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Sustainable Energy Transition, Gender and Modernisation in Rural Sarawak

Nurul Hidayah Shabdin*[,a], Rory Padfield[b]

[a]Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, 54100 Kuala Lumpur, Malaysia
[b]Faculty of Humanities and Social Sciences, Oxford Brookes University, Headington Campus, Gipsy Lane Oxford OX3 0BP
nurulzshab@gmail.com

In the past two decades policy-makers have highlighted the need for societies to use energy in a more sustainable way. In support of a general trend towards evidence based, policy-making academic research in sustainable energy related fields has gathered pace. In particular, research has concentrated largely on technologies, energy economics and broad concepts of smart energy system. Research focusing on the social sciences of sustainable energy, including topics such as human behaviour change, gender impacts, household scale studies etc. – have tended to receive limited attention from research sponsors and until recently assumed to have limited impact on a transition to a sustainable energy future. Yet recent research in these topics has shown to have great potential in achieving positive social and environmental impact. In line with increasing interest in the social science of sustainable energy transitions, this study examines social behaviour and energy practices of rural communities without access to twenty-four hour electricity in Sarawak, East Malaysia. The research aims to understand the impact of modernity in influencing rural communities' energy transition with a particular focus on the role women play in energy behaviour at the household level. Five case studies was undertaken in the villages of Kampung Sibu Laut, Mersan, Telaga Air, Boyan and Gersik. Through purposive sampling 25 households in total were selected from these five villages. Consistent with triangulation methodological approaches the fieldwork involved a number of research methods such as a household energy survey, semi-structured interviews, focus groups and ethnographic style methods (i.e. participant observation). Investigating multiple data sources allows a deeper understanding and increased reliability of findings. Initial findings reveals women across the village play a key role in managing the household's energy needs, and specifically, energy efficiency and energy conservation aspects. Household income also influenced the behaviour of householders with regards to energy saving. For instance, wealthier families owned more electric goods and gadgets as compared with poorer families; thus, energy demand is assumed higher in the former households. Meanwhile, villages without twenty-four hour access to affordable electricity have less energy demand while it is also noted that many of the younger generation have migrated to the town. The research also reveals that besides geographical challenges in rural Sarawak, villages close to protected ecosystems, such as Ramsar sites, have limited development. In this way, electrical appliances were far fewer as compared with villages where there is more consistent electricity supply.

1. Introduction: Energy, Women and Sustainability Living

Women have always been and remain as the deciding influence on the quality of life and well-being of their families and communities. They are the primary care-givers and the managers of natural resources, including food, shelter and consumption of goods, in most cultures. Women's responsibilities place them in a unique position to improve human and economic well-being, and to conserve and maintain the natural environment. Yet, their needs, their work and their voices are often not considered a priority. As a result, women in many countries do not have equal access to education, health care, employment, land, credit, technology or political power. Evolve together is the energy which is fundamental to the support and encouragement of economy and to the modernisation of a country. In fact, electricity directly improves human development index (HDI). As studied by United Nation Development Programme (UNDP), Malaysia's HDI value for 2014 is 0.779, which put

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the country in the high human development category – positioning it at 62 out of 188 countries and territories. Between 1980 and 2014, Malaysia's HDI value increased from 0.569 to 0.779, an increase of 37.0 percent or an average annual increase of about 0.93 percent. However, the new gender development index (GDI) which measures gender gaps in human development achievements by accounting for disparities between women and men in three basic dimensions of human development - health, knowledge and living standards still shows lack women empowerment in Malaysia. It is a direct measure of gender gap showing the female HDI as a percentage of the male HDI. It is good for understanding the real gender gap in human development achievements and is useful to design policy tools to close the gap. In Malaysia, 14.2 percent of parliamentary seats are held by women, and 65.1 percent of adult women have reached at least a secondary level of education compared to 71.3 percent of their male counterparts. For every 100,000 live births, 29 women die from pregnancy related causes; and the adolescent birth rate is 5.7 births per 1,000 women of ages 15-19. Besides, female participation in the labour market is 44.4 percent compared to 75.5 for men. The GDI shows how much women are lagging behind their male counterparts and how much women need to catch up within each dimension of human development. Hong (2015) suggested great efforts should be made to protect ecological environment, try hard to improve capacity of ecological environment and forge the sustainable development ability. Only in this way can a solid foundation be laid for the sustainable development of the economy and society. This study aims to look at energy transition and modernisation in rural Sarawak as well as women roles as daily manager in households which potentially develop as critical partners and leaders in finding solutions to sustainable development.

1.1 Case Studies

Recent on news, the recorded data by Tenaga Nasional Berhad (TNB) shows highest ever demand for electricity in Peninsular Malaysia which is at 17,788 MW. In their statement, TNB said the peak reading of 17,788 MW recorded was a 37.82 % increase compared to demand on Jan 1 (12,906 MW) due to the El-Nino phenomenon. Sarawak face the same effects. The scorching hot and dry weather which has continued to today can cause the use of electricity to increase more in future. The heat during the day has prolonged effect that lasts up to the early morning of the following day, which indirectly increase the use of appliances especially air conditioning units. Short observation in my neighboring community shows air conditioning use in most households has triple up in this few months. An average use of 3h has change to more than 8 h/d. This is how in urban area, but how about people in rural area where there is no luxury of air conditioning?

There are many, effective ways of providing access to energy, but no single, easy fix. No doubt it is more energy and cost-efficient to centralize power supply when electrifying urban areas where populations are concentrated. But the same power distribution model becomes inefficient and costly when applied to rural populations where communities are spread out. Even more, in rural Sarawak, geographical challenges often hinders such development. Sometimes it is because they were just left out. That is why many rural communities in Malaysia especially Borneo remain off-the-grid. Same scenario happens in this case study, where interestingly this Kampong Sibu Laut and Mersan located just opposite to the mainland where they are separated by a river. It took about 30 – 40 minutes to cross the river using boat from Kpg. Telaga Air jetty to this two villages. But what happen is that, community living here have no access to electricity until today. Numerous efforts was done by local folks here to request access but none give them positive feedbacks.

Figure 1: (On left) Location map of Kampong Boyan and Gersik. (On right) Kampong Sibu Laut, Mersan and Telaga Air.

Figure 1 above shows the location of 5 villages selected in this study. The selected villages have different characteristics. Kpg. Sibu Laut and Mersan has no access to electricity, separated by river and located next to Ramsar site. While neighboring village, Kpg. Telaga Air has access to 24h electricity though located just

opposite Ramsar site but it is accessible by road. Meanwhile, map on the left shows Kpg. Boyan and Gersik. These two kampongs located in the Kuching town which also opposite of Kuching Riverfront. Interestingly, although separated by river, both kampongs are modernize same as city dwellers. They remained features of kampong houses and local activities which has attracted local tourism industry. So, the close proximity of these two villages to the city area was one of the factor justify its modernisation. On the other hand, villages near to Ramsar site was remain less develop as high ecological concern of the area. In Sarawak, the mangrove area north of Kuching (Kuching Wetlands) has been designated as a Ramsar site in November 2005. The Kuching Wetlands National Park covers an area of 6,610 hectares on the estuarine reaches of the Sibu Laut and Salak rivers. The park is mostly comprised of a saline mangrove system that includes an extensive network of marine waterways and tidal creeks interconnecting the two major rivers that form the boundaries of the park. Small patches of heath forest are found in the interior of the park. The park is an important spawning and nursery ground for fish and prawn species and contains a wide diversity of wildlife, including proboscis monkeys, long tailed macaque monkeys, silver-leaf monkeys, monitor lizards, estuarine crocodiles and a range of birdlife, including kingfishers, white-bellied sea eagles and shore birds, including the rare lesser adjutant stork. Gazette as a national park in July 2002, the site is one of the last remnants of the formerly extensive Sarawak Mangrove Forest Reserve, which previously covered approximately 17,000 hectares and was first protected in 1924.

2. Methods and Approach

Science, place, and uneven geographies have long been avenues of inquiry in political ecology. Political ecology understands these themes as problems, which are relationally intertwined, produced over time, inherently political, and always simultaneously material and symbolic. In addition, political ecologists investigate these problems through a mix of methods. To open up possibilities for a practice of a political ecology, different approaches to energy problems was proposed. To do so, three perspectives or ‘angles’ was selected, which emerge from political ecology; gender, modernity, and sustainability (Figure 2). The understanding knowledge was practiced (including my own) as partial and situated as well as using insights from previous studies and incorporating the non-human into the study of socio-energy system. Study angles here offers as a metaphor for this practice; as these different perspectives or angles converge, research subjects, places, problems, and methods are illuminated. From approach here, this study hopes to open up the possibility of integrating in still more angles.

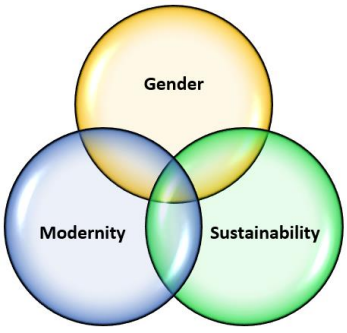

Figure 2: Three angles of study

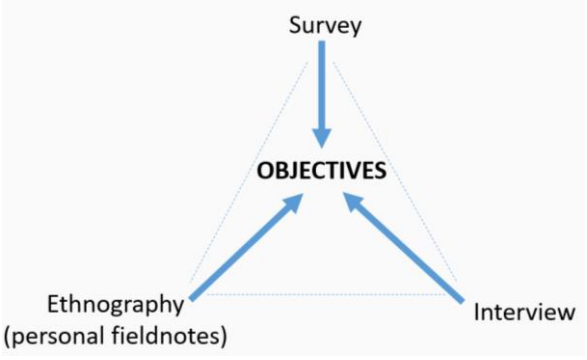

Figure 3: Triangulation methods

So, primary and secondary data was collected through semi-structured questionnaire survey, interviews and ethnography (personal field notes) as shown in Figure 3 above. Using method of triangulation to validate, multiple data sources in this investigation was used to produce deeper understanding. Field trips was conducted in few phases. Visit to these five villages was accompanied by local guide for easy interactions with villagers. Overnight stay with few households allows for ethnography observations. Using mix-method of qualitative and quantitative, this research was able to dig further on energy transition, gender roles and modernisation in rural Sarawak. Semi-structured questionnaire was employed among 25 households from these five villages. As shown in Figure 4, the survey form was divided into four parts. Part A was respondent profiles. Part B was about energy practice and cost. While part C was on gender roles in energy practice and lastly, part D was designed to understand more on feminist political ecology.

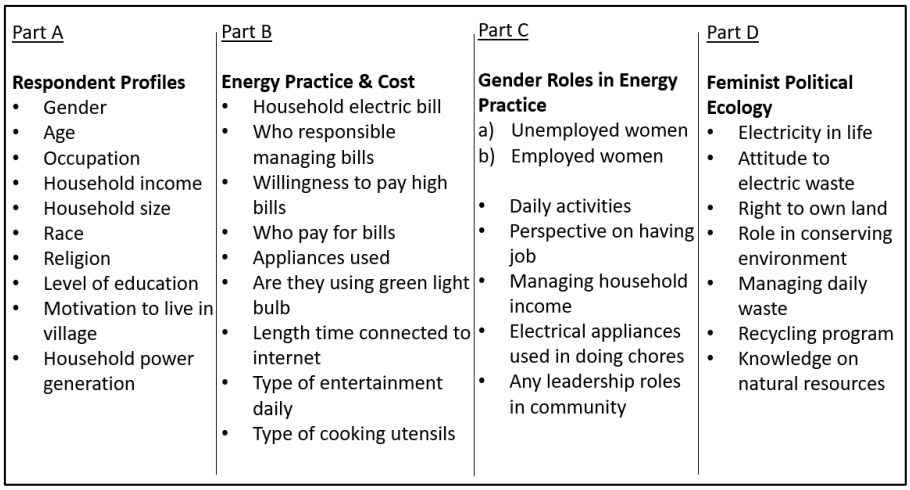

Figure 4: Semi-structured design questions

3. Findings and Discussions

In the modern world, affordable energy is the major driver to increase the productivity of a community. Living without basic necessities such in Kpg. Sibu Laut and Mersan are a great challenge. Women strive harder to manage house necessities given their poor living condition. Villagers here mostly are fishermen with below RM 500 income per month. As stated in Table 1, Kpg. Sibu Laut and Mersan using diesel generator to power their houses about 3-4 h/d. While Kpg. Telaga Air, Boyan and Gersik were connected to power grid which allows them for 24 h electricity access. However, electricity bill was higher for households in Kpg. Boyan and Gersik because of their business shops. Most households in Kpg. Boyan and Gersik sells their famous local products, such as 'kek lapis' (layered cake) and 'ikan terubok masin' (salted fish). All cake shops used air conditioning to maintain their cakes in a cool temperature. Therefore, they pays quite high electric bill per month. Having access to electricity improve local economy as well as their livelihood. Kpg. Boyan, Gersik and Telaga Air were the example of how electricity brought transition or changes in uptake of appliances used in their daily life which also the evident of modernisation take place in rural communities. Electricity brought local economic growth in tourism sector for these villages unlike in Kpg. Sibu Laut and Mersan which are still left behind. Although there are potential for eco-tourism in these two villages (due to its near location to Ramsar site), local people were not able to take this opportunities as no access to electricity hinders their economic prosper. Chin and Ng (2015) shows evident that younger generation are lack exposure to natural rivers which are not found in the urbanized residential areas. Thus, eco-tourism is a great potential for economic growth in Kpg. Sibu Laut and Mersan as providing learning platform for younger generation on natural conservations.

Table 1: Five selected villages for case studies

	Sibu Laut	Mersan	Telaga Air	Boyan	Gersik
Household income (RM)	< 500	< 500	< 1,000	1,000-3,000	1,000-3,000
Occupation	Fisherman	Fisherman	Fisherman	Local business	Local business
power supply	diesel generator	diesel generator	power grid	power grid	power grid
electric bill/month (RM)	0	0	< 100	< 500	< 500
Motivation to live in village	own a land	own a land	own a land	family business	family business

Findings also shows generally older generations settle down in village because they own a land, retired, or running a local business. Younger generation age between 20 and 40 are most likely to migrate to towns for better jobs and lifestyle. Respondents in this study were mostly aged 50 above. Figure 5 below shows evident in uptake of appliances among households in this study. For households in Kpg. Sibu Laut and Mersan, they survive without any appliances use in their daily life. Ethnography observation recorded that women do all their house chores like cooking and cleaning manually. While all men will go out for fishing whole day. Women works their best to cater for their family basic needs which demonstrate their creativity and high dependent on surrounding natural resources. The 3-4 h electric supply was normally used at night to watch TV given to them by charity. Even laptops were given by school to their children who attended school in neighboring village which

was often left idle due to lack of power supply in his village. Homework and learning made much more difficult for them to catch up and they end up left behind. This also demonstrates how the government is out of touch with the living reality of rural students without electricity access.
On the other hand, the neighboring village, Kpg. Telaga Air, enjoys 24h electricity access which demonstrate their increase in appliances uptake. Household's survey in this village shows appliances was used mostly to assist their activities. Still women plays a big roles in managing household chores however their hard work was reduced with appliances support. In all five households interview, they have at least one item in each appliances categories recorded in the charts below. Every households in this village change to a better lifestyle with electric provision and modernisation impacts.
Different scenario in case of Kpg. Boyan and Gersik, they have become almost on par with urban dwellers. Located opposite Kuching Riverfront development and close proximity to town, have open up tourist access to gain experience in so called 'local setting' in these villages. Thus, these villages have remain as traditional village producing local famous products and become well known spots for both local and international tourists. As recorded in charts below, appliances item was owned more than one per households which shows increase in uptake of appliances to support not only their basic needs, but also in their businesses. Fridge and air conditioning were the highest owned appliances among households in these two villages. This was mostly used in their shops.

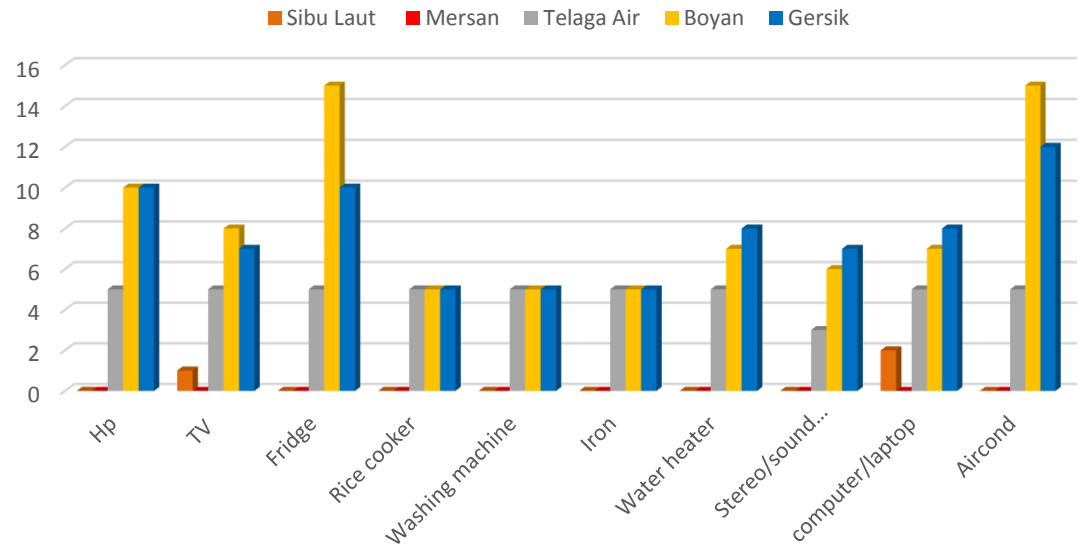

Figure 5: Uptake of appliances in five case studies

Observation on women roles as daily manager in every households in these case studies have proven the importance of their leadership in transforming communities towards expanding clean and sustainable energy. Women continues to improve gender inequalities, making their voice stronger in society. The whole experience suggest the significant roles women plays in every household, which related to what Hosomi (2007) suggested, women possess the survival abilities or might consider as creative in managing house chores in any condition which in this case, poor condition. The relevance of looking at women roles in this study is that, often development plans for these rural community tended to ignore rural people's science or tended to separate it from the larger context of life, labour and livelihoods. It also not often been studied and understood as gendered knowledge and practice. However, growing concerns has also noted the distinct roles and interest of women as the daily managers for sustainable living. Survey findings also described women awareness in energy saving were much higher compared to men. They are keener in reminding their children to turn off any unused appliances to avoid paying higher bills. It is important to note that changing practices and how women behave in managing their family life, constitutes to the understanding of modernity and how energy transitions shape society. From interviews and observations, women tend to be very conscious of any changes in the environment because the health of their families is closely linked to the health of the land, the quality of water and air, and the conservation of forests, fisheries and other natural resources. Ma et al. (2016) has stated that environmental pollution and waste resources has brought tremendous pressure on ecosystems. Hence, more study in feminist political ecology are essential to in fact highlighting them as critical partners and leaders in finding solutions to sustainable development.

4. Conclusions

Sustainability concept as debated for more than decades by all scientist, economist, ecologist and others followed by commitment from all countries in every pledges and policies, have yet find any ultimate solution and it seems the more we try to understand it the more this become complicated. However, to sustain is an obligation no matter how and what we understand sustainability is and so as to the rural communities. Lack of knowledge and education does not mean they are not part of this obligation. In fact, they are more closely link to the environment. In reality it is not about top-down rules and targets at all. Wang and Li (2016) suggested that sustainable development is a major issue of coordinating all kinds of city elements. To build the sustainable society in rural areas, requires the greatest need to answer the questions about how government at every level can empower rural communities which for instance to provide electricity access, manage and plan for business and residential growth in the rural over time, to shape and take part in the delivery of services, and to meet the challenges of any severity and climate change.

Malaysia's national green economy framework reflects a mainstream economics framing, almost like the United Nations Environment Programme (UNEP) and the Organisation for Economic Co-operation and Development (OECD). That is, it attempts to strengthen the economy via incentives, the tax system and pricing, regulatory frameworks and prioritized investments. Its target group, however, is industries located in urban centers and not the poor communities living in the rural areas of Malaysia. Consequently, the social dimension is not clearly spelled out in terms of programme and policy tools, despite the fact that "improving the quality of life for all" is one of the four pillars of Malaysia's National Green Technology Policy. This is manifested in the country's green policy design, evincing an urban bias. Unfortunately, the Renewable Energy Act 2011 also does not provide any support for the deployment of small-scale energy projects in these communities. The legislation favours more urban consumers and existing corporate power producers.

This study also suggest that Sarawak currently have no gender sensitive energy policy implemented. Lack of voice on women roles and empowerment, lead to insensitive equalities in communities. Energy sector always behaves in specific ways depending on the energy system's geographical outlay which depending on the interests manifest in the system. But in fact, energy transition is not solely on the technology 'itself' but also to the interest it represents. To question this require understanding of political ecology of the energy system. Instead further study must be done into the remarkably underexplored political ecology of energy systems in Sarawak and Malaysia as a whole. The research results discussed here were not only correspond to reality, but also make up the insufficiency of the studies on socio-energy system.

Acknowledgments

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