MASTS-PECRE Final Report:

Dr. Huiwen Cai. Zhejiang Ocean University, Zhoushan, China

Host Institution:
Institute of Aquaculture, School of Natural Sciences, University of Stirling, Stirling. FK9 4LA.

Hosting Faculty:
Prof. Lindsay Glenn Ross. Institute of Aquaculture, School of Natural Sciences, University of Stirling.
Dr Trevor C Telfer.

Background:
This fellowship aimed to study the waste loading during the growth production process of cage farming of Large Yellow Croaker (LYC), *Larimichthys crocae*. This fellowship combined the experience of a MASTS professor who is a leader in sustainable aquaculture, with the fellow's skill sets. The work was developed using datasets derived from the long-term study and field experience on LYC cage farming in Zhoushan, China, in combination with environmental modelling skills and approaches developed at the host institution. This exchange has enhanced international collaboration between the MASTS community and Chinese research groups and has created new collaborative links with Scotland and China which we hope will be long-term.

Interaction with the MASTS community:
During this fellowship visit to Scotland, I was an active member of the MASTS institution. Contact was not only confined to Prof. Ross and Dr. Telfer, I also interacted with other research groups (Prof. Jauncey, Prof. Little) as well as with faculty and graduate students in the university. I had the opportunity to present MASTS and the findings of the work more broadly at the "Cross-Strait Young Scientists' forum". I also took the opportunity to introduce MASTS and University of Stirling to the Zhejiang Ocean University research community and to other research groups in China.

Outputs completed and expected:

1. ***Development of new method for assessment of nitrogenous waste from cage farming:***
   This exchange allowed the fellow to learn new approaches in developing a bioenergetics model for aquaculture ecosystem. During this fellowship, a bioenergetics-based nitrogenous waste model was developed which can simulate the nutrient loadings during the growth and production process of LYC cage farming. The model enabled a greater understanding of the flows and processes related to inputs and fate of nitrogen in LYC aquaculture. It was also used to investigate the quantitative environmental effects of changes in feeding strategy which is expected to enhance production while mitigating environmental impact as it is implemented, going forward.
2. ***Impact of feeding strategy to wastes generation and wild fish community:***
   During this fellowship, the fellow discussed some ideas for grant applications together with the involvement of other faculty of the Institute of Aquaculture on impact of feeding strategy to wastes

generation and wild fish communities.

Building on this, a joint grant proposal for £10k has been prepared and submitted to the Natural Science Funding Council of China on "Nutritional impacts of fish farming on wild fish-case study in Zhoushan China and Oban Scotland". The project will use fatty acid profiles in wild fish in the location of fish farms to assess the impact of aquaculture on wild fish communities.

3. Publications:

We have already submitted one paper to the highly regarded peer-reviewed journal; Aquaculture (Cai et al).

4. Enhancing collaborations between two universities:

This exchange visit enhanced the opportunity for collaborations between the MASTS community and partners in China. The enhanced contact helped to enable a professional visit by Prof Ross and Dr Telfer to Zhejiang in May 2014 during which specialist presentations were made to over 200 students. Overall, this has resulted in school-level discussions to establish further collaboration and formal links between the Institute of Aquaculture at Stirling and Zhejiang Ocean University.

5. Conferences:

I gave an Oral presentation at "Cross-Strait Marine Aquaculture Technology Development and Young Scientists' Forum 2014" (Xiamen, China) on "Challenges and Countermeasures to Marine Aquaculture Environment", authors Huiwen Cai, Changwen Wu, Lifei Zhuo.

Future plans for building on the PECRE support:

This research exchange has already led to significant developments with respect to applications for joint research projects (see above).

Award size and expenditure:

In addition to the financial support through PECRE (Total Award £1551), I greatly appreciate the additional financial help of more than £2000 arranged by my supervisor Prof. Lindsay Ross to support my other subsistence expenses.

Acknowledgements:

I would like to thank sincerely the Marine Alliance for Science and Technology for Scotland for the financial support provided through PECRE, as well as the support and help of MASTS staff Dr. David Patterson and Dr Emma Defew.

I also thank Professor Lindsay Ross very much for the MASTS application suggestion and for his generous inspiration and ARRANGING additional financial support during my stay. Thanks are due to Dr. Trevor Telfer and Dr. Bruce Adams very much for their involvement, help and support during my research and to Dr Lynne Falconer, Dr. Neil Handisyde and other graduate students in the GIS Lab for their help and support. Finally, I thank faculty in the Institute of Aquaculture, University of Stirling, for their great help throughout my stay, especially Ms Melanie Cruickshank.

References:

Cai, H., Ross, L.G., Telfer, T.C., Wu, C., Zhao, S. 2014. Modelling the nitrogen loadings from Large Yellow Croaker cage aquaculture. Submitted to Aquaculture.