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Energy and Poverty in Bangladesh: Sustainability Accounting Perspectives

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Poverty in rural Bangladesh is commonly explained with lack of reliable energy supply. Intrinsically motivated, the purpose of this research is to put such a rhetoric to the test. Following a qualitative analysis of traditional wisdom data, including teachings of the mystic Baul-philosophers, the main finding is that energy and poverty are largely unrelated but linked to the social, geo-environmental and cultural norms of Bangladesh. A push to fossil fuel-based electrification to reduce poverty is unsustainable with renewable energy being the best option instead. The study concludes that rural resilience largely depends on practicing sustainability accounting for natural resources conservation.

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1. Introduction

Economic development has long been associated with energy provision and use. It is assumed that the lack of reliable energy impedes development and causes poverty to persist (e.g. Khandker et al. 2009, 2010; Barnes et al. 2010, 2011). Hence, chronic poverty in rural Bangladesh is seen as the result from a crisis in energy supply. The majority of this country's population, namely 80% out of 160 million, lives in rural areas and the rhetoric about the link between energy and poverty largely misrepresents its geo-physical and socio-ecological reality. It is a foreign western view of the world. The natural, socio-economic and demographic features of rural Bangladesh are not conducive to the same predominantly fossil fuel based electricity generation and transmission as in the West.

This study explores the link between energy and poverty within the context of rural Bangladesh. It is intrinsically motivated (Griggs 2010) by the opportunity to explore and learn (Coon & Mitterer 2010) from rural practices to better understand how important energy provision is in defining poverty. Its research question is: how is rural poverty in Bangladesh manifested and what is its link to energy availability? The purpose of the study is to put to the test the western interpretation of the connection between poverty and energy provision. Development in any settings needs to take into account the specific reality on the ground and generalised assumptions, such as in this case – electrification based on fossil fuels, rarely work. In Bangladesh, the country's culture of sustainability accounting (Khan et al. 2015) has resulted in rural people living within the available resources and environmental limitations.

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Within the context of the developing world, Bangladesh is of particular interest not only because of its large share of rural population but also because of the progress the country has made in achieving the Millennium Development Goals (MDGs) (GED 2015) and its current commitment to the targets of the UN Sustainable Development Goals (SDGs) adopted in 2015. In fact, the UN sees Bangladesh as a leader and a role model for South Asia (Star Business Report 2016). Two of the SDGs refer specifically to the topic of this analysis, namely Goal 1 No Poverty and Goal 7 Renewable Energy (UN 2016).

The findings of the study argue that improving the quality of life and reducing poverty in rural Bangladesh should be achieved by building self-reliance and using renewable resources. It shows that in the case of Bangladesh, the lack of energy is largely unrelated to poverty which is a cultural and widely accepted phenomenon in rural areas. This most-needed different perspective recognises the nature of poverty roots in Bangladesh and disassociates them from the need for electrification at all cost – as has been the case with using petrochemicals and fossil fuel-based energy sources. At the same time, this should allow development efforts, including those related to energy, to be directed towards renewables and self-reliance. The significance of the analysis presented here is in discrediting exotic assumptions and making the case for resilience. This new perspective on the link between poverty and energy explains the Bangladeshi case in a way that allows to leapfrog the stage of polluting energy-related technologies in order to preserve the country's natural resources and build the capacity of its population to face a more ecologically secure future. These new findings are significant both, within the context of the extant literature and also for policy decisions related to allocation of resources.

The paper is organised around the themes of energy and poverty which are first covered by literature review. This is followed by an explanation of the methodology of the current analysis and the achieved new findings around sustainability accounting and self-reliance. The final concluding section summarises the main argument of the study, explains its limitations and emphasises its importance for policy development.

2. Literature Review

Sustainability, or meeting the needs of current and future generations (WCED 1987), is the overarching current theoretical, practical and policy framework for development. It requires integration of all aspects of development, often presented by the social, environmental and economic triad. Sustainable development has particular priorities in different parts of the world with developing countries facing the urgency of meeting the needs of their current populations without compromising the ability of future generations to also have access to natural resources and the same opportunities. Raphaely (2012) argues that the economic aspect of development is embedded in the social and environmental conditions and can only be secondary to efforts of individual empowerment for sustainability. This approach is particularly relevant when dealing with issues of poverty where everyday survival and resilience remain the main priority.

When it comes to poverty, a major part of rural Bangladesh has always been poor. Poverty implies lack of adequate resources to guarantee nutritious food and basic needs. Another face of poverty is dependence on others for survival and making a living. According to Lauber (2005), the lack of electricity and gas exacerbates rural poverty with village people suffering in relation to food, health, education, income, occupational and general developmental opportunities. Many see improving availability of energy (or reducing energy poverty) as a condition for reducing income-related poverty (Barnes et al. 2011). Although

energy provision can benefit the poor, it has to be done in a way that is appropriate and builds capacity for them to become self-reliant without destroying the natural environment on which they depend. This has not been the case in rural Bangladesh where 45% of rural households are income poor (Barnes et al. 2011). Below we review literature on poverty and attempts to eradicate it, including the Green Revolution and fossil fuel based energy supply.

2.1 Poverty in Bangladesh

The lack of "a minimum nutritionally adequate diet plus essential non-food requirements… not affordable" (Townsend 1993, p. 9) is the most obvious manifestation of poverty. It may be caused by social norms associated with the use and distribution of available resources, lack of social safety nets, political turmoil, civil unrest and war conflicts but it could also be the outcome of natural phenomena, including droughts, floods, fires, earthquakes, hurricanes and other extreme weather events and geographic phenomena. Both groups of factors – social and natural, are creating poverty in Bangladesh. Brammer (1997), for example, explains that soil or land erosion due to river migration causes poverty to hundreds of thousands of families in the Char lands of Bangladesh. Another example is the neo-poverty generated through foreign aid which forces rural people to take loans they cannot repay (Hossain 2001).

The Green Revolution of the 1970s was an attempt of the West to assist in poverty alleviation in Bangladesh. People thought that it aimed only “to increase agricultural output with high-yield seeds, chemical fertilisers and pesticides, irrigation, and advanced machinery” (Dauvergne 2009, p. 87). In reality however it delivered the opposite results – declining natural resources and cultural heritage. Its energy intensive technologies, such as mechanical tilling and irrigation, chemical fertilisers, insecticides and pesticides are some of the most damaging agents for humankind and the environment. Any benefits from increased agricultural productivity were short-term, unsustainable and at the cost of contamination (Shiva 1993).

The Green Revolution created an ecological breakdown in nature through major changes in ecosystems and agrarian structures together with a breakdown of society with local labour replaced by capital- and chemical-intensive solutions, creating debt for farmers. According to Shiva (1993), these are the consequences of a policy based on tearing apart both nature and society. The Green Revolution technologies generated social and cultural setback, including widening of the economic gap between the rich and the poor farmers as well as politico-cultural crises due to the erosion of moral values (Shiva 1993, 2016; Rogers et al. 2008). Most importantly, its technologies created demand for electricity beyond what the country could supply.

2.2 Energy in Bangladesh

Energy, generated mainly from fossil fuels, is seen as necessary for socio-economic development, crucial and indispensible to initiate and maintain progress (UNDP 1993). Since the 1990s however concerns are raised about resource depletion, climate change and air pollution associated with fossil fuels. The IPCC assessments reports (e.g. IPCC 2013) show that the western energy intensive economies are responsible for climate change and the planet’s projected bleak future. Energy demand needs to be met through clean sources, which do not cause further environmental deterioration and are also economically affordable, technically and culturally appropriate (Hossain 2001).

The link between poverty and energy is not straightforward. With development being reframed within a sustainability context, satisfying growing demand for energy in rural Bangladesh is progressively being set within renewable energy programs for poverty reduction (Goal 1 of the Millennium Development, UN 2015a). This is also an expectation in the Sustainable Development Goals (UN 2015b).

The fossil fuel centralised model for energy provision is not suitable for Bangladesh for a number of reasons. First, the country needs to import gas, petrol and coal, as it does not have large fossil fuel reserves (Islam et al. 2008). Second, its geography – with many rivers, canals and lakes criss-crossing the countryside, frequent river erosion, dispersed rural settlements and families living on boats, deep forests in the undulating Barind, and the Hill Tracts – is not conducive to building a centralised grid (World Bank 2013). Third, such energy is not affordable to the rural poor and the technology is similarly expensive and not appropriate (Hossain 2001). Fourth, these technologies contribute to climate change and utterly damage the environment. Energy generation and distribution are contributing the bulk of the global greenhouse emissions – 24% (IPCC 2013). The entire energy sector together with energy intensive industries needs to be reformed in order to conform to a sustainable development ethos (Newton 2006).

2.3 Sustainability Accounting

A relatively recent academic concept which attempts to account for the human impacts on the environment is sustainability accounting (Khan et al. 2016). As a social practice, its aim is to reconcile, in the case of energy, the ecological footprint of power generation with the ecological health of the planet as well as with the social implications this has on communities. Sustainability accounting is a new way of representing and reporting about the performance of a sector, such as energy generation, by disclosing non-financial information which relates to its ecological and social performance (Tilt 2009).

According to Khan et al. (2016) however, sustainability accounting has been a long-aged tradition in rural Bangladesh. It is practiced through traditional wisdom and folklore as a way to provide information about social and environmental responsibilities. Part of the social obligations relates to support of poor people while responsibilities linked to the environment apply to all. Khan et al. (2016) also identify three value principles of sustainability accounting which should guide behaviour when it comes to any economic activities, including power generation. They are: kindness – explained as use of resources without destruction, modesty – understood as limiting consumption so that there is also left for others; and resilience – manifested through self-reliance and strength to overcome adversities.

The above value principles of sustainability accounting should also inform the relationship between poverty and energy. Linking energy supply to poverty alleviation and economic development without considering its adverse environmental, economic, social and cultural impacts on sustainability is largely flawed. Without sustainability accounting and a change in the current fossil fuel based global developmental paradigm, poverty is likely to occur and persist in a world of ecological decline and resource depletion (Gibson et al. 2005). However, there is also an opportunity to show a better alternative.

Bangladesh requires a different approach to development that is informed by the tradition of self-reliance, sustainability accounting and responsibility. The major elements of such practices are embedded in the country's culture and spirituality for nature conservation. While the link between energy and poverty has been researched and conceptualised within a

Western type development model, the input to this debate from traditional sources and practices remains largely unexplored. The current study seeks to bridge this research and conceptual gap.

3. Methodology

According to Uddin (2009), the nature and specifics of traditionalist societies need to be considered in order to understand governance and accounting practices in Bangladesh. The work of Weber (1978) explains the importance of the socio-cultural context, including historical, cultural, social and economic factors, in shaping a particular type of society, such as traditionalist. This is particularly relevant to understanding the complex socio-cultural and economic issue of poverty. Traditionalism and traditionalist domination are further explored by Uddin and Choudhury (2008) to explain the Bangladeshi society.

This study starts from a similar perspective by acknowledging the traditionalist nature of rural Bangladesh. It is based on qualitative analysis in order to answer the "how" and "what" research question set up for this investigation (Yin 2013) in an interpretive and pragmatic way (Saunders et al. 2016). This recognises that research about people is more complex in nature than studying objects and physical phenomena – interpretivism, and while multiple viewpoints about the truth and reality exist, pragmatism accepts that the researcher/s should study what is of particular interest to them (Saunders et al. 2016).

The following sources are used to allow for triangulation of the data and collection methods (Patton 2015). First, two of the authors have first-hand experience (since 1970s) about the energy crisis and poverty phenomena in rural Bangladesh. Second, in order to understand the link between energy and poverty, we have analysed a large volume of traditional knowledge as expressed by the country's spiritual gurus in their teachings and songs. Third, field research was conducted in rural Bangladesh in 2010–2014 with several trips during which participant observation (Kawulich 2005) was used. Finally, secondary information and evidence from newspapers, digital and other sources were collected and analysed. Through these methods various aspects of sustainability in rural Bangladesh are covered, including poverty characteristics, use of technologies, cultural traits and self-reliance. A qualitative analysis is best suited when dealing with complex issues and questions which relate to why people make certain decisions and how they apply moral values and judgments. This approach differs from quantitative analysis when the aims are to explore frequencies and distributions and questions, such as how many and how often certain phenomena manifest. A more meaningful interpretation of the reality of rural Bangladesh can be achieved through the adopted qualitative approach.

In assessing the poverty and energy rhetoric in Bangladesh, we relate them to sustainability. A major part in the analysis is focused on the role of the Baul philosophers – the mystics of Bangladesh, who educate people with spontaneous songs in response to socio-economic and political issues, solutions to environmental problems, moral values and spirituality. The highly respected in Bangladesh Bauls are recognised as an intangible cultural heritage to humanity by UNESCO (2008) for their life philosophy and contribution to sustainability.

Although there have been several studies examining the link between energy and poverty in Bangladesh (e.g. Barnes et al. 2010, 2011; Khandker et al. 2009, 2010; Energypedia 2016) and even within sustainable development context (e.g. Hossain and Tamim 2005/2006, Mondal 2010), all of them rely on quantitative and technical descriptions as the basis for future recommendations, policies and strategies. The approach taken in this study is very

different as it is firstly, interpretive and secondly, builds on the traditionalist nature of the rural Bangladeshi society. This allows us to provide a new perspective which has not been considered before and which enriches the understanding of poverty by offering ways for it to be reconciled with energy.

4. Results and Analysis

4.1 Energy

Bangladesh has a relatively small energy infrastructure and the country's 280 kWh annual electricity consumption per capita is one of the lowest in the world (World Bank 2015). Fossil fuel driven energy generation and distribution cannot be made sustainable because of the country's geo-environmental, cultural and economic characteristics as well as its poor resource base with small oil and coal deposits and limited natural gas reserves. Furthermore, Bangladesh does not yet have the necessary hardware manufacturing industries for infrastructural requirements related to distribution lines nor a good skill base for energy management – factors which could contribute to lowering the costs of production and supply.

The price of energy cannot be maintained at an affordable level. Frequent price hikes hit hard both commercial and residential consumers and are regularly reported in the daily newspapers. For example, the government increased the retail prices of electricity by 64% between 2010 and 2014 (Ahsan 2014). The prices of diesel, kerosene, furnace oil and compressed natural gas are similarly on the rise. Being increasingly dependent on the imports of fuel and technologies, Bangladesh is also exposed to changes in the global prices.

The total installed capacity of Bangladesh's energy generation systems is 11,532 MW in 2015 while the daily generation is around 6000–8000 MW (BPDB 2015). Its fuel mix includes: natural gas 63%, furnace oil 20%, diesel 8%, coal 2% and hydro 2% (plus power imports of around 5%) (BPDB 2015). With the prospect of the available domestic gas reserves being exhausted in the next 10 years (Rahman 2013) and no new fields discovered, the country would have to rely on imports. This is economically unviable and with only a small current share of renewable energy, the Bangladesh energy sector is contributing to environmental pollution and greenhouse gas emissions.

The coverage of the electricity grid is also limited. According to the International Energy Agency, the 2012 total primary energy supply in Bangladesh was 0.21 tonnes of oil equivalent per capita compared to 0.64 in India, 5.27 in China and 5.55 in Australia (IEA 2015). Only 60% of the population have access to electricity (World Bank 2015) and for rural areas this share is down to 40% (World Bank 2013). Even when access is available, frequent supply disruptions, poor transmission and network operation hinder the country's economy and household sector (Islam et al. 2014).

The above energy scenario is most likely to persist, because CO_2 emissions intensive development is incompatible with Bangladesh's economic affordability. The country is not economically capable to import increasing amounts of petroleum (Ahiduzzam & Islam 2011). A large fraction of Bangladesh's annual budget is aid dependent and its foreign debt is continuingly increasing (Khan 2014). The infrastructure for electricity production and distribution is old, badly maintained, frequently breaks down and is inadequate to meet the demand. Power cuts are a regular occurrence; many areas are supplied only for a few hours per day; others have no power for many days in a row. Moreover, in the process of import and distribution of goods and services, including power supply, there exists a severe mal-

governance infected with corruption, western marketing practices of non-essential products, over-exploitation of local natural resources, and above all, people's values degradation (Hossain & Marinova 2015). Under these circumstances the Bangladesh poor do not stand a chance to benefit from such electricity supply.

On the other hand, Bangladesh is a niche country for renewable energy systems as it is endowed with a range of resources, such as solar, wind, tidal, geothermal, biomass and biogas. It is possible to avoid the present state of energy crisis with renewable resources that would bring real opportunities for the country's rural areas and its dispersed population. Government and non-government agencies are starting to actively pursue renewable energy based power project development. While the government utilities are engaged with large-scale grid connected renewable energy, the private sector is involved with off-grid home-based solutions. Since its introduction in 2003, the solar home system (SHS) – the first significant PV-based rural electrification program, is increasingly becoming popular in Bangladesh with more than 3 million installed units. The program is thriving through its integration with the government's financial institution – Infrastructure Development Company Limited (IDCOL) established in 1997 (IDCOL 2014). It is considered a successful model for installation of SHSs in the world and has received international recognition through several sustainable business and finances awards, such as the Karlsruhe Sustainable Finance Award in 2013 and 2014 and Asia power and electricity award in 2014 (IDCOL 2014).

Such developments are much better suited to the cultural undercurrent of responsible environmental behaviour and sustainability accounting (Khan et al. 2015) that support self-reliant simple living largely averting consumerism (Hossain 2001). They are also consistent with people accepting ordinary climatic normalcy rather than prioritising energy-based technological solutions. Finally they give a better chance to the rural poor to maintain and gradually improve their quality of life without destroying the livelihoods on which they depend.

4.2 No Poverty–Energy Link

Linking traditional poverty phenomena to an energy crisis in Bangladesh is largely irrelevant and misrepresents the rural reality. There is no obvious direct link between energy and poverty. In fact, the diversity of poverty in this country is manifestation of a wide range of problems that are rooted not solely in the social and economic structure of society, but are also highly linked to its geographic and climatic conditions. The lack of electricity per se is not a cause of poverty and energy can play only a limited role in changing the country's rural areas. According to Hossain (2001), there are four types of inherent and difficult to address poverty characteristics that exist in Bangladesh – the needy, beggars, mystics and landless poor.

The needy (ovabi)

These are families temporarily in deficit of food or money due to social and environmental calamities, such as land erosion, bad harvest, floods or indebtedness due to social reasons. For example, thousands of hectares of land are eroded each year resulting in hundreds of thousands of people becoming landless and/or homeless (Displacement Solutions 2012). Riverbank erosion is a regular phenomenon in Bangladesh – a country located in the delta of some of the world's largest rivers (the Ganges, Brahmaputra and Meghna) and reports on land erosion appear frequently in local newspapers (e.g. the daily New Age). Between 1973 and 2007, 88,780 hectares of land was eroded along the Brahmaputra, 27,990 along the Padma and 38,510 along their distributaries depriving thousands of people of their

livelihoods (Raju & Taznin 2014). The rivers flowing across the country break their banks at one place and build shoals (char land) elsewhere. A standard energy supply and distribution system is not able to cope with these dynamics.

A bad harvest is generally caused by unfavourable climatic conditions. Borrowing for agricultural purposes often throws the debtors into poverty if they fail to make enough money to cover their basic needs as well as repay the debt's principal and interest. Social obligations, such as wedding ceremonial expenses including dowry, treatment of illness of family members and death ritual expenses, also push many households into immediate poverty. The natural calamities of floods, cyclones and droughts, which are common in Bangladesh, also force many people into poverty.

Most of the poor in the *needy* category however can potentially recover from poverty over a period of time as long as they are not repeatedly and frequently exposed to similar situations. Nevertheless, energy or other poverty alleviation programs rarely provide them with such opportunities.

The beggars (vikshuk)

*B*egging is socially acceptable for particular categories of people, such as poor village widows with young children, disabled, the old, lame, blind and priests. Genuine beggars are even invited from time to time to visit non-poor households. Semi-disabled elders can also provide additional income to their families by begging. Furthermore, alms-giving in cash or kind is a Muslim religious obligation for the non-poor who cannot perform this duty without the beggars (and mystics). Energy programs do not touch on the needs of these layers of society.

The mystics (fakir)

These are people who deliberately possess nothing beyond the bare necessities because of socio-religious and spiritual grounds. Mendicant singers, their gurus and disciples are socially recognised as fakirs and Bangladesh has many of them. They are naturalists, live pro-environmental lives, do not eat meat, eggs or other animal products and observe asceticism[1]. The mystics are well respected by most people, and jealously disrespected by some of the religious leaders and elite because of their social activism and praxis, which are labelled as heretic. With present environmental degradation and illiteracy in Bangladesh, NGOs and government agencies value the fakirs as social and environmental facilitators, educators and animators. For example, the government of Bangladesh often invites the renowned Baul Fakirs on radio and television programs related to environmental ethics, agriculture, fishing, food habits, population control, morality, literacy and schooling. Again, these people would have very little benefit from centralised energy supply.

The landless poor (daridra)

These are the 'neo-poor' who have received international attention and are been targeted as subject of empowerment. This group emerged after the country's liberation from Pakistan in the 1970s when relief and microcredit facilities became available through international aid organisations by the way of NGOs. Generally, a family which owns less than half an acre of land, is classified as daridra. Most of the landless poor are clients of NGO groups. Their livelihood activities are diverse, but overwhelmingly limited to cash income, supplemented by relief and microcredit facilities provided by NGOs. Small business, cottage industries,

fisheries, bee keeping, rickshaw pulling, homestead production, food-for-work and relief are included in their livelihood. The NGOs assist them with cash and commodity loans. Some also distribute food grains, clothing, tube wells, latrines, housing, seeds and fertilisers as relief when available from international aid organisations in order to meet emergency situations caused by natural calamities. This group of poor could potentially benefit from power supply; however it has to be affordable and easy to maintain while most of the current options do not satisfy these criteria.

Hence, poverty in Bangladesh has very diverse faces and an approach to energy provision should allow for all kind of groups to benefit without compromising their value systems, livelihoods, the environment and future opportunity. It is unlikely that mainstream fossil fuel based energy networks could ever deliver this. Innovative solutions are needed that are in tune with traditional values and sustainability principles which have helped the country's population survive and deal with many challenges.

4.3 Reconciling Poverty and Energy

The pathway to reconcile the needs of the rural poor with their socio-ecological environment is through traditional sustainability accounting, self-reliance and modesty in consumption. Energy provision should also comply and facilitate this path and only renewable sources can satisfy such requirements.

Traditional sustainability accounting

Sustainability accounting is an integral part of the Bangladesh's culture of folklore with intensive oral traditions which regulate learning from the past and practicing for the present time (Khan et al. 2015). Sustainability accounting is transmitted from one generation to another. Being an oral tradition, it reaches beyond the literates (Rosenberg 1991), which is particularly important for Bangladesh where most rural people are formally uneducated. The practice of sustainability accounting is an ongoing dynamic tool for addressing the diverse challenges of agricultural productivity and ecological stability – the major determinants of rural people's economic wellbeing. It is a practical accounting method based on values such as modesty, happiness with less, simplicity and self-reliance through which the rural people of the country reconcile their livelihood impacts on the environment and natural resources. It is a ubiquitous social practice that touches them every day (Lawrence 2007).

An example of this is the song of Baul Bijoy Sarkar which calls: "We are obliged to leave this beautiful earth, keeping the Earth as it is". The song articulates the main goal of sustainability accounting in managing the existing natural resources by way of reconciling present and future human needs and natural re-generative capacity. It also stresses the beauty of the planet and the human responsibility to preserve it. Another example relates to consuming milk by healthy people between childhood and old age which the Bauls see as unnecessary and unsustainable. According to them, this is like pouring water into a glass that is already full and also, Bangladesh does not have enough land to raise cows for everyone to drink milk.

For Bangladesh – a densely populated country, sustainability accounting practice is essential for maintaining ecological footprint accounts so that as less land area as possible is used for survivability. Any energy generation should also comply with these requirements.

Self-reliance

The goal of self-reliant living is a genuine independence within the available local bio-resources and biosystems with their integrity, stability and beauty preserved (Sterba 1998). It implies meeting basic needs by sustainable natural resources using biosystems or/and bio-friendly human innovated technological systems (Marinova et al. 2006). An example of this is the concept of ecological footprint – a sustainability accounting approach related to nature's carrying capacity. It begins with a particular section of the landscape and asks what population this locality can support sustainably; it then calculates the current pressure on this area (Rees 2000). This is an attempt to measure human demand on the planet's ecology based on self-reliance.

Both Hindu and Muslim traditions in Bangladesh encourage self-reliant living through sustainable consumption practices and recycling of natural resources. People are persuaded to lead self-reliant lives within the limited available renewable resources by practicing simplicity, naturalism and spirituality which are considered traditional values in Bangladesh's culture of sustainability accounting. In rural Bangladesh such a lifestyle is also strongly supported by the Bauls. These unique philosophers encourage harmony within nature and society through their songs and music, and they transcend the question of affluence or hardship by way of peace and happiness (Hossain 2001). When living self-reliantly rural people take responsibility for the long-term health of the biosystems to which they belong and would not trade economic rewards at the cost of environmental and social degradation. Most importantly, self-reliance stimulates human creativity to develop methods and technologies which synergistically build resilience to ensure stability, control, competence and independence (Marinova et al. 2006). Any energy technologies should be able to allow self-reliance and renewable energy is such a solution as manifested through the quick spread and popularity of the solar home systems.

Modest living

Sustainability accounting precepts and practices encourage people to observe naturalism as a means to live obeying the law of nature. They inspire people to take care of nature's sustainability first, and then share its produce with humans and other living beings. Thus sustainability accounting is used as an assessment tool that promotes living simply and in harmony with nature (Hossain and Marinova, 2003). Traditionally in rural Bangladesh, people live modestly and simply meeting their needs from nature in a calculative way without being wasteful or hoarding wealth for profit (El Guindi 2003). This is very different from the situation in the West where environmental priorities are only now emerging as green consumerism with debates around responsibility and what can be done to trigger social change towards modesty and voluntary simplicity (Lorenzen 2014). Gandhi expressed modest living and material possessions in the phrase: "The more I have, the less I am" (Joshi 1993, p. 53). By contrast, the western consumerist philosophy encourages material achievements without any sustainability accounting.

The Bauls are a big inspiration – they respect nature and live modestly in accordance with its limits. Mujtaba and Musavi (2000, p. 47) explain that naturalists acquire wisdom for modest living from the manifestations of how every other species adapts to the natural conditions of life. Following sustainability accounting, the people of rural Bangladesh look not only for what harvest the current season will bring but also how to sustain the productivity of the land for future yields. It is in this context that in recent years villagers have changed their practices away from the discredited methods of the Green Revolution and against planetary death

(Shiva 2005). Small-scale and organic farming that supports biodiversity and does not exploit nature's fertility beyond restoration are now preferred. Thus, sustainability accounting is the foundation for sustenance living economies (Shiva 2005) and the rural poor need energy technologies that are appropriate for this.

The answer to the research question set in this study is that rural poverty in Bangladesh has many different manifestations. It should not be defined as only the income-poor as done in previous research (Khandker et al. 2009, 2010; Barnes et al. 2010, 2011), but is a wide socio-economic and geo-physical phenomenon with strong historical roots. Similarly, in contrast to previous research arguments, there is no direct link between energy and poverty. Although energy availability has only a limited effect on people's poverty state, the use of fossil fuels in Bangladesh can create problems which exacerbate the difficulties faced by the country's poor. This new understanding of poverty strengthens the argument for the use of renewable energy, should inform development efforts and should also direct international aid practices.

5. Summary and Conclusions

Many argue that economic progress depends on how a country, and Bangladesh in particular, manages its electricity sector (e.g. Islam et al. 2014). Although this might have been the case for the last few centuries, the climate change and other ecological priorities of the 21st century require a much closer look at the nature of the energy sector. Fossil-fuel based electricity is an ecological burden for the planet but is also unsuited for Bangladesh. This country has higher environmental values than those observed in the rest of the world (Ngwenya 2015) and the qualitative analysis conducted here explains the importance of preserving its traditional sustainability accounting.

Two theoretical frameworks were used to understand the link between energy and poverty, namely sustainable development and Weber's (1978) traditionalist societies. They were both powerful in allowing to frame the main argument of this study, namely that the legacy of diverse poverty phenomena has little connection with the energy crisis in Bangladesh. This conclusion is very different from previous studies (e.g. Khandker et al. 2009, 2010; Barnes et al. 2010, 2011) which see poverty and energy interlinked.

Through the findings of this research a new view of poverty emerged as summarised below:

• Living with a lack of conventional fossil fuel based energy and persisting poverty are both sustainable in Bangladesh. The poverty phenomena in the country largely prevail due to geo-environmental, cultural, spiritual and philosophical reasons. Energy is not yet a basic need for most of its rural people.

• If the poverty–energy link were to be resolved it would have to be with new renewable technologies that are appropriate and affordable to the rural people and utilise the country's abundant resources.

• According to the naturalist Baul philosophers of Bangladesh, sustainability is the outcome of rural folks' accounting precepts and practices towards the goal that one generation should leave this beautiful planet ecologically unchanged for the generations to come. In the geo-environmental and cultural context of Bangladesh, sustainability (accounting) means management of land and water based natural resources as well as cultural integrity.

Within the study's sustainability framework, the implications from these findings are that the aim of any development should be focused on building local resilience. Encouraging self-reliance, simple living and continuing sustainability accounting allows meaningful and long-lasting improvements of the present poor without compromising the livelihoods of future generations. Future research is needed to analyse development efforts in Bangladesh and how they target or affect the three principles which emerged from this study.

Following Weber's (1978) line of thought, the paper argued that poverty should be understood within the culture and specific geo-physical characteristics of a particular society. With the analysis being only on Bangladesh, a lack of comparisons with other countries is a limitation of this study. It would be interesting to explore the interplay between environmental and spiritual values and their impact on poverty and simple living in other settings. Nevertheless, the Bangladesh example challenges widely accepted modern rhetoric and presents a new perspective on the link between poverty and energy.

Endnotes

[1] Only the very elderly fakirs who have lost their teeth consume milk. Aziz Shah Fakir who is 104 started drinking milk after he turned 90.

References

Ahiduzzaman, M & Islam, AKMS 2011, 'Greenhouse gas emission and renewable energy sources for sustainable development in Bangladesh', *Renewable and Sustainable Energy Reviews*, vol. 15, no. 9, pp. 4659-66.

Ahsan, M 2014, 'People suffer for rapid rise in fuels, power prices', New Age, 25 May, viewed 19 August 2015, <http://newagebd.net/14489/people-suffer-for-rapid-rise-in-fuels-power-prices/#sthash.CMjlM4J0.MlaAk5FV.dpbs>.

Bangladesh Power Development Board (BPDB) 2015, *Key statistics: Present Installed Generation Capacity (MW) as on June 2015*, viewed 19 August 2015, <http://www.bpdb.gov.bd/bpdb/index.php?option=com_content&view=article&id=5&Itemid=6>.

Barnes, DF, Khandker, SR & Samad, HA 2010, *Energy access, efficiency, and poverty: how many households are energy poor in Bangladesh*? Policy Research Working Paper no. WPS 5332, World Bank, Washington DC, viewed 20 August 2016, <https://openknowledge.worldbank.org/handle/10986/3818>.

Barnes, DF, Khandker, SR & Samad, HA 2011, 'Energy poverty in rural Bangladesh', *Energy Policy*, vol. 39, no. 2, pp. 894–904.

Brammer, H 1997, *Agricultural development possibilities in Bangladesh*, University Press, Dhaka.

Coon, D & Mitterer, JO 2010, *Introduction to psychology: gateways to mind and behavior with concept maps*, Wadsworth, Belmont, CA.

Displacement Solutions 2012, *Climate displacement in Bangladesh*, viewed 21 August 2015, <http://displacementsolutions.org/wp-content/uploads/DS-Climate-Displacement-in-Bangladesh-Report-LOW-RES-FOR-WEB.pdf>.

Dauvergne, P 2009, *The A to Z of environmentalism*, The Scarecrow Press, Toronto.

El Guindi, F 2003, *Veil: modesty, privacy and resistance*, Bloomsbury Academic, London.

Energypedia 2016, *Bangladesh energy situation*, viewed 21 August 2016, <https://energypedia.info/wiki/Bangladesh_Energy_Situation>.

Gibson, RB, Hassan, S, Holtz, S, Tansey, J & Whitelaw, G 2005, *Sustainability assessment: criteria, processes and application*, Earthscan, London.

Griggs, RA 2010, *Psychology: a concise introduction*, Worth Publishers New York.

Hossain, A 2001, 'Renewing self-reliance for rural Bangladesh through renewable energy technology system', PhD thesis, Murdoch University, Perth, Australia.

Hossain, A & Marinova, D 2003, 'Assessing tools for sustainability: Bangladesh context', *Proceedings of the Second Meeting of the Academic Forum of Regional Government for Sustainable Development*, Fremantle, Australia, viewed 23 August 2015, http://researchrepository.murdoch.edu.au/21335/1/assessing_tools_for_sustainability.pdf

Hossain, A & Marinova, D 2015, 'Restoring sustainable governance in Bangladesh', in RN Ghosh, MAB Siddique (eds), *Corruption, good governance and economic development: contemporary analysis and case studies*, World Scientific, Singapore, pp. 101-22.

Hossain, I & Tamim M 2005/2006, *Energy and sustainable development in Bangladesh*, Sustainable Energy Watch, HELIO International, viewed 21 August 2016, <http://cleancookstoves.org/resources_files/energy-and-sustainable.pdf>.

Infrastructure Development Company Limited (IDCOL) 2014, *Key milestones*, viewed 19 August 2015, <http://idcol.org/home/milestones>.

Intergovernmental Panel on Climate Change (IPCC) 2013, *Climate Change 2013: Synthesis Report*, viewed 23 August 2015, <http://www.ipcc.ch/report/ar5/syr/>.

International Energy Agency (IEA) 2015, *Bangladesh: Indicators for 2012*, viewed 19 August 2015, <http://www.iea.org/statistics/statisticssearch/report/?year=2012&country=Bangladesh&product=Indicators>

Islam, A, Chan, E-S, Taufiq-Yap, YH, Mondal, MAH, Moniruzzaman, M & Mridha, M 2014, 'Energy security in Bangladesh perspective—an assessment and implication', *Renewable and Sustainable Energy Reviews*, vol. 32, pp. 154-71.

Islam, MR, Islam, MR & Beg, RMA 2008, 'Renewable energy resources and technologies practice in Bangladesh', *Renewable and Sustainable Energy Reviews*, vol. 12, pp. 299-343.

Joshi, N 1993, *Economics of the spinning wheel*, Navajiban Mudranalaya, Ahmedabad.

Kawulich, BB 2005, 'Participant observation as a data collection method', *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, vol. *6*, no. 2, art. 43, viewed 23 August 2015, http://nbn-resolving.de/urn:nbn:de:0114-fqs0502430.

Khan, SA 2014, *Is foreign debt a problem for Bangladesh?*, Jagannath University, Dhaka, viewed 19 August 2015, <https://www.academia.edu/9824385/Is_foreign_Debt_a_Problem_for_Bangladesh>.

Khan, M, Hossain, A & Marinova, D 2015, 'Traditional sustainability accounting principles in Bangladesh', *World Journal of Social Sciences*, vol. 5, no. 2, pp. 201-10.

Khan, M, Hossain, A & Marinova, D 2016, 'Sustainability accounting for natural resource management in Bangladesh', in T Kerr & J. Stephens (eds), *Indian ocean futures: communities, sustainability and society*, Cambridge Scholars Publishing, Newcastle, UK, pp. 173–92.

Khandker, SR, Barnes, DF & Samad, HA 2009, Welfare impacts of rural electrification: a case study from Bangladesh, Policy Research Working Paper no. WPS 4859, World Bank, Washington DC, viewed 20 August 2016, <https://openknowledge.worldbank.org/handle/10986/4055>.

Khandker, SR, Barnes, DF & Samad, HA 2010, Energy poverty in rural and urban India: are the energy poor also income poor? Policy Research Working Paper no. WPS 5332. World Bank, Washington DC, viewed 20 August 2016, <https://openknowledge.worldbank.org/handle/10986/3818>.

Lauber, V (ed.) 2005, *Switching to renewable power: a framework for the 21st century*, Earthscan, London.

Lawrence, S 2007, 'Toward accounting for sustainability: a New Zealand view, in S May, G Cheney & J Roper (eds), *The debate over corporate social responsibility*, Oxford University Press, Oxford, pp. 232-40.

Lorenzen, JA 2014, 'Green consumption and social change: debates over responsibility, private action, and access', *Sociology Compass*, vol. 8, no. 8, pp. 1063-81.

Marinova, D, Hossain, A & Hossain-Rhaman, P 2006, 'Sustaining local lifestyle through self-reliance: core principles', in S Wooltorton & D Marinova (eds), *Sharing wisdom for our future: environmental education in action*, Australian Association for Environmental Education, Sydney, pp. 373-80.

Mondal, MAH 2010, 'Implications of renewable energy technologies in the Bangladesh power sector: long-term planning strategies', PhD thesis, University of Bonn, Germany.

Mujtaba, S & Musavi, L 2000, *God and his attributes: lessons on Islamic doctrine*, (translated by H Algar), Islamic Education Centre, Motomac.

Ngwenya, E 2015, 'Evidence of rich environmental values among the poorest exposed to highest environmental risk: a comparative analysis of Bangladesh and the rest of the world', *International Journal of Climate Change: Impacts and Responses*, vol. 7, no. 1, pp.33-43.

Newton, LH 2005, *Business ethics and the natural environment*, Blackwell, Oxford, UK.

Patton, MQ 2015, *Qualitative research & evaluation methods: integrating theory and practice*, 4th revised edition, Sage, Thousand Oaks, CA.

Rahman, MA 2013, 'Bangladesh's existing gas reserves to run out in 10 years: sources', *Platts McGraw Hill Financial*, 24 June, viewed 19 August 2015, <http://www.platts.com/latest-news/natural-gas/dhaka/bangladeshs-existing-gas-reserves-to-run-out-26046254>.

Raju, MNA & Taznin, A 2014, 'Coping with riverbank erosion', *New Age*, 3 October, viewed 21 August 2015, http://newagebd.net/54639/coping-with-riverbank-erosion/#sthash.VaXtFrRb.dpbs.

Raphaely, T 2012, 'The power of us: counteracting decreasing sustainability', PhD thesis, Curtin University, Perth, Australia.

Rees, WE 2000, 'Eco-footprint analysis: merits and brickbats', *Ecological Economics*, vol. 32, pp. 371-4.

Rogers, PP, Jalal, KF & Boyd, JA 2008, *An Introduction to sustainable development*, Earthscan, London.

Rosenberg, BA 1991, *Folklore and literature: rival siblings*, University of Tennessee Press, Knoxville.

Saunders, MNK, Lewis, P & Thornhill, A 2016, *Research methods for business students*, 7th edition, Pearson Education, Harlow, UK.

Shiva, V 1993, *The violence of the Green Revolution: ecological degradation and political conflict in Punjab*, Zed Press. New Delhi.

Shiva, V 2005, *Earth democracy: justice, sustainability and peace*, South End Press, Cambridge.

Shiva, V 2016, *The violence of the Green Revolution: Third world agriculture, ecology and politics*, Kentucky University Press, Lexington, KY.

Star Business Report 2016, 'Bangladesh to lead charge towards SDGs', *The Daily Star*, 18 August, viewed 20 August 2016, <http://www.thedailystar.net/business/bangladesh-lead-charge-towards-sdgs-1271344>.

Sterba, JP 1998, 'Biocentrism and ecological integrity', in J Lemons, L Westra & R Goodland (eds), *Ecological sustainability and integrity: concepts and approaches*, Kluwer Academic Publishers, London, pp. 63-74.

Tilt, C 2007, 'Corporate responsibility, accounting and accountants', in S Idowu & WL Filho (eds), *Professionals' perspectives of corporate social responsibility*, Springer, Berlin, pp. 11-32.

Townsend, P 1993, *International analysis of poverty*, Harvester Wheatsheaf, London.

Uddin, S 2009, 'Rationalities, domination and accounting control: A case study from a traditional society', *Critical Perspectives on Accounting*, vol. 20, no. 6, pp. 782-94.

Uddin, S & J Choudhury, J 2008, 'Rationality, traditionalism and the state of corporate governance mechanisms: Illustrations from a less-developed country', *Accounting, Auditing & Accountability Journal*, vol. 21, no. 7, pp. 1026-51.

United Nations (UN) 2015a, *Millennium Development Goals*, viewed 23 August 2015, <http://www.un.org/millenniumgoals/>.

United Nations (UN) 2015b, *Sustainable Development Goals*, viewed 23 August 2015, https://sustainabledevelopment.un.org/?menu=1300.

United Nation (UN) 2016, *Sustainable Development Goals: 17 Goals to transform our world*, viewed 20 August 2016, <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

United Nations Development Program (UNDP) 1993, *Energy, environment and sustainable development*, Energy Resources Development Series No. 34, New York.

United Nations Educational Scientific and Cultural Organization (UNESCO) 2008, *Baul songs*, viewed 23 August 2015, <http://www.unesco.org/culture/ich/RL/00107>.

Weber, M 1978, *Economy and society*, University of California Press, Berkeley, CA.

World Bank 2013, *Bangladesh: Lighting Up Rural Communities,* viewed 19 August 2015, <http://www.worldbank.org/en/results/2013/04/15/bangladesh-lighting-up-rural-communities>.

World Bank 2015, *Data: Access to electricity (% of population*), viewed 19 August 2015, <http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>.

World Commission on Environment and Development (WCED) 1987, *Our common future*, Oxford University Press, Oxford, UK, viewed 20 August 2016, <http://www.un-documents.net/our-common-future.pdf>.

Yin, RK 2013, *Case study research: design and methods*, 5th edition, Sage, Los Angeles, CA.