Updated Call

Postdoctoral Position in “Water-Food-Energy Nexus: Hydropower and competing water uses” at Universidad de Chile (Chile)

Applications are invited for a postdoctoral position in the project “Comparative study on water-food-energy nexus at the river basin level in Chile and China: Reconciling hydropower and competing water uses”. The project is based in the Department of Civil Engineering at Universidad de Chile (Santiago, Chile), and funded by ANID (Chile’s main public research funding) through its International Collaboration Program (PCI).

The successful candidate will join a multidisciplinary team covering disciplines like hydrology, eco-hydraulics, and water resources systems analysis with the aim to study the tradeoffs between hydropower production and competing water uses, both consumptive and instream. The position is for one year, with a possible extension to two years. Proficiency in Spanish is not required, but will be a factor in the evaluation of applicants.

Project Description

Hydropower plays an important role in power systems around the world. As a renewable energy source this role is expected to become yet more prominent in low-carbon or decarbonized power systems. In addition, hydropower’s capability to provide storage capacity and rapidly change its power output - hydropeaking - is a major beneficial attribute for power systems, especially those undergoing massive penetration of renewables of variable source, like wind and solar power. These attributes of hydropower (part of a large-scale power system, and variable operation) are challenging for water resources management in the basins where hydropower is produced.

As a non-consumptive water use, in principle hydropower would not compete with other water uses in terms of water quantity. However, in practice there are several instances where hydropower is potentially conflicting with consumptive and instream uses. A prominent example of the first is irrigation, where the conflict is commonly related to a seasonal mismatch of demands for power and water for irrigation. This conflict poses an operational challenge to multi-purpose reservoir systems, so that release decisions represent an adequate balance between the two purposes. Instream water uses, on the other hand, require extending the traditional concept of minimum environmental flows to deal with operational variability at several time scales, from seasonal to subdaily, as in hydropeaking operations.

This international collaboration project, which involves researchers from Chile and China (Tsinghua and Zhejiang Universities), aims at advancing our understanding of the nature of the tradeoffs between hydropower and competing water uses, with a focus on irrigation, fisheries, native species conservation, and instream recreation. Characterization of such tradeoffs will allow identifying promising water management alternatives, including operational schemes, for a diverse range of conditions observed in China and Chile.
The research approach involves mathematical modelling of closely coupled natural processes and human interventions, including infrastructure development and operations as well as management decisions. Simulation and optimization models will be developed and tested through case studies in China and Chile, reflecting several conditions and scales as well as different competing uses. Hydropower will be a key component in all case studies selected for this project, as it is a common topic for China and Chile. All water uses will be characterized in technical and economic terms if possible. The Lancang-Mekong river basin which originates from China was chosen to study the conflict between hydropower, irrigated agriculture and fisheries. Chilean case studies include four river basins: Maipo, Tinguiririca, Maule, and Biobio. These basins represent a wide range of possible conflict between hydropower (both reservoir and run-of-river), irrigated agriculture, drinking water supply, ecosystem conservation, and instream recreation.

The expected outcome of this project is an improvement in the coordination between hydropower and all competing uses. These improvements will be the result of implementation of promising water management alternatives for reconciling those water uses, including modified operations for hydropower reservoirs that can better meet the requirements of other uses without any significant negative impact on the energy sector. In other words, we will identify Pareto-efficient solutions for alternative scenarios (hydrological, energy mix, etc), considering economic impacts for hydropower and irrigation and alternative indicators for benefits for recreation and fisheries. An additional outcome would be recommendations for modifying existing agreements between users for future scenarios, including climate change.

Benefits and Application

The selected Postdoctoral researcher will receive an annual gross salary of CLP 20,000,000 for up to two years, plus additional project and conference travel support. The interested candidate must hold a Ph.D. in water resources, power systems, operations research, or a related field at the time of joining the project. Application packages must be sent by email to the project’s Director Prof. Marcelo A. Olivares maroliva@uchile.cl until October 30th, 2020 and must include:

1. A personal statement including his/her motivation and expected contribution to the project, and suggestions for specific topics of interest within the scope of the project’s objectives.

2. A Curriculum Vitae, including a list of recent publications, participation in research projects, and a short summary of his/her doctoral research. Proven experience in operational systems modelling with an optimization approach is a must and experience in integration of water resources systems and power systems models will be a plus.

3. Certificates of PhD and previous relevant degrees and a list of Ph.D. courses taken and the most recent transcript.

4. Names, affiliation and contact information of three references.

5. Sworn statements as requested in the attached official call (in Spanish)

A subset of the candidates will be selected based on the strength of their CV and their fit with the project. They will be invited for an interview and their references will be contacted. The final decision will be
determined by the research team and the accepted candidates will be notified by November 27th, 2020. The selected candidate can start working in the project as soon as December 2020, or at a later date by mutual agreement depending on the conditions imposed by the COVID-19 pandemics.

**More details on the position requirements and application process in the attached official call announcing the position (in Spanish).**

For further information, please send an email to maroliva@uchile.cl.