# RESOURCE CONSUMPTION ASSESSMENT OF PANGASIUS AQUACULTURE IN THE MEKONG DELTA, VIETNAM

Nhu Thuy Trang*, Sophie Huysveld, Thomas Schaubroeck, Steven De Meester, Patrick Sorgeloos, Herman Van Langenhove, Veerle Van linden, Jo Dewulf.
*Research Group EnVOC, Department of Sustainable Organic Chemistry and Technology, Faculty of Bioscience Engineering, Ghent University, Coupure Links 653, B-9000 Gent, Belgium. Email: Trang.nhuthuy@UGent.be

In light of full exploitation and overexploitation of marine fish stocks on a global scale, aquaculture has gained prominence to meet the increasing fish demand induced by population growth and rising incomes. Pangasius production in Vietnam is widely known as a success story in the aquaculture sector due to a tremendous expansion by volume and value in recent years. However, a growing concern has arisen about the environmental sustainability of this system, particularly in terms of resource extraction. We addressed this issue here by expressing all resources in one common unit: Joules of exergy. Exergy is defined as the amount of maximum useful energy obtained from a resource. Analysis using this metric was performed at process level through Exergy Analysis (EA; Table 1) and from a life cycle perspective via quantification of the Cumulative Exergy Extraction from the Natural Environment (CEENE; Figure 1), which was subdivided into seven resource categories. This allows one to identify hotspots over the life cycle stages, including feed production, juvenile production and fish cultivation.

Table 1. Resource use efficiencies at process and life cycle level

| Life cycle step (product) | Process level<br>$\frac{Exergy\ content\ (J)\ of\ product}{Exergy\ content\ (J)\ of\ inputs}$ | Life cycle level<br>$\frac{Exergy\ content\ (J)\ of\ product}{CEENE(J) of\ supply\ chain}$ |
|---|---|---|
| Feed mill (feed pellets) | 87.2% | 13.0% |
| Hatcheries (Pangasius fingerlings) | 5.5% | 3.0% |
| Farms (Pangasius adult) | 11.6% | 3.6% |

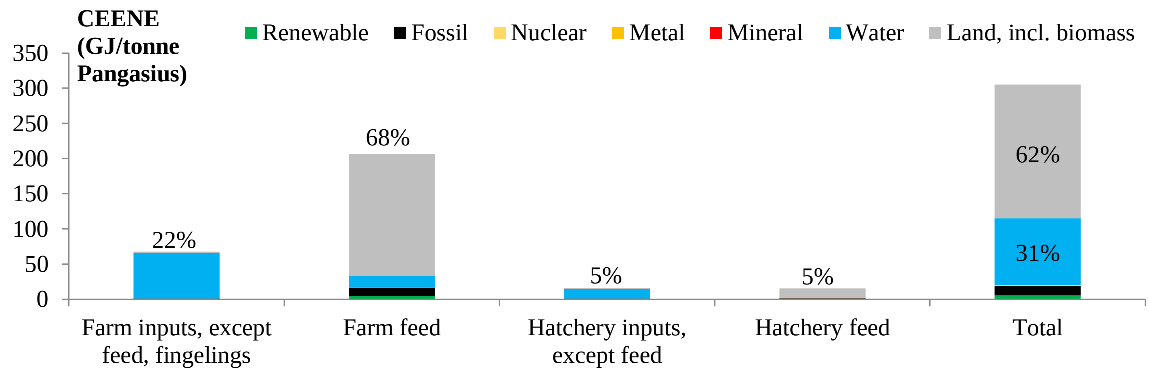


Figure 1. CEENE of the Pangasius life cycle and its most important steps per tonne Pangasius produced.

Results show that the largest contributors were the feed input (73% of the total CEENE) and the water renewal of the ponds (25%), mainly assigned to the farm phase (90%). Land (62%) and water (31%) account for the main share in the resource footprint, which is reasoned by the agricultural production of the crop-based feed ingredients and the high water exchange in pond farming, respectively. Improvements therefore should focus on lowering water input into the ponds and increasing the efficiency of the feed supply chain. The latter option represents a great challenge while the former could be feasible through the application of a recirculating aquaculture system (RAS). Further research is needed to explore whether RAS is a feasible sustainable alternative. Overall, Vietnamese farm and feed mill managers play a key role in improving the environmental performance of Pangasius products. Focus should not only lay on their own farming and processing, but also on the selection of their feed suppliers.

**Acknowledgement.** We wish to thank the Special Research Fund (BOF) of the Research Council of Ghent University, Belgium.