

Agriculture - Sustainable Development

Communities



water Agriculture Sources - Sustainable Development Communities

CRHIAN



DESCRIPTION

Chile is amid one of the longest droughts in history. This water shortage critically affects the population, ecosystems and economic development of the country. Agriculture and mining are two of the most important industrial activities of the national economy. Both activities face the difficult challenge of becoming sustainable, even when the amount of water available continues to decline. In 2014 the Water Research Center for Agriculture and Mining (CRHIAM) was founded under the framework of CONICYT's fifth contest called Fund for Research Centers in Priority Areas (FONDAP) competition. CRHIAM is led by the University of Concepción in association with the Universidad de La Frontera and Universidad del Desarrollo.





MISSION

To be a national authority on the creation of advanced scientific and technological knowledge on water resources for agriculture, mining and communities and contribute to the achievement of sustainable development goals.

VISION

To be a worldwide authority as a water resources research center for the sustainable development of agriculture, mining and communities, in consideration of the principles of water security.

OBJECTIVES

CRHIAM has four main objectives:

- Promote world-class research on water resources to create knowledge and develop technologies to contribute to the water security of ecosystems, communities and production sectors.
- Form undergraduate and especially graduate and postdoctoral human resources in order to create a critical mass that will support the development of abilities in the water resources field.
- Create networks with the main domestic and international research institutions and the public and private sectors to benefit common interests regarding research, innovation and development in water resources.
- Contribute to better water management through communication and dissemination of scientific evidence that contributes to public policies and to the knowledge of society.

Water Agriculture Resources Sustainable Development Mining Communities

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LINES OF RESEARCH

CRHIAM fosters spaces for interdisciplinary work and dissemination, implement actions with the participation of society and contribute to the development of knowledge to achieve water security for ecosystems, communities and production systems.

LINE OF RESEARCH 1 EFFICIENT USE OF WATER IN AGRICULTURE AND MINING

The main goals of this line of research are the optimization of water resources and the analysis of large amounts of data. Research in agriculture is consolidated in two fields connected to the efficient use of water and information technologies and data analysis applied to complex production systems. For mining the focus is on improving water recovery in copper concentrators.

LINE OF RESEARCH 2 NEW WATER SOURCES FOR AGRICULTURE, MINING AND COMMUNITIES

Three major forces drive this line: freeing freshwater for households and agriculture, anticipating the "not a single drop of freshwater for industrial processes" policy and evaluating the use of low-quality metallurgical water, seawater, well water and recycled water to make mining activity more viable in extremely arid regions. Research work is organized around four projects: use of as-is or partially desalinated seawater in mineral processing; use of partially desalinated seawater in agriculture, development of cost-effective methods to improve water quality for agriculture and use of colloidal clay to clean large bodies of water and control the spread of harmful algae; development of a scientifically rigorous and quantitative methodology for the design of flotation, flocculation and anti-fouling reagents based on molecular modelling tools and exploration of a methodology that does not involve water for separating mineral particles under the dry or green mining framework.

• LINE OF RESEARCH 3 WATER AVAILABILITY AND QUALITY FOR AGRICULTURE AND MINING AMID CLIMATE CHANGE

This line of research aims to understand the impact of climate change on the availability and quality of water in the basins of central Chile. To this end, it is proposed the development of modeling and monitoring tools that allow deeper study of hydrological processes that control water resources availability and the production and pollution transport processes that affect their quality. All this to guarantee water for human consumption and then for agricultural and mining production, pollution control, environmental protection and social well-being.



LINE OF RESEARCH 4 TECHNOLOGY FOR WATER TREATMENT AND ENVIRONMENTAL REMEDIATION

Some of the technologies addressed in this line of research are aimed at recovering wastewater, improving water retention in degraded soils and closing cycles, recovering valuable compounds, nutrients, energy and/or water, among other elements. Both intensive and extensive technologies, based on physical, chemical and/or biological processes, are studied. The interdisciplinary life-cycle assessment tool is integrated into evaluation of different scenarios of technology application and its connection with the environment. In addition, the influence of technology acceptance by society is investigated, mainly through studies on its adaptation for implementation in rural communities.

STRATEGIC FOCUSES

- Ecosystem services as a key to reducing conflicts over water resources.
- Water supply for communities that coexist with increasing agricultural and mining development through sustainable technologies and practices.
- Strategic alignment with UN Sustainable Development Goals (SDGs) related to water access and sustainable consumption and production.

LINE OF RESEARCH 5 WATER GOVERNANCE, ECOSYSTEM SERVICES AND SUSTAINABILITY

Esta línea busca desarrollar investigación que permita asegurar la calidad y cantidad del agua desde la óptica del respeto a los derechos fundamentales, los Objetivos de Desarrollo Sostenible planteados por la Organización de las Naciones Unidas, desde la perspectiva conceptual y estratégica de la Seguridad Hídrica. Por otro lado, se trabaja en mejorar la protección de los distintos cuerpos de agua (lagunas, humedales, acuíferos, glaciares, entre otros) y los servicios ecosistémicos asociados a éstos, a través de instrumentos de conservación ambiental y de planificación del territorio. Además, se trabaja en promover la gobernanza del agua que fomente una toma de decisiones más equitativa, inclusiva, justa y democrática; orientada a prevenir y abordar los conflictos sociales por el agua y su judicialización.



TEAM

CRHIAM is led by its Directorate and supported by administrative personnel.

CRHIAM works with an Academic Council composed of eight principal investigators who lead four clusters: Resources, Demand, Technology and Water and Society. Each cluster is composed of two principal investigators, associate researchers, support personnel, postdoctoral fellows and undergraduate and graduate students. The work of the researchers of each cluster contributes to one or more of the center's five lines of research.

The center has a Scientific Committee composed of leading scholars from foreign universities that ensures that the research carried out at the center is first class.

In addition, CRHIAM has an Advisory Council composed of leading professionals from institutions related to water management in agriculture and mining, this council guarantees that the work done at the center is directly related to important issues for the country.





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SUMMARY INDICATORS 2014 – 2019

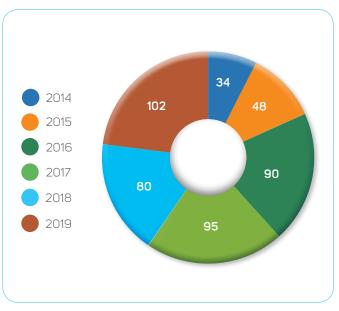


Figure 1.

Total publications in the first 6 years of CRHIAM (2014-2019). Total number of publications = 449

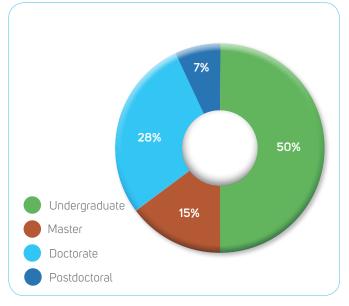


Figure 3.

Percentage of students in the first 6 years of CRHIAM (2014-2019), by current academic degree. Total number of students = 798.



Figure 2.

Total publications in the last 6 years of CRHIAM (2014-2019), by type of publication.

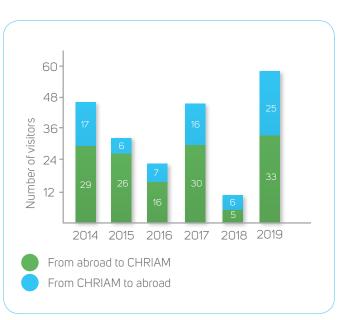


Figure 4.

Number of collaborative visits in the first 6 years of CRHIAM (2014-2019).



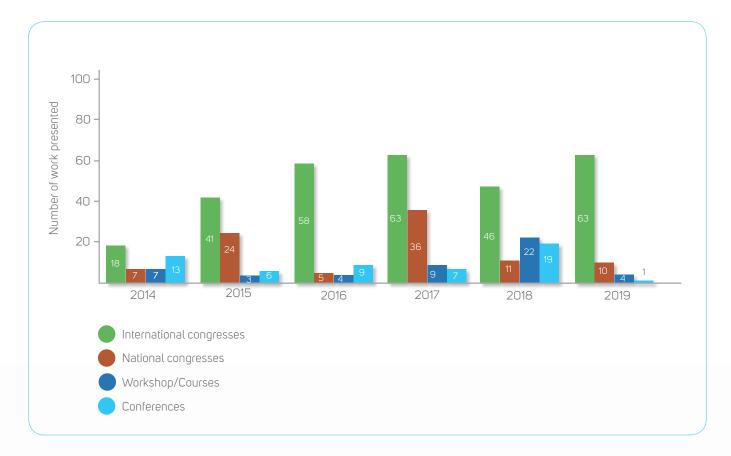


Figure 5.

Participation of members of the Center in congresses in the first 6 years of CRHIAM (2014-2019).





SCHOOLS WORKING WITH CRHIAM, 2019-2023



Water Agriculture Resources Sustainable Development



INTERNATIONAL COLLABORATION

Canada

University of Alberta The University of British Columbia University of New Brunswick University of Waterloo Université Laval Water Security Agency

Mexico

Universidad Autónoma de San Luis Potosí Universidad Autónoma del Estado de Hidalgo Instituto Potosino de Investigación Científica y Tecnológica, A.C.

Universidad Autónoma de Yucatán

Germany

Heinrich-Heine-Universität Düsseldorf University of Stuttgart Leibniz Universität Hannover Magdeburg-Stendal University of Applied Sciences Karlsruhe Institute of Technology Friedrich-Alexander-Universität Erlangen-Nürnberg Deutschen Zentrums für Luft- und Raumfahrt Universität zu Köln

Colombia

Universidad Mariana Universidad Nacional de Colombia Universidad de Antioquia

Brazil

Universidad Estatal de Campinas Instituto de Botânica Universidade de São Paulo Universidad Federal de Alfenas Universidad Federal de Campina Grande Universidade Tecnológica Federal do Paraná Empresa Brasileira de Pesquisa Agropecuária – Embrapa Instituto Nacional de Pesquisas Espaciais, São José dos Campos

Argentina

Universidad Nacional de La Plata Universidad Nacional de Mar del Plata

United States

University of California Georgia State University Arizona State University Oakland University Brown University University of Nebraska-Lincoln University of Colorado Boulder University of Colorado Boulder University of Colorado Boulder University of Idaho University of Idaho University of Pittsburgh University of Pittsburgh University of Pittsburgh University of Delaware Columbia University National Institutes of Health

Honduras

Universidad Nacional Autónoma de Honduras

Costa Rica

Tecnológico de Costa Rica Universidad de Costa Rica

Ecuador

Universidad de las Fuerzas Armadas-ESPE

Chile

CRHIAM



Universidad Politécnica de Madrid Universidad Politécnica de Cataluña Universitat de València Universidad Pablo de Olavide, Sevilla Universidad de Santiago de Compostela Universidad de Valladolid Universidad de Málaga Universidad de Alcalá Universidad de Huelva Instituto de Diagnóstico Ambiental y Estudios del Agua (IDAEA-CSIC) Universidad Complutense de Madrid

England

University of Bristol University of Oxford Cranfield University Loughborough University Northumbria University

Portugal

Universidade de Coimbra Universidade do Minbó

Sweden

Lund University Swedish Institute of Agricultural and Environmental Engineering (JTI) Swedish University of Agricultural Aciences (SLU), Uppsala.

Denmark

Technical University of Denmark (DTU)

Finland

Aalto University School of Science University of Oulu

Russia

Institute of Problems of Mechanical Engineering (IPME)

Belgium

Université de Liège Vrije Universiteit Amsterdam Universiteit Gent Vlaamse Instelling voor Technologisch Onderzoek (VITO)

France

Université Paris-Saclay Université de Bordeaux Université de Versailles Saint-Quentin-en-Yvelines (UV\$Q) Université Blaise Pascal (UBP) Université de Strasbourg Centre National de la Recherche Scientifique (CNRS)

Italy

Basilicata

Switzerland

Université de Lausanne (UNIL) Universität Basel

Università degli Studi di Siena Università Roma Tre

Austria Università degli Studi di Catania Università degli Studi della Universität Innsbruck

University of Thessaly Aristotle University of Thessaloniki

Greece

Czech Republic

Masarykova Univerzita University of Chemistry and Technology Prague Institute of Chemical Technology Prague (ICT)

Australia

The University of Queensland The University of Melbourne Griffith University James Cook University University of South Australia Commonwealth Scientific and Industrial Research Organisation (CSIRO)











Contacto

- Victoria 1295, Concepción Chile
- 041-2661570
- 🗢 crhiam@udec.cl
- www.crhiam.cl



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