technologies: achievements, perspectives, constraints* was organized on 10-11 December 2012 at ICRA gathering over 50 participants from Europe and India. In total 14 oral presentations and 10 posters were presented. A round-table discussion, *Wastewater treatment today and potential needs for the future: Current implementation of the Water Framework Directive (WFD) in Europe and challenges in developing countries*, was organized during the workshop.

Internal Collaborations at ICRA:

With regard to internal collaborations at ICRA, in 2012, several projects have been developed in collaboration with other researchers from ICRA. We have continued working in collaboration with the Microbiology research line and the Resources and Ecosystems (RIE) research area in different studies that aim to evaluate the generation of microbial resistance in relation to the presence of antibiotics both in natural ecosystems (reservoirs and river) and in hospital and urban wastewater. Also in collaboration with the area of RIE, we have worked on a study in the framework of the SCARCE project aimed at the natural attenuation of different pharmaceutical compounds along 4 different watersheds in Spain.

Finally, we have collaborated with the Technologies and Evaluation Area in a project on the mechanisms of degradation of pharmaceutical compounds that occur during the processes of wastewater treatment, focusing on the generation of transformation products of these contaminants.

In all these projects, participants in the line of chemical contamination of water bodies have developed specific methods for determining the pollutants of interest in different environmental matrices, in order to understand aspects such as distribution processes in the environment and the interactions and effects of these contaminants in both natural and water treatment processes.





AII3

Quality and Microbial diversity

• Analytical Determination of Sources of Organic Pollution in Waters. Human Resources Mobility Research project. Ministry of Economy and Competitiveness (MINECO).

A novel comprehensive, rapid method to identify the sources of organic pollution of natural waters and to estimate the individual source loadings has been developed. The method utilizes advanced liquid chromatography-mass spectrometry (LC-MS/MS) methodology to analyze for source “molecular markers”. The marker compounds are selected as characteristic of individual sources of pollution: the artificial sweeteners acesulfame and sucralose have been found to be excellent markers of human wastewater input; bile acids (cholic acid, chenodeoxycholic acid, lithocholic acid) and faecal sterols (cholesterol, stigmastanol, coprostanol) associated with particulates can identify inputs of animal waste; organic matter from natural sources (humic and fulvic acids). This study was performed during the 6-month stay of Dr. John Harwood from Tennessee Technological University, USA.

• Urban and industrial wastewaters as a source of pharmaceuticals in the environment.

The occurrence and distribution of pharmaceuticals in surface, underground, waste and drinking water samples collected at different sampling points in northern Serbia have been studied using a multi-residue LC-MS/MS method for the analysis of 80 pharmaceutical drugs. Forty-seven compounds of 80 drugs were found in four different types of analysed water. A widespread occurrence of pharmaceuticals in the analysed waters was proven, with levels ranging from low ng/L to more than 1µg/L, as found for some of drugs such as ibuprofen, diclofenac, codeine, valsartan, acetaminophen, 2-hydroxycarbamazepine and 10,11- epoxy carbamazepine in effluents from pharmaceutical industry that are discharged to the aquatic environment. This study represents the first attempt to assess the occurrence of pharmaceutical residues in natural and waste waters in Serbia.

Internal Collaborations at ICRA:

In collaboration with the Resources and Ecosystems Area, we have worked on the correlation of chemical and biological data collected within the framework of the SCARCE project. We have also contributed to a study aimed at the natural attenuation of different pharmaceutical compounds along 4 different watersheds in Spain.

In 2012, the main project-related activities of this line were:

• Antibiotic Resistance.

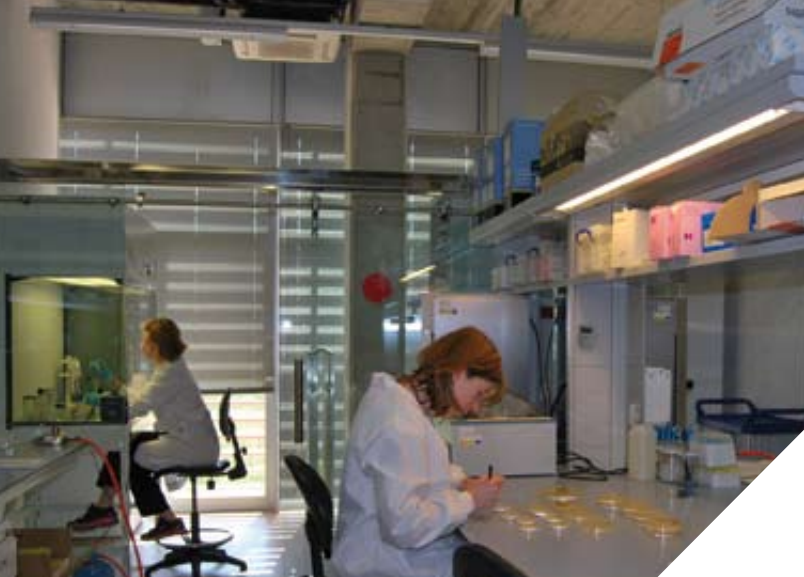
Members of this research line have been involved in studying the effect of wastewater treatment plant effluents on the prevalence of antibiotic resistance genes and bacterial community composition in the environment. Antibiotic resistance has become a major public health concern because microorganisms that cause infections are becoming less sensitive to antibiotic treatment. We have used culture-independent approaches such as real-time PCR to determine the prevalence of these resistance genes and 16S rRNA gene-based pyrosequencing to examine the composition of bacterial communities. Some of these activities have been supported by the Fundación Eugenio Rodríguez Pascual.

• Ecology of Archaea and biogeochemical cycling in stratified karstic lakes (ARCANOX).

In the framework of this project we have studied population ecology of the most abundant groups of Archaea in meso- to eutrophic, stratified karstic lakes with seasonal anoxia. We have followed archaeal population dynamics using different molecular and geochemistry high-resolution technologies to describe community composition and community assembly rules and to evaluate the impact of archaeal activity in carbon fluxes. We have also invested efforts in the design of new enrichment strategies to overcome the low cultivability of lacustrine archaea.

The Spanish government through the 2012 call of the Subprogram for Fundamental Research Projects has funded a new project entitled “Contribution of uncultured archaea to organic carbon recycling in anoxic sediments (ARCOS)” led by Dr. Carles Borrego. ARCOS will constitute one of our main lines of research for the next three years (2013–2015).





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

The diversity and activity of microbial key players in relation to sulphide detoxification and dark carbon fixation have been investigated in the oxic-anoxic boundary layer of a meromictic basin of Lake Banyoles. This study has identified a freshwater member of the genus *Arcobacter* (*Epsilonproteobacteria*) as the main component of an active microbial community thriving in the upper water layers of the anoxic, sulphide-rich monimolimnion. After monitoring this EPS community for two full-year cycles, we observed clear seasonal trends, with maximal abundances in winter. Moreover, the combination of CARD-FISH counts with in situ incubations using radiolabelled bicarbonate provided direct evidence that the *Arcobacter* population actively incorporates inorganic carbon in the dark at high rates.

We have also been involved in **internal collaborations with other research groups from the ICRA**, specifically the following:

• Together with colleagues from the Resources and Ecosystems Area, we have investigated how bacterial communities thriving in different compartments (epilithic, episammic and hyporheic) of the streambed of a Mediterranean river vary in response to changes in the hydrological regime. We have applied a molecular approach combining 16S rRNA gene fingerprinting and pyrosequencing to identify those members of bacterial communities that are resilient to drought episodes and those that are more sensitive to alterations in water regime.

• We started a collaboration in the framework of project **“Sulfide and Greenhouse Gas emissions from Mediterranean Sewers (SGHGEMS)”** led by Dr. Oriol Gutiérrez (Technologies and Evaluation Area) to investigate biofilm colonisation in anaerobic sewers in relation to physical and chemical variations in the input wastewater.

We have combined different molecular techniques to study biofilm development in terms of abundance, diversity and activity of microbial groups responsible of sulphide and methane emissions, i.e. sulphate-reducing bacteria and methanogenic archaea. The work was carried out in a laboratory system that had previously been shown to successfully mimic rising-pressure pipes including features such as hydraulics, sewage composition and biofilm growth.

• Dr. José Luis Balcázar has also taken part 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 (Research Scientist Ramon y Cajal at the ICRA).

AII Ongoing PhD dissertations at ICRA

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: Elisabet Marti

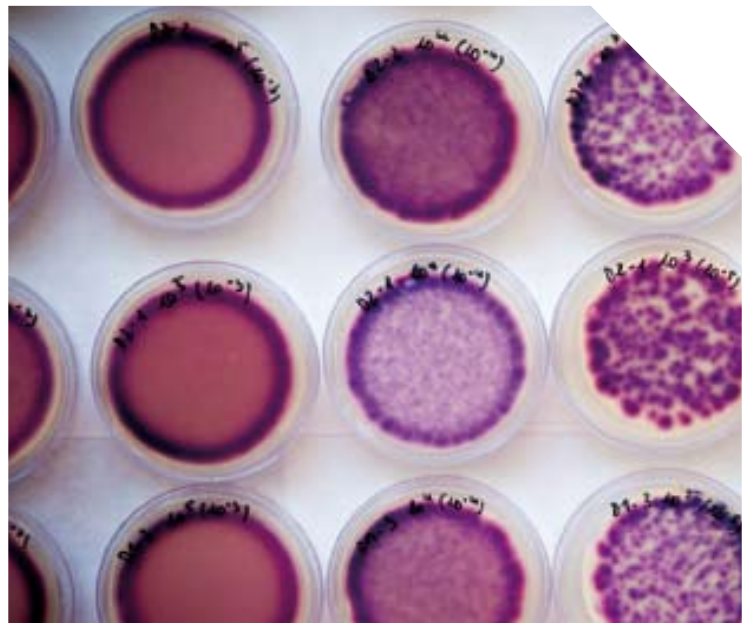
Title: Efecto de los antibióticos sobre la diversidad y el resistoma de comunidades bacterianas acuáticas.

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.



AII Stays abroad

Elisabet Marti

(predoctoral student). Centre: Department Bacteriologie-Virologie, Hospital du Kremlin de Bicêtre, University of Paris-Sud, Paris, France (1/2/2012 to 30/4/2012).

Meritxell Gros

(postdoc researcher). Centre: Swiss Federal Institute of Aquatic Science and Technology (EAWAG), Dübendorf, Switzerland, sponsored by the José Castillejo Programme of the Ministry of Education, Culture and Sport (JC2011-0329), (1/2/2012 to 30/4/2012).

José Luis Balcázar

(research scientist-Ramon y Cajal). Centre: Rollins School of Public Health (University of Emory), Atlanta, USA, sponsored by the José Castillejo Programme of Ministry of Education, Culture and Sport (JC2011-0294), (1/5/2012 to 31/8/2012).

Sara Rodríguez-Mozaz

(research scientist). Centre: Ecole Polytechnique, Paris, France (1/9/2012 to 30/9/2012).

AII Scientific collaborators

Norma Cecilia Cavazos

Chemistry Degree and Environmental Sciences Student at the School of Medicine, Autonomous University of Nuevo León, Monterrey, Mexico (January-February 2012).

Maâmar Yagoubi

Research professor of the Microbiology Department of the School of Medicine and Pharmacy, Rabat, Morocco (March 2012).

John Harwood

Research professor of the Chemistry Department, Foster Hall, Tennessee Technology University (TTU), Tennessee, USA, sponsored by the Foreigners under sabbatical stay in Spanish centers Programme of Ministry of Education, Culture and Sport (SAB2011-0032)", (June-November 2012).

AII Visitors

Sara Chamorro

Predocctoral student of the Water Science and Technology MSc, University of Girona, Girona, Spain (January-May 2012).

Olga Auguet

Internship student of the Molecular Biology and Biomedicine MSc, University of Girona, Girona, Spain (February-August 2012).

Lucilaine Valéria de Souza Santos

Predocctoral student of the Sanitary and Environmental Engineering Department, University Federal of Minas Gerais, Brazil (May-June 2012).

Jelena Zivancev

Predocctoral student of the Technology Faculty, University of Novi Sad, Serbia (May-July 2012).

Thiago Mescoloto

Predocctoral student of the Chemistry Institute, Paulista State University Julio de Mesquita Filho (UNESP), Araquara, Brazil (May-October 2012).

Laura Gómez

Internship student of Microbiology Grade at the Biosciences Faculty, Autonomous University of Barcelona, Barcelona, Spain (June-September 2012).

Anna Jakimska

Predocctoral student of the Gdansk University of Technology (GUT), Gdansk, Poland, in the framework of the Lifelong Learning Programme-Erasmus of the European Union (June-December 2012).

Ewa Olkowska

Predocctoral student of the Gdansk University of Technology (GUT), Gdansk, Poland (September-December 2012).

Zaneta Barganska

Predocctoral student of the Gdansk University of Technology (GUT), Gdansk, Poland (September-December 2012).

Rubén Moreno

Predocctoral student of the Spanish Oceanographic Institute of Murcia, Murcia, Spain (September-December 2012).

Ingrid Cuesta

Internship Student of the Molecular Biology and Biomedicine MSc, University of Girona, Girona, Spain (November 2012-June 2013).



AIII Technologies and Evaluation Area

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

LINES

AIII1 Purification and distribution

AIII2 Treatment/reuse of waste water

AIII3 Modelling and management systems

AIII4 Unit operations

During 2012, the AIII2 and AIII3 have been working.

We would like to thank Manel Poch, Research Professor (University of Girona Associated) who worked with us as a Head of this Research Area from 2008 to 2012. These functions were transferred during 2012 to Ignasi Rodríguez-Roda, Research Professor (University of Girona Associated).





Left to right (stand up): Maite Pijuan, Albert Montserrat, Gianluigi Buttiglieri, Gemma Noguera, Anna Ribera, Lluís Corominas, Joana Batista Marques, Hèctor Monclús, Neus Collado, Oriol Gutiérrez, Ignasi Rodríguez-Roda, Adrián Rodríguez, Albert Benzal, Ignasi Aymerich, Manel Poch, Olga Auguet

Left to right (squatting): Adrià Rubirola, Damià Murlà, Joshua Obradors, Esther Llorens

27 researchers

1 research professor (UdG associated) and Group Leader

Ignasi Rodríguez-Roda

1 research professor (UdG associated)

Manel Poch

2 research scientists (Ramon y Cajal)

Maite Pijuan

Albert Poater

1 postdoc researcher (Juan de la Cierva)

Lluís Corominas

5 postdoc researchers

Oriol Gutiérrez

Esther Llorens

Gianluigi Buttiglieri

Giuliana Ferrero

Anna Díaz

4 predoctoral students

Manel Garrido

Albert Montserrat

Adrián Rodríguez

Anna Ribera

1 early-stage researcher

Joana Batista Marques

6 research technicians

Gemma Noguera

Albert Benzal

Ignasi Aymerich

Mariona Casadevall

Joshua Obradors

Olga Auguet

1 research auxiliar

Adrià Rubirola

1 postdoc researcher GS INIMA Environment SA

Hèctor Monclús

1 postdoc researcher UdG

Rubén Reif

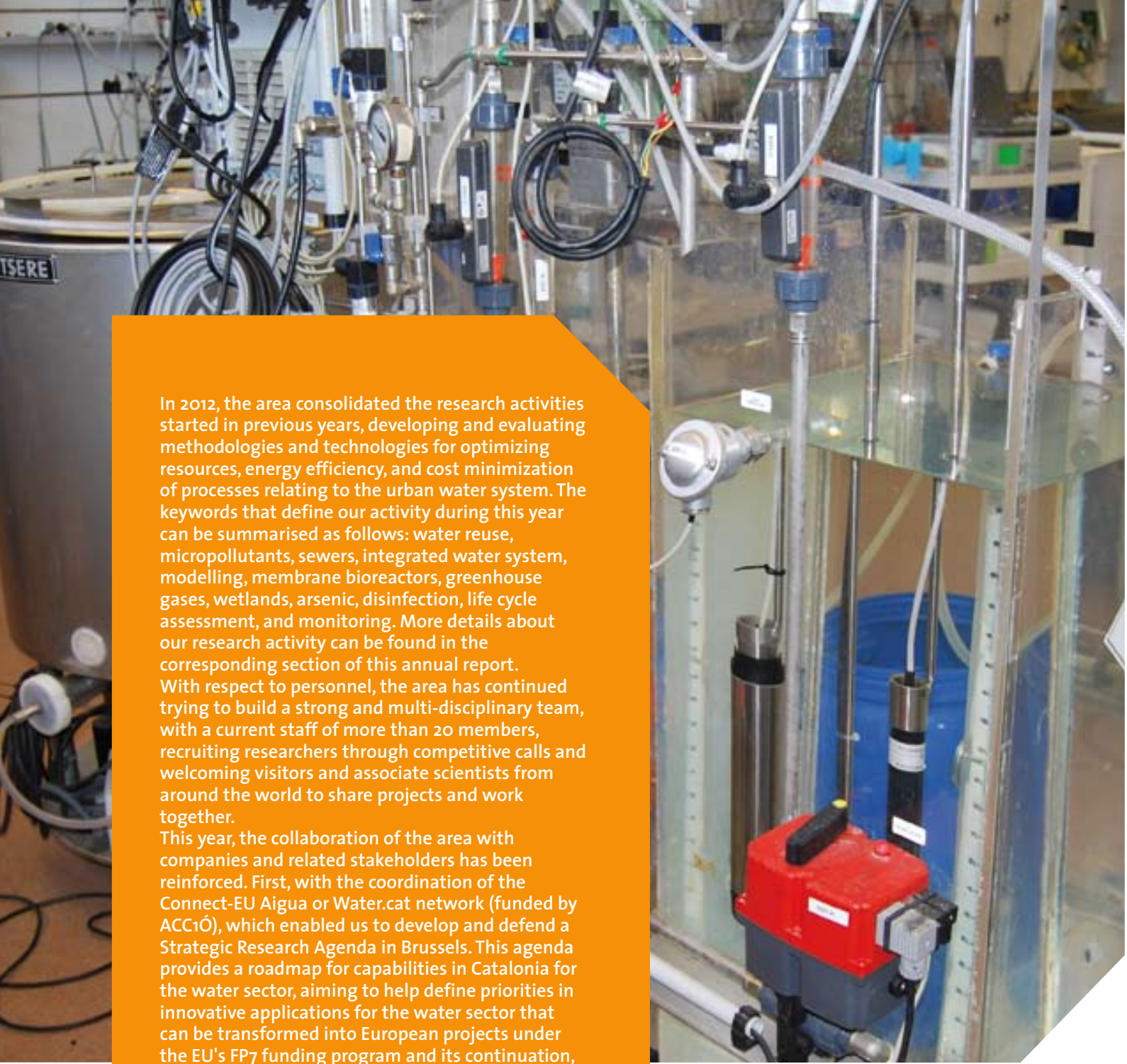
3 predoctoral students UdG

Neus Collado

Damià Murlà

Michele Stefani

*Errata: the 2011 Report says Oriol Gutiérrez Junior Researcher and should say Postdoc Researcher.



In 2012, the area consolidated the research activities started in previous years, developing and evaluating methodologies and technologies for optimizing resources, energy efficiency, and cost minimization of processes relating to the urban water system. The keywords that define our activity during this year can be summarised as follows: water reuse, micropollutants, sewers, integrated water system, modelling, membrane bioreactors, greenhouse gases, wetlands, arsenic, disinfection, life cycle assessment, and monitoring. More details about our research activity can be found in the corresponding section of this annual report.

With respect to personnel, the area has continued trying to build a strong and multi-disciplinary team, with a current staff of more than 20 members, recruiting researchers through competitive calls and welcoming visitors and associate scientists from around the world to share projects and work together.

This year, the collaboration of the area with companies and related stakeholders has been reinforced. First, with the coordination of the Connect-EU Aigua or Water.cat network (funded by ACCIÓ), which enabled us to develop and defend a Strategic Research Agenda in Brussels. This agenda provides a roadmap for capabilities in Catalonia for the water sector, aiming to help define priorities in innovative applications for the water sector that can be transformed into European projects under the EU's FP7 funding program and its continuation, HORIZON 2020. Second, with our involvement in national and international technological platforms (Plataforma Tecnológica Española del Agua - PTEA, Plataforma de Tecnologías Ambientales - PLANETA, Water supply and sanitation Technology Platform - WssTP, Mesa Española de Tratamiento de Aguas - META, etc), contributing to the drafts of strategic implementation plans and future calls relating to different European initiatives in the field of water, and on the scientific board of the Catalan Water Partnership - CWP, an association of innovative companies in the field of water. And finally, all the junior and senior researchers of the area are very active members of the management committee of different specialist and/or working groups of the IWA (International Water Association), such as Modelling and Integrated Assessment - MIA, Life Cycle Assessment - LCA, Greenhouse Gas Emission - GHG, Benchmarking of Control Strategies for Wastewater Treatment Plants - BSM, etc.

AIII2

Treatment/reuse of waste water

In 2012, part of the research conducted within this line has focused on identifying the parameters affecting the direct emissions of nitrous oxide (N₂O) and methane (CH₄) from wastewater transport and treatment systems. These two potent greenhouse gases are currently released from sewer networks and wastewater treatment plants in an uncontrollable fashion and, in some cases, are responsible for most of the carbon footprint in these systems. Efforts have been aimed at i) full-scale monitoring of the emissions in full-scale sewers and wastewater treatment facilities and ii) controlled experiments in lab-scale systems mimicking processes from full-scale installations. Results indicate that CH₄ is produced in anaerobic sewer systems via the carbon transformations carried out by methanogenic archaea, but it appears that the amount of these emissions is linked to the maturity of the biofilm present in the sewer network. Regarding N₂O, this greenhouse gas is mainly produced during the nitrogen transformations (nitrification and denitrification) occurring in wastewater treatment systems. Investigations carried out in 2012 have indicated that, in systems where nitrite accumulates, such as partial nitrification reactors, idle or settling periods should be avoided, since a significant fraction of the N₂O is produced in these phases.

This research is strongly linked to the research conducted in the Modelling line, where new models of wastewater treatment plants and sewer systems are being developed to describe the processes responsible for N₂O emissions.

This line has also been very active in the field of Membrane Bioreactors (MBR), mainly for municipal wastewater. The research has focused on energy optimization and fouling minimization through the integration of both the biological and the filtration processes. Collaborative and applied projects related to sludge thickening and air-scour control have also been successfully carried out in 2012.

Finally, the degradation mechanisms of pharmaceuticals from wastewater have also been studied in detail at different scales (lab, pilot plant and full scale). Among other results, it has been possible to model the behaviour of a selected pharmaceutical and its transformation products. The role and usefulness of proteomics when investigating the possible proteins involved in the biodegradation pathways of certain pharmaceutical compounds has also been explored.

- **Understanding Fugitive Greenhouse Gas Emissions from Wastewater Transport and Treatment Systems (GEISTAR). 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 GHG. The objective of this project is to reliably quantify the emissions of these two gases in wastewater transport and treatment systems. The biological mechanisms leading to the production of these gases are also being studied. In 2012, several pilot plants were constructed at the ICRA laboratories. Two pilot plants mimicking a rising main section of a sewer system were constructed and are currently in operation to study the production of CH₄ from sewer systems and the strategies to minimize its emission. Furthermore, 5 lab-scale sequencing batch reactors (SBR) are being operated to stimulate the growth of different groups of microorganisms involved in the production of N₂O in wastewater treatment plants.



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

This project, which is 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 from both centres to target research questions aimed at minimizing GHG emissions from wastewater treatment systems. In 2012, a PhD student from the UNL made a research visit to the ICRA laboratories.



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

The NITRI-GHG project aims to provide some 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 contributor 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, two different nitrifying cultures have been developed at the ICRA laboratories, which are 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 in these two groups of AOB.

• **MBRCONTROL. Development and validation at full scale of an MBR air-scour control system. OHL Medio Ambiente INIMA SAU (CDTI).**

This was a demonstration project to validate the air-scour MBR patent filed by the inventors, ICRA, LEQUiA-UdG and GS Inima. The control system was adapted and implemented in La Bisbal d'Empordà MBR, where the product's robustness, the monitoring system and the impact of the energy optimization regarding membrane aeration were successfully validated.

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

ITACA is a 3-year CDTI INNPRONTA project that started in December 2011. ICRA's role in the project is to improve the knowledge of pharmaceutical removal from wastewater by means of biological treatments. Both macro scale (removal, transformation products, operative conditions influence, etc.) and micro scale (proteomics) approaches are being considered and combined. During this year, a model target compound, ibuprofen, was selected due to its widespread diffusion in waste and natural waters. Its removal has been evaluated at several ibuprofen and biomass contents, together with its transformation products. Furthermore, pioneering proteomics has been applied to activated sludge systems and low target compound concentrations (1 mg/L and below).

• **Feasibility study of membrane technology for WAS thickening (Vitemesp). ACCIONA (CDTI).**

This project targeted the optimisation of membrane technology for its use as a sludge thickening process. Operational fluxes, final sludge concentrations and membrane cleaning and maintenance protocols were some of the parameters tested. A pilot plant located in the PLANTEA facilities was used for the experiments. Biodegradability of the sludge concentrated using membranes was also studied. Batch tests were carried out with the thickened sludge to assess its energy potential and anaerobic biodegradability.

• **Prevention of foaming in anaerobic digestion (DAM).**

Depuración de Aguas del Mediterráneo (DAM) is involved with the Agencia Catalana del Agua, ICRA and LEQUiA research group of the University of Girona in a two-year international research project on the formation of foaming in anaerobic digesters. This project also includes the sponsorship and participation of the North-American WERF (Water Environment Research Foundation). Anaerobic digestion (AD) has gained importance throughout the world due to increased interest in biogas production and in reducing the quantity of solid residuals from wastewater treatment plants. The major bottleneck of anaerobic digestion due to biological foaming was surveyed in 44 Spanish full-scale AD plants. The frequency of AD foaming ranged from seasonal (7 plants), intermittent (13 plants), and persistent (3 plants). The AD foaming causes included feed sludge characteristics and operating factors. The most common control technologies implemented included use of defoamers, uniform sludge feeding, and optimized mixing. The full-scale Vilanova i La Geltrú Wastewater Treatment Plant (WWTP) was studied in greater detail. The main cause of AD foaming events was attributed to high levels of gas production with insufficient surface area for gas to escape the liquid volume. This was mitigated by controlling the percentage of PS and WAS, thereby reducing the %VS going to the digester. This plant has an ultrasound WAS pretreatment process whose effect on AD foaming is being investigated.

AIII3

Modelling and management systems

In 2012, progress has been made in three research areas:

Modelling: The integrated modelling of sewer systems, wastewater treatment plants and rivers is a reality. We have proven that these models allow for better evaluation of strategies to implement the Water Framework Directive. Research is currently being conducted to expand the models to include fate and removal of pharmaceutical products in urban wastewater systems and rivers. Furthermore, a new model that describes removal of Arsenic from high-arsenic waters in constructed wetlands has been developed within the framework of two projects funded by the Spanish Agency for International Development and Cooperation (AECID), ARSENIC and ARSENIC II.

Smart management systems: A new decision-support system (DSS) has been developed within the framework of the ENDERUS project, aimed at turning data into information. This DSS helps wastewater treatment managers make more qualified decisions.

Life Cycle Assessment: The IWA Working Group for Life Cycle Assessment of Water and Wastewater Treatment (LCA-Water WG) has recently been created; it is co-chaired by Lluís Corominas. The aim of this WG is to facilitate the exchange of ideas and develop consensual methodologies to promote better use of LCA in urban water systems.

• **ENvironmental DEcision support system to select Robust operational strategies in Urban water Systems (ENDERUS). Ministry of Economy and Competitiveness (MINECO) CTM2009-13018.**

The ENDERUS Project finalized in December 2012, with successful results in the field of integrated management of urban wastewater systems and rivers. New experimental



methods have been developed and applied to better understand the sewer systems, wastewater treatment plants and rivers. Of note is a low-cost method to determine occurrence and duration of combined sewer overflows, which has been patented. An integrated model has been developed and validated in the case study of the Congost catchment where two wastewater treatment plants are discharging treated wastewater. Improved operation of the urban wastewater system has been proposed under extreme conditions of water scarcity and drought. The model has also been used to identify gaps in current wastewater treatment legislation. The new decision-support system (DATA_MAIN) has been finalized and allows for on-line and off-line data acquisition, data quality verification and the generation of information that help wastewater treatment managers to make more qualified decisions. DATA_MAIN has been verified with the data from the water consortium CDCRB. Overall, the project has resulted in 1 patent, 6 peer-reviewed international journal papers published (and 10 more submitted or under preparation), 10 oral presentations and 6 posters at conferences (and 6 more waiting for decision). Two PhD theses have been defended and a third one is to be finalized next year.

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

The main objective of this project is to increase knowledge of the interactions between UWWS and rivers in order to propose strategies to maximize ecosystem services, while minimizing operating costs of the UWWS. The project methodology combines field experimental work, dynamic modelling and Environmental Decision Support Systems (EDSS) tools. The experimental work has been conducted in 2012 after collaboration with the other research areas of ICRA. Next year, the focus of the project will be on improving models to describe the coupled behaviour of wastewater treatment plant and rivers.

• **Arsenic removal from water for agricultural and domestic uses in small communities from North of Mexico and other Latin American regions (ARSENIC), 10-CAP1-o631.**

The ARSENIC project is an international project of cooperation in research and education between ICRA (Spain) and CIMAV (Mexico), with the additional collaboration of CETA, from the University of Buenos Aires, and the National Commission of Atomic Energy of Argentina. The project starts with the idea that arsenic can be removed from high-arsenic waters by means of constructed wetland technology. There are two specific objectives within the ARSENIC project: 1) the adaptation of a conceptual model for numerical simulation of constructed wetlands as a tool for education and diffusion regarding the arsenic problem; and 2) knowledge transfer



to local groups from Northern Mexico and Argentina by means of a number of technical seminars. The results obtained in this project have been positive. This fact, together with the idea of doing some experimentation at lab scale and of developing a useful model for constructed wetland simulation to treat high-arsenic waters, has suggested the possibility of asking for a second project (ARSENIC II).

• **Arsenic problems and removal from water for domestic uses in Latin American communities (ARSENIC II), 11-CAP2-1583.**

ARSENIC II is the continuation of the ARSENIC project. It is an international project of cooperation in research and education between ICRA (Spain), CIMAV (Mexico), and CETA (Argentina). In the ARSENIC II project, there are 3 specific objectives: 1) development of a model for numerical simulation of constructed wetlands as a design tool for treatment of the arsenic problem; 2) development and implementation of a constructed wetland prototype for arsenic removal from water, in order to generate data for the model development and for the optimization of the treatment; and 3) to continue with the knowledge transfer begun in the previous ARSENIC project by means of two types of seminars: technological and dissemination.

• **Sulphide and greenhouse gas emissions from Mediterranean sewers, (SGHGEMS), EU People-PIRGo8-GA-2010-277050.**

The SGHGEMS research project aims to study and mitigate the production of sulphide and greenhouse gas emissions from sewers exposed to Mediterranean climate conditions. The project methodology combines extensive experimental work on real sewers with advanced mathematical modelling to provide effective applicable control measures. 2012 has been a very productive year in the project following the setup of facilities and monitoring carried out in 2011. This year, we successfully established the extent of H₂S and CH₄ impacts on the urban wastewater systems of l'Escala. Thanks to advanced modelling studies, we were able to provide the best control strategy for this particular system, thereby reducing the chemicals used in the sewer system by 50% while still achieving complete control of the detrimental emissions.

15/11/2012 Training Day



AIII Ongoing PhD dissertations at ICRA

Candidate: Adrián Rodríguez

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

Candidate: Neus Collado

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

Candidate: Anna Ribera

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

Candidate: Manel Garrido

Title: Development of an environmental decision support system for the selection and integrated assessment of process flow diagrams in wastewater treatment.

Candidate: Damià Murlà

Title: Coordinated management of Urban Wastewater Systems by means of Advanced Environmental Decision Support Systems.

Candidate: Albert Montserrat

Title: Integrated Modelling of urban wastewater systems.

Candidate: Joana Batista Marques

Title: Assessment and control of sewer detrimental emissions for optimal management of UWS.

Candidate: Olga Auguet

Title: Microbial transformations in anaerobic sewer environments.

AIII Stays abroad

Manel Garrido

(predoctoral student) – Centre: University of Santiago de Compostela, Spain (12/10/2011 to 15/2/2012).

Albert Poater

(research scientist-Ramon y Cajal). Centre: University of Studies of Salerno, Italy (16/1/2012 to 15/4/2012).

Albert Montserrat

(predoctoral student). Centre: Graz Technology University, Graz, Austria (15/2/2012 to 15/6/2012).

Lluís Corominas

(postdoc researcher-Juan de la Cierva). Centre: University Laval (modelEAU), Quebec, Canada (23/7/2012 to 12/8/2012).

AIII Scientific collaborators

Sudip Chakraborty

Research Scientist of the Membrane Separation Laboratory, Chemical Engineering Department, Jadavpur University (JU), India (December 2012-January 2013).

Pau Prat

Predocctoral student of the Chemical and Environmental Engineering Laboratory (LEQUIA) of the University of Girona, Girona, Spain (January-March 2012).

Adrià Riu

Predocctoral student of the Chemical and Environmental Engineering Laboratory (LEQUIA) of the University of Girona, Girona, Spain (January-April 2012).

Miquel Sànchez-Marrè

Research professor from the Computer Languages and Systems Department, Polytechnic University of Catalonia, Barcelona, Spain (on sabbatical stay, January-August 2012).

Ricardo Marçalo da Silva Marques

Predocctoral student of the Sciences and Technology Faculty of Lisboa Nova University (UNL), Lisboa, Portugal (October 2012-April 2013).

AIII Visitors

Meriem Chtourou

Internship student of the Chemistry Department, Sciences Faculty, University of Sfax, Tunisia (January-February 2012).

Yacciri Barrios

Internship student of Industrial Administration MSc, Autonomous University of Tamaulipas, Mexico (January-April 2012).

Evelyn Meza

Internship student of Industrial Administration MSc, Autonomous University of Tamaulipas, Mexico (January-April 2012).



Marcel Gómez

Predocctoral student of the Institute of Chemical Technology, University of Prague, Prague, Czech Republic (January-April 2012).

Adrià Rubirola

Internship student of Environmental Sciences, Sciences Faculty, University of Girona, Girona, Spain (February-September 2012).

Laura Estorch

Internship student of Industrial Engineering of the Technical College of the University of Girona, Girona, Spain (February 2012-September 2013).

Maria Molinos

Postdoc researcher of the Water Economy Group, University of Valencia, Valencia, Spain (March-April 2012).

Marta Muñoz

Internship student of Chemistry Degree, Sciences Faculty, University of Girona, Girona, Spain (March-July 2012).

Selena Gismeros

Internship student of Biology Degree, Sciences Faculty, University of Girona, Girona, Spain (April 2012-September 2013).

Núria Cañaveras

Internship student of Chemistry Degree, Sciences Faculty, University of Girona, Girona, Spain (July-August 2012).

Lluïsa Bellolell

Internship student of Environmental Sciences, Sciences Faculty, University of Girona, Girona, Spain (July-September 2012).

Enric Blázquez

Internship student of Environmental Sciences, Sciences Faculty, University of Girona, Girona, Spain (July-September 2012).

Irene Muñoz

Internship student of Biotechnology Degree, Sciences Faculty, University of Girona, Girona, Spain (July-September 2012).

Maria Cecilia Valles

Predocctoral student of the Advanced Materials Research Center (CIMAV) of Mexico, (September-December 2012).

Anna Ribera

Predocctoral student of the Science and Technology of Water MSc, University of Girona, Girona, Spain (October-November 2012).

Eric Santos

Internship student of Environmental Sciences Grade, Sciences Faculty, University of Girona, Girona, Spain (November 2012-June 2013).

Publications & Congresses

4.

Total publications: 162

Resources and Ecosystems Research Area

SCI PUBLICATIONS

(Science Citation Index)

(Ordered by impact index JCR 2011)

Steward, A.L., von Schiller, D., Tockner, K., Marshall, J.C., Bunn, S.E. **When the river runs dry: human and ecological values of dry riverbeds.** *Frontiers in Ecology and the Environment*, 10 (4) (2012), 202-209.

Timoner, X., Acuña, V., von Schiller, D., Sabater, S. **Functional responses of stream biofilms to flow cessation, desiccation and rewetting.** *Freshwater Biology*, 57 (2012), 1565-1578.

Artigas, J., Pérez-Baliero, M.C., Romani, A.M., Ruiz-González, C., Soley, S., Sabater, S. **Phosphorus use by planktonic communities in a large regulated Mediterranean river.** *Science of the Total Environment*, 426 (2012), 180-187.

Graeber, D., Gelbrecht, J., Pusch, M.T., Anlanger, C., von Schiller, D. **Agriculture has changed the amount and composition of dissolved organic matter in Central European headwater streams.** *Science of the Total Environment*, 438 (2012), 435-446.

Osorio, V., Marcé, R., Pérez, S., Ginebreda, A., Cortina, J.L., Barceló, D. **Occurrence and modelling of pharmaceuticals on a sewage-impacted Mediterranean river and their dynamics under different hydrological conditions.** *Science of the Total Environment*, 440 (2012), 3-13.

Aguilera, R., Marcé, R., Sabater, S. **Linking in-stream nutrient flux to land use and inter-annual hydrological variability at the watershed scale.** *Science of the Total Environment*, 440 (2012), 72-81.

Sánchez-Canales, M., López Benito, A., Passuello, A., Terrado, M., Ziv, G., Acuña, V., Schuhmacher, M., Elorza, F.J. **Sensitivity analysis of ecosystem service evaluation in a Mediterranean watershed.** *Science of the Total Environment*, 440 (2012), 140-153.

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

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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.

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Alarcón-Herrera, M.T., Llorens, E., Olmos-Márquez, M.A., Valles-Aragon, C., Benavidez-Montoya, A. **Assessing plants for phytoremediation of arsenic-contaminated water.** Congress: *4th International Symposium on Trace Elements in the Food Chain. Friends or Foes?*. Visegrád, Hungary (November 2012).

Morera, S., Corominas, L., Rigola, M., Comas, J. **Towards a Modular LCA Approach in the Urban Water Cycle.** Congress: *SETAC Europe 18th LCA case study symposium*. Copenhagen, Dinamarca (November 2012).

Benzal, A., Corominas, L., Sánchez-Marrè, M., Montserrat, A., Poch, M. **Understanding the sewer network performance under wet weather conditions by using data mining techniques.** Congress: *New developments in IT & Water*. Amsterdam, The Netherlands (November 2012).

POSTERS

Flores-Alsina, X., Arnell, M., Amerlinck, Y., Corominas, L., Gernaey, K.V., Guo, L., Lindblom, E., Nopens, I., Porro, J., Shaw, A., Snip, L., Vanrolleghem, P.A., Jeppsson, U. **A dynamic modelling approach to evaluate GHG emissions from wastewater treatment plants.** Congress: *World Congress on Water, Climate and Energy 2012*. Dublin, Irlanda (May 2012).

Buttiglieri, G., Collado, N., Ferrando-Climent, L., Rodríguez-Mozaz, S., Comas, J., Rodríguez-Roda, I. **Proteomics Applied to Ibuprofen Degradation in activated sludge: preliminary results.** Congress: *9th Edition International Symposium of sanitary and environmental engineering*. Milan, Italy (June 2012).

Dalmau, M., Rodríguez-Roda, I., Maere, T., Nopens, I., Odriozola, J., Sancho, J., Ayesa, E., Comas, J. **Modelling and Simulation of a full-scale hybrid MBR.** Congress: *Ecotechnologies for Wastewater Treatment. 2012 International Conference – ecoSTP*. Santiago de Compostela, Spain. (June 2012).

Corominas, L., Foley, J., Guest, J.S., Hospido, A., Larsen, H.F., Shaw, A. **IWA working group for Life Cycle Assessment (LCA) of water and wastewater treatment.** Congress: *Ecotechnologies for Wastewater Treatment. 2012 International Conference – ecoSTP*. Santiago de Compostela, Spain. (June 2012).

Wang, Q., Pijuan, M., Ye, L., Yuan, Z. **A novel free nitrous acid (FNA)-based technology for improving sludge biodegradability.** Congress: *9th IWA Leading Edge Conference on Water and Waste Water Technologies*. Brisbane, Australia (June 2012).

Gabarron, S., Dalmau, M., Monclús, H., Atanasova, N., Rodríguez-Roda, I., Comas, J. **Study of the correlations between filtration variables, sludge properties and operational conditions via statistical analysis in a MBR pilot plant.** Congress: *Euromembrane 2012*. London, United Kingdom (September 2012).

Llorens, E., Obradors, J., Poch, M. **Arsenic retention modelling in constructed wetlands treating groundwater.** Congress: *3rd International Conference on Industrial and Hazardous Waste Management*. Crete, Greece (September 2012).

Llorens, E., Alarcón-Herrera, M.T., Obradors, J., Poch, M. **Arsenic retention in subsurface flow constructed wetlands.** Congress: *1st European Symposium on Remediation Technologies and their Integration in Water Management*. Barcelona, Spain (September 2012).

Dalmau, M., Maere, T., Nopens, I., Rodríguez-Roda, I., Comas, J. **Effluent quality and cost optimization of a real full-scale MBR.** Congress: *EU-India Science Technology and Innovation Cooperation Days*. Hyderabad, India (November 2012).

Dalmau, M., Maere, T., Nopens, I., Rodríguez-Roda, I., Comas, J. **Model-based optimization of a full-scale hybrid MBR GREEN-TECH.** Congress: *Sustainable water treatment technologies: achievements, perspectives, constraints – NEW-INDIGO*. Girona, Spain (December 2012).

Roux, P., Corominas, L., Hospido, A. **Announcement of an IWA working group for LCA of water & wastewater treatment.** Congress: *50th LCA Discussion Forum*. Zurich, Switzerland (December 2012).

05. Projects

Resources and Ecosystems Research Area

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	€ 45000

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	€ 484006

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	€ 177870

Project	Contribución de las Archaea no cultivadas en el Reciclaje del Carbono Orgánico en Sedimentos (ARCOS)
Funding agency	Ministerio de Economía y Competitividad (MINECO) – CGL2012-33033
Duration	2012-2015
Coordinator	ICRA
Leader researcher	Carles Borrego
Amount for ICRA	€ 99450

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	€ 131100



Technologies and Evaluation Research Area

Project	Detección de genes de resistencia en poblaciones bacterianas de un río influenciado por efluentes de una estación depuradora de aguas residuales (EDAR)
Funding agency	Fundación Eugenio Rodríguez Pascual
Duration	2011-2012
Coordinator	ICRA
Leader researcher	José Luis Balcázar
Amount for ICRA	€ 10000

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	€ 218838

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	€ 35000

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	€ 100000

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	€ 127530

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	€ 5400

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	€ 3000

Project	Remoción de arsénico del agua de consumo humano en comunidades del norte de México y otras regiones de Latinoamérica (ARSENIC)
Funding agency	Agencia Española de Cooperación Internacional para el Desarrollo (AECID). Convocatoria CAP 2010 (10-CAP1-0631)
Duration	2010-2012
Coordinator	ICRA
Leader researcher	Esther Llorens
Amount for ICRA	€ 42000

Project	Diseño y evaluación de un sistema de ayuda a la decisión para la selección de estrategias operacionales robustas en la gestión integrada de sistemas de alcantarillado y estaciones depuradoras (ENDERUS)
Funding agency	Ministerio de Economía y Competitividad (MINECO) i FEDER (CTM2009-13018)
Duration	2009-2012
Coordinator	ICRA
Leader researcher	Manel Poch
Amount for ICRA	€ 204000

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	€ 100000

Project	Ecosystem-based Management strategies for urban wastewater systems (EcoMaWat)
Funding agency	European Union PCIGo9-GA-2011-293535
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Lluís Corominas
Amount for ICRA	€ 100000

Project	Ab initio Statics and Molecular Dynamics Simulation of Olefin Metathesis Catalysts for Pharmacological purposes (Compute DRUG)
Funding agency	European Union PCIGo9-GA-2011-293900
Duration	2011-2015
Coordinator	ICRA
Leader researcher	Albert Poater
Amount for ICRA	€ 100000

Project	Sustainable and integrated urban water system management (SANITAS)
Funding agency	European Union PITN-GA-2011-289193
Duration	2011-2015
Coordinator	LEQUIA-Universitat de Girona
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€ 256387

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	€ 110110

Project	Water.cat – Catalan R&D Network for Water Technologies (Xarxa Connect-EU Aigua)
Funding agency	Agència de Suport a l'Empresa Catalana (ACC1Ó), Generalitat de Catalunya
Duration	2011-2012
Coordinator	ICRA
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€ 39192,81

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 Convocatòria CAP 2011(11-CAP2-1583)
Duration	2011-2013
Coordinator	ICRA
Leader researcher	Esther Llorens
Amount for ICRA	€ 85000

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	€ 6000



06.

Contracts

Resources and Ecosystems Research Area

Contract	Gestió dels Serveis Ambientals per reduir costos de tractament i millorar la Qualitat de l'Aigua del Riu Llobregat (SERAMBLO)
Contracting agency	Agència Catalana de l'Aigua
Duration	2010-2012
Leader researcher	Sergi Sabater
Amount for ICRA	€ 66000

Water Quality Research Area

Contract	Analysis of pharmaceuticals and EDCs in lyophilized WWTP sludge samples.
Contracting agency	La Creole Compagnie Réunionnaise des Eaux, Ile de la Reunion.
Duration	2012
Leader researcher	Mira Petrovic
Amount for ICRA	€ 3000

Technologies and Evaluation Research Area

Contract	Feasibility study of membrane technology for WAS thickening (VITEMESP)
Contracting agency	ACCIONA AGUA (Programa investigación colaborativa - Centro para el Desarrollo Tecnológico Industrial -CDTI)
Duration	2010-2012
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€ 114740

Contract	Desarrollo y validación a escala real del sistema automático de control de la aireación en reactores biológicos de membranas (MBR Control)
Contracting agency	OHL Medio Ambiente - INIMA, S.A.U.
Duration	2011-2012
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€ 55000

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	ADASA SISTEMAS, S.A.
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€ 131000

Contract	Formació d'escumes en els digestors anaerobis de les depuradores d'aigües residuals i establir els millors mètodes de prevenció i control (DAM)
Contracting agency	Depuración de Aguas del Mediterráneo (DAM)
Duration	2011-2012
Coordinator	DAM
Leader researcher	Ignasi Rodríguez-Roda
Amount for ICRA	€ 25316



Agreements 07.

30/01/2012

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Laura Estorch Vigas**, Industrial Engineering student of the Technical College, during the period from 6/2/2012 to 14/9/2012 in the Technologies and Evaluation Area, Modelling and Management Systems line, under the supervision of Esther Llorens, ICRA postdoc researcher.

01/02/2012

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Adrià Rubirola Gamell**, Environmental Sciences student, during the period from 6/2/2012 to 14/9/2012 in the Technologies and Evaluation Area, Treatment/reuse of wastewater line, under the supervision of Gianluigi Buttiglieri, ICRA postdoc researcher.

07/02/2012

CEMAGREF/IRSTEA

Framework cooperation agreement with CEMAGREF / IRSTEA (Institut National de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture, France) for the exchange of information, performance of joint research activities, and collaboration in projects and student exchanges.

11/02/2012

Institute of Continuing Education, Pompeu Fabra University (UPF)

Cooperation agreement with the Pompeu Fabra University's Institute of Continuing Education, in the MSc course on medical and environmental science communication, to provide an internship for the student **Joaquim Antolin Carol** at the R&D&i office during the period from 11/2/2012 to 11/5/2012 and from 12/5/2012 to 30/9/2012, under the supervision of Jaume Alemany, ICRA R&D&i Office Manager.

16/02/2012

University of San Jorge (USJ)

Cooperation agreement with the University San Jorge (Villanueva de Gallego, Zaragoza, Spain) for collaboration in the Environment PhD official programme.

22/02/2012**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Olga Auguet Horta**, Molecular Biology and Biomedicine MSc student, during the period from 24/2/2012 to 31/7/2012 in the Water Quality Area, Quality and Microbial diversity line, under the supervision of Carles Borrego, ICRA research professor (University of Girona associated). On 27/7/2012, the agreement was extended until 31/8/2012.

08/03/2012**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Marta Muñoz Villanueva**, Chemistry student, during the period from 14/03/2012 to 6/07/2012, in the Technologies and Evaluation Area, Treatment/reuse of wastewater line, under the supervision of Gianluigi Buttiglieri, ICRA postdoc researcher.

12/04/2012**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Selena Gismeros Prat**, Biology student, during the period from 18/04/2012 to 14/09/2012 in the Technologies and Evaluation Area, Modelling and Management Systems line, under the supervision of Esther Llorens, ICRA postdoc researcher.

22/05/2012**Autonomous University of Barcelona (UAB)**

Framework cooperation agreement in education with the UAB for the performance of external academic practices for credits transfer. The purpose of the agreement is to establish the conditions under which external academic practices must take place and which UAB students must conduct for their training in the partner institution.

22/05/2012**Autonomous University of Barcelona (UAB)**

Specific cooperation agreement in education for the realization of external academic practices for credits transfer. The purpose of the agreement is to establish the conditions which must be developed for academic practices for the degree in Microbiology at the Faculty of Biosciences at UAB of the student **Laura Gómez Pérez**, to conduct her training at ICRA during the period from 25/06/2012 to 14/09/2012, in the Water Quality Area, Quality and Microbial diversity line, under the supervision of Carles Borrego, ICRA research professor (University of Girona associated).

04/06/2012**University of Girona (UdG)**

Specific cooperation agreement with the UdG for the performance of external academic practices. 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 University of Girona and how it is determined in the respective curricula.

27/06/2012**University for Peace (UPAZ)**

Specific agreement with the University for Peace (UPAZ), Costa Rica and the Consortium of the Costa Brava to host **Chelsea Burns**, International Affairs and Natural Resources Sustainable Development MSc Student as an internship student from June to August 2012.

29/06/2012**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Cristina Padullés Rius**, Biology student, during the period from 16/7/2012 to 13/9/2012 in the Resources and Ecosystems Area, Fluvial Systems line, under the supervision of Daniel von Schiller, ICRA postdoc researcher (Juan de la Cierva).

29/06/2012**University-Enterprise/Institution Educational Cooperation Programme**

Cooperation agreement with the University of Girona to provide an internship for **Irene Muñoz Ruiz**, Biotecnology Grade student, during the period from 13/7/2012 to 14/9/2012, in the Technologies and Evaluation Area, Treatment/reuse of wastewater line, under the supervision of Ignasi Rodríguez-Roda, ICRA research professor (University of Girona associated).

02/07/2012**University of Girona (UdG)**

Addendum to the regulation agreement between ICRA and UdG dealing with the incorporation and assignment of research activity at the ICRA Technologies and Evaluation Area, for Dr. **Ignasi Rodríguez-Roda Layret**, which includes the particular conditions resulting from the assignment of all the research of Dr. Ignasi Rodríguez-Roda Layret and complementary to those provided in the agreement of 27/7/2007. The assignment will begin on 2/7/2012 and end on 1/7/2016.

01/08/2012

University of Buenos Aires (UBA)

Framework scientific and academic cooperation agreement with the Faculty of Veterinary Sciences of UBA for the exchange of information, carrying out joint research activities, and collaboration in projects and student exchanges.

03/09/2012

University of Lleida (UdL)

Addendum to the framework cooperation agreement signed on 11/2/2008 between UdL and ICRA, which incorporated into the agreement a new clause relating to the training of researchers in training and affiliated to ICRA in UdL PhD programmes.

20/09/2012

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Laura Estorch Vigas**, Industrial Engineering student of the Technical College, during the period from 20/09/2012 to 14/09/2013, in the Technologies and Evaluation Area, Modelling and Management systems line, under the supervision of Lluís Corominas, ICRA postdoc researcher (Juan de la Cierva).

21/09/2012

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Selena Gismeros Prat**, Water Science and Technology MSc student, during the period from 21/09/2012 to 14/09/2013, in the Technologies and Evaluation Area, Modelling and Management systems line, under the supervision of Lluís Corominas, ICRA postdoc researcher (Juan de la Cierva).

25/09/2012

University-Enterprise/Institution Educational Cooperation Programme

Cooperation agreement with the University of Girona to provide an internship for **Anna Ribera Guardia**, Water Science and Technology MSc student, during the period from 1/10/2012 to 31/12/2012, in the Technologies and Evaluation Area, Treatment/reuse of wastewater line, under the supervision of Ignasi Rodríguez-Roda, ICRA research professor (University of Girona associated). On 7/12/2012 the stay period is modified until 31/11/2012.

25/09/2012

Lifelong Learning Programme - ERASMUS of the European Union

Cooperation agreement in the framework of the Lifelong Learning Programme-Erasmus of the European Union to provide an internship for **Christina Nannou**, Analytical Chemistry MSc Student of the Ioannina University (Greece) during the period from 25/02/2013 to 27/05/2013, in the Water Quality Area, Chemical contamination of water bodies line, under the supervision of Sara Rodríguez-Mozaz, ICRA research scientist.

01/10/2012

Ministry of Education, Culture and Sports

Cooperation agreement with the Ministry of Education, Culture and Sports of Spain for a better management of grants to encourage the mobility of Spanish teachers and researchers in foreign institutions and foreign teachers and researchers in all Spanish centres in all areas of scientific knowledge.

01/10/2012

CatalunyaCaixa Foundation

Cooperation agreement with the CatalunyaCaixa Foundation to promote activities and initiatives under the Teachers and Science programme, whose goal is to improve secondary school teachers' science background through training sessions at Catalan research centres.

08/10/2012

Lifelong Learning Programme - ERASMUS of the European Union

Cooperation agreement in the framework of the Lifelong Learning Programme-Erasmus of the European Union to provide an internship for **Anna Jakimska**, Chemistry PhD Student of Gdansk University of Technology (Poland) during the period from 20/09/2012 to 20/12/2012, in the Water Quality Area, Chemical contamination of water bodies line, under the supervision of Sara Rodríguez-Mozaz, ICRA research scientist.

10/12/2012

Lifelong Learning Programme - ERASMUS of the European Union

Cooperation agreement in the framework of the Lifelong Learning Programme-Erasmus of the European Union to provide an internship for **Ivan Dekkers**, Chemistry Degree Student of the Thomas More Kempen University (Belgium) during the period from 4/02/2013 to 31/05/2013, in the Water Quality Area, Chemical contamination of water bodies line, under the supervision of Sara Rodríguez-Mozaz, ICRA research scientist.

08. Activities

19/03/2012
Seminar
ICRA, Girona

The ICRA hosts the seminar "Nanocalorimetry: a tool for analyzing and predicting the thermal stability of pharmaceuticals in water", organized by the University of Girona. It is taught by Jordi Farjas and Joan Pere López from the Thermal Analysis Unit (STR), University of Girona.



26/03/2012
Institutional visit of the UniZambeze University of Mozambique
ICRA, Girona

Manel Poch and Ignasi Rodríguez-Roda, research professors (University of Girona associated) of the ICRA, received a delegation from the UniZambeze University of Mozambique who visited the University of Girona as part of an international cooperation program of the Vives Universities Network, with the aim of analyzing the possibilities of working on cooperation projects between the medical faculties of both universities. The delegation, consisting of Lourenço Magaia, Director of Planning and Development Cooperation and Institutional and Vicente Aniceto Manjante, director of the office of president, visited the ICRA to see the research we conduct.





30/03/2012

Lecture of ARSENIC II project at University of Barcelona
Faculty of Law, University of Barcelona, Barcelona

Alicia Fernández Cirelli, from the Transdisciplinary Studies Center of Water (CETA) at the University of Buenos Aires, Argentina, gave a talk on "The problem of arsenic in drinking water in Argentina and other countries of Latin America" as part of the joint research project (ARSENIC II) carried out by the CETA and Esther Llorens, postdoc researcher of the Technologies and Evaluation research area of ICRA.

The presence of arsenic in water in concentrations above those recommended for human consumption is now a major problem worldwide, mainly in Latin America and Asia.

Photo from left to right: Esther Llorens and Alicia Fernández Cirelli.



02/4/2012

Institutional visit (Catalan Regional Government)
ICRA, Girona

Different institutional personalities visit the PCiT within the framework of a collaboration agreement signed between Anna M. Geli, president of the Science and Technology Park (PCiT) of the University of Girona, and Jaume Carol, president of the Catalan Water Partnership (CWP), to jointly promote the water sector. Specifically, Jordi Xuclà, member of parliament for Girona, and Imma Riera, member of the Catalan parliamentary group CiU, visited the ICRA facilities to see the international projects we carry out.

Photo from left to right: Iván Sánchez (ICRA General Manager), Jordi Xuclà, Imma Riera, Damià Barceló (Director of the ICRA), Jaume Alemany (ICRA R&D&i Office Manager), Sara Insa (ICRA head of SCT), Carles Borrego (UdG-associated research professor in ICRA's Water Quality Research Area), Sergi Sabater (Deputy Director of the ICRA).



26/4/2012

Recording of a 3D video
ICRA, Girona

The ICRA collaborates with the Council of Girona in the recording of a video by the company VISUAL13 3D for the new centre BLOOM, 3D and Emerging Technologies Center, created by the Council of Girona and installed at the Science and Technology Park of the University of Girona. The video shows the ICRA research facilities. The video includes the promotional offer of Girona with the culture, entertainment, sport and science, among others.

27/04/12

ICRA with the Leonardo da Vinci European Community Programme

ICRA, Girona

Maria Papadopoulou head of the Leonardo Da Vinci Mobility Actions for People in the Labour Market (PLM) of the University of Ioannina (Greece), visited ICRA to meet with Damià Barceló, director of the ICRA, and ICRA's supervisors of the Leonardo mobility programme: Jaume Alemany (ICRA R&D&i Office Manager), Vicenç Acuña (research scientist of the Resources and Ecosystems Area), Sara Rodríguez-Mozaz (research scientist of the Water Quality Area) and Maite Pijuan (research scientist, Ramon y Cajal of the Technologies and Evaluation Area).

Photo from left to right: Damià Barceló, Vicenç Acuña, Jaume Alemany, Maria Papadopoulou, Sara Rodríguez-Mozaz and Maite Pijuan.



08-09/05/2012

II European H2O Forum on Innovation water, building a sustainable hydrological future

The Spanish National Research Council (CSIC), Madrid

Oriol Gutiérrez, postdoc researcher of the Technologies and Evaluation Research Area of ICRA, participated in this European forum organized by the Spanish Technology Platform for Water (PTEA), which ICRA is sponsoring. This H2O forum allows participants to learn about and be involved in the development and structuring of R&D&i carried out in water from this technological platform and learn of their progress, projects and sector perspectives in the framework of the new European and national water and innovation policy.



22/05/2012

Experimental Streams Facility (ESF) presentation

ICRA, Girona

On 22 May we presented to the media the new Experimental Streams Facility (ESF). The ICRA puts into operation the installation of 24 experimental rivers and reaffirms one of the few research institutes in Europe on water that concentrates in one place all the resources and services necessary to provide a comprehensive and cross in search of water through various disciplines.

This unique facility in Europe will make it possible, among other ecotoxicological tests, to determine the concentrations of chemicals that cause effects in river ecosystems, as well as testing for experimental research in aspects of climate change. The importance of conducting experiments at laboratory mesocosms level lies in the fact that they can help to predict how changes in rainfall and temperature can affect the condition of rivers and ecosystem services that derive from these ecosystems, with the corresponding economic impact.





30/05/2012
**Working Day Groups Connect-EU:
Energy-Agrofood-Water**
ICRA, Girona

ICRA leader of the Connect-EU Aigua or Water.Cat, held this day of joint working groups between Connect-EU Energy, Agrofood and Water for the preparation of European projects in the field of KBBE2013 (Knowledge based Bio-Economy). The meeting was attended by 30 organizations, including research groups, technology centres and companies of the three sectors. The meeting, organized by ACCIÓ (Government of Catalonia) and by the three groups of Connect-EU mentioned above, was convened in order to stimulate the creation of future consortia for the presentation of R&D project proposals in the last KBBE call of the 7th Framework Programme. The topics that were addressed were the KBBE.2013.2.3-01: Development and industrial application of sensors for food processing operations and the KBBE.2013.2.5-02: Saving water and energy for resource-efficient food processing.



30/05/2012
Visit of the Migdia School of Girona
ICRA, Girona

A group of 3 boys and 3 girls from Migdia School (public elementary and primary school) of Girona, accompanied by their teacher Núria Niell Casamort, visit ICRA to take data that will serve to make the Xinxeta magazine that the school publishes annually. Ignasi Rodríguez-Roda, research professor (University of Girona associated) of the ICRA welcomed the children and answered questions about ICRA, water, the state of the rivers, etc.



05/06/2012
**Official presentation in Catalonia of the Strategic
Research Agenda (SRA) of the group Connect-EU
Aigua or Water.cat**
Polytechnic University of Catalonia, Barcelona

Esther Llorens, coordinator of the Group Connect-EU Aigua and postdoc researcher of the Technologies and Evaluation Area of ICRA, presented the SRA (Strategic Research Agenda) a reference document for policy decisions on water R&D&i, and a tool to defend Catalan interests in Europe in this field. Water.cat is funded by ACCIÓ and the AGAUR and it is led by ICRA and coordinated in conjunction with Manresa Technology Centre (MTC), the Polytechnic University of Catalonia (UPC), the Catalan Water Partnership and the

enterprises ADASA, WaterIdea and IsardSAT. This network has a total of 32 companies, 21 research organizations and groups and 3 administrations.

The platform also aims to achieve higher ranks for companies and centres/ Catalan research groups in the current 7th Framework Programme for research and innovation in the European Union and the subsequent HORIZON2020.

On 12 June 2012, the SRA was also presented in Brussels at the offices of the Belgian city of ACC1Ó.

13-14/06/2012

bizbarcelona 2012

Montjuïc, Fira de Barcelona, Barcelona

Jaume Alemany (ICRA R&D&i Office Manager) presented ICRA as a centre for R&D&i in this event to promote consulting and networking companies, businesses or business projects. bizbarcelona is the event that brings solutions for the creation, growth and internationalization of companies.



19/06/2012

Institutional visit of the National Institute of Industrial Technology (INTI), Argentina

ICRA, Girona

Mira Petrovic, research professor (ICREA) of the Water Quality Area and Esther Llorens, postdoc researcher of the Technologies and Evaluation Area, of ICRA received two representatives of the INTI: Remigio Pablo Colcombet, Manager of Chaco's headquarters and Dora Andrea Acosta, northeast Regional Argentine delegate of Missions headquarters. The purpose of the visit is to get to know the ICRA and its equipment, in order to obtain technical advice for the future installation of a new water institute in the region of Corrientes (Argentina).



20/06/2012

Business visit of ACCIONA Agua

ICRA, Girona

Damià Barceló, director of the ICRA and Ramon Moreno, ICRA's Consultant on external relations with companies, received Jorge Juan Malfeito Sánchez, Director of R&D&i at ACCIONA Agua and Cristina Hernández, Project Manager, to see the facilities and equipment of the ICRA and evaluate the possibility of stable cooperation based on the research interests of ACCIONA Agua and the scientific and technological capacities of the ICRA.

Photo from left to right: Damià Barceló, Jorge Juan Malfeito Sánchez, Cristina Hernández, Vicenç Acuña (research scientist of ICRA's Resources and Ecosystems Research Area).





01-05/07/2012
iEMSs - 6th International Congress on Environmental Modelling and Software
 Leipzig, Germany

Lluís Corominas, postdoc researcher (Juan de la Cierva) of the Technologies and Evaluation Area of ICRA, along with LEQUIA (Chemical and Environmental Engineering Laboratory of the University of Girona) and modelEAU (Canada) organized the session entitled "Use of models for integrated management of urban water systems (UWS)." The objective of this session is to create a platform for discussion for researchers involved in the development and application of models for integrated management of urban water systems (UWS). Also highlight the importance of integrated models for successful implementation of the Water Framework Directive (WFD) to achieve a good ecological and chemical status of receiving waters.



02-04/07/2012
8th Annual LC/MS/MS Workshop on Environmental Applications and Food Safety
 Institute of Catalan Studies, Barcelona

The Spanish National Research Council (CSIC) and ICRA organized this workshop divided into two main sessions, covering environmental analysis and food. Damià Barceló, director of the ICRA and Mira Petrovic, research professor (ICREA) of the Water Quality Area of ICRA took part in the Scientific Committee. The workshop is designed to share the latest information and ideas on the challenges and advances in LC/MS/MS among scientists from academia, government and industry. The workshop was attended by around 125 people and 53 posters were presented.



12/07/2012
Visit of a Girona group of high school students
 ICRA, Girona

Sergi Sabater, deputy director of the ICRA, welcomed a group of 60 high school students from various schools in the province of Girona with a presentation on water a scarce resource. The visit took place within the framework of the 5th edition of the Young Research Campus organized by the University of Girona, an initiative that aims to bring secondary education to university. Then the ICRA researchers: Vicenç Acuña (Research Scientist), Natàlia Corcoll (Postdoc Researcher) and Maria Casellas (Research Technician), all of the Resources and Ecosystems Area of ICRA, show the new installation of Experimental Streams Facility, so that students know a part of the experimental research that is conducted by ICRA.

19/07/2012

Visit of GS Engineering and Construction from Korea

ICRA, Girona

Ignasi Rodríguez-Roda, research professor (University of Girona associated) of the ICRA and coordinator of the MBR Control project welcomed a delegation of South Korea's GS Engineering and Construction, along with Joan Canals, director of the company OHL Environment INIMA (from 1.9.2012: GS INIMA Environment SA).

The main objective of the visit was the presentation of recent research results of the control of membrane bioreactor (MBR) of the Technologies and Evaluation Area of ICRA.

MBR technology is one of the best wastewater future prospects for obtaining high quality effluent that can be reused. The South Korean company showed interest in learning about the technology with a view to installing it in their sewage systems in Korea.

Photo from left to right, first line: Hèctor Monclús (ICRA postdoc researcher GS INIMA Environment SA), Ignasi Rodríguez-Roda, Joaquim Comas (LEQUIA) and second line, Joan Canals (GS INIMA).



01/08/2012

Technical meeting of the SGHGEMS project

ICRA, Girona

Oriol Gutiérrez, postdoc researcher of the Technologies and Evaluation Research Area of ICRA organizes the technical seminar "Sulfide and GreenHouse Gas Emissions from Mediterranean Sewers (SGHGEMS)."

The conference is the presentation of the 1st year results of the European project SGHGEMS, about the harmful emissions that occur in sewer systems characteristic of Mediterranean areas.

The partners of the project are the ICRA, the Costa Brava Partnership (CCB) and the Joint Water Company Costa Brava (EMACB).



03-07/09/2012

XII International Summer School on the Environment (ISSE 2012)

Faculty of Sciences, University of Girona (UdG), Girona

Under the Sudoe Interreg IV B project of the European Union, ICRA collaborates in this Summer School (ECOTECH Summer School) of the Environmental Institute of UdG, organized by the Chemical and Environmental Engineering Laboratory (LEQUIA) of UdG. Lluís Corominas postdoc researcher (Juan de la Cierva) of the Technologies and Evaluation Area of ICRA coordinates this course entitled "Life Cycle Assessment (LCA) and Water Issues." This is an



intensive and highly specialized methodology based on the diagnosis of the life cycle and its application to the impacts of water use relating to human activity. It is aimed at graduate students.



05/09/2012
Technical seminar: Exploring the Landscape
ICRA, Girona

Lluís Corominas, postdoc researcher (Juan de la Cierva) of the Technologies and Evaluation Area of ICRA, invites Jeremy S. Guest, Assistant Professor of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign (USA) to deliver the seminar: "Exploring the Landscape: A Role for Quantitative Sustainable Design in Sanitation Technology Development".

The seminar gives an overview of his research group and includes a discussion on the recovery of resources from waste water and the use of microalgae, and a diagnosis of integrating life cycle, cost analysis and models performance to improve the design of wastewater treatment systems.

Photo: Jeremy S. Guest.



19/09/2012
Institutional visit (Catalan Regional Government)
ICRA, Girona

ICRA welcomes the Minister of Territory and Sustainability of the Government of Catalonia, Lluís Recoder, to show the ICRA's facilities and the research that is conducted at ICRA. He was accompanied by Damià Barceló and Sergi Sabater, director and deputy director of the ICRA, respectively, Josep Llebot, Secretary of the Environment and Sustainability, Department of Territory and Sustainability, Eudald Casadesús, delegate of the Catalan Government in Girona, Josep Cortadellas, Director of Regional Services, Department of Territory and Sustainability at Girona, Anna Maria Geli, Chancellor of the University of Girona, Pere Condom, director of the Science and Technology Park of the University of Girona, Carles Puigdemont, Mayor of Girona, Domènec Espadaler president of the Chamber of Commerce, Lluís Rovira, director of CERCA and secretary of the ICRA's board of trustees, Alex Rocas, delegate of the Catalan Water Agency in Girona, and Manel Poch, scientific director of the Campus of excellence of the University of Girona (e-MTA) and Research Professor (University of Girona associated).

The Minister visited the experimental streams facility and pilot plants and chromatography laboratories. A range of equipment, much of it unique in Europe. The Minister explained that "ICRA is a research centre with an ambitious and well oriented strategic growth plan" and added that "centres like ICRA are a strategic model in their sector."

Photo from left to right: Minister Lluís Recoder and Damià Barceló.

21/09/2012

Technical seminar: Intermittent Rivers**ICRA, Girona**

Daniel von Schiller, postdoc researcher (Juan de la Cierva) of the Resources and Ecosystems Area of ICRA invited Australian researchers to give the seminar: Jonathan C. Marshall and Alisha L. Steward of the Department of Science, Information Technology, Innovation and the Arts of the State of Queensland and Laurisse Frampton from the Australian Rivers Institute at Griffith University. The presentations were:

Jonathan C. Marshall: "Climate variability, palaeoecology and Queensland wetlands".

Alisha L. Steward: "A new frontier: responses of terrestrial invertebrates in dry river beds to landscape disturbance".

Laurisse Frampton: "A ^{15}N isotope tracer study of Mayfly and Caddis fly movements during the dry phase of an Australian intermittent stream".

Photo from left to right: Alisha L. Steward, Jonathan C. Marshall, Laurisse Frampton.



28/09/2012

Institutional visit (European Union)**ICRA, Girona**

Damià Barceló and Sergi Sabater, director and deputy director of the ICRA respectively welcomed Monica Hoek, Project Officer, of the grants program "Marie Curie Grants Integration" of the European Union. The visit is to meet ICRA researchers that are enjoying these grants for projects and see the facilities where they work. ICRA's Marie Curie researchers and their projects are:

-Vicenç Acuña, research scientist, Resources and Ecosystems Research Area

Global warming effects on the stream carbon balance (GWESCB)

-Maite Pijuan, research scientist (Ramon y Cajal), Technologies and Evaluation Research Area

Exploring novel nitrifier pathways to minimise direct greenhouse gas emissions from WWTPs (NITRI-GHG)

-Lluís Corominas, postdoc researcher (Juan de la Cierva), Technologies and Evaluation Research Area
Ecosystem-based Management strategies for urban wastewater systems (EcoMaWat)

-Oriol Gutiérrez, postdoc researcher, Technologies and Evaluation Research Area

Sulfide and GreenHouse Gas emissions from Mediterranean Sewers (SGHGEMS)

-Albert Poater, postdoc researcher, Technologies and Evaluation Research Area

Ab initio Statics and Molecular Dynamics Simulation of Olefin Metathesis Catalysts for Pharmacological purposes (Compute DRUG)

Photo from left to right: Sergi Sabater, Olga Corral (PA to Managing Director), Lluís Corominas, Anita Geiszinger (Support Technician to KTT), Damià Barceló, Monica Hoek, Vicenç Acuña.





18/10/2012
Institutional visit of the Ministry of Water Resources, China
ICRA, Girona

ICRA's management received a delegation from the Ministry of Water Resources of the Republic of China (Pearl River Water Resources Commission) to visit the facilities of the ICRA:

Mr. Chen Jiezhao, General Engineer of Pearl River Water Resources Commission, Mr. Cai Shangtu, Director of Water Resource Administration, Pearl River Water Resources Commission, Ms. Zheng Dongyan, Deputy General Engineer of Integrated Technology Centre, Pearl River Water Resources Commission, Mr. Xiang Dezhong, Senior Engineer of China Pearl River Water Resources Planning, Designing & Surveying Co.,Ltd., Mr. Chen Junqiang, General Manager of Guangdong South Hydropower High-tech Development Co., Ltd., i Mr. Yang Qinglin, General Manager of Pearl River Water Resources Science Institute Suian Company.



19/10/2012
Institutional visit of The Spanish National Research Council
ICRA, Girona

ICRA's management received Emilio Lora-Tamayo, President of the Spanish National Research Council (CSIC), to visit the ICRA's facilities accompanied by Luis Calvo, institutional coordinator of the CSIC in Catalonia, Anna Maria Geli, Chancellor of the University of Girona (UdG), Josep Calbó, Deputy Dean of Research and Transfer of the UdG and Pere Condom, director of the Science and Technology Park of the UdG.

Photo from left to right: Luis Calvo, Emilio Lora-Tamayo, Vicenç Acuña (Research Scientist, ICRA's Resources and Ecosystems Research Area).



25/10/2012
1st Global Meeting for international opportunities and cooperation challenges
FoodLab, Riudellots de la Selva, Girona

The village of Riudellots de la Selva, FoodLab (Innnovació Culinary Industrial Center) and KIM (Knowledge Innovation Market) organized the 1st meeting dedicated to clusters and cooperatives.

Although the conference was focused on the food sector, several initiatives and success stories for cooperation projects were presented, especially for the internationalization of activities. The aim was to increase the competitiveness of enterprises through innovation and cooperation between companies and R&D&i centres. The ICRA collaborates in this meeting and Jaume Alemany (ICRA R&D&i Office Manager) participated in the session "Business environment and research challenges".

15/11/2012

Training Day: CatalunyaCaixa Teachers and Science Programme ICRA, Girona

The Fundació CatalunyaCaixa, as part of its cultural and educational activities, has created the Teachers and Science programme, targeting secondary school teachers to improve their science background. At 2011 ICRA was the first research centre to start this collaboration. In 2012 ICRA organized the third edition. The programme consists of one day when 8 teachers are actively involved with ICRA, which presents its activities and the research carried out in its three areas of research. Teachers come from different secondary schools in the province of Girona and Barcelona. The Scientific and Technical Services of ICRA coordinated the participation of the teachers on this day.



26-27/11/2012

3rd SCARCE Annual Conference: Bridging toxicants, stressors and Risk-Based Management under water scarcity Rector Peset Higher School, Valencia

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), the University of Valencia and the Polytechnic University of Valencia organized the 3rd Scarce Annual Conference, in collaboration with the ICRA. It was attended by 120 scientists from around the world, and 35 papers and 44 posters were presented.

In this conference, the latest studies on the impact of global change on water availability and quality of Spanish basins were presented, together with impacts on society and the economy.

One of the most performed studies conducted by ICRA is the detection for the first time, in a comprehensive field study in Spain and pioneer in Europe, of pharmaceutical residue levels in various species of fish from the Ebro, the Llobregat Xúcar and the Guadalquivir rivers. These drug accumulations carry risks for long-term aquatic systems. This work, which has already been tested in the laboratory, is the result of ICRA researchers Belinda Huerta, leader of the study (Predoctoral Student), Anna Jakimska (Predoctoral Student, University of Technology, Gdansk, Poland, and visiting ICRA), Meritxell Gros (Postdoc Researcher), Sara Rodríguez-Mozaz (Research Scientist) and Damià Barceló (Director of the ICRA and Research Professor, CSIC associated).





03/12/2012
Institutional visit of the Environmental Laboratory of “Aigües de Terrassa”
ICRA, Girona

Damià Barceló, director of the ICRA, welcomed Marta Brull, Laboratory Technical Director and Deputy Director of the Quality and Environment and Joan Vacarisas, Industrial Engineer, Consultant, both of Aigües de Terrassa (Waters of Terrassa, Barcelona). The purpose of the visit was to show the ICRA's facilities and the research carried out here.



10-12/12/2012
Workshop: Sustainable Water Treatment Technologies: achievements, perspectives, constraints - NEW INDIGO
ICRA, Girona

The ICRA's research areas of Water Quality and Technologies and Evaluation organized this workshop in the framework of ICRA's GREEN-TECH project, a networking project driven by NEW INDIGO, an initiative for the development and integration of research in Europe and India. The aim is to provide a networking platform to share knowledge and experiences in sustainable technologies for water treatment.

The network is made up of ICRA, CIEMAT (Centre for the Plataforma Solar de Almeria, Spain), the University of Antwerp (Belgium), Jadavpur University (India) and the Energy and Resources Institute - TERI (India).

51 people attended and 14 papers and 10 posters were presented.

Photo from left to right: Damià Barceló (Director of the ICRA) and Mira Petrovic (Research Professor ICREA and Water Quality ICRA's Research Area).



18/12/2012
Kick-off meeting WATER - Fate Project
ICRA, Girona

Ignasi Rodríguez-Roda research professor (University of Girona associated) of the Technologies and Evaluation ICRA's Research Area organize this first meeting of the ICRA's project WATER-Fate to prepare the work plan and objectives of the project. The project funded by the Ministry of Economy and Competitiveness (MINECO) is “Eliminación de microcontaminantes y productos de desinfección en sistemas integrados de membranas seguidos de desinfección. Potencial para la reutilización directa o indirecta”.

Awards 09.

(National Business Award, July 18, 2012. Winning photo) Detail

MEMBRANE BIOREACTORS AWARD

On 27 June 2012, **Ignasi Rodríguez-Roda**, research professor (University of Girona associated) of the Treatment/reuse of wastewater line in the Technologies and Evaluation ICRA's Area received the award for the best poster presentation with the title: *"Modelling and simulation of a full-scale hybrid MBR"* during the IWA ecoSTP international congress held from 25 to 27 June 2012 in Santiago de Compostela, Spain.

The work was done in collaboration with the University of Gent (Belgium), the CEIT (Basque Country) and LEQUIA (University of Girona).



WATER QUALITY AWARD

On July 4, 2012, **Marta Llorca**, research technician of the Chemical contamination of water bodies line in the Water Quality ICRA's Area received the third award given by the company "AVANTOR Performance Materials" during the conference "8th Annual LC/MS/MS workshop on Environmental Applications and Food Safety", held from 2 to 4 July 2012 in Barcelona, Spain.

The paper/presentation award was: "*Analysis of perfluoroalkyl substances in waters from Germany and Spain*" with the following co-authors: Marta Llorca, Marinella Farré, Yolanda Picó, Jutta Müller, Thomas P. Knepper and Damià Barceló.



MICROBIOLOGY AWARD

During the XVI Congress of the Iberian Association of Limnology, held at the University du Minho, Guimaraes, Portugal, from 2 to 6 July 2012, **Mireia Fillol**, predoctoral student, scientific collaborator of the Quality and Microbial Diversity ICRA's Area, received the first prize in the category of oral presentations for the work entitled: "*Segregation of archaeal communities in stratified lakes and design of specific molecular tools for uncultured lineages*" with the following coauthors: Mireia Fillol, Frederic Gich and Carles Borrego.

At the same Congress, **Olga Auguet**, internship student of the Molecular Biology and Biomedicine MSc, University of Girona and visitor of Quality and Microbial Diversity ICRA's Area, received the first prize in the poster category for her work entitled: "*Comparison of DNA and RNA finger prints to discriminate active and latent archaeal populations*" with the following co-authors: Olga Auguet, Mireia Fillol, Mercè Figueras and Carles Borrego. The research presented at the Congress is a summary of the final MSc project done by Olga Auguet that will be defending it on September 2012.



Both works are made in collaboration with the Molecular Microbial Ecology research group (gEMM) of the University of Girona's Institute of Aquatic Ecology, and in the case of the second work, also with the Cork Laboratory of the Biology Department of the same university.

NATIONAL BUSINESS AWARD

On 18 July 2012, **Ricard Zamora**, ICRA head of maintenance, received from Activa Mutua 2008 *the first national photography award* in the category of CRITICAL LOOK, displaying *photographs taken at ICRA with the title "sparks"*.

The award was sponsored by ICRA's Occupational Risk Prevention Company, Activa Mutua 2008, with the title "Put your goal in prevention," inviting all associated companies to participate.

Photo from left to right: Anni Sánchez, Director of the Activa Mutua Girona delegation, Ricard Zamora (winner), Guillem Saura, Activa Mutua Provincial Director.



PRINCE SULTAN BIN ABDULAZIZ INTERNATIONAL PRIZE FOR WATER 5th AWARD 2012 OF SAUDI ARABIA

On October 2012, **Damià Barceló**, director of the ICRA is awarded with the prestigious Prince Sultan Bin Abdulaziz International Prize for Water of Saudi Arabia, which is awarded every two years. Dr. Barceló will collect the prize on January 6, 2013 in Riyadh (Saudi Arabia).



The Prize in the category of Water Management & Protection is 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. The research team of Dr. Barceló proves that a wide range of pharmaceutical contaminants are widespread in aquatic environments, and shows that the effluents from the wastewater treatment plants are among the main causes of the problem. Moreover, these studies show how the final process at the treatment plants can reduce the burden of pharmaceutical contaminants in the effluent just before new circulation, a work that opens the way to more effective treatment processes to control the adverse effects of pharmaceutical contaminants.

UNIVERSITY OF GIRONA PROMOTION PRIZE

Adrià Rubirola, Research Auxiliar of the Technologies and Evaluation Area of ICRA, receives the Graduate in Environmental Sciences 2011-2012 promotion Special Prize given by the University of Girona to the best student in his class.



RECIPHARM INTERNATIONAL ENVIRONMENTAL AWARD

RECIPHARM, AB, the Swedish pharmaceutical manufacturer, leader in Europe, since 2008 annually gives an international *award for the best environmental performance* or environmental best practice and innovation within the pharmaceutical industry or the academic world.

On December 2012 **Damià Barceló**, director of the ICRA, received this award for his personal scientific career in the world of emerging pollutants and pharmaceutical that affect the environment. Dr. Barceló will collect the prize on January 23, 2013 in a ceremony held at the ICRA.



10. Financing

Contribution of the Catalan Regional Government's Ministry of Economy and Knowledge (DECO)	€ 2.018.073,05
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Competitive projects (Catalan Regional Government)	€ 33.466,48
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Competitive projects (Ministry of Economy and Competitiveness)	€ 635.177,57
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Competitive projects (European Union)	€ 155.794,52
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Transfer projects	€ 236.645,30
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Financial income	€ 27.964,89
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Other income	€ 12.203,80
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TOTAL INCOME 2012	€ 3.119.325,61
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This project 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 (DA3^a) of the Catalan Statute of Autonomy.

Selected news and press

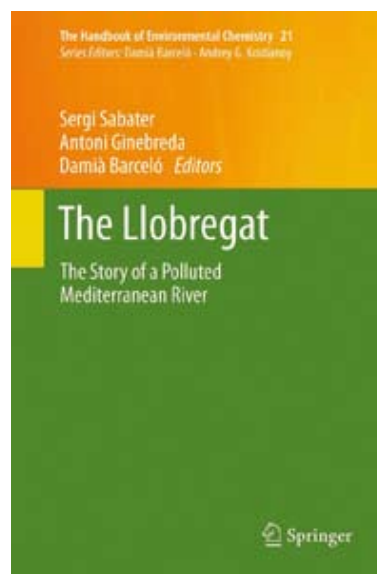


25/04/2012

Published the book: The Llobregat: The story of a polluted Mediterranean river

Edited by Sergi Sabater (Deputy Director of the ICRA), Antoni Ginebreda (Research Professor IDAEA/CSIC) and Damià Barceló (Director of the ICRA).

The Llobregat belongs to the most thoroughly studied rivers in Europe and is a paradigm of the confluence of human and natural disturbances in a single basin. Because of its location in a very densely populated region and its Mediterranean character, the Llobregat supports a mixture of irregular flow, water abstraction, excess nutrients, mining debris, and a wide array of pollutants. The aquatic organisms strive to survive in a dramatically changing river that passes through a succession of dams, weirs and channels. The long-term river monitoring and the research that has been carried out in the river for a long time have provided an extensive knowledge of these disturbances and their effects on the biological communities. This book highlights the available information, with emphasis on the hydrological, chemical and biological elements interspersed in the river. Experts in the field discuss the main nutrient patterns and pollutant occurrence and the responses of the biological quality elements as well as the river ecosystem to the overall natural and man-made influences.



02/05/2012

ICRA published the first world study on drugs in urban groundwater

Based on a study that began in 2010, researchers of IDAEA (CSIC) and the Polytechnic University of Catalonia led by Damià Barceló, director of the ICRA, have published an article in the journal Science of Total Environment, 424 (2012), 280-288, on drugs found in the urban groundwater of Barcelona - "Drugs of abuse in urban groundwater. A case study: Barcelona" - This is a very detailed study of wastewater that lets us know the status of the wells during drought in Barcelona.

22/05/2012

Presentation of the experimental streams facility

On 22 May 2012, ICRA presented the installation of the Experimental Streams Facility. The ICRA put into operation this facility and reaffirms itself as one of the few research institutes in Europe that concentrates in the same space all the resources and services needed to provide a global service and cross-sectional research of water through various disciplines. This facility, leader in Europe, will make it possible to carry out, among other tests, ecotoxicological tests that determine concentrations of chemicals that cause effects on river ecosystems, as well as experimental tests to conduct research on aspects of climate change. The importance of being able to perform experiments in laboratories at the mesocosm level lies in the fact that these can help to predict how changes in rainfall and temperature, can affect the condition of rivers and the ecosystem services that derive from these ecosystems, with the corresponding economic impact. The Experimental Streams Facility will help to improve the management of river basins.



20/06/2012

Reported for the first time in europe the presence of perfluoroalkyl substances in tap water

The presence of perfluoroalkyl substances in drinking water from Spain and Germany has been reported for the first time in Europe.

These substances are still unregulated in Europe for drinking water. However, a 2013 law in the USA established the requirement for water-distribution companies to monitor the presence of perfluoroalkyl substances.

Researchers from IDAEA (CSIC, Spain), Universitat de València (Spain), Institute for Analytical Research (Idstein, Germany) and Damià Barceló, director of the ICRA (Spain) are the authors of the paper published in Science of the Total Environment, 431 (2012) 139–150.

26/11/2012

Pharmaceutical residues detected in fish rivers

ICRA researchers detected for the first time after an exhaustive field study in Spain and pioneer in Europe, residues of pharmaceutical in fish of the Ebro, Llobregat, Júcar and Guadalquivir rivers.

These studies were presented in Valencia on 26 and 27 November 2012 at the 3rd Annual Conference of the project CONSOLIDER-INGENIO (SCARCE), a multidisciplinary project coordinated by Damià Barceló, director of the ICRA.

The work, which had been tested in the laboratory, is the result of ICRA researchers Belinda Huerta (predoctoral student and study leader), Anna Jakimska (predoctoral student, University of Technology, Gdansk, Poland, and visitor at ICRA), Meritxell Gros (postdoc researcher currently at CSIRO Land and Water, Adelaide, Australia), Sara Rodríguez-Mozaz (research scientist) and Damià Barceló (director of the ICRA). Diclofenac has been detected in different species of fish, showing that this contaminant is found in all watersheds. The European Union wants to add it to the list of priority pollutants in water samples in control.

Damià Barceló explains that this drug accumulation in fish is not harmful to human health. The long-term risks are for aquatic systems.

19/12/2012

A pilot project demonstrated that reverse osmosis filtration eliminates over 99% of drug deposited in the wwtp

The authors of the study are: Davor Dolar, Meritxell Gros, Sara Rodríguez- Mozaz, Jordi Moreno, Joaquim Comas, Ignasi Rodríguez-Roda and Damià Barceló.

The combination of MBR and RO treatment has shown excellent efficacy in eliminating the drug, which allowed removing over 99% of all cases.

The presence of emerging contaminants such as pharmaceuticals in the aquatic environment and their effects on living organisms has become an issue of growing concern for scientists, water managers and the public.

A pilot project conducted at the Station Wastewater Treatment Plant (WWTP) Castell-Platja d'Aro proves the efficiency of removal of pharmaceuticals that are considered emerging contaminants from wastewater using a system that includes a bioreactor membrane combined with a reverse osmosis system (MBR-RO). The project was carried out by the Catalan Institute for Water Research (ICRA), Laboratory of Chemical and Environmental Engineering of the University of Girona (LEQUIA), the Consortium of Costa Brava (CCB) and the Joint Company Waters of the Costa Brava, SA.

19/07/2012

An investigation find insecticides in dolphins

A study led by researchers from Damià Barceló group, director of the ICRA and IDAEA research professor of the Spanish National Research Council (CSIC) on pyrethroids insecticides in dolphins was published in the journal Environment International.

The main researcher is Eljarrat Ethel, CSIC scientist at the Institute of Environmental Assessment and Water Studies (IDAEA), who analysed the accumulation of contaminants in dolphins in Brazil.

The results show concentrations of pyrethroids in dolphins of 7.04 nanograms per gram of fat in adults and 68.4 nanograms per gram of fat in offspring.

24/09/2012

A study indicates that investment in maintaining and improving the quality of rivers generates economic benefits

A study conducted by ICRA, together with the Catalan Water Agency (ACA), Water Technology Centre (CETAqua), Waters of Ter Llobregat (ATLL) and Waters of Barcelona (Agbar) has quantified some of the environmental services provided by the Llobregat river. The study reveals that the riparian forest near the Llobregat river offers, at present, environmental services for water purification worth about 79,000 per year. This purification saving is achieved by reducing the temperature of the river water, which lowers its subsequent purification cost.



References to the ICRA in the communication media in 2012 (not translated)

Data	Titular	Mitjà
29/1/12	La investigació gironina acusa la crisi	Diari de Girona
22/2/12	La confirmació, per correu electrònic	El Punt Avui (digital)
22/2/12	Article d'opinió: Joan Mesquida - To maintain and to preserve our natural heritage is essential	Campus e-MTA.eu
22/2/12	H2O Water Line	Campus e-MTA.eu
22/2/12	Santiago Tadeo, president of the Menorca Island Council, congratulates the e-MTA Campus for its recognition as CEIR	Campus e-MTA.eu
22/2/12	La confirmació, per correu electrònic	El Punt Avui
25/2/12	Investigación en la que participa Unicauca logró financiamiento para el desarrollo de alimento prebiótico para peces	Aquahoy.com
28/2/12	'Filologia Catalana té 5 catedràtics per a 8 estudiants'	Diari de Girona (digital)
29/2/12	Cinc catedràtics per a vuit estudiants	Regió 7
15/3/12	Una plataforma formativa connectarà la UIB con dos universidades francesas	ABC (digital)
15/3/12	El Govern de França concedeix 5,5 milions d'euros a un projecte liderat per la Universitat de Perpinyà-Via Domicia en el qual participa la UIB	Universitat de les Illes Balears
15/3/12	Presupuestos de la Generalidad de Cataluña	lustel.com
16/3/12	El proyecto en el que participa la UIB recibe 5,5 millones públicos	El Mundo
17/3/12	Contaminantes emergentes	La Razón (digital)
20/3/12	La UdG presenta dijous el campus d'excel·lència	El Punt Avui (digital)
20/3/12	Contaminantes emergentes	Madri+D
20/3/12	La UdG presenta dijous el campus d'excel·lència	El Punt Avui
22/3/12	El campus d'excel·lència de la UdG arrenca al Parc	El Punt Avui (digital)
22/3/12	The Campus e-MTA celebrates World Water Day	Campus e-MTA.eu
22/3/12	La crisi econòmica passa factura a la gestió del agua	El Periódico - Ecòpolis
22/3/12	El campus d'excel·lència de la UdG arrenca al Parc	El Punt Avui
22/3/12	Article d'opinió: Dr. Manel Poch - Dia Mundial de l'Aigua a la UdG	Diari de Girona
22/3/12	Ecòpolis, Dia mundial del agua 2012, agua y seguridad alimentaria	El Periódico - Ecòpolis
22/3/12	La crisi econòmica passa factura a la gestió de l'aigua	El Periódico - Ecòpolis
23/3/12	La UdG projecta la seva excel·lència en turisme i aigua tot i els entrebancs	El Punt Avui
24/3/12	Artículo de opinión: Adrián Martínez - ¿Y si resulta que el algodón sí engaña?	Información.es
24/3/12	Artículo de opinión: Adrián Martínez - ¿Y si resulta que el algodón sí engaña?	Diario Información
27/3/12	¿El jabón antibacteriano sirve para acabar con los gérmenes?	Xataka
30/3/12	Contaminantes emergentes	Beft.es
2/4/12	Jordi Xuclà i Imma Riera visiten l'Institut Català de Recerca de l'Aigua	CDC.org
3/4/12	Els diputats de CiU s'interessen per l'ICra	El Punt Avui
3/4/12	Jordi Xuclà i Imma Riera, a l'Institut Català de Recerca de l'Aigua	Diari de Girona
5/4/12	El PCIT podrà ajornar les quotes del deute	Gironainfo.cat
5/4/12	L'Estat permetrà al Parc Científic i Tecnològic de la UdG ajornar les quotes del deute aquest 2012	Aragirona.cat
5/4/12	Girona Jordi Xuclà i Imma Riera, a l'Institut Català de Recerca de l'Aigua	Diari de Girona (digital)
5/4/12	Els diputats de CiU s'interessen per l'ICRA	El Punt Avui (digital)
7/4/12	L'Estat permetrà al Parc Científic de la UdG ajornar les quotes del deute aquest any 2012	Diari de Girona (digital)
7/4/12	L'Estat permetrà al Parc Científic ajornar les quotes del deute	Empordà Info
7/4/12	El Parc Científic de la UdG pot ajornar el deute el 2012	El Punt Avui
7/4/12	L'Estat permetrà al Parc Científic de la UdG ajornar les quotes del deute aquest any 2012	Diari de Girona
07/4/12	El Parc Científic de la UdG pot ajornar el deute el 2012	El Punt Avui (digital)
9/4/12	The Mediterranean: Beneath the surface	Chemical & Engineering News
11/4/12	¿Qué tan efectivo es el jabón antibacteriano en gel?	Vida Efectiva Magazine
13/4/12	Girona referma l'aposta en I+D	Gironainfo.cat
13/4/12	L'Ajuntament de Girona referma l'aposta per la investigació i recerca de les empreses de la ciutat	Ajuntament de Girona
13/4/12	El Ayuntamiento reafirma la apuesta por la investigación y búsqueda de las empresas de la ciudad	Tribuna Municipal.es
13/4/12	10º Congreso Mundial de Ingeniería Química	Madridiario.com
15/4/12	'El Campus pot donar indicacions al sector turístic sobre el vital estalvi d'aigua'	Diari de Girona (digital)
15/4/12	Manel Poch, coordinador científic a la UdG del Campus Euromediterrani de Turisme i Aigua: 'El Campus pot donar indicacions al sector turístic sobre el vital estalvi d'aigua'	Diari de Girona
26/4/12	Cocaïna en el Eixample, metadona en el Besòs	El Mundo (digital)
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	La Vanguardia (digital)
26/4/12	Un estudi detecta importants nivells de cocaïna en pous de l'Eixample de Barcelona	Ara.cat

11. Selected news and press

26/4/12	Un estudi detecta importants nivells de cocaïna en pous del carrer Mallorca de Barcelona	ACN
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Terra
26/4/12	La droga que consumes sin saberlo: está en el agua, el aire y los billetes	El Confidencial
26/4/12	Coca en el Eixample, èxtasis en el Paral·lel	La Razón (digital)
26/4/12	Las aguas subterráneas dibujan el mapa del consumo de drogas	Diariotarragona.com
26/4/12	Rastros de drogas en las aguas subterráneas de Barcelona	Diario de Bergantinos
26/4/12	L'aigua subterrània de Barcelona va plena de drogues d'abús	Ecodiari.cat
26/4/12	L'aqüífer de Barcelona va ple de drogues d'abús	Nació digital
26/4/12	Les aigües subterrànies dibuixen el mapa del consum de drogues	Europa Press
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Qué.es
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Paginoticias.es
26/4/12	Les aigües subterrànies dibuixen un 'mapa clàssista' del consum de drogues a Barcelona	Vilaweb
26/4/12	Las aguas subterráneas dibujan un 'mapa clàssista' del consumo de drogas en Barcelona	La Información Digital.com
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Efeverde.com
26/4/12	Detectan rastros de drogas en las aguas de riego de Barcelona	Intereconomia.com
26/4/12	Un estudi detecta rastres de drogues a les aigües subterrànies de Barcelona	La Malla.net
26/4/12	Las aguas subterráneas dibujan el mapa del consumo de drogas	Diariobarcelona.com
26/4/12	Un estudi detecta importants nivells de cocaïna en pous del carrer Mallorca de Barcelona	324.cat
26/4/12	Las aguas subterráneas dibujan un 'mapa clàssista' del consumo de drogas en Barcelona	Te interesa.com
26/4/12	Las aguas subterráneas dibujan un 'mapa clàssista' del consumo de drogas en Barcelona	Gentedigital.es
26/4/12	Las aguas subterráneas dibujan un 'mapa clàssista' del consumo de drogas en Barcelona	Yahoo News
26/4/12	Un estudi detecta importants nivells de cocaïna en pous del carrer Mallorca de Barcelona	ACN
26/4/12	Las aguas subterráneas dibujan un 'mapa clàssista' del consumo de drogas en Barcelona	El Economista (digital)
26/4/12	Un estudi detecta importants nivells de cocaïna en pous del carrer Mallorca de Barcelona	Directe.cat
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Diario Vasco
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Hoy Digital
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	elcorreo.com
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Las Provincias
26/4/12	Un estudio detecta rastros de drogas en las aguas subterráneas de Barcelona	Sur Digital
26/4/12	Les aigües residuals permeten detectar drogues i zones de consum	TV3
26/4/12	Primer estudi mundial sobre drogues en aqüífers urbans	8tv.cat
27/4/12	La importancia ecológica de los ríos	rtve.es
27/4/12	Les aigües freàtiques de Barcelona tenen rastres de cocaïna i èxtasi	El Periódico de Catalunya
27/4/12	La cocaïna flota en el subsuelo de Barcelona	GranCanariaActualidad.com
27/4/12	Detecten restes de droga als aqüífers de Barcelona	Ara
27/4/12	La droga a la ciutat de Barcelona també va per barris	El Punt Avui
27/4/12	Las aguas freáticas de Barcelona tienen trazas de cocaïna y èxtasi	El Periódico de Catalunya
27/4/12	El subsuelo del Besòs es el que tiene más metadona	El País
27/4/12	Detectan restos de droga en las aguas del subsuelo de BCN	El Mundo
27/4/12	Els aqüífers dibuixen un 'mapa clàssista' del consum de drogues	Regió 7
27/4/12	Hallan rastros de drogas en aguas de Barcelona	El Universal
27/4/12	Un estudio detecta restos de droga en las aguas subterráneas de Barcelona	Antena 3 TV
27/4/12	Sustancias químicas de diverso origen en aguas subterráneas	rdipress.com
27/4/12	Un mapa de la droga a través de l'orina que es filtra als aqüífers	Btvnoticies.cat
27/4/12	La cocaïna flota en el subsuelo de Barcelona	Gran Canaria Actualidad
27/4/12	La cocaïna flota en el subsuelo de Barcelona	El País (digital)
28/4/12	Hallan rastros de drogas en aguas de Barcelona	El Pueblo.com
28/4/12	Las aguas subterráneas dibujan el mapa del consumo de drogas	Telecinco
28/4/12	La droga que consumes sin saberlo: está en el agua, el aire y los billetes	Informe21.com
28/4/12	Dime dónde vives y te diré qué droga se consume en tu barrio	diagramconsultores.com
28/4/12	Les aigües subterrànies dibuixen un 'mapa clàssista' del consum de drogues a la ciutat	Ràdio Trinitat Vella
28/4/12	La droga va per barris	Ràdio Trinitat Vella
28/4/12	Dime dónde vives y te diré qué droga se consume en tu barrio	ABC (digital)
28/4/12	Dime dónde vives y te diré qué droga se consume en tu barrio	Todo Gaceta.com
28/4/12	Detectan droga en agua de Barcelona	Noroeste.com.mx
29/4/12	La droga que consumes sin saberlo: está en el agua, el aire y los billetes	Medio Informativo.com
29/4/12	Barcelona opta a ser seu de l'organisme mundial per a la gestió de l'aigua	La Malla.net
29/4/12	Barcelona opta a ser seu permanent l'organisme mundial de la ONU per la gestió de l'aigua	Ajuntament de Barcelona
2/5/12	Barcelona opta a ser seu permanent l'organisme mundial de l'ONU per la gestió de l'aigua	Sostenible.cat
6/5/12	Damià Barceló, director de l'ICRA i vicedirector de l'IDAEA-CSIC: 'Les substàncies que trobem a l'aigua ens parlen de com és la societat en la que vivim'	Com Ràdio

22/5/12	Girona inaugura una sala de rius artificials puntera a Europa	Gironainfo.cat
22/5/12	Un trabajo con ríos artificiales preverá las consecuencias de una sequía	Efeverde.com
22/5/12	Girona inaugura una sala de rius artificials puntera a Europa per investigar el canvi climàtic i els fàrmacs a l'aigua	324.cat
22/5/12	Inauguren una sala de rius artificials per investigar el canvi climàtic i els fàrmacs a l'aigua	Aragirona.cat
22/5/12	Girona inaugura una sala de rius artificials puntera a Europa per investigar el canvi climàtic i els fàrmacs a l'aigua	Directe.cat
22/5/12	Girona inaugura una sala de rius artificials puntera a Europa per investigar el canvi climàtic i els fàrmacs a l'aigua	ACN
22/5/12	Nova sala de rius experimentals	TV3.cat
22/5/12	Un centre d'investigació de l'aigua capdavanter a Europa	Catalunya Ràdio
23/5/12	Un trabajo con ríos artificiales preverá las consecuencias de una sequía	Madri+D
23/5/12	Girona inaugura una sala de rius artificials puntera a Europa	Diari de Girona
23/5/12	L'ICRA estrena a Girona una sala de recerca que recrea rius artificialment	El Punt Avui (digital)
23/5/12	L'ICRA basteix un riu al subsòl per fer alta recerca de l'aigua	Ecodiari.cat
23/5/12	Un laboratori, vital per al projecte	El Punt Avui (digital)
23/5/12	Un trabajo con ríos artificiales preverá las consecuencias de una sequía	La Vanguardia (digital)
23/5/12	Un trabajo con ríos artificiales preverá las consecuencias de una sequía	Agroinformación
23/5/12	L'ICRA estrena a Girona una sala de recerca que recrea rius artificialment	El Punt Avui
23/5/12	Rius artificials per preveure les consqüències d'una sequera	Regió 7
23/5/12	Girona inaugura una sala de rius artificials puntera a Europa per investigar les aigües	Diari de Girona
23/5/12	Un treball amb rius artificials preverà les conseqüències d'una sequera	La Malla.net
28/5/12	Un riu al soterrani per fer recerca	Presspeople.com
5/6/12	Water.cat presenta l'agenda estratègica de recerca sobre l'aigua	Ecodiari.cat
5/6/12	Investigadors del cicle de l'aigua catalans busquen captar fons a Brussel·les	Europa Press
5/6/12	Investigadors del cicle de l'aigua catalans busquen captar fons a Brussel·les	Vilaweb
5/6/12	Investigadors del cicle de l'aigua catalans busquen captar fons a Brussel·les	Catalunya News
11/6/12	Científics catalans creen un laboratori amb rius artificials	El Periódico de Catalunya
11/6/12	Científicos catalanes crean un laboratorio con ríos artificiales	El Periódico de Catalunya
11/6/12	El ICRA reproduce el comportamiento de los ríos en sus propias instalaciones	Europaagraria.es
12/6/12	I+D+i: Científicos catalanes crean un laboratorio con ríos artificiales	Aguas Residuales.info
13/6/12	Reportatge rius artificials ICRA	Tv Girona
18/6/12	Rios de laboratorio	La Sexta Noticias
27/6/12	Connexió Barcelona: El CSIC troba traces de droga a l'aigua del subsòl de Barcelona	Btvnoticies.cat
3/7/12	Un estudi detecta nivells elevats de perfluorats en l'aigua de consum diari d'Espanya i Alemanya	ACN
3/7/12	Un estudi detecta nivells elevats de perfluorats en l'aigua de consum diari d'Espanya i Alemanya	Directe.cat
4/7/12	L'ICRA detecta alts nivells de perfluorats en l'aigua que es beu de l'aixeta a Girona	Diari de Girona (digital)
4/7/12	Nivells elevats de perfluorats en l'aigua de consum d'Espanya i Alemanya	Empordà Info
4/7/12	Descobrixen alts índexs de perfluorats a l'aigua de l'aixeta	Regió 7 - Digital
4/7/12	Es detecta fluor a l'aigua d'Espanya i Alemanya	Diari més
4/7/12	Detecten alts nivells de perfluorats en l'aigua de l'àrea metropolitana	Ecodiari.cat
4/7/12	Un estudi detecta nivells elevats de perfluorats en l'aigua de consum diari d'Espanya i Alemanya	gdiari.cat
4/7/12	L'ICRA detecta alts nivells de perfluorats en l'aigua que es beu de l'aixeta a Girona	Diari de Girona
24/8/12	Johnson & Johnson elimina cuatro ingredientes de sus productos	El Nuevo Diario.com
11/9/12	Why has the Yangtze River turned red?	Nature
12/9/12	Damià Barceló, director de l'ICRA: 'L'estudi de l'aigua residual dona les úniques dades reals de consum de droga'	El Temps
17/9/12	Los peligros del antibacterial conocido como triclosán	ecologismo.com
18/9/12	L'Institut Català de Recerca de l'Aigua col·labora en la formació del professorat de Secundària	Diari de Girona
19/9/12	Recoder vol més relació amb l'ICRA	Nació digital
19/9/12	Recoder apuesta por una relación "más estrecha" entre el Govern y el ICRA	Noticias.com
19/9/12	Recoder aposta per una relació 'més estreta' entre el Govern i l'ICRA	Vilaweb
19/9/12	Recoder vol més relació amb l'ICRA	Ecodiari.cat
19/9/12	Recoder apuesta por una relación 'más estrecha' entre el Govern y el ICRA	La Información Digital.com
19/9/12	Recoder apuesta por una relación "más estrecha" entre el Govern y el ICRA	Gentedigital.es
19/9/12	Recoder apuesta por una relación 'más estrecha' entre el Govern y el ICRA	Europa Press
19/9/12	Recoder apuesta por una relación "más estrecha" entre el Govern y el ICRA	La Vanguardia (digital)
19/9/12	Recoder apuesta por una relación 'más estrecha' entre el Govern y el ICRA	Terra
19/9/12	Recoder apuesta por una relación 'más estrecha' entre el Govern y el ICRA	20 minutos (digital)
19/9/12	Recoder apuesta por una relación 'más estrecha' entre el Govern y el ICRA	Te interesa.com
19/9/12	Recoder justifica la privatització d'Aigües Ter-Llobregat	TV3.cat
20/9/12	El Govern continuarà reclamant l'AP-7 gratuïta si no es desdobra la N-II	gihostaleria.org
20/9/12	Recoder o com vendre les joies de l'Àvia	Diari de Girona (digital)
20/9/12	Crítica que hi havia hagut 'promeses sense inversions' pel cabal del Ter	El Punt Avui
20/9/12	Recoder aposta per alliberar l'AP-7 mentre no es faci l'N-II	El Punt Avui

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20/9/12	Recoder o com vendre les joies de l'àvia	Diari de Girona
20/9/12	Recoder aposta per alliberar l'AP-7 mentre no es faci l'N-II	El Punt Avui
21/9/12	A punt de privatitzar-se aigües Ter-Llobregat	Tv Girona
24/9/12	El Campus e-MTA celebra el Dia Mundial del Turisme en la UIB con una jornada abierta al público	Prespm.eu
24/9/12	La Universitat de Girona i la UIB celebren el Dia Mundial del Turisme en una jornada oberta al públic	Universitat de les Illes Balears
24/9/12	El Campus e-MTA celebra el Dia Mundial del Turisme en una jornada oberta al públic	e-MTA.eu
1/10/12	Mantenir i invertir en la qualitat dels rius genera beneficis	Nació digital
1/10/12	El director de l'ICRA recibe un premio internacional del agua	Parc Científic i Tecnològic Universitat de Girona
4/10/12	Se celebra la X Reunión de la Mesa de Tratamiento de Aguas 2012 en Almería, META 2012	iAgua.es
4/10/12	José Antonio Donaire i Manel Poch descriuen el nou paradigma turístic en el marc del Dia Mundial del Turisme	e-MTA.eu
6/10/12	Aigües, aires, llocs	Catalunya Ràdio
7/10/12	La inversió en el manteniment i la millora de la qualitat dels rius genera beneficis econòmics	Sostenible.cat
8/10/12	Almería acoge la X Reunión de la Mesa Española de Tratamiento de Aguas	Interempresas.net
8/10/12	Damià Barceló, cap de l'ICRA, Premi Internacional de l'Aigua	Nació digital
8/10/12	META 2012 en Almería	Tecnoenergiahoy.es
8/10/12	META 2012 en Almería	Solar News
8/10/12	Almería acoge la X Reunión de la Mesa Española de Tratamiento de Aguas	Interempresas.net
8/10/12	Entrevista a Damià Barceló, director general de l'ICRA	Tv Girona
9/10/12	Fàrmacs a l'aigua del Segre	TV3
9/10/12	Se celebra la X Reunión de la Mesa de Tratamiento de Aguas 2012 en Almería, META 2012	iAgua.es
10/10/12	Investiguen els efectes que produeixen els fàrmacs al riu Segre	Segre
11/10/12	La Mesa Española para el Tratamiento de Aguas se reúne en Almería para compartir técnicas, ideas y experiencias	Construible.es
15/10/12	Dr. Damia Barcelo (Co-Editor in Chief STOTEN) wins PSPIPW prize	Environmental Science and Ecology
21/10/12	El CSIC anima la UdG a apostar per l'especialització	El Punt Avui
21/10/12	El CSIC anima la UdG a apostar per l'especialització	El Punt Avui (digital)
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de ríos españoles	20 minutos (digital)
26/11/12	Encuentran niveles de residuos de fármacos en peces de ríos españoles	Antena 3 TV
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	Crónica de Cantabria.com
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de ríos españoles	Cronoticias.com
26/11/12	Hallados residuos de Voltaren en los peces del Júcar y del Ebro	El País (digital)
26/11/12	Un estudi revela nivells de residus de fàrmacs en peixos dels rius Ebre i Llobregat	Europa Press - Barcelona
26/11/12	Un estudi revela nivells de residus de fàrmacs com el voltarén en peixos dels rius Ebre o Xúquer	Europa Press - València
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	Europa Press - València
26/11/12	Los peces de Júcar y del Ebro toman el antiinflamatorio 'voltarén'	GranCanariaActualidad.com
26/11/12	Detectan niveles de Voltarén en los peces del río Júcar	La Verdad Digital
26/11/12	Detectan niveles de Voltarén en los peces del río Júcar	Las Provincias
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	Medicinatv.com
26/11/12	Un estudio revela niveles de residuos de fármacos como el voltarén en peces de los ríos Ebro o Júcar	Noticias.com
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	Telecinco
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	Terra
26/11/12	Un estudi revela nivells de residus de fàrmacs en peixos dels rius Ebre i Llobregat	Vilaweb
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	Yahoo! Noticias
26/11/12	Un estudio revela niveles de residuos de fármacos en peces de ríos españoles	El Mundo (digital)
27/11/12	Los peces del Ebro y del Llobregat "beben" Voltarén	ABC
27/11/12	Hallan residuos de fármacos como el voltarén en peces de los ríos Ebro, Guadalquivir o Júcar	Deia
27/11/12	Localizan diclofenaco en peces de ríos españoles	Diario Médico
27/11/12	Los ríos Ebro o Júcar contaminados por residuos de fármacos	Ecoticias.com
27/11/12	Els peixos del Llobregat, l'Ebre i el Xúquer ingereixen residus farmacèutics	El Punt Avui
27/11/12	Peces de los ríos Ebro o Júcar, afectados por residuos de fármacos	Europa Press
27/11/12	Detectan residuos de fármacos en peces de los ríos Ebro, Llobregat, Júcar y Guadalquivir	Infoambiental.com
27/11/12	Encuentran restos de fármacos en peces de varios ríos españoles	infosald.com
27/11/12	Un estudio revela niveles de residuos de fármacos en peces de los ríos Ebro o Júcar	La Información Digital.com
27/11/12	Detectan restos de fármacos en peces del Ebro, el Júcar y el Guadalquivir	La Razón (digital)
27/11/12	Detectan restos de un antiinflamatorio en los peces de los 4 ríos mediterráneos	Levante - El Mercantil Valenciano
27/11/12	Detectan restos de un antiinflamatorio en los peces de los 4 ríos mediterráneos	Levante (digital)
28/11/12	Hallan restos de antiinflamatorios en el organismo de los peces del río	La Tribuna Digital
29/11/12	Se descubren altos niveles de residuos de fármacos en peces de los ríos Ebro y Júcar	Cambioideal.es
29/11/12	El proyecto SCARCE detecta niveles de residuos de fármacos como el diclofenaco o voltarén en peces de los ríos Ebro, Llobregat, Júcar y Guadalquivir	Noticias Médicas
29/11/12	Les deixalles en fàrmacs en els rius	Ràdio 4

2/12/12	Por primera vez se detectan niveles de residuos de fármacos en peces de río	ABC Punto Radio
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Diario Siglo XXI
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	El Economista
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Europa Press
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	La Información Digital.com
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	La Voz Libre
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Medicinatv.com
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Medicinatv.com
19/12/12	Ósmosis inversa elimina más del 99% de los fármacos de las EDAR	Nació digital
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Saludigestivo.es
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Te interesa.com
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Telecinco
19/12/12	Filtrar el agua por ósmosis inversa en las depuradoras elimina el 99% de restos de fármacos	Yahoo News
20/12/12	La filtración por ósmosis inversa elimina más del 99% de los residuos de fármacos en depuradora	Infoambiental.com
20/12/12	Un proyecto piloto demuestra que la filtración por ósmosis inversa elimina más del 99% de los fármacos depositados en las EDARS	Noticias Médicas
26/12/12	Proponen usar la ósmosis para limpiar el Júcar de medicamentos	La Tribuna Digital
27/12/12	Un Villancico Contaminado (Biosfera Envenenada por Tierra, Mar, Aire y Suelo)	Madrid.org
31/12/12	Una prova pilot elimina el 99% dels fàrmacs de l'aigua residual	El Periódico de Catalunya
31/12/12	Una prueba piloto elimina el 99% de los fármacos del agua residual	El Periódico de Catalunya



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www.icra.cat

Catalan Institute
for Water Research

H2 O Building
Science and Technology Park.
University of Girona

Emili Grahit, 101
17003 Girona (Spain)
T (+34) 972 18 33 80
info@icra.cat

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