PMCDP Project Report

2012-2013

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Abstract

The PMCDP (Philippine Micro-Hydro-Power Community Development Partnership) is a new partnership between EWB-Imperial and SIBAT which aims to improve the existing micro hydro systems built by SIBAT in rural communities in the Philippines. The main objective of the partnership is to improve the lives of people in these communities through technological improvement of the MHPs, coupled with skills development to help raise the potential of the communities through long-term cooperation.

The HYDRA project is a new project focusing on replacing the existing load control system implemented in some of the MHP systems with a new digital system that is cheaper and lighter than the current system. The project will hopefully increase the reliability and safety of the systems that do not have integrated load control as well as add the potential for future upgrades such as remote monitoring and control.

The AGRITECH project is another new project to design a 'do it yourself' multi grain grinder for the community to use, to be powered by the MHP system. The focus is on educating the community in the skills required to build the grinder and to use it to make rice flour, ground corn and coffee.. This will give them a higher mark up on some of their agricultural exports as well as give them a business model to work towards. The primary reason is to give the community some experience in machining and fabrication of new technologies which is invaluable, and will promote future innovation.

Introduction

The purpose of this report is threefold. The first aspect is to outline the background of the project and the country and sites of interest, alongside the partner NGO SIBAT. The second is to briefly describe the summer 2013 visit, the phase 2 strategy and some recommendations for the 2014 visit. The third and most significant part is to describe the two projects that will be taking place this year, their objectives, impacts, and technical aspects.

The report will be structured as such. This section will serve as an introduction that will cover the background of the project, and hopefully put the reasoning behind the two projects into perspective. The report will then outline some of the potential projects we found along the way, for use in additional projects under the PMCD Partnership. The project specification will detail the two projects in depth. A summary of the 2013 will follow, and some recommendations for the 2014 trip in terms of kit, accommodation, food and transport (which will be incredibly useful for next year's abroad team) will be shown.

Philippines

The Philippines is a cluster of 7107 islands in Southeast Asia in the western Pacific Ocean. The capital city is Manila which is situated on the largest island of Luzon. There are over 98 million people in the Philippines making it the 12th most populated country in the world. There is a very strong divide between the rich and the poor with a history of inefficient and corrupt governments, who have enabled the few in power to take advantage of the county's finances, whilst doing little to help those in poverty.

The climate is very warm and very wet, with typhoons andtropical storms, typically in the months May-November. In the cities, frequent heavy downpours cause flooding, increasing the traffic even more than usual, and sometimes displacing large numbers of people from their homes and businesses. This climate is essential for the growing of the staple crop of rice (often cropped twice annually) among other foodstuffs. The national currency is the Filipino Peso (Php) and £1=Php70 (as of Sept 2013). In the cities, there is a modern, American-influenced culture, particularly accessed by the affluent minority, but also countless examples of relative poverty in the slums and roadside shelters. . In the rural areas, many people adopt a simple, farming lifestyle, involving many hours of manual labour each day. These agricultural communities often have limited access to healthcare, education, financial services and key infrastructure such as connectivity to the national grid.

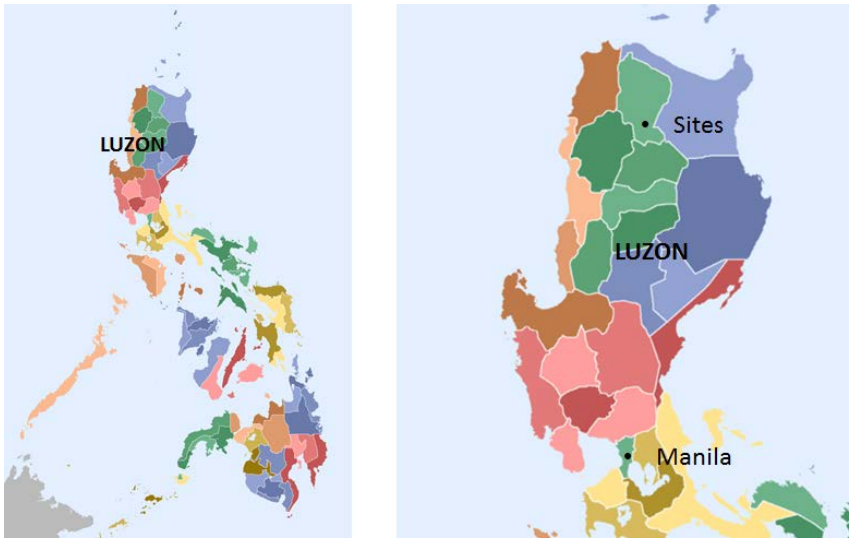
SIBAT

SIBAT (Sibol na Agham at Teknolohiya) is an NGO (non-government organisation) which focuses on using appropriate technology and farming techniques to help poor communities in the Philippines who are so remote that they do not have access to the national grid. These communities have seen many economic and social benefits of working with SIBAT, through the application of sustainable agricultural methods and the realisation of RE (renewable energy) sources. In RE, SIBAT mostly specialise in MHP (micro hydro power) systems but also have implemented PHP (pico hydro power); SPVWPS (solar photovoltaic water pumping system); SBCS (solar battery charge stations) and wind turbines.

Nationwide, MHPs provide ~8586 households with enough electricity to provide lighting and grain mills for rice, corn and coffee (which is an arduous and time consuming task). SIBAT currently has 28 communities benefiting from MHP projects running at varying levels of functioning. Some of these were set up as far back as 1995; have been damaged through poor maintenance, by typhoons or have been ruined by local conflicts. When SIBAT started developing the early MHPs, they were made to a lower standard due to the less advanced technology, and lower quality support. During this period, SIBAT had the task of demonstrating over many sites, that systems of this type would function physically, be cost effective and create numerous benefits for the community. The installation of MHPs in communities is currently being suspended to focus on upgrading the older systems before beginning to install more modern, reliable and easier to use ones. A number of these systems have ELCs (electronic load controllers), to balance the electrical loads with the generated power output. Along with general repairs, one of the important upgrades is to implement a PLC (programmable load controller) and that's where EWB-Imperial comes in.

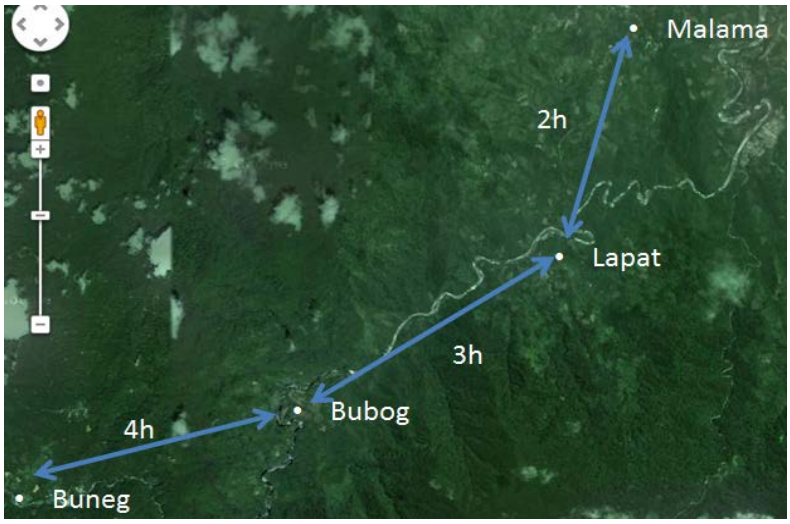
The Apayao Province - Site profiles

Apayao is a province in the North of the main island of Luzon in the Philippines. South West of Conner (Malama), the regional town, is the Barangay Nabuangan, consisting of three sitios (villages): Lapat, Bubug and Buneg. The peoples who live in Apayao or Cordillera Administrative Region (CAR) are mostly from the Isneg people. They are kind and accommodating communities who, on the most part, work together to sustain themselves and keep the MHPs currently installed in good working order and therefore ensuring the sustained benefit of the energy for lighting and agro-processing.



Geographical representations of the Philippines

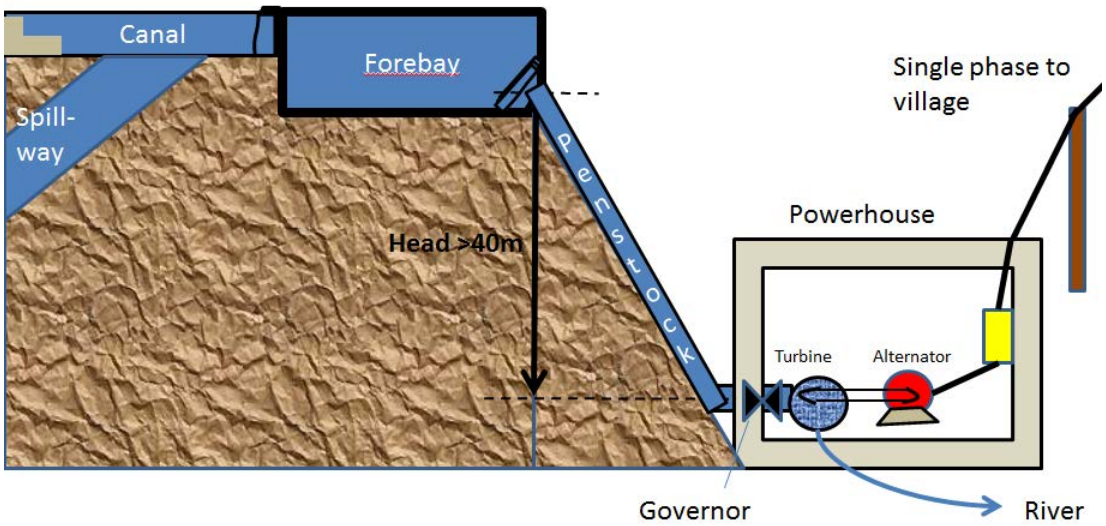
Lapat has been recently connected to the road (motorcycle access), but Bubog and Buneg are reached only by forest trails. The remoteness and isolation of these settlements have served to preserve the traditional life and rich culture of the Isneg tribe, but has largely excluded them from investments in infrastructure, health-support and education. All three have schools, which offer teaching of grades 1-6. Healthcare is limited, and there are numerous cases of oral cancers, tuberculosis and tropical diseases, however the wholesome diet and active lifestyle (bar heavy physical labour), keep the population relatively healthy. Each village has different demographic features; Buneg has an expanding population, due to the retention of young adults, however Lapat and more so Bubog have aging and depleting populations. This is mainly due to the emigration of young adults who finish their schooling in Conner, seeking better paid work and establish families outside of the Nabuangan area.



An aerial view of the Brgy. Nabuangan region. The road at Malama is accessed by a trek of ~8h from Buneg, 4 from Bubog and <2 from Lapat

The villages are situated close to the fast-flowing Nabuangan river in steep sided forested valleys, which offer protection from tropical storms. They are surrounded by virgin rainforest, with huge natural capital and environmental value. The well-constructed organisation (eg. Buneg *Mabaka* Tribal Organization) and cooperation of these villages has allowed them to resist exploitation of their indigenous lands from mining and logging operations. .

The sitios are relatively poor, and the majority of the adult population spend significant periods of time farming the nearby rice paddies, which they cultivate for two crops per year. . These close nit communities have well built wooden framed houses, are almost completely self-sufficient in the basics for life; clean stream-fed water, local rice, fruit, other natural forest and river foods . They are also progressing towards agricultural sustainability, (without the use of chemicals), through SIBAT training programmes .



A diagram of the basic components of a MHP system

There is a functioning MHP system at each of the villages, which were installed following a huge effort from the populace to transport the materials and construct the powerhouse and civil works.

The 7.5kW (52m head) system at **Buneg** (>300 people) was the first to be inaugurated (2002) of the three sitios, and consists of an early crossflow turbine and civil works design (without an ELC). It was found to be in poor condition, with mechanical issues, leakage from the turbine housing and penstock, and two brushed alternators in need of repair. The age of the system and lax maintenance practices were apparent. The operator training and community financial management are likely contributors to the situation. Despite these problems from an engineering point of view, the system still works, is cost effective and has a huge positive impact, mainly through the extra 'daylight' used for household tasks, crafts, reading and socialising. . A rice mill is operated for household use, and a system of payment in pesos or rice is in place to help pay for the maintenance and reduce the effects of food shortages (through a rice bank). Each household also pays ~20PHP per month for access to electricity, with additional costs for extra lights or appliances.

Bubog (~80 people) has an 8kW system, commissioned in 2009, which is of a later design than Buneg (but no ELC), and crucially includes a reliable, long-life brushless alternator. Additionally, the powerhouse design incorporates a 2nd turbine pipe, to allow operation while maintenance is conducted, and to prolong the working-life of the equipment. During the build, the villagers had much more technical support from SIBAT than was received at Buneg, so a result, the system is well kept and has minimal downtime. The dam at the intake to the supply canal is periodically damaged during flash floods. This element of the civil works needs careful examination and redesign by a civil engineer. EWB-Imperial is under resourced in this technical area, but will look into how the civil works can be surveyed and improved during future visits.
The tariff system is similar to Buneg, (with a rice mill) and the revenue is comparable despite being much smaller than Buneg in terms of population. This also highlights the slightly improved economic situation here, being more proximate to the road and markets for the net production of rice. Due to the current operability of the system, its access and lack of ELC, it would be the most suitable site of a PLC pilot.

MHP powerhouse in Buneg (turbine, alternator and rice mill)

Lapat (meaning no fishing here), has a 9kW system, commissioned in 2010 which is served by an impressive 2.5km canal (with some slippage and collapse issues) and ~80m of head. This is the only site with an ELC, so the operator is only required at the start up and shutdown of the turbine on a daily basis. The locals must however use a privately owned diesel-powered rice mill. They are in the process of funding and installing a community mill, which remains a priority for reducing household food costs and time spent manually

processing the rice. The village itself comprises of ~150 people, and has the highest density of electrical appliances and lighting of the three sitios. The power from the MHP is still underutilised, and all power to the ballast resistor load is non-recoverable.
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All three site have good watershed management, due to the conservation of the forest ecosystem around the water source, so the water supply for the turbine is seasonally unaffected, thus the energy is renewable and sustainable for the foreseeable future. In Bubog and Buneg, there is only manual governing of the turbine and no electrical load control system, this means that all the appliances need to stay on when the MHP is running to maintain the frequency and voltage of the supply, and avoid power surges. .. Therefore, they are possible pilot sites for innovations in this technological area. None of these MHP systems are currently used to their maximum power capacity as they are only used for lights, a small number of TVs and phone chargers at the moment.

Community Based Micro Hydro Power Projects

Potential Projects

- The main idea for a project is installing PLCs in the already existing MHPs.
- Another idea is that the people of Buneg expressed a strong want for a sugar cane press; multigrain grinder or a welder for repairing and making tools.
- Another thought we had was to use the electricity from the MHP to power extractor fans in the kitchens to reduce the build up of smoke and soot in an effort to increase the health of the villagers.
- Also, along these lines we were thinking of designing a more efficient cooker to use less wood and produce more focussed heat.
- The people of Buneg live 4 hours walk away from the next village of Bubog so the movement of any building materials or anything else bulky is a tedious manual task. They spoke of a potential scheme by the government to create a road which could allow motorbikes to travel to and from Buneg, increasing trade.
- There were ideas of setting up a small pharmacy in Buneg to provide painkillers and antibiotics to people when they got ill.
- A bridge at Bubog would be useful as there is currently a weak makeshift raft used to cross a river to get to Buneg.
- There is telephone signal in the village of Buneg itself. One has to walk up the hill to the school or if that doesnt work it's a 30 minute work up a different hill. This is not ideal in emergencies so one idea was to create a receiver to increase the signal of the telephone network in the village.
- Both Bubog and Lapat would like to decease their dependence on pesticides which SIBAT is helping them through their sustainable agriculture scheme.

Project HYDRA Specification

Introduction and Aims

The current micro hydro power (MHP) installations either utilize an electronic load controller as a governing system or do not have a governing system installed. ELCs cost around PHP 60,000, which is a substantial sum of money for small agricultural communities. This is one of the reasons that some of the MHP sites do not include an ELC. Currently, the loads faced by the MHP mainly consist of lighting and television. Few sites have refrigeration units and other electrical appliances. Hence, the current fluctuations in power load are insignificant (Note that most sites only use 30% of the current power capacity of the MHP site). However, in the future, more appliances will be used and hence the fluctuations in load will increase, and subsequently, MHP sites without ELC governors will experience large fluctuations in AC frequency which will lead to appliance damage.

Aside from cost, there are multiple other disadvantages to ELCs. The sites are often far from the road, and hence all equipment must be carried by hand or sometimes by carabao/horse. The ELC design is quite heavy, as the components are all analog. Also, analog systems are less flexible, and not easily upgradable to contain more features that may be useful to a governing system.

The objective of the project is to replace the current ELC load controller with a more advanced, digital based system. The aims are to produce a cheaper system that fulfils the same role, as well as aim to design a system that is lighter and smaller for easier transportation. It should be robust and easy to repair, and should accommodate any potential upgrades such as the capability to remotely monitor the system.
Impact

The impact of designing a cheaper, digital unit to replace the old ELC is that such a small project can be rolled out to all of the 28 other MHP sites. The individual impact felt by the communities, whilst small, will be amplified by the fact that the unit will be used throughout the Philippines. The project will help save communities money that can be otherwise spent in purchasing agricultural machinery such as rice mills, sugar pressers, multi grain grinders, planers etc. Another advantage for the community will be the potential of future upgrades such as remote monitoring.

Technical Specification

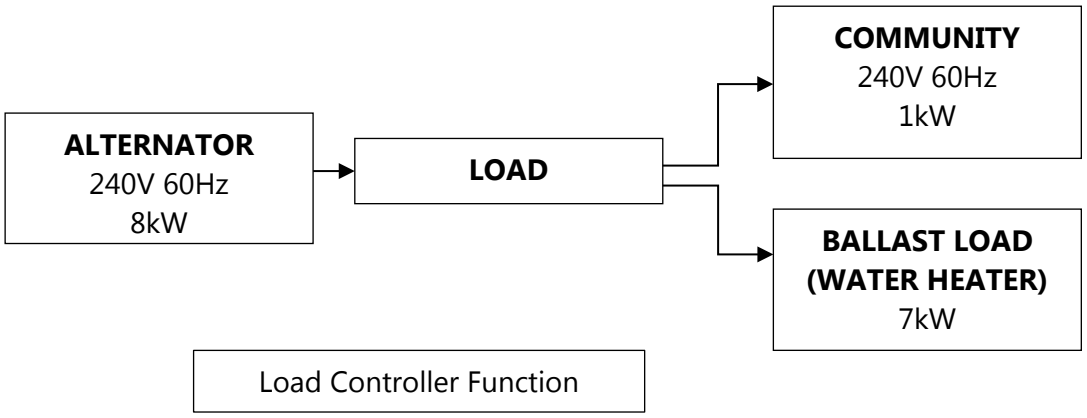
The new load controller should be able to achieve the following:

Essential Features

- Serve the same purpose as the current ELC:
    - Keep output at 220V and 60Hz.
    - Do this by keeping the alternator load on the turbine constant (and hence keeping the turbine and alternator angular velocity constant).
    - Dump any remaining electricity (shown in the diagram below) into a ballast load (currently a bank of resistors heating water, hopefully design a heat exchanger to heat water).
- Be a programmable system (using an arduino, raspberry pi, or other PIC systems) with sensors to collect electrical data (voltage, current, frequency)
- Be able to upgrade the system in the future (such as remote monitoring of the system)
- Be able to handle 1-20 kW alternator outputs and single and multiphase alternator outputs
- Be cheaper and lighter than current systems
- Output the essential data on a control panel next to the MHP to show frequency, voltage and current, as well as show the current power assigned to the community and to the ballast load

Optional Features

- Attempt to source locally available parts from the Philippines to ensure that the controller can be repaired easily and possibly be built by the NGO.
- Design a remote panel that outputs information collected from the controller such that the operator can monitor the MHP from his home



Load Controller Function

Micro Hydro Power Plant (Turbine Side)

Alternator Specification
(Alternator is belt driven)

Implementation and Conclusion

The project is to design, make and test the load controller. The design and fabrication will take place in Imperial College London, and the testing will be done both at the College as well as a pilot test in the MHP site in the Philippines. The pilot test will take place over the summer between July and September. EWB Imperial will be sending a team of 3 students to install and test the equipment as well as evaluate future projects under the PMCD partnership.

Project AGRITECH Specification

Introduction and Aims

When visiting the rural sitios in Apayao, the community members expressed a strong desire for a multigrain grinder. They stated how a lot of time and effort was spent crushing up rice (to make flour for sticky rice; which is very popular locally as a work-meal), coffee, and corn. The rice (de-husking) mills which the communities have access to only separate the rice grain from the husk. Significant manual labour is still required to further process the rice into flour, so only small quantities are produced and sold.
The capability of grinding agricultural output will add significant value (mark-up) to the product at market. Additionally, the product has a higher value to volume/ mass ratio, making manual transport of the goods to sell in Conner a more worthwhile use of time and energy.

The people of Buneg also expressed a desire for a sugar cane press. The village sugar cane press is formed of two stone cylinders which rotated due to the work done by a carabao. The sugar cane would then be fed in between these two crushers. The aim of this project is to design a simple multi-grain grinder (with or without the capability of press the sugar cane) made out of materials which can be sourced locally, and using build techniques familiar with members of the community. The project will also incorporate workshops aimed at transferring skills such as welding, project and business planning. These capabilities will allow operation of the grinder in situ, but also may promote futher production and sales to other areas, initiating a social enterprise out of it.

Technical Specification

Taking on this project will require:

- Researching literature for designs and application of multi grain grinders: mechanical functions, energy consumption, MHP integration, alternative designs
- Assessing the availability of build materials in the Philippines (locally to Conner, Apayao).
- Producing the design, specified by:
    - Highly reliable and low-maintenance
    - Able to grind >10kg per h of grain (subject to type)
    - Utilises power from MHP (direct belt or motorised)
    - Feed rate control and a safe loading regime with suitable hopper capacity
    - Processes corn, rice and coffee to the required consistency
    - Cost effective and competitive with locally available alternatives/ machine hire
    - Portable parts, for onsite assembly (manual portage over difficult terrain)
    - Low mechanical complexity: operator must understand the mechanism and how to repair it using affordable, locally available parts
    - Appropriate choice of fabrication techniques and equipment
- Producing straight forward instructions on how to build and maintain the equipment.
- Building a prototype in Imperial to test performance and identify design alterations
- Running a pilot scheme in one of Lapat, Bubog or Buneg during a summer visit.
- Planning how to implement the scheme technically with the MHP.

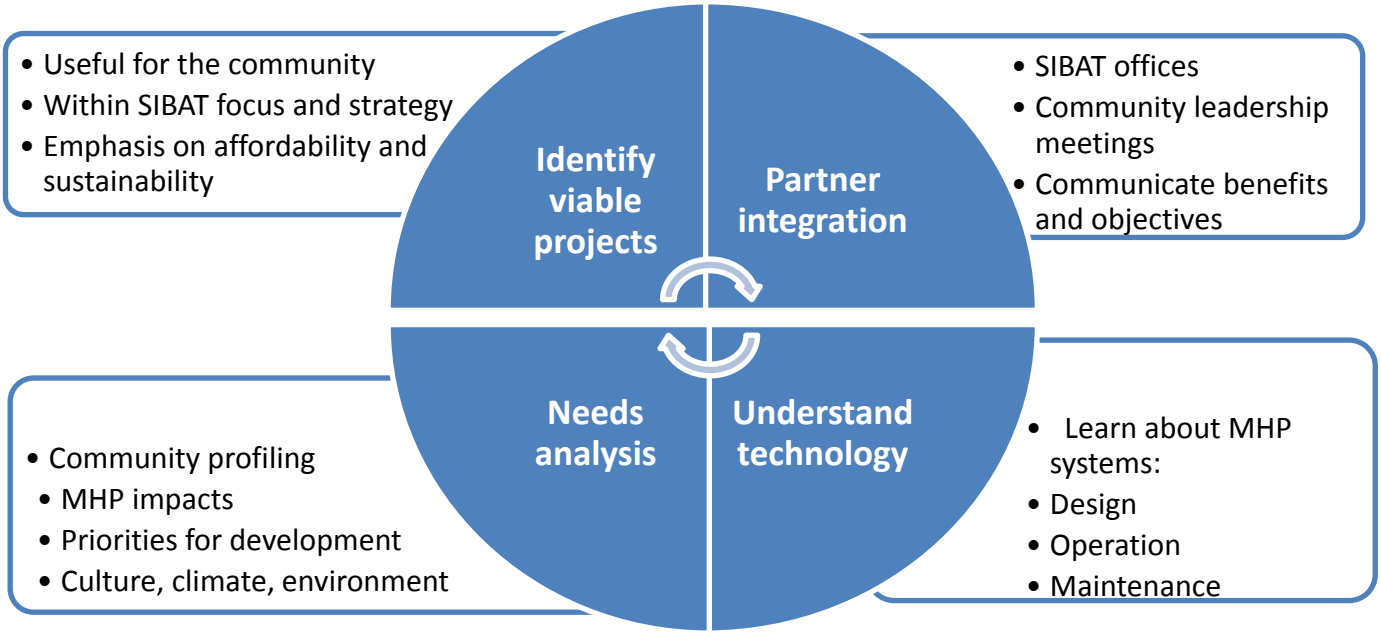
- Planning a fair and sustainable cost management scheme (grant repayment), ensuring the equipment operation is a viable business, and has a suitable payback period of <6years
- Developing a set of skills transfer workshops and a community-SIBAT feedback system

Sugar cane press similar to Bunea design

Multigrain grinder driven by a bicycle

September 2013 Trip Summary

In early 2013, EWB-Imperial expressed interest in initiating a Member Led International Partnership with SIBAT, a sustainable energy and agriculture NGO based in the Philippines. In early summer, affiliations with EWB-UK and Imperial College were gained, and the trip was fully funded from an IC Trust grant and CGCU student activity award grant. James, Marcus and Ian were selected to visit the Philippines, tasked with establishing a sustainable development project based around a partnership between SIBAT, rural communities and



Imperial students, which could be sustained for 5 years or more.

The three arrived in Manila on 9th September and began adjusting to city life.
On September 12th the team met with engineers and management of SIBAT, discussed objectives and planned a visit to rural Micro Hydro Power systems at three locations in

Northern Luzon. They also met with an academic at the Electrical Engineering department of University of the Philippines (UP), discussing initial project ideas and collaboration potential.

The group including two SIBAT staff; Robin and Jeddai left Manila on the 16th, to conduct routine monitoring of the operation and maintenance of the MHP systems. The three villages (in Conner, Apayao), are set along the Nabuangan river; Lapat, Bubbog and Buneg (in order of distance from the road). These were reached by first flying to Tuguegarao City, taking a bus to Malama and then trekking through the rainforest; 2h walk to Lapat, a further 3h to Bubbog and after crossing the river at Bubbog, 4h to Buneg. During the walk to Bubbog on the 17th, Ian injured his ankle, and spent time recovering and consulting locals in Lapat (meeting the others in Bubbog on the 19th), whilst Robin, Jeddai, Marcus and James progressed to Buneg. Two more SIBAT staff arrived on the 18th to conduct bearing replacement on the Lapat turbine.

At each site, the group fully integrated with the locals over 1 or 2 days, learning about the local environment, culture and lifestyle of the peoples by living and socialising with a host family, who generously provided three meals a day and a place to sleep. Community consultations took place, including a meeting with senior members of the peoples' organisation (village elders). These were important in establishing an understanding of the demographic, educational and social issues in the village. They also evaluated the impacts of the MHP and asked about priorities for investment in equipment, repairs, training etc. Additionally, the civil works and powerhouse were visited to familiarise with key elements of MHP design and document the condition of the equipment. The team also observed operation and maintenance procedures of the turbine system and rice mill.

Following the visits, a debrief meeting was held at the SIBAT offices in Manila, where the team reported on their finding and preliminary proposals for projects. The main proposal to SIBAT was for students at Imperial to design a more advanced (digital/computerised), load controller in replacement of the analogue electronic load controllers already installed, whilst being simpler and lower cost. The view is to implement a pilot system at one of the sites visited in Summer 2014. Pending testing, economic analysis and addressing any necessary changes to design, there may be opportunities to offer the technology to more rural communities in partnership with SIBAT.
Additionally it was agreed that EWB-Imperial should investigate design of self-build post-harvest agro-processing equipment, such as a multi-grain grinder, focusing on simple fabrication and local materials procurement.

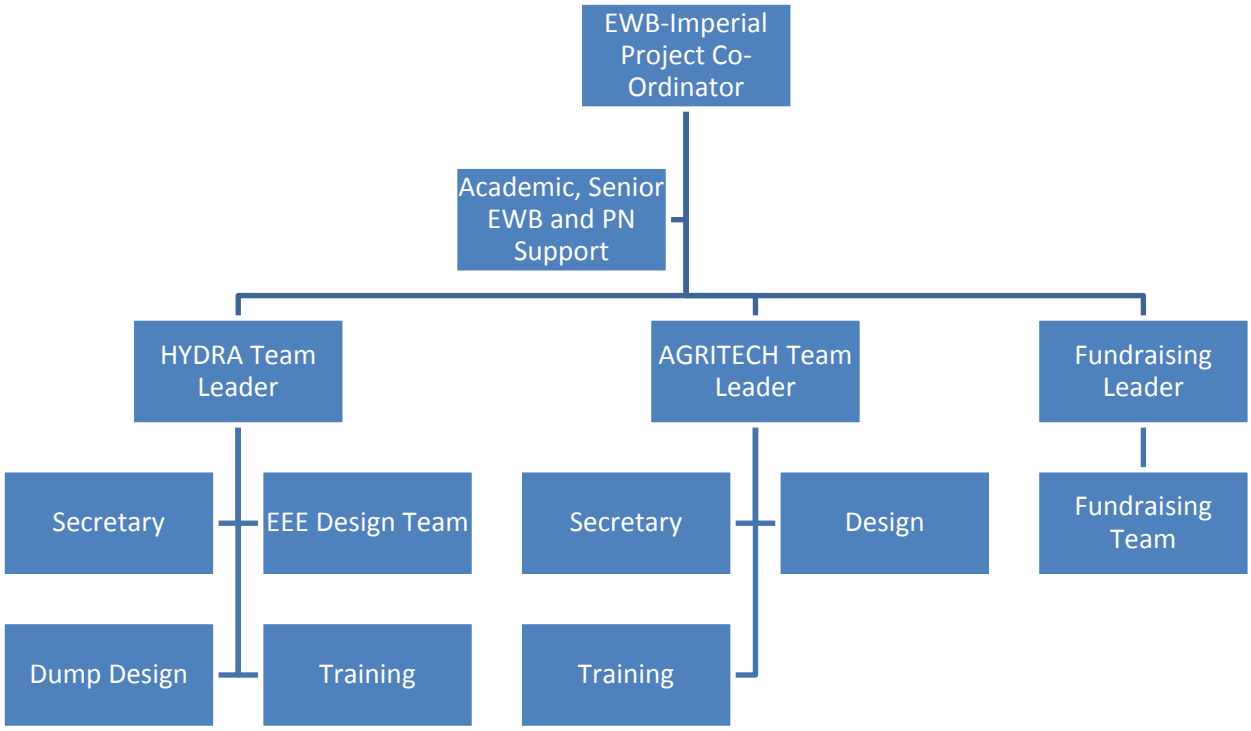
Returning to London on 29th September, the report is finalised and presented to EWB-Imperial, and made available to SIBAT, the IC Trust and research groups at Imperial.

Project Team Profiles

There are to be two research and design projects in relation to the PMCDP; HYDRA (advanced load control) and AGRITECH (post-harvest processing equipment). These will each require a team of 6-9 student facilitators. In addition to these, a third group (of >4 students) will be set up to support project fundraising and publicity, as well as investigating new project opportunities in the PMCDP and elsewhere. It is suggested that all project team members attend the 'leadership for development' course run in partnership with industry professionals. They will explore the complexities of international development and some key

issues commonly encountered when working abroad with NGOs and beneficiary communities. Additionally, the students selected to travel to the Philippines will attend a 'Know Before You Go' training course.

To promote efficient working towards the target goals, a number of important individual roles have been identified within each of the HYDRA and AGRITECH groups:



Role explanations:

EWB MLIP coordinator: Helps to establish the project group and appoint roles based on experience and time commitments. Conveys to the project group personal experiences and expertise on project specifics including cultural and community profiles, MHP systems and the Apayao sites. They will continually support and evaluate the design process and material output of the group, and help with strategic decision making (eg to implement pilot in 2014 or 2015).

The following individual specialisations will run alongside standard research and technical design tasks, and the role profiles may change during the course of the project:

Team Leader: Responsible for organising the group and scheduling group meetings. Also ensures that deadlines set externally (departmental, EWB, SIBAT) and internally are adhered to. Submits a weekly summary of the group's activity to the MLIP coordinator (could be through a short meeting). Candidates with good leadership credentials and relevant technical experience/ interest are encouraged to apply for this role.

Secretary: They will help organise the group's meetings (ie. Library room bookings, emails, minute taking and distribution). Also responsible for administrating the facebook group/dropbox.
Treasurer: They will document project expenditure. They will also budget for future expenditure, and liaise with the department contact, team leader and students responsible for design costing/ fundraising to ensure budgets are accurate and spending is fully financed. They will also have to meet periodically with the EWB-Imperial treasurer (Yash).

Design integration: They will focus on the part of the project related to integrating the chosen solution with the current MHP system and site/powerhouse setup. They will

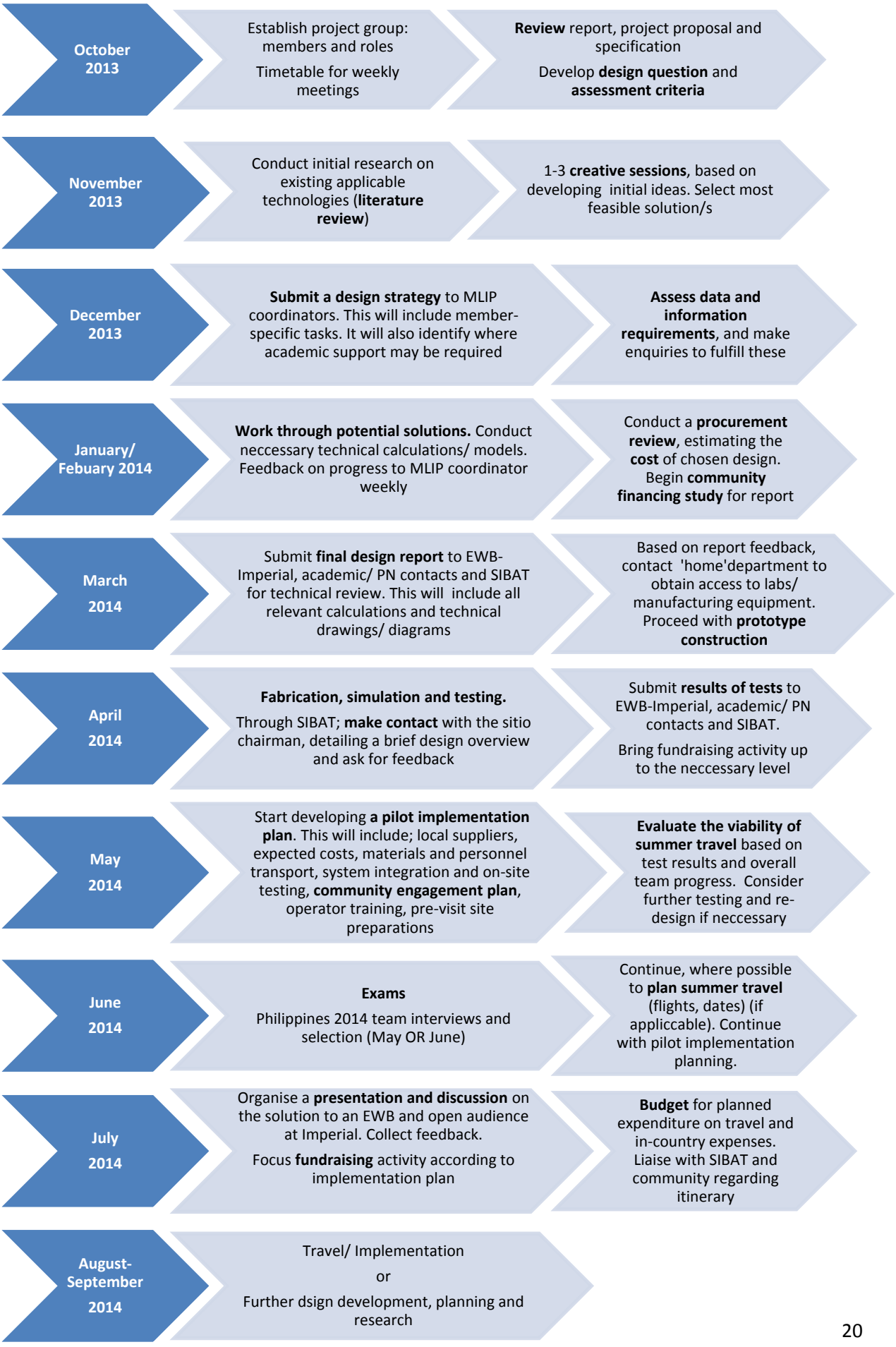
concentrate on planning community engagement sessions, writing training and operation manuals (and organise for them to be translated).

Design costing: They will work closely with the procurement engineer to evaluate the costs of the design, particularly examining the viability of the solution compared with existing systems. They will also contribute towards the affordability/ financing plan for the community.
Procurement: Particularly focus on researching locally available materials, skills and through SIBAT contacts, attempt to find their costs and availability. These are crucial factors for the success of the solution, and together with the costing engineer, they will co-develop a strategy for economic implementation and micro financing.

Community and operator interactions: They will maintain communications SIBAT and community representatives. Through this, they will update the NGO on progress and collect feedback throughout. They will try and understand how the users of the technology might interact and interpret it in terms of; build complexity, ease of operation, cost, aesthetics etc. These findings should be regularly discussed with the team, and will form important criteria for design assessment.

Fundraising and publicity: They will work closely with the fundraising support team, to come up with suitable targets and help finance the project through charity events, corporate sponsorships and grant awards. They will also publicise and document (eg blog) the team's work, in coordination with the EWB Imperial publicity coordinator (Andrew).

Project Strategy and Timeline



Recommended Kit List

Item	Comments
Rucksack (for walking)	>50L enough space for 10 days out of Manila. Must be well constructed, a broken shoulder strap makes the bag useless!
Daysack	For transporting laptop, gadgets, books etc.
Roll mat	Expect to sleep on wooden floors (small-packing inflating mats are perfect)
Sleeping bag/ blanket	1 season. Night temp >20^{o}C, good for reducing no. of insect bites
Mosquito net	Night time is prime time for mosquito bites, make sure sting is packed so the net can be erected easily
Dry bag/ waterproof rucksack cover	Important to keep clothes+electrical equipment dry in the rainforest. Dry bags are useful for river crossings
Plastic bags	Useful for separating kit, for rubbish, and for the fruit you'll inevitably be gifted
Water bottle	Should have at least 2L capacity. Camel-back/ tube containers allow for continual rehydration when on the move
Wash kit	Inc. toothbrush, paste, deodorant, razor, baby wipes, hand sanitizer, shampoo etc.
1st Aid Kit (more than normally expected – isolated locations)	**Must contain:** Triangular bandage, large+ small dressings (cling film is also good), medical tape, plasters, scissors, safety pins, string, gloves, CPR face mask, eye rinse, antiseptic cream/ wipes, bite/sting cream, oral rehydration sachets, sun cream, paracetamol/ibuprofen/cocodamol, rennie, aspirin, personal antimalarials, personal medication, epi-pen, inhaler etc.
Sun protection	Wide brimmed hat, sunglasses, suncream
Waterproof coat or poncho	*Rain*forest – its in the name. Ponchos are good because they can be draped over the rucksack as a rain cover
Umbrella	Useful in heavy downpours (watch out for the afternoon rainstorm!)
Insect repellent	Jungle formula is good, comes in roll-on, spray and lotion. Tip: leave the bottle of repellent open overnight to deter mosquitos (just don't tip it over)
Walking boots	Sturdy pair of walking boots with good grips and ankle support
Sandals/ flip flops	
Walking socks/ high sports socks	Tuck into trousers, or if wearing shorts, can prevent leech bites which are mainly around the ankles
Long sleeved top	Stops insect bites on arms
T-Shirts	1 per 2 days, can wash en route, synthetic T-shirts dry quickly
Shorts	1 or 2 pairs, synthetic are ideal + 1 pair of swimming shorts/ costume
Trousers	1 pair walking trousers, jeans and cotton trousers are heavy when wet. Recommended over shorts for reducing insect+leech bites
Underwear + socks	As needed, washing can be done easily, but drying may be trickier!
Towel	Small, quick drying towels are ideal

Gifts for hosts	Basketballs, biscuits, sugar, matches, salt etc. NO MONEY
Camera + phone	Worth packing in a waterproof case, bring a charger to hydro-power it up!
Spare sets of clothes to leave in Manila	

Accommodation, food, transport

Accommodation – Either stay at the SIBAT office (ask SIBAT first if this is possible) for free or rent the UP NISMED Hostel around PHP 1395 for single and PHP 1900 for double.

Food – There are many places to get food around manila, but if staying at SIBAT offices, the recommendation is to go to Tomas Morato rd. for great value restaurants or if staying at UP to go to the Technohub for restaurants

Transport – Use taxis to get around for about PHP 100-200 per one way journey. If staying at UP, the group can make use of the jeepneys that go around the campus for 20 pesos. For flights around the Philippines, use Cebu Pacific. For other travel details concerning travel in the provinces, consult SIBAT for recommendations.

Important contacts

Name	Email	Responsibility
EWB-Imperial		
Ian Sipin	ian.sipin11@ic.ac.uk	**EWB Imperial Member Led International Partnerships (MLIP) coordinator**; responsible for project group organisation, NGO collaborations and design support.
James Metcalfe	james.metcalfe12@ic.ac.uk	EWB Innovation Hub Manager – connecting innovators to facilitators through EWB-UK's Professional Network (PN). Also has a role in supporting the Philippines project teams with
Marcus Bishop	marcus.bishop12@ic.ac.uk	EWB Imperial Outreach coordinator; liaises with local schools to promote EWB initiatives. Also Philippines project teams with budget, fundraising and design process support.
Liam Bale	liam.bale11@ic.ac.uk	EWB Imperial president
Vicki Walshaw	victoria.walshaw11@ic.ac.uk	EWB Imperial secretary
Yash Dongre	yash.dongre11@ic.ac.uk	EWB Imperial treasurer
Alec Stevens	Alec.stevens11@ic.ac.uk	EWB Imperial training coordinator

Andrew	Gng.zi11@ic.ac.uk	EWB Imperial publicity
Tom Hills	thomas.hills07@imperial.ac.uk	PhD/ Research assistant at Grantham Institute for Climate Change. Contact for guidance on design process, idea feasibility, academic contacts.
Imperial College Union		
Anthony Crowther	a.crowther@imperial.ac.uk	Student activities manager (ICU). Contact for union enquiries, particularly IC Trust funding/ venture proposal submissions.
Philip Power	philip.power@imperial.ac.uk	Membership services manager (ICU). Contact as above.
Ruth Whincup	ruth.whincup@imperialhub.org	Imperial Hub training enquiries. Eg. First Aid, stakeholder engagement, fundraising.
EWB-UK		
Claudia Ramirez	claudia.ramirez@ewb-uk.org	Professional Network Coordinator for London area; contact to liaise with professional engineers, especially with design questions and evaluation.
Angus Mcbride	angus.mcbride@ewb-uk.org	MLIP strategy and assessment; contact with queries about future affiliation, NGO/ academic partnerships and MLIP information.
Andy Pickering	andy.pickering@ewb-uk.org	Member-led Partnerships, Guidance and Training
Johnny Gutterage	jonny.gutteridge@ewb-uk.org	Head of International Partnerships and Chief Executive
Samantha Ferrel	samantha.ferrell@ewb-uk.org	International Partnership Programmes Administrator. Contact for insurance and administrative questions.
SIBAT and Philippines		
Ryan Simms	ryansims88@gmail.com	Year placement with SIBAT 2012/13, experienced in MHP, wind and solar systems and in site evaluation. Currently working in a renewable energy company.
Robin Scanlon	robindscanlon@gmail.com	Currently on a 1 year EWB-SIBAT placement, focusing on site profiling and monitoring. Travelled to the sites in Apayao with Imperial team. Contact in reference to data requirements, community profiles and general site information. Mainly interested in AGRITECH project, may provide information on available materials and local fabrication capability.
Shen Maglinte	shen_maglinte@yahoo.com	Manager for SIBAT CBRES (Community Based Renewable Energy Systems). Contact for design and ideas evaluation, general SIBAT enquiries and in-country planning. Can facilitate communications with the communities in Conner, Apayao.
Vicky Lopez	vmlopez12@yahoo.com	Manager of SIBAT Manila office. Contact for information on NGO status and focus, project

		funding, international research/ funding partner contacts and project planning.
Marcelo Isla	islamarcelo@yahoo.com	SIBAT Electrical Engineer, currently assessing current ELC designs and investigating improvements to the technology. Contact in reference to technical aspects of the project; equipment/turbine specifications, grid loading data, circuit and local grid diagrams, in-country procurement (electrical equipment available) etc.
Carlos		Ex-SIBAT Engineer (now private consultant) responsible for design and implementation of current ELC systems used by SIBAT. Contact for design assistance, ELC circuit diagrams and
Jade (Jedai) Angngalao	1036oliver@gmail.com	SIBAT Agricultural engineer, travelled to sites with Imperial team. Contact for help on travel, language, local resource, agro-technical, monitoring, trip planning and site updates. Can facilitate communications with the communities in Conner, Apayao.
Chris	-	Consultant Agricultural engineer, travelled to sites with Imperial team.
JenJen	-	SIBAT Mechanical engineer, also went to Apayao. Contact for mechanical design queries especially system maintenance requirements and operational procedures and current system (ELC) performance. Can facilitate communications with the communities in Conner, Apayao.
Prof. Miguel Escoto Jr	mikee@eee.upd.edu.ph	Academic at University of the Philippines EEE dept., specialist in Power Electronics and Electric Motor Drives. Met with Imperial team to discuss initial project ideas. Contact for technical support and collaboration with UP academics and Masters/ Postgraduate students. Also contact for design evaluation, simulation and testing.
Ian Sipin family contact:		Planning queries, in-country preparations, luggage storage and emergency contact.

Useful links

SIBAT: http://sibat.org

UP EEE: http://www.eee.upd.edu.ph/

EWB PMCDP dropbox: https://www.dropbox.com/sh/gsk4g9tbq6tij3r/m7pozY3Fnl

SIBAT documents dropbox: https://www.dropbox.com/sh/wzjnxbah6ohnx7c/p9ckJDqjkc

EWB-UK: http://www.ewb-uk.org/

EWB Imperial (general public) for trip diary: https://www.facebook.com/ewbimperial

EWB Imperial (member students): https://www.facebook.com/groups/303380069801355/

Medical information Philippines: http://www.fitfortravel.nhs.uk/destinations/asia-%28east%29/philippines.aspx

UP NISMED hostel (for accommodation in Manila): http://www.nismed.upd.edu.ph/hostel/

Example Personal Risk Assessment

Volunteer name:	James Metcalfe	Placement / member-led partnership:	SIBAT
Destination location:	Philippines	Transit locations:	Brunei
Travel date:	9/9/13	Form completed on date:	18/6/13

Risk assessment matrix

		Severity of consequences				
		1 (low)	**2**	**3**	**4**	**5 (high)**
Likelihood during placement	**1 (low)**	General Medical issues Dehydration	Site safety issues (offending local customs+culture) Lost/ can't communicate	Sun stroke Kidnap		
	2	Theft/ loss of money/ documents	Hepatitis A Slips/ trips/ falls	Hepatitis B Food poisoning Water poisoning	Road accident Slips/ trips/ falls	Tuberculosis
	3		Intoxication (alcohol)		Rabies	Japanese Encephalitis
	4					Malaria
	5 (high)					

Actions in preparation to reduce risk

Level	Action (at least one for each risk identified)	Help needed
Red	**Malaria:** We will have malaria prophylaxis as prescribed by Imperial College Occupational Health, also mosquito nets will be slept in when staying in rural environments, and insect repellent applied to clothing.	The costs of the Malarial tablets.
Orange	**Rabies:** I'll keep away from freely roaming animals such as dogs and goats. Vaccination against rabies is not covered by default by Imperial Occupational Health, and wont be part of my vaccination campaign. Dengue fever: I am aware of symptoms (rash/ fever joint pains) and will avoid insect bites. **Japanese Encephalitis:** Around rice paddies/ piggeries, especially in the evening, adhere to insect bite avoidance strategies. Currently seeking professional advice for vaccination, a very expensive procedure. **Tuberculosis:** Risk from exposure is high, and we are pursuing vaccination against this.	Medical consultation and costs covered for both vaccinations.
Yellow	**Food poisoning:** Food will only be eaten from trusted restaurants and food sources. Only clearly sealed bought food will be consumed otherwise. Only thick-skinned fruit and vegetables will be consumed raw and all other foods will be boiled first to reduce risk. **Water poisoning:** Only mineral or verified filtered water will be consumed. Water filters and iodine tablets will be brought by the team if required. Everyone knows not to drink directly from the local water supplies, and to stick to sealed bottled water when travelling. **Hepatitis B:** This is endemic in Luzon (Philippines) and I am aware of the possibility of working with people infected with hepatitis B. If there are any incidents of exposure to blood 1st aiders should ensure they use new protective rubber gloves before dealing with the situation to ensure there is no chance of them contracting the disease. We'll travel with a med kit and members will also be advised to bring things such as rubber gloves with them personally too. **Intoxication (alcohol):** Alcohol is highly available possibly in part due to a lack of drinking water and the knowledge that alcoholic beverages should certainly be safe to drink. I will be watch and control what they drink (ie drink in moderation). We will look after each other to ensure nobody is drinking excessively making them dangerous to themselves or others. **Road safety:** We will only hire qualified and trusted drivers that are recommended to us by SIBAT and known to be safe drivers. Only 4x4 vehicles will be hired to deal with the rough terrain outside city zones. Travel will only be permitted during safe weather conditions and when the roads are dry/ low risk of landslips. **Slips Trips Falls:** Sturdy walking boots should be worn, and a walking stick used on narrow/ treacherous paths. A guide should always accompany the team when on unfamiliar tracks/ terrain.	Medical consultation and costs covered.

Light green	**Hepatitis A:** I have received a vaccination against Hepatitis A (together with hep B) **Site safety:** Risks associated with ground instability, river and stream crossings, tree/ rock face climbing are all noted and the rest of the group will be consulted if an issue arises. Preferably, all three of us, a representative of the NGO, and a community member should be present when looking around the site. I have a good awareness of cultural sensitivities, and will research further to ensure no offence is caused during community consultations and when living with locals. **Theft/ loss of money/ documentation:** I will remain aware of my belongings and not leave them in positions open to theft. Additionally, only trusted and secure accommodation will be used which will minimise the chance of theft occurring overnight. We will only carry small amounts of money, and can provide emergency bank transfers if necessary (inc EWB insurance support) **Lost/ cant communicate:** We will always travel as a group, and will be travelling with representatives of SIBAT when away from Manila. I will also take a mobile for general communication. Night travel will be avoided. **Sun stroke/ sunburn:** I will wear hat/ sunscreen and try to stay out of the sun. Also we will travel only when temperatures are reasonable. **Kidnap:** We'll only ever travel in known areas, but if it is necessary to go to unknown areas a trusted guide will be used (SIBAT/ local). In addition to this everyone will have in-country mobile phones. Should kidnap occur, we will follow the protocols set out by EWB security, the foreign office, and the insurance policy. **Slips trips falls:** I'll take a sturdy pair of ankle-supported walking boots for confident foot travel and to avoid slips. In low-light conditions torches will always be used to increase visibility.	Medical consultation and costs covered. Will need a local guide with knowledge or area and the people. Keep on top of local news and possible threats.
Green	**Medical issues:** I have been provided with in-country and Imperial College/ EWB emergency contact details. I am aware of the medical issues of applying members (none serious). I will bring all necessary equipment to ensure my own wellbeing (eg antimalarials/ insect repellent/ sun protector). **Dehydration:** I will travel with a personal drinking container filled from a clean source of water. When necessary water will also be shared. To support recovery from food poisoning I will bring rehydration medicine.	

Conclusion

The aim of the partnership is to help agricultural communities in the Philippines develop into more modern and self-sustaining communities. The projects presented in this document will hopefully aid in furthering this cause. The upcoming year will be focused on these projects and subsequent visits to the Philippines will be used to implement the solutions as well as find new projects to undertake under the partnership.