4th Royal Belum Scientific Expedition 2015

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REPORT

By

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Rural Technology Cluster UTM TRANSROYAL
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The Potential of Micro-Hydropower Plant for Orang Asli Community in Royal Belum State Park

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1. Introduction

4th Royal Belum Scientific Expedition was held in September 2015 involving researchers from all over Malaysia as well as researchers from Universiti Teknologi Malaysia especially from UTM Razak School of Engineering and Advanced Technology. A group from Rural Technology UTM TRANSROYAL studied sustainable renewable energy (SRE) at the urging of life necessities of Orang Asli communities who live in the Royal Belum State Park (RBSP). The need for electric power has never achieved consistently. In such case this project aims for helping those people, this group has been camped for a week to review and retrieve data for the effectiveness of sustainable energy in remote areas.

RBSP has several indigenous villages consist of Jahai community. Locality is defined as Kampung Sungai Tiang, Kampung Sungai Kejar, Kampung Sungai Kenerong, Kampug Desa Pelancongan, Kampung Sungai Sanghoi and Kampung Sungai Mendulum. Six small villages that existed since 1952 and is located to the north of Lake Temangor the largest man-made lake covering an area of 15200 hectares. The lake is formed when a dam of Temangor completion in 1975 and thus submerge Kampung Belum Lama and other small villages. Royal Belum forest part of Belum-Temangor Forest Complex is the world's oldest about 130 years old. Belum-Temengor forest include RBSP (117,500 hectares), Hutan Simpan Grik (34,995 hectares) and Temangor Forest (147.505 hectares) [1-6].

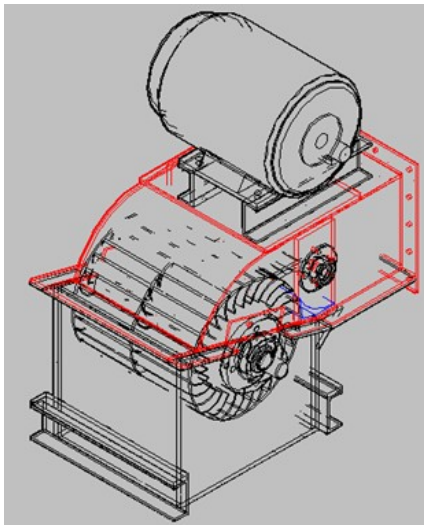
Beginning with data collections in Kampung Kejar Hulu and Kampung Sungai Tiang, researchers have provided a set of questionnaire about the energy consumption in the village. This report focuses on the potential of micro-hydropower plant in RBSP due to its numerous rivers and canals providing off-grid power to the remote areas and also to the areas that are still outside the main grid network. The report reflects on the need to explore green energy thus proving how the establishment of widespread micro-hydropower plant can help overcome the current power crisis and

play a role in the economic progress of the state. The survey to the potential sites and the means to identify new sites are outlined by performing hydrology studies, topographic studies, head calculations, turbine selection, and so forth.

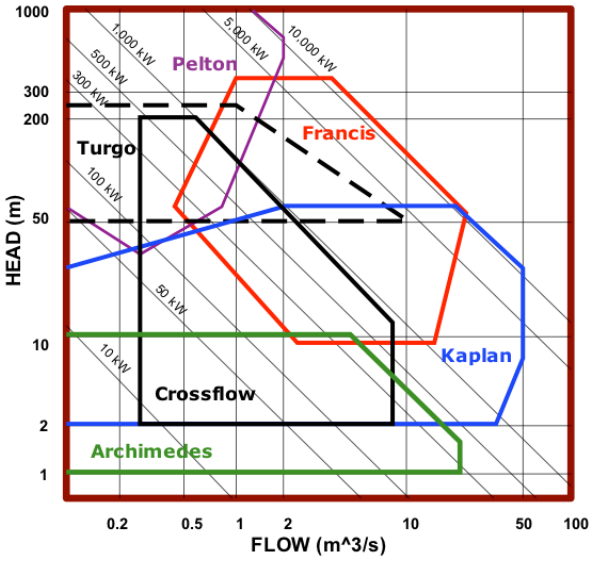
UTM Researchers with community of Kampung Kejar Hulu

2. Cross- flow (Banki) Turbine

Mainly consists of 2 parts; nozzle and turbine runner. Water jet passes through the rotor blades. This type of turbine applied over a wide head range (less than 2 m - more than 100 m). It has relatively flat efficiency curve, gained wide acceptance- due to simple construction. Cross-flow turbines are used widely in such hydro-power plants due to their simple design, easier maintenance, low initial investment and modest efficiency.



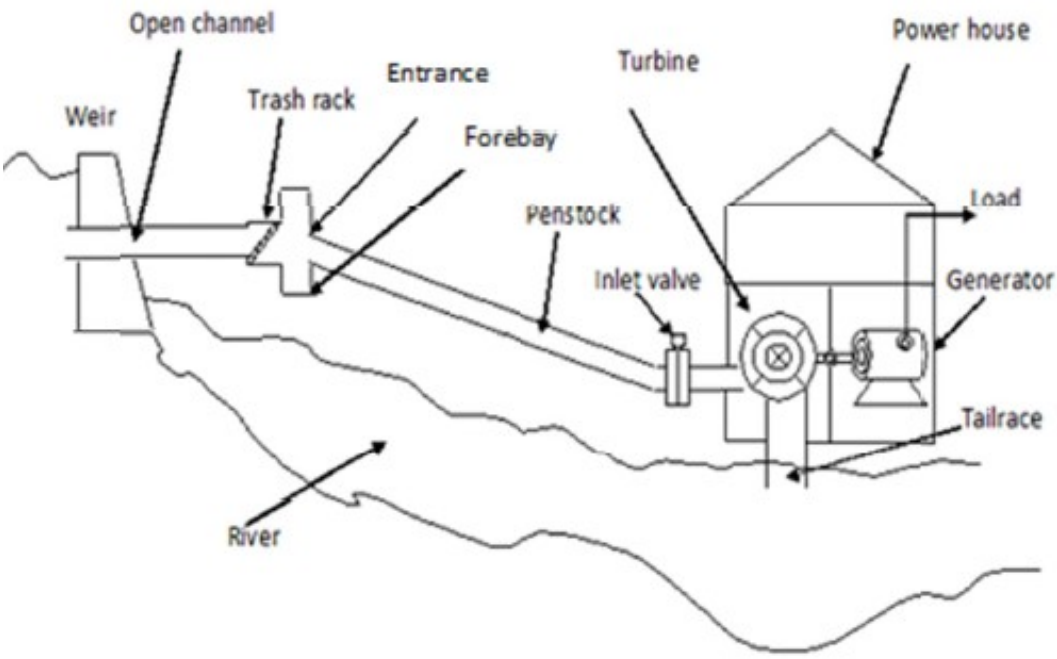
UTM Micro-hydro turbine [5]



Head-flow range for turbines [7]

3. Micro-hydro Power plants (5 kW -100 kW)

Solution to the power needs of small communities. Small hydraulic sites present a variety of economic advantages. Provide power for industrial, agricultural and domestic uses. Cost effective source for the rural communities not fed by the national grid.



Schematic diagram of micro-hydro power plant [8]

4. Objective of Expedition

1. Study the electrical energy consumption in Kampung Kejar hulu dan Kampung Sungai Tiang.
2. Potential renewable energy in remote area.
3. Identify areas for pilot micro-hydro turbine.

5. Method

1. Quantitative and Qualitative

Data were collected in and around Kampung Kejar Hulu and Kejar Base Camp. A total of 19 respondents participated in the survey consisted of 11 people from Kampung Kejar Hulu and 8 people of Kampung Sungai Tiang. Each respondent was composed of men who came from the tribe Jahai.

Kampung Kejar Hulu lead by Tok Batin Rudi

2. Measurement

Using measurement equipments such as meter gauge, some ropes, a buoy and a stop watch to calculate the stream flow rate. GPS is also used to determine the coordinates and elevation.

- Stream flow rate calculation
- Pressure head identified using GPS

Mess river during the dry season in September

6. Analysis

An analysis using SPSS software and map topology to determine the hydro system layout.

- SPSS
- Hydro system layout

7. Discussion

Suitable areas have been identified by using quantitative and qualitative method and identify suitable locations for the micro-hydro turbine system.

Mess waterfall

8. Conclusion

The results obtained from the 4th Royal Belum Scientific Expedition 2015 have found the suitable location for the construction of a micro-hydro power generation for the needs of Orang Asli. This system will provide a continuous source of electricity for 24 hours throughout the year with the advantage of low costs of construction and operating.

9. Future Work

Hopefully the good work will successfully carried out for supplying electricity free of charge to the Orang Asli community and hopefully manage to get some fund from international and local agencies. Cost estimates were identified to build this system

and hopefully local companies can provide some funds so that this project can be implemented as soon as possible.

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