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WARATAH POWER DRIVES APPLIED SUSTAINABLE HYDROPOWER RESEARCH IN THE MEKONG

Waratah Power is pleased to be working with an applied research consortium in the Mekong basin to further sustainable small hydropower. The work, funded by the CGIAR – a major international agricultural research agency – will focus on deriving ecological benchmarks for hydropower design and applying them to new projects in the region.

The research builds on Waratah Power's existing applied research and technology program, funded by the New South Wales and Federal Governments (ARENA's 'Emerging Renewables' program).

Waratah Power will be exercising expertise in hydropower design and innovative low-head turbine technology application. We will assess existing structures for their capacity to be retrofitted with ecologically-benign high-efficiency turbines, with a view to moving to development in a next phase.

The Mekong basin has the most valuable inland fishery in the world with a total economic value up to \$9.5 bn per year. However, there is substantial pressure to develop the full potential of the basin's enormous hydropower resources, which could significantly negatively impact the fishery. We intend to enable renewable energy generation, while preserving an important economic and livelihood resource. The Waratah team has already worked on many aspects of hydropower in the Mekong basin (in Laos, Cambodia and Vietnam).

Waratah Power Chairman, Graham Hart AM, commented:

"We are very pleased to be working with CGIAR and our research partners including Electricite du Laos to develop the region's substantial hydropower resources in a truly sustainable manner. The Mekong Basin has a hydropower potential of some 900 terawatt-hours. We look forward to pioneering a new standard in small hydropower development"

A regional workshop later in the year will serve to set out further phases of the project application phases.

The research phase will continue through to the end of 2013.

A full project précis can be found below, and accessed at:



<http://mekong.waterandfood.org/archives/1384>



CPWF Mekong

Optimising fish-friendly criteria for incorporation into the design of mini-hydro schemes in the Lower Mekong Basin

Brief

description

The preliminary, but very necessary, work to determine the engineering design criteria needed to allow fish to migrate past instream barriers with minimal injury or mortality in the Lower Mekong Basin (LMB) will be determined. The project is promoted as a critical first step in ensuring mini-hydro development can proceed, and thus help reduce rural poverty, in a way that maintains fisheries sustainability and diversity. Almost all freshwater fish are migratory and undertake small and large scale movements to access spawning, feeding and nursery habitat. Construction of water regulatory structures has led to a worldwide increase in the number of low-level (generally less than 6 m) weirs, impeding fish movements. It is therefore important that any water development activity allows the free passage of fish to enable completion of essential life history stages. Criteria for the design and operation of water management structures have been well-defined in North America, but only for salmonid species where applied research has yielded sufficient criteria enabling construction of both upstream and downstream passage facilities. No similar data currently exists which demonstrates safe passage of any Lower Mekong fish species through a hydro plant. This incomplete information regarding potential 'baseline' environmental impacts at existing structures, and the possibilities of using innovative technologies to minimise impacts, is a major impediment to the informed management of sustainable irrigation and mini hydro systems. Continued paucity of data may contribute to continued declines in both subsistence and capture fisheries. In addition, power generating opportunities are being missed because hydro generation is not considered when constructing flood and irrigation structures. The project will specifically focus on a limited number of species at one site in Lao PDR that could incorporate a mini-hydro development scheme, and that information will be used to produce a social, economic and environmentally sustainable project pre-feasibility study for one type of mini-hydro scheme. The information generated from this work will be used to prepare preliminary design criteria to guide and promote the construction of a demonstration mini-hydro power site at one site in central Lao PDR.

Outputs

- A guideline for fish-friendly criteria for use in future mini-hydropower pre-feasibility studies.
- A scientific paper submitted for publication to a peer reviewed international journal.
- A economic/social/environmental pre-feasibility study for low-head/high-volume hydro development at one site in Lao PDR.



- A regional workshop to present research results under the auspices of a leading Mekong basin agency such as the MRC, WorldFish and/or the CPWF.

How will the project change anything?

After this project is completed stakeholders in mini-hydropower development in the Mekong region will be:

- Aware of the potential impacts mini-hydro can have on the downstream passage of fish.
- Have access to design criteria specifically developed for LMB fish species to minimise this impact.
- Able to make use of existing instream structures to realise potential hydro power generation opportunities in a sustainable manner.
- Consent authorities review and approval of new development proposals can be based on a system where informed decisions on the potential impacts and mitigation options for mini-hydro development can be made and implemented.

Insofar as specific changes to the behaviour of project participants are concerned, these will be the following:

- NUOL and LARReC start using a type of research tool never before applied in the LMB: deploying and retrieving Sensor Fish (pressure, impact and acceleration change recording instrument) for mapping hydraulic conditions during downstream passage through turbines.
- Waratah Power will undertake the modeling of their hydro-engine based on the actual arrangement and flow conditions at one site in Lao PDR and communication those results to the research team through workshops meeting with the NUOL and LARReC.
- NUOL and LARReC start to use new types of research tools: barotrauma chambers and shear flumes to recreate hydraulic conditions recorded by Sensor Fish during downstream passage through an existing turbine and the model conditions through a hydro-engine design to determine injury and mortality probabilities for three common Mekong migratory species.
- NUOL and LARReC will analyse the results of the injury and mortality studies based on both real life and modeled downstream passage conditions and publish them in a peer reviewed paper.
- NUOL, LARReC and Waratah will use results to develop a set of guidelines for designing fish-friendly mini-hydro schemes.
- Waratah will engage an engineering consultant to help them analyze the economic potential of low-head, high volume mini-hydro plant for potential installation at a selected site and produce a commercial pre-feasibility study to present the results to NUOL, LARReC and EdL and CPWF in a workshop and a written report.

Partners

MK15 is led by the [National University of Laos](#), in partnership with the Living Aquatic Resources Research Centre (LARReC – Lao PDR), [Electricite du Lao](#) (EdL) and Waratah Power Company (Australia).