Renewable energyexample persuasive

1 GENDER AND RENEWABLE ENERGY IN THE PHILIPPINES: A community-based microhydro project in Kalinga and a PV-battery charging station in Southern Leyte1 Feri G. Lumampao, Victoria Lopez and Lisa Go APPROTECH ASIA (The Asian Alliance of Appropriate Technology Practitioners, Inc.) G/F, Philippine Social Development Center Building Magallanes corner Real Street, Intramuros Manila 1002, Philippines E-mail address:

org This report is an output of the Collaborative Research Group on Gender and Energy (CRGGE) with support from the ENERGIA International Network on Gender and Sustainable Energy and the United Kingdom Department for International Development (DFID) KaR research project R8346 on “ Gender as a Key Variable in Energy Interventions. ” For more information and other publications of the CRGGE and the DFID project, see www. energia. org/crgge. 2 TABLE OF CONTENTS Abstract ..

.....

....

.....

......

......

......

....

......

.....

.....

.....

....

.....

....

.....

.....

.....

.....

.....

.....

.....

....

.....

.....

....

.....

....

.....

... Acknowledgements.

.....

.....

.....

.....

....

....

....

.....

.....

.....

.....

.....

.....

....

....

.....

....

.....

....

....

.....

....

.....

.....

....

....

... 6 Executive Summary ...

.....

....

....

....

....

....

.....

.....

....

.....

....

.....

.....

....

.....

.....

.....

.....

.....

.....

.....

.....

....

......

... 7 The Study’s Focus and Methods Used..

......

....

......

.....

.....

.....

....

....

....

......

....

....

.....

....

....

.....

..... 7 Women’s participation in the projects

..... Some Benefits and Impacts of the Renewable Energy Projects

..... 8 Recommendations.....

..... 9 1 Introduction.....

..... 10 1. 1 Background/Rationale.....

..... 0 1. 1. 1 Gender roles

..... 11 1. 1. 2 Preview to the case studies and report structure

..... 11 2 Methodology.....

..... 12 2. 1 Framework of the study

..... 2 2. 2 Areas where renewable energy impacts..... 13 2. 3

Development Office NCSO National Census and Statistics Office NEA National Electrification Administration NGO Non-Government Organisation PAGASA Philippine Atmospheric Geophysical and Astronomical Service Administration PhP Philippine Peso PNOC-EDC Philippine National Oil Company- Energy Development Corporation PO People’s OrganisationsPV-BCS Solar-photovoltaic Battery Charging Station RE Renewable Energy RRA Rapid Rural Assessment SIBAT Sibol ng Agham at Teknolohiya SOLECO Southern Leyte Electric Cooperative LOCAL TERMS agamang- rice granary amma- final ploughing ani or buras- harvesting basi- sugarcane-based alcohol choschos-initial ploughing dapilan- a wooden case juice extractor kaat or lichias-cleaning kaingin- swidden lingliwen- woven blanket osok- sewing papur-as-finbal cleaning pigwa- second ploughing saleng- pithwood tullog- weeding uma- swidden farms habal-habal- type of motorcycle used inSouthern Leyte tagak- abaca twine tuba- coco toddy 4 Abstract Community-based renewable energy (RE) projects have been shown to provide greater accessibility to community members in remote areas. Through two case studies, this report aims to document the role of women in community projects and the impacts of RE projects on women in the areas of production, reproduction and community participation. The two projects covered are of a community-based microhydro project (MHP) in Tulgao, Tinglayan, Kalinga and a photovoltaic battery charging station (PV–BCS) in Malitbog, Southern Leyte. The two Tulgao villages (East and West) in Kalinga are populated by indigenous peoples belonging to the Tulgao tribe of the CAR. New Katipunan and Cadaruhan Sur in Malitbog, Leyte are populated by native Visayans. Qualitative methods such as semi-structured, in-depth household interviews with husband and wife, key informant interviews with selected key people

involved in the project and results of focus group discussions (FGDs) were used to gather data in the MHP case study in Tulgao. FGDs were conducted with women participants, with men participants and with mixed groups from the two communities. In the PV-BCS charging station study, the assessment tools used were focused on uncovering the attitudes of project beneficiaries towards their solar lighting system in relation to livelihood activities and other aspects. Purposive cluster sampling was used to determine participants. FGDs and key informant interviews were also conducted to gather information. Rapid rural appraisal (RRA) results that were gathered before the installation of the projects were incorporated with the data later collected. Both case study sites were excluded from the rural electrification programmes of the local electric cooperatives and the local public/private power distributors either because of the distances involved or the rugged terrain that separate them from the existing power grid. Given this situation, microhydro power as an alternative source was tapped in 2000 in Tulgao through community mobilisation led by three NGOs: KEEP, SIBAT and ENDP. Since installation, the MHP has provided electricity for lighting and small appliances to over 300 households and community buildings such as the church, the school and the health clinic. In New Katipunan and Cadaruhan Sur, a three-channel PV-BCS plus residential lighting systems were installed in 2001 through a grant from the country’s DOE and counterpart funding from the Municipality of Malitbog. The introduction of the solar energy projects to residents of the two barangays has brought convenience to their lives. The findings of the two case studies confirmed that the installation of the MHP and the PV-BCS have contributed to improving the lives of the residents through increased economic resources, environmental protection,

improved health and wellbeing and better socio-cultural and political activities. Both projects also involved considerable contributions by women in mobilisation and task completion, thus enhancing community participation. Of the significant benefits brought by the introduction of these RE projects, some were specific to the reproductive work and practical needs of women. In Tulgao, for example, the introduction of an electricity-powered rice mill freed women from the daily labour of pounding rice. This had a tremendous impact on women’s time allocation, and on reducing drudgery, and opened up opportunities for substantive roles in production. The example of Estela Agalao described later in the paper shows how the 5 MHP contributed to improving the productive role of indigenous women. The study recommends the following: 1 In terms of community projects, women should be involved in needs assessment and planning so that their concerns can be incorporated in project development processes. 2 Service providers, such as NGOs, need to develop methodologies that consciously address the participation, access, availability and benefits of women in community-based systems so that economic gains address gender diversity. Development plans should broaden the stereotypical roles of women by increasing their knowledge, skills and participation in technical tasks and in the operation of community projects. In terms of gender mainstreaming in policies on renewable energy: 1 To highlight the gains from renewable energy in general, and particularly in empowering women, there should also be more contact and documentation of similar studies on women and renewable energy. Further, since this study has shown the successes and opportunities created by RE, up-scaling community-based renewable energy projects will ensure development and empowerment of all stakeholders in the

community, especially women. 6 Acknowledgements We would like to express our heartfelt gratitude to ENERGIA’s Elizabeth Cecelski and Sheila Oparaocha and to our colleagues in the Collaborative Research Group on Gender and Energy for the mentoring, encouragement, valuable comments and insights that led to the improvement of the study and the report. We also thank our researchers and partners in conducting the study. SIBAT is one of the pioneering NGOs working on community-based microhydro and solar energy projects in the country. It has rich experience in networking with the community, with other NGOs and the government in the management of microhydro projects. We also acknowledge with gratitude the valuable cooperation of the local communities in Tulgao and Malitbog during meetings and data-gathering exercises. We also thank Amber York, KEEP missionary intern in Tulgao, for sharing her photographs. We would like to acknowledge the assistance of the hardworking staff in Approtech Asia who worked beyond office hours and during weekends. The source of light and inspiration in this study are several articles and publications on gender-energy-poverty by Elizabeth Cecelski, Joy Clancy and Margaret Skutsch among others. The results of the study are disseminated in meetings, conferences, newsletters among our network members and partners in energy-related projects and programmes. 7 Executive SummaryCommunity-based renewable energy projects have proven to provide accessibility to energy services for people in rural and remote areas of the Philippines. The ability of such systems to provide multiple benefits to the communities has been observed. Today, there are several successful micro-power systems with capacities ranging from less than 1kW to 99 kW installed in the country, facilitated by government agencies led by the Department of Energy (DOE),

non-governmental organisations (NGOs) and banking institutions. The Study’s Focus and Methods UsedThis study attempted to document the role of women in such community-based renewable energy projects and the impacts of such projects on women in the spheres of production, reproduction and community participation. For this purpose, the study used two sites: a) a community-based micro-hydro project in Tulgao, Tinglayan, Kalinga; and b) a Photovoltaic Battery Charging Station in Malitbog, Southern Leyte. The two Tulgao villages (East and West) in Kalinga are populated by indigenous peoples belonging to the Tulgao tribe of the Cordillera Administrative Region. New Katipunan and Cadaruhan Sur in Malitbog are populated by native Visayans. Neither case study site had been reached by the rural electrification programmes of the government and local electric cooperatives, or by local public/private power distributors due either to the distance or the rugged terrain that separated them from the power grids. Therefore, in Tulgao in 2000, an alternative source in the form of micro-hydro was tapped through community mobilisation led by NGOs such as SIBAT (Sibol ng Agham at Teknolohiya) and religious organisations active in the communities. Since then, the project has provided electricity for lighting and small appliances for over 300 households and community buildings such as the church, the school and the health clinic. In New Katipunan and Cadaruhan Sur, Malitbog, a photovoltaic battery charging station and residential lighting systems were installed in 2001 through a grant from the DOE and counterpart funding from the Municipality of Malitbog. More recently, New Katipunan village centre has been connected to the grid. Qualitative methods such as semi-structured, in-depth household interviews with husbands and wives, key informant interviews of selected key people

involved in the project, and focus group discussions were used to gather data in the micro-hydro case study in Tulgao. The focus group discussions were conducted in women’s groups, in men’s groups, and in mixed groups of both sexes from the two villages. In the photovoltaic battery charging study, assessment tools focused on the attitudes of the project beneficiaries towards their solar lighting system in relation to livelihood activities and other aspects of living. Purposive cluster sampling was used to select participants. Focus group discussions and key informant interviews were conducted to gather information. Rapid rural appraisal (RRA) results that had been gathered before the installation of the energy equipment were incorporated into the data. Women’s participation in the projects Despite the traditionally dominant role of men in water works, women contributed quite substantially to the micro-hydro project in its construction phase. Men and women shared the work; men doing the heaviest tasks and women hauling sand from the river, fetching water and preparing food for the workers. Although the women had not been present during the planning meetings, the focus group discussions revealed that the men had consulted with their wives at home and brought their views into the discussions. Three of the seven members of the project management team are women and are thus involved in making 8 decisions regarding the micro-hydro project. In terms of operation and maintenance, men are involved in the technical troubleshooting and repairs, while the women take care of administrative matters such as book keeping and payment collection. Women have not participated in any of the related technical training programmes and therefore have only very limited knowledge of the technical workings of the micro-hydro project. In the case of the photovoltaic battery charging project,

both the men and women were consulted during the planning stage. They saw the benefits of the project for themselves and their children (e. g. lights to work longer in the evening and for studying, listening to the radio, watching TV). The supplier was responsible for the installation of the system as well as for repairs. Mostly men were involved in providing assistance due to the heavy nature of the work – hauling material and equipment, setting up lighting fixtures etc. The women contributed by preparing meals for the workers. Women are now involved in simple operation and maintenance tasks such as cleaning the components (surface, terminals), monitoring the battery, switching the lights on and off. They also collect charging fees, monthly dues and keep records. Some Benefits and Impacts of the Renewable Energy ProjectsThe case studies confirmed that both projects have contributed to improving the lives of the residents through increased economic resources, environmental protection, improved health and wellbeing and better socio-cultural and political activities. Lighting is one of the major benefits of the projects mentioned by both men and women. Kerosene and pine pith traditionally used for lighting has been replaced by electric lights. Economically, electricity with the current tariff is cheaper than kerosene or pine pith. The working day has been extended and women are able to do some of their chores at night. This gives them more time for farm work during the day. The women also say that the better lighting in the home has helped them work easier and faster as they can better see what they are doing. For example, peeling sweet potato for daily cooking goes much quicker and is easier. Lighting has brought health benefits too – reduced incidences of eye and respiratory diseases are reported due to reduced exposure to wood and kerosene soot. Lighting has also allowed the

communities to hold meetings and festivals for longer hours in the evenings. In terms of electrical appliances and equipment, many families have invested in televisions and radios. They do mention not only entertainment, but also education through increased access to news and information. Sitting together with the whole family in the evening to watch a TV programme or talking with each other, according to the women, helps strengthen family bonds. Appliances that assist in household work have been less popular, although rice cookers, grinders and washing machines have been acquired in limited numbers. In Tulgao, a rice mill has made a great difference, especially to the women. Before the construction of the micro-hydro plant, women and girls used to spend tiring hours pounding rice for the daily meal. Now, the women have been relieved of this exhausting task and use their time and energy for other household activities, and can even afford to take short rest breaks. Women have also found more time to help men in the planting of rice and the management of the rice fields. More women now get a cash income from planting high-value cash crops, such as vegetables and beans, along the dikes and around the rice fields. 9 In Malitbog, women would have to walk over two kilometres or take a risky motorbike ride and spend more than a US dollar for transport and charging fees when going to town for charging batteries for lighting. Now, they only walk a few minutes to the solar PV-charging station and pay a little over US 50 cents to charge their batteries. Thus women save time to work on other productive activities such as cropping and making abaca twine. Both renewable energy projects have boosted income generation in the villages. The men in Tulgao who weave baskets are now able to make more baskets in a month with access to lighting. In Malitbog, there is a marked increase in the volume of agricultural

products such as copra, abaca twine, cut flowers and vegetables, particularly because women have more time to spend on these activities. A community bakery and several retail grocery stores have also been established. In both communities, women find time to participate in community meetings and other activities, especially in gatherings related to improving family health, income, and technology-based livelihood activities. Their experience of saving time and finding other enterprises to augment family income from these projects motivates them to get actively involved in meetings and community development initiatives. RecommendationsThe study recommends the following: 1) Involvement of women in needs assessment and planning so that their concerns can be incorporated in the project development processes, especially in resource allocation; 2) NGOs develop methodologies that consciously address the participation, access, and benefits of women in community-based systems so that economic gains consider gender diversity; 3) Development plans broaden the stereotyped roles of women by increasing their knowledge, skills, and participation in technical tasks and operations of community-based projects, especially in water and energy technologies; 4) Gender should be mainstreamed in policies on renewable energy; and, 5) Enhancing women’s leadership and management skills and enabling an environment for them to put these into practice. To highlight gains in renewable energy in general, and empowering women in particular, there should be more studies and documentation of women and renewable energy. Further, the success and opportunities created by renewable energy as demonstrated through this study also suggest that scaling up community-based projects on renewable energy will ensure development and empowerment of all stakeholders in the

community, especially women who are so often overlooked. 10 1 Introduction 1. 1 Background/Rationale Renewable Energy (RE) when linked to gender and poverty challenges has been established by development studies to be a tool for sustainable energy development and for greater equity in rural areas. Since poverty reduction and gender equality have become important goals for development institutions, studies on RE are now being explored for their potential to serve as models and approaches to respond to the needs of these institutions. In addition, gender issues have recently gained increased prominence among the various sustainable energy aspects. Energy programmes have increasingly focused on gender issues and initiatives, and have resulted in the development of national and international networks on gender and energy. This paper, through two case studies, sets out to establish the effects of two RE projects on rural communities which, through the initiatives of NGOs, GOs and the support of community organisers and local organisations, have established their own interventions to meet the challenge of a lack of electricity in the locale. It focuses on the impacts of the RE projects on the production, reproduction and community participation roles of women in rural areas. RE has been invoked by policymakers and proven in practice to be a viable and appropriate response to far-flung and poor rural conditions (in areas where it will take a long time, if ever, for the grid to reach). Presently, in the Philippines, a Renewable Energy Bill is being promoted to enhance the support to renewable energy development in the country. In many of the statements made regarding renewable energy, decentralised RE electrification has been highlighted because of its impact on poor communities – if made affordable and accessible to those who need it. In this

regard, the role of specific decentralised community-based systems, such as microhydro installations, has been encouraged. Today, there are more than a hundred microhydro systems (up to 100 kW output) installed in the country, mostly by government agencies led by the DOE and by NGOs. The ability of such systems to provide multiple benefits, beyond electrification, in rural areas has been noted. The case study on the MHP in Tulgao proves that such benefits are possible and manageable in a community-based project, where primarily the stakeholders are spread throughout the community. The renewable energy system was built through organised community participation, i. e. n an approach where participation is regarded as a key aspect of stakeholdership. Turning to the PV-BCS case study, the Philippine government first declared, in 1960, full electrification as a national policy objective. In line with this, the government has already achieved 100% electrification at the municipality level, and the present target is to achieve this at the barangay level in 2006. To integrate all the DOE's rural electrification efforts, the government has established the O'Ilaw Program. This had already achieved 87. 1% barangay electrification by 2002. The DOE also created, in April 2003, an Energy Response Team to effectively manage and integrate the country's rural electrification programmes. The barangays of Cadaruhan Sur and New Katipunan in Malitbog, Southern Leyte, were considered priority areas since they were excluded from the electrification plans of the Southern Leyte Electric Cooperative (SOLECO). A Rapid Rural Assessment (RRA) was conducted by DOE staff in these identified barangays. The RRA revealed that the residents owned standard car batteries that were used for lighting, radio, karaoke machines etc. Further, the car batteries were transported twelve kilometres to and from a town for charging at a rate

of PhP 50 to PhP 70 which represents a large part of the income of household members given that daily wages are 11 typically PhP 90-150 per person per day. Coupled with a transportation cost of PhP 50, a household would thus have to spend about PhP100 to have their battery charged. Where charging is needed weekly, a battery owner would end up paying around PhP 400 per month and the batteries would also suffer from shocks due to the rough roads. As a consequence, a three-channel PV-BCS plus residential lighting systems were installed in the two barangays in 2001 through a PhP 1 050 000 grant from DOE and a PhP 50 000 contribution from the Municipality of Malitbog. The three channels enabled three end uses to be targeted: (1) battery charging, (2) residential lighting, and (3) electrical appliances. The project benefited seventy households in the two barangays. In addition, lighting systems in the community halls were also provided. A Barangay Power Association (BAPA) was organised to manage the operation and maintenance of the PV-BCS. At present, the cost of charging a battery is pegged at PhP 20 and an additional monthly fee of PhP 80 is required from the members to defray other expenses such as battery replacement, minor repairs etc. 1. 1. 1 Gender roles The gendered roles and relationships in the communities have shown varying levels of inequality in productive, reproductive and community concerns. In many studies, gender inequality is revealed even in those areas where cooperativism has been traditionally strong. Burdens are placed on women in both productive and reproductive spheres. In many cases, women suffer even greater burdens because of the physical and cultural difficulties inherent in mountain areas and tribal communities. 1. 1. 2 Preview to the case studies and report structure These case studies illustrate the relationships that result when a community-based

project is directed towards the real needs of its stakeholders, especially those of women. In communities where women play crucial roles in economic activities, even where these remain unquantified, the value of the results within the framework discussed in the methodology in Section 2 are relevant inputs for future developmental work. Section 3 describes the case studies: the socio-physical and economic characteristics of the study areas; the roles of men and women in relation to economic activities; the energy sources in the study areas before the installation of the RE equipment, the inception and completion of the programmes, and their impacts on the stakeholders and especially the women. The major results and findings of the studies, including recommendations, are presented in the final two sections. 12 2 Methodology Several meetings were conducted, especially in the project orientation and planning phase, during the preparation of the interview schedule, and while writing the report which involved young researchers and several reviews involving gender and energy experts in the country. The results of the study were presented at national and regional meetings and workshops attended by major stakeholders in energy, such as the Global Village Energy Partnership (GVEP) and the UNDP Regional Energy Programme for Poverty Reduction (REP-PoR) and referred to in the country report on energy prepared by the Philippine UNDP REP-PoR consultant. This study is also linked with SIBAT’s evaluation of its microhydro projects, DOE’s assessment of the livelihood activities associated with BEP, Approtech Asia’s Improved Cookstove Programme in the Philippines and other research and documentation activities on gender-energy-poverty. 2. 1 Framework of the studyWhile providing greater access to energy for community members is seen to be a feature of community-based renewable energy projects, the

extent that women benefit depends on the opportunities offered by such projects. There are three areas that should be looked at in appraising the impact of renewable energy projects on women, namely: (a) Production In rural communities, productive work on farms is shared, and women may take on equal or even a greater number of substantial and diverse roles in most stages of farm work compared with their men. In indigenous warrior societies, women are the main farmers because men are busy with political conflicts. However, livelihood activities that involve income-generation are generally more accessible to men and, where waged work on farms is a feature, women are generally paid less than their male counterparts. b) Reproduction In addition to their substantial roles in production, women take up most of the reproductive burden with occasional contributions by men. The majority of household chores are seen as women's tasks. For example, the important year-round task of rice pounding is normally carried out by women and children. (c) Community participation Community participation remains relatively strong in many rural communities, and cooperativism in many aspects of life still dominates. Men and women seemingly participate equally in many school, church and community affairs, although there are activities that are considered to be within the men's domain. The decision-making role of women is confined to household, school and church concerns, or outside of the political domain of men. The situation of women in these three areas needs to be analysed in order to clearly understand the gender relationships. 13 2. 2 Areas where renewable energy impacts The impact of renewable energy projects on women, their access to a project and the benefits derived from it, can be best viewed within the broader economic, environment, socio-political and cultural contexts. Their roles in decision-

making are best understood within the socio-political as well as in the socio-cultural contexts. Women’s empowerment should touch those aspects of traditional culture that block their development. 2. 3 Community-based development perspectiveIt is important that the perspective of the community as a whole is seen when looking at the changes and development outcomes of a renewable energy project. More opportunities for women-focused activities are possible if founded on a wider community outlook. The community-based perspective is important in comprehensively and decisively pushing to empower women, both as women and as community members. 2. 4 Case study approach These case studies aimed to document the impacts of the community-based MHP on women in the indigenous communities of Tulgao West and East near the town of Tinglayan in the province of Kalinga; and of the PV-BCS on women and heir livelihood activities in Malitbog, Southern Leyte, in the Philippines. The case studies utilised qualitative methods in gathering quantitative and qualitative data from respondents and beneficiaries in the study areas. The methods used in the case studies as follows: 1. Semi-structured interviews: (a) Three in-depth household interviews (i. e. with husband and wife); and (b) Key informant interviews with selected key people involved in the project including women leaders. 2. Focus group discussions (FGDs) with three types of group: (a) With both men and women from the community; (b) With women participants; and (c) With men participants. 3. A detailed case development on one particular indigenous woman, focusing on the benefits of electrification in her productive work. 2. 5 Limitations of the study In Tulgao, there was limited time for interviews during the data-gathering stage because most of the women were busy in the field as it was the rice planting

season. The FGDs and household case studies had to be done in the evenings. Further, the study included only two of the three communities benefiting from the MHP project. The community of Dananao could not be included as it was too distant from two adjacent communities of Tulgao East and West. In the PV-BCS project, the direct beneficiaries were limited to thirty households per barangay. The 14 esearch did not determine if there were any wider impacts on the communities as a whole. 15 3 The case studies 3. 1 Case study 1: Microhydro power project in Tinglayan, Kalinga The case study set out to investigate whether indigenous women were empowered through the introduction of a community-based renewable energy technology, namely a microhydro power project, in Tinglayan, Kalinga. 3. 1. 1 Characteristics of the study area The beneficiaries of a 33 kW MHP installed in 1999 in Kalinga live in the three upland villages of Tulgao East, Tulgao West (collectively referred to here as Tulgao) and Dananao, located within the municipality of Kalinga, north of the Cordillera Mountain Region in Northern Luzon. The province of Kalinga is bordered by the provinces of Apayao, Cagayan, Isabela, Mountain Province and Abra. The three communities are neighbours and a steep valley, through which flows Bunog Creek, separates Dananao from the Tulgaos. Bunog Creek, from where the MHP system gets its energy, forms a natural boundary between the two tribes. The route from Tinglayan, the local town, to Tulgao is a steady uphill hike of three hours, followed by a steep descent into Tulgao. During the dry months, Tulgao is accessible by a four-wheel-drive vehicle. Dananao is never accessible by vehicle, but can be reached by a four hour hike along another route from Tinglayan. It takes around one hour on foot from Dananao to Tulgao. Topography and climateThe entire Kalinga province

is characterised by dramatic mountain ranges, and the major river in the region, the Chico, flows close to Tinglayan. The barangays tend to be situated along the steep slopes of the mountains, approximately 1100 metres above sea level. The climate in the area falls under Type III of the PAGASA classification, with relatively unpronounced seasons and the weather relatively dry from November to April and wet for the rest of the year. The humidity is higher than in most of the country and varies depending on altitude. It has low temperatures, and on average seven to eight hours of sunlight due to the mountains. Statistics from 1995 show the annual rainfall to be approximately 280 mm. Watershed and vegetation Visually, grassland and pine forests appear to dominate the mountain areas around the villages. The remainder are taken up by swiddens (kaingin) and terraced farms. The natural vegetation, on both communal and private lands, is reported as having been depleted, and deforestation in the area has led to significant soil erosion in the vicinity. This situation has been slightly improved by a watershed protection scheme that has involved the planting of pine trees. Pine and pithwood (saleng) are respectively used to provide fuelwood and light. Many parts of the catchment area have been cleared for swidden and wetland rice farming. DemographyThe two Tulgao villages have 213 households, while Dananao has a further 124 households. The total population is estimated at 1600 people. Key informants claim that the infant mortality rate has fallen due to rising educational levels and the presence of a permanent midwife. There are a similar number of men and women, but the population 16 decreases rapidly with age. The average number of children per family is seven in Tulgao and six in Dananao, with the largest families having around thirteen members. Culturally, a large family is

regarded as a blessing. There has been a steady migration of people to Tinglayan, Bontoc and Tabuk seeking education, work and marriage. Ethnicity and tribal conflictThe people in Tulgao belong to the Tulgao tribe and the people of Dananao to the Dananao tribe, both are part of the larger Kalinga ethno-linguistic group. Conflicts among tribes in Kalinga, where disputes commonly arise from border or territorial and resource issues, are nowadays settled through the peace pact. Tulgao and Dananao have a long tradition of rivalry and disputes over territory and, as recently as 1997, a border conflict broke out between the barangays. It is worth mentioning that since the conception and installation of the MHP, any disputes arising between the two villages have been resolved without violence. Religion The population in Tulgao are Catholics (60%) and Episcopalians, members of the EDNP (Episcopal Diocese of Northern Philippines). EducationTulgao and Dananao each have an elementary school, with six teachers covering Grades 1-6, and an average class size of around thirty students. The nearest high schools are in Tinglayan, Tabuk (a neighbouring barangay) and Bontoc. University education is rare without outside funding or bursaries since very few people can afford to send their children to university. Those who go to universities go on to find work outside the municipality. Health Both communities have a resident midwife and two barangay health workers, who provide pre- and post-natal assistance and training, including family planning and care. The leading causes of morbidity are tuberculosis, acute respiratory illness (ARI) and pneumonia, with respiratory complaints increasing during the rainy season. Although there are certain immunisations that are given to all children, such as BCG (for tuberculosis), DPT (diphtheria, polio, tetanus) and against measles, others such as Hepatitis A and B are only given when

there is excess in Tabuk that is made available. The drugs available at the medical centre are similarly limited and are reserved for emergency cases. Facilities Potable water is available in both barangays all year round through delivery pipes from springs. Communal irrigation facilities (canals built through the farmlands) exist but need improvement to service the rice fields in the villages of Tulgao and Dananao. There are rice-drying areas in both communities, and recently rice mills were installed that run on the electricity provided by the MHP. A sugar cane press was provided in 2002, but was unused until it was connected to the MHP in November 2003. 17 The indigenous culture Indigenous cultural practices have been sustained in these villages despite the inroads of religion and other external influences. Community rituals covering each stage of rice production in both wet rice terraced farming and swidden, following the traditional agricultural calendar, are still strongly observed and enforced by traditional elders. Community cooperation remains relatively intact for certain traditional activities such as harvesting, forest protection, and emergency assistance to members of the tribe. This strong traditional cooperation has been tapped to build the community-based MHP. The differentiated roles of men and women in Tulgao and Dananao villages are rooted in the typical warrior culture of these indigenous societies. Indigenous agricultural production focus of the Tulgao villages Kalinga province is identified as one of the poorest provinces in the Philippines. The average family income in the barangays is well below the poverty line set by the National Census and Statistics Office (NCSO 2004). The Tulgao population relies on agriculture for food and grows rice as its primary subsistence crop, i. e. for household consumption. Wet terraced farming is the predominant form of rice agriculture supplemented by dry

cultivation in the swiddens (kaingin). The availability of prime agricultural land is limited by the steep mountain slopes. Due to the climate and also the long period to maturity of the rice varieties grown (5-7 months), it is only possible to grow one rice crop per year, with rice transplanted around January and harvested in June or July. Rice Farming Organic farming, which is the traditional practice among these communities, enables rice to be grown without the application of chemical fertilisers. The farmers leave the rice fields fallow for several months to allow the regeneration of soil nutrients before they start replanting. The traditional varieties of rice have also been noted for their good resistance to pests. Wet rice production in these highlands remains limited to an average of 600 bundles of paddy per household per year for various reasons (as explained in the subsequent statements and reflecting the capacity of the household members to manage). For a start, the average household owns only two or three rice fields, or about one-eighth of a hectare. The lack of appropriate machinery and technology hampers the expansion of farmland in this mountainous area. The use of simple hand tools and a few carabaos (water buffaloes), which are used in land preparation for low-lying fields, make land improvement a laborious process. The amount of rice harvested is usually insufficient to last the whole year for most families, who need to buy rice for anything up to six months per year (called the lean months). Table 1 shows the production from one of the better-off families. 18 Table 1: Rice production in TulgaoRice field Seedlings Harvest Field 1 12 bundles 6 chalan (360 bundles) Field 2 18 bundles 11 chalan (660 bundles) Field 3 4 bundles 3 chalan (180 bundles) Field 4 16 bundles 5 chalan (300 bundles) Total 25 chalan (1500 bundles of paddy or 350 gantas of rice)* *1 ganta = 2. 2k

Swidden farming and other food sources Swidden farms (uma) provide year-round sources of vegetables and some upland rice, and this helps households through the lean months. These are planted mostly with camote, squash, native cabbage, legumes, tobacco and sugar cane. The sale of legumes and other vegetables from the swiddens are a source of income for most households in Tulgao. The communities tend livestock for food as well as for ritual use. The practice is to let pigs and chickens roam freely within the village. In this way, the livestock do not substantially compete with humans for the limited food available. Coffee and fruit trees are grown in the vicinity, and some of the products are sold in Tinglayan and Tabuk. Small fish are also caught in the river and streams. Sugar cane production Sugar cane is an essential secondary crop, for sugar and for making basi (native wine). The latter holds an important place in the cultural practices and rituals associated with agricultural production. The harvested sugar cane has to be processed to make sugar and basi. Sugar canes are brought to the dapilan: a wooden cane-juice extractor worked by a water buffalo. The rest of the process entails cooking, evaporation and fermentation until the wine is stored for some months for use in rituals. Other livelihood opportunities Aside from agriculture, there are other activities that augment the income of families especially during the lean months of rice and food shortages. These include basket weaving, carpentry, construction or road-building and blacksmithing. Men and women also carry out waged labour on other farms. Gender roles In general, both men and women in these upland communities are involved heavily in economic and community work. The subsequent discussions will focus on the roles of both within the framework discussed in Section 2 and will delineate the roles of each gender as necessary. 3. 1. 2

Productive Work Rice Farming Rice cultivation has defined roles for men and women in these upland villages. Building rice terraces, land preparation and the repair of rice terraces are in the male domain, 19 although women provide assistance. Building a rice field is considered a laborious task in the absence of machinery, and is generally a man’s job. With only a few hand tools for clearing, cutting and digging, it takes about two to three years to establish a single rice field. Women help by carrying black soil to be spread and levelled on the fields. Farming on both wet terraces and in the swiddens involves diverse tasks that are generally considered to be women’s work. After land preparation by the men, women take care of seedbed preparation and transplanting. For nearly three months from planting until harvest time, women regularly tend, clean and weed the fields. Harvesting is a much anticipated community event, and thus involves men, women and children. Table 2 shows the rice calendar and the allotted tasks for men and women. Table 2: Seasonal calendar for wet-rice farming (Tulgao) Month Activity Participant November – December Land preparation/sowing Men/Women January – February Transplanting of seedlings WomenMarch –May Cleaning and weeding Women June – July Harvesting Family August Second crop, (rarely sown) Family The woman is given the role of seed selector. She selects ten stalks of paddy which she wraps in a lingliwen (woven blanket) to be stored in the agamang (rice granary) for use in the following planting season. Swidden Farming Swidden farming in Tulgao predominantly involves women in all the tasks shown in Table 3. Women play the major part in the production of legumes and vegetables. Traditionally, it is the women who sow the legume seeds, although men dig the holes for the seeds to be sown. Legumes are sold by women in nearby towns for cash. As in wet rice

agriculture, women select and store the seeds for the following crop. Table 3: Women’s work in swidden farming Activity First Crop Second Crop Number of work days Clearing 8 days Burning ? day Final cleaning (papur-as) March-April September – October 3 days Sowing (osok) May December 2 ? days Weeding (tullog) June –July January – February 2 days Harvesting (buras) August March 6 days Drying 2 days Winnowing, pounding, cleaning 4 days Marketing 6 days Table 4 below summarises the farm work for a family with four fields in Tulgao 20 Table 4: Farm work and time allocation (Tulgao) Activity Number of works days (m) = male, (f) = female and (p) = people Field 1 Field 2 Field 3 Field 4 Initial ploughing (choschos) days (m) 3 days (m) 1 day 2 days Cleaning (kaat) 3 days (f) 2 days (f) ? day 2 days Second ploughing (pigwa) 1 day (m) 1 day (m) 1 day 2 days Final ploughing (amma) 1 day (m) 1 day (m) 1 day 2 days Transplanting 4 days (f) 5 days (f) 2 days 5 days Weeding (sagamsam) 2 days (f) 2 days (f) 1 day 2 days Cleaning (lichias) 1 ? days (f) 2 days (f) ? day 2 days Harvesting (ani) 1 day (18 p) 1 day (22 p) 1 day (8 p) 1 day (25 p) Drying 3 days 3 days 3 days 3 days Repair and maintenance of irrigation canals and rice terraces As required (m) Total 18 ? days 20 days 11 days 21 days Income Generation Income generation is seen as part of the male domain in these upland villages. The Tulgao men produce several handicraft items (baskets, soft brooms and mats) using traditional weaving methods. They also manufacture traditional blacksmith tools for use within the community and for selling in nearby towns. Carpentry is another livelihood source for the men, within and outside the community. In some families, both the men and women carry out waged work on farms within the community, or beyond, to generate additional income. The average payment for men and women are 175 and 75 pesos,

respectively, per day. Reproductive Work The women, apart from their productive roles, perform most of the household chores since these are considered in these indigenous villages as women’s tasks (Table 5). Fuelwood gathering, on the other hand, is men’s work. 21 Table 5: Roles and responsibilities of men and women in Tulgao Domains Male-dominated Activities Female-dominated Activities Shared roles 1. Reproductive: household work and family affairs Firewood gathering House repairs Washing of family clothes House cleaning Food gathering Rice pounding Food preparation/cooking Child rearing and discipline of children Caring of sick 2. Productive: On farm work 2. 1 Rice Farming Land preparation (trampling) Scarecrow making Water maintenance Seed preparation Transplanting Weeding Field hygiene, clearing the surroundings Harvesting Drying Storing in granary 2. Swidden Farming Scouting for land Carry seeds to farm Hauling to market Sowing Weeding Drying, pulling and sorting Field care inc. cleaning, cutting bushes, spreading ash from fires to lower soil pH Firebreak making Harvesting Storing 3. Productive: off farm Rice winnowing and pounding 4. Productive work: livelihood Basket weaving Soft broom making Blacksmith Buy and Sell Carpentry Hired labour (shared role, depending on age of children) 5. Community participation: Involvement in community affairs MHP: planning, maintenance Watershed management MHP: construction, management School-related such as meetings Church-related activities Community festivities uch as weddings and rituals Community Participation As shown in Table 5, most of the community affairs related to school, church and community festivities involve both men and women. Decision-making is a shared role on matters pertaining to households, the family and children, church and school. The women were observed as being

predominantly active in school and church concerns. However, decision-making on issues of a political nature, such as those related to tribal conflicts, remain in the traditional domain of men. Women do not participate in peace-pact gatherings and ceremonies. Community labour for waterworks construction is in the domain of men. In the case of the MHP, however, women shared in some of the manual tasks such as hauling. This was a result of the community mobilisation invoked by the lead organisations for this innovative project. The two barangays have had several community projects to improve the local area, carried out by both the local government (through LGUs) and NGOs, some with funding from KEEP. Within the community, there are a number of people's organisations. In Tulgao, the principal of the elementary school heads the women's organisation that assists in upholding welfare and order in the barangay. The other people's organisations include a farmers' association and a church-led youth group. 22 3. 1. 3 The interventionOne of the systems selected for this research was the community-based microhydro project (MHP) located in the cluster of remote and upland barangays of Tulgao East, Tulgao West and Dananao in Tinglayan, Kalinga. Already for five years, these three barangays have been benefiting from the electricity from a 33kW MHP system, drawing its energy from the Bonog Creek which passes through the cluster of villages. The focus of the actual data-gathering, and hence the case study, are the two Tulgao villages of Tulgao and Dananao. The communities are made up of indigenous peoples belonging to the Tulgao tribe of the Cordillera Administrative Region (CAR). These two tribes have an age-long warrior tradition, and have been tribal enemies in recent history prior to the establishment of the MHP. This project had enabled them to work together in its installation and subsequent

operation. SIBAT had undertaken the technical assistance for this project, which was initiated by EDNP and funded by KEEP of Japan. The Tulgao Farmers Association has been the core organisation which has owned the operation and management of the project from its conception onwards. Its members represent the community in this project. Tulgao MHP: feasibility study The MHP project site which provides electricity to the barangays of Tulgao East, Tulgao West and Dananao was initially surveyed in 1997. The feasibility of the MHP project was established in 1998 which led to the construction of the system and its commissioning in 1999. Research conducted by SIBAT as part of the feasibility study in November 1997 showed that Kalinga was among the least-served provinces in CAR, with less than 16% of its barangays having an electricity supply. The nearest point on an electricity grid was more than 30 kilometres away from the communities and, moreover, operated by MOPRECO whose area of operation was limited to Mount Province and so did not cover these three villages. The nearest point on KAELCO’s grid, the operator most likely to connect Tulgao and Dananao, was, in 1997, more than 70 km away. Further, discussions with members of these electricity cooperatives revealed that these communities were unlikely to be connected to the grid within the next 10-20 years due to the distances involved coupled with the rugged terrain which made connection expensive. As of 1996, MOPRECO and KAELCO stated that the installation costs for transmission lines only was about PhP 450 000 per km. Thus, alternative energy sources for these barangays needed to be explored. The energy consumption in the community before the installation of the MHP was primarily for lighting and cooking, with additional battery-powered flashlights and transistor radios used by some residents. Only one in five

households had a transistor radio. There were typically one or two kerosene lamps per household, but fewer than 40% of the households regularly used erosene due to its high cost and the problems of transporting it from Tinglayan or Tabuk. All the post-harvest activities, mainly related to rice production, were performed manually by women and children. Each barangay had a small-capacity diesel generator, potentially useable to charge batteries, but the five households in the three barangays who did own rechargeable (car) batteries would take them to Tinglayan or Tabuk to be charged. The Anglican Church had a solar PV system for lighting and battery charging connected to the multi-purpose centre in Tulgao West, site of the clinic and reading centre. A needs assessment yielded the community's desire for better lighting. The reasons given for this emphasis were the cost of kerosene, and the dirty soot that it left behind in the houses. A rice mill was also said to be a good option, to reduce the workload of women and children. 23 The feasibility study showed that, on average, PhP 38 per month was spent on kerosene, by the minority who used it. The average monthly expenditure on saleng was given as PhP 79 per household per year. 3. 1. 4 The community-based MHP The community's roles in the project's development were through community mobilisation and counterpart contributions in the form of labour and locally procured materials. A community plan was developed for the entire installation phase; where the roles of the community, the church and SIBAT were outlined. The community organised various committees to organise the tasks relating to their counterpart role. A watershed preservation and enhancement project was also undertaken in cooperation with SIBAT, with thousands of pine tree seedlings successfully planted. However, this project was discontinued in

2003, just over half way through its planned duration of 2000-2004. The microhydro project was officially inaugurated in November 2000, with festive ceremonies attended by representatives from many indigenous villages in Kalinga. The project has been fully operational since then, except for an eight-month shutdown in 2003. The lead organisations involved in the project were the EpiscopalDiocese of Northern Philippines (ENDP) and the Sibol ng Agham at Teknolohiya (SIBAT), which divided the tasks between them of organising the community and providing technical assistance. The project was funded by the Kyosato Experimental Education Program (KEEP). The total investment cost was projected as PhP 2 587 450, with the value of community work and materials provided locally estimated at PhP 293 000. The microhydro project uses the energy of moving water to turn a turbine, like a water wheel, which turns a generator and so produces electricity. Bunog Creek has a typical flow of 0. 17 m3/sec which is also tapped for the community’s communal irrigation system. To achieve a 30kW power output, the flow was diverted to a forebay site from where it drops 40 m to the turbine. The powerhouse site is approximately 1. 5 km from Tulgao and 1. 2 km from Dananao. The project fulfilled its objectives of providing enough electricity for lighting and small appliance use in over 300 households; as well as in community buildings such as the church, the school and the health clinic. Although the capacity of the system is 30kW, only 4-5kW are currently being used. Two rice mills were installed in 2002, and a sugarcane press in November 2003. These facilities are powered during the day, thus generating additional income for the community and reducing people’s workloads. 3. 1. 5 Beneficiaries of the MHPThe target beneficiaries of the MHP were the entire communities of Tulgao East, Tulgao West and Dananao,

comprising of 300 households, plus various communal buildings including the church, a multi-purpose hall, the school and health clinics. In practice, the MHP was able to reach around 80% of the total population of the three communities (see Table 6). The number of beneficiaries has fluctuated due to the migration of some families to other places. Most of the households have one or two light bulbs in their houses linked to the system. 24 Table 6: Beneficiaries (households) of the MHP electrification Community 2000 2001 2002 2003 2004 Tulgao East 83 83 84 80 81 Tulgao West 70 67 68 68 62 Dananao 93 97 101 103 91 Total 246 247 253 251 234 Some families chose to invest in appliances, and it total there are 21 families with 24 appliances (see Table 7). Aside from own entertainment use, the VHS and televisions are used as additional sources of income, with children in particular paying to watch videos. Payment is one pine pithwood (a log or piece of wood from a pine tree), used for fuel, per show. It was commented that this causes problems within the community as children steal the pithwood. It was also mentioned in the male FGD that the purchasing of appliances highlighted the wide range of economic capacities of families within the community. Most of the families able to afford appliances had income from outside employment, such as as teachers and government employees. Table 7: List of appliances in the community (as of 2004) Appliance Number of units Entertainment • CD and TV 15 • CD cassette 4 Kitchen • Rice cooker 1 Grinder/blender 1 Laundry • Washing machine 2 Others • Sewing machine 1 TOTAL 24 What Table 7 highlights is that most appliance purchases are related to entertainment rather than alleviating household chores. Only the rice cooker, the food grinder and the two washing machines can be seen as in the latter category, and just one sewing machine was bought for productive purposes.

3. 1. 6 Energy Consumption The output from the microhydro plant is primarily used for lighting, with some small appliances, plus for processing farm produce with a rice mill and sugarcane press, and some blacksmithing (making farm implements). The system generally operates from 4. 0 pm to 7 am (based on an agreed policy), and during the daytime if needed for the rice mill or lighting for the school. As agreed by the community, each household pays a monthly tariff of PhP 25 for their first 10W bulb and an additional PhP 5 for each extra bulb. For appliances, a household pays an additional PhP 30 per month per appliance. 3. 1. 7 Operation and Management The MHP is managed by the Board of Directors, and there is a Manager responsible for the day-to-day operations. The Board of Directors is composed of three women and four men. The Manager is the pastor of the Episcopal Church. The MHP has a staff comprising one cashier/bookkeeper, three fee collectors and two operators. 25 3. Case study 2: PV-battery charging in Malitbog, Southern Leyte The case study focussed on assessing the impacts on women and their livelihood activities of the PV-battery charging station in Malitbog, Southern Leyte, and in particular in the two remote villages of New Katipunan and Cadaruhan Sur. 3. 2. 1 Characteristics of the study area New Katipunan is 1. 5 kilometres farther away from the town of Malitbog (13 km), from the town market (also 13 km) and also from the nearest city of Maasin (55 km), than Cadaruhan Sur. Moreover, New Katipunan remains two kilometres away from the nearest electricity grid whereas Cadaruhan Sur is now connected. While Cadaruhan Sur can be reached by four-wheel drive vehicles, New Katipunan has to rely on motorcycles, locally known as habal-habal. DemographyNew Katipunan is larger (263 081 ha) and on steeper terrain, with the road climbing uphill

through about 200 metres before reaching Cadaruhan Sur with an area of 221 542 hectares. Whilst Cadaruhan Sur is smaller in area, it is slightly nearer to key locations and has a larger population than New Katipunan (see also Table 8). The total population of Cadaruhan Sur is 456, of which 263 are males and 193 females, and the total population of New Katipunan is 294 (159 males and 135 females). The numbers of households in Cadaruhan Sur and New Katipunan, as of the 2000 NSO Census, were 73 and 55 respectively. In Cadaruhan Sur, the households are close together, whereas they are more dispersed in New Katipunan. The Internal Revenue Allotment (IRA) for Cadaruhan Sur is PhP 384 636 and for New Katipunan PhP 368 000 FacilitiesNatural resources such as land, forests, waterfalls