

# DESIGNING AND DEVELOPING MICRO-HYDRO AND SOLAR POWER SYSTEMS AS ELECTRICAL ENERGY SUPPLIERS FOR AQUACULTURE OPERATIONS

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## ABSTRACT

Micro-hydro systems integrated with solar panels represent an environmentally friendly solution to reduce carbon emissions and mitigate ecological impacts. Advancements in renewable energy technologies such as micro-hydro power (PLTMh) and solar power (PLTS) have made it possible to design efficient systems capable of supplying energy for essential aquaculture equipment. This study demonstrates the feasibility of utilizing hybrid renewable energy sources—solar and micro-hydro—as power supplies for lighting and aerators in fish farming operations. The PLTMh setup uses a spiral turbine installed in an irrigation water channel near rice fields, powering a 5 W lamp and a 3 W aerator. Simultaneously, the solar panel converts sunlight into electrical energy to support a 7 W lamp and a 3 W aerator. System testing, supported by a 12V/7AH battery, confirms that the generated energy is sufficient to operate the inverter, lighting, and aeration systems required in aquaculture ponds.

**Keywords:** Micro-Hydro Power (PLTMh), Solar Power (PLTS), Fish Farming Ponds